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EXECUTIVE COMMITTEE
OF THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-seventh Meeting
Montreal, 24-26 March 1999

PRODUCTION SECTOR

This document consists of:

- Part I: Report of the Executive Committee's Subgroup on the Production Sector (to be submitted/distributed at the meeting)
- Part II: Draft proposed agreement from Canada, Italy and the United States relating to compensation for the complete closure of the CFC Production Sector in China
- Part III: Project proposal for the phase-out of the CFC Production Sector in China
- Part IV: Sector Strategy for gradual phase-out of CFC-11 & CFC-12 Production in India

**PART I: REPORT OF THE EXECUTIVE COMMITTEE S SUBGROUP ON THE
PRODUCTION SECTOR**

(to be submitted/distributed at the meeting)

**PART II: DRAFT PROPOSED AGREEMENT FROM CANADA, ITALY AND THE
UNITED STATES RELATING TO COMPENSATION FOR THE COMPLETE
CLOSURE OF THE CFC PRODUCTION SECTOR IN CHINA**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
AIR AND RADIATION

19 February 1999

Dr. Omar El-Arini
Chief Officer of the Multilateral Fund
Montreal, Canada

Dear Omar,

Attached please find a draft proposed agreement from Canada, Italy and the United States relating to compensation for the complete closure of the CFC production sector in China. This draft proposal was developed after carefully reviewing and considering China's initial proposal. The draft is being submitted in an effort to meet the February 19th date that was established by the Subgroup on the Production Sector for submission of documents that may be considered at the upcoming meeting.

While we had hoped to complete a similar proposal for India by the 19th, and have done work towards that end, unlike the case with China, we have not had the opportunity to carefully review a full scale proposal from India. Accordingly, at this time, we are not in a position to put forward a fully informed proposal for India. However, we are committed to working on the Indian production sector in the most expeditious manner possible. As a consequence, and given the importance of this issue, we are asking for an extension of two weeks from the date of receipt of the formal Indian proposal, to enable us to submit a draft agreement covering India. While we would strive to submit a proposal sooner, we believe that a two week extension would ensure sufficient time to prepare a truly thoughtful response. If it is determined not to be possible to provide such an extension for formal document submission, then it would be our intent to provide a draft agreement as an information document, which can be used to help advance related discussions.

Sincerely,

A handwritten signature in black ink, appearing to read "P. Horwitz", written over a circular stamp or mark.

Paul S. Horwitz

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**18 February 1999 Draft Agreement for China Production Sector
Proposal by Canada, Italy and the United States**

The Executive Committee decides to approve in principal a total of \$123m in funding to China for the phased reduction and closure of the entire CFC production capacity in China. This is the total funding that would be available to China from the Multilateral Fund for the total permanent closure and dismantling of all capacity for the production of Group I Annex A and Group II Annex B CFCs, and/or the development of capacity to produce alternatives to these CFCs. The agreed level of funding would be paid out in installments in the exact amounts specified in para b, and on the basis of the following understanding:

a. by this approval, China agrees that in exchange for the funding level agreed in para b, it will reduce its CFC production and eventually close and render unusable its CFC production facilities in accordance with the following schedule:

- China will reduce its CFC production (as defined in the Montreal Protocol) to the following levels in the following years: 44,931 MT in 1999; 36,200 MT in 2001; 30,000 tonnes in 2003; 18,750 tonnes in 2005; 13,500 MT in 2006, 9,600 MT in 2007, 3,200 MT in 2009, and, to 0 metric tonnes in 2010, save for any CFC production that may be agreed by the Parties to meet essential uses for China.

b. In order to facilitate China meeting their 1999 CFC reduction target and other targets included in paragraph a, the Executive Committee agrees to provide \$20m to China during 1999. Further, the Executive Committee agrees in principal to provide China with an additional \$10.3m a year each year from 2000 up to and including 2009. The payments noted in this paragraph (other than the initial tranche for 1999) are conditioned upon completion of the agreed production decreases noted in paragraph a being independently verified and maintained, and China meeting the other requirements of this agreement. For example, payment in 2003 will be conditional on verification that China had, at a minimum, sustained its required 2001 reduction through 2002. By this agreement China also commits that within 18 months of any of its existing CFC plants ceasing production of CFCs, that it will, after consultation with experts, take action to ensure that such plants are incapable of producing CFCs in the future, and that key components are dismantled and destroyed. Notwithstanding this provision, China may, in a verifiable manner, convert related equipment and infrastructure to uses other than the production of ozone depleting substances.

c. China agrees to ensure accurate monitoring of the phase out, and to report regularly, consistent with their obligations under the Protocol. China also agrees to allow for independent technical audits administered as directed by the Executive Committee to verify that annual CFC production levels agreed in point a and conditions in point b related to plant dismantling and destruction are actually being met.

d. The Executive Committee wishes to provide China with maximum flexibility in using the agreed funds to meet the reduction requirements agreed in point a. Accordingly, while China's country programme, sector strategy or other ancillary documentation may have included

estimates of specific funds that were thought to be needed for specific items, the Executive Committee is of the understanding that during implementation, as long as it is consistent with this agreement, the funds provided China pursuant to this agreement may be used in any manner that China believes will achieve the smoothest possible CFC production phase out possible.

e. China agrees that the funds being agreed in principle by the Executive Committee at its 27th meeting for complete closure of its CFC production capacity is the total funding that will be available to it to enable its full compliance with the CFC production phase out requirements of the Montreal Protocol, and that no additional Multilateral Fund resources will be forthcoming for either the development of infrastructure for the production of alternatives, the import of such alternatives, or the eventual closure of any HCFC facilities that use the existing CFC infrastructure. It is also understood that aside from the agency fee referred to in para g below, China and the Multilateral Fund and its implementing agencies and bilateral donors will neither provide nor request further Multilateral Fund related funding for the accomplishment of the total phase out of CFC production in accordance with the schedule noted above and the terms of the strategy being approved. This includes but is not limited to funding for employee compensation and all technical assistance including training.

f. China understands that if it does not meet the reduction requirements outlined in point a, and the other requirements outlined in this document, the implementing entity and Multilateral Fund will withhold funding for the subsequent tranche of funding outlined in point b until such time as the required reduction has been met or the required dismantling has been completed. In addition, China understands that the Multilateral Fund will reduce the subsequent tranche and therefore, total funding for the CFC production closure on the basis of \$1000 per ODP tonne of reductions not achieved in any year of this agreement.

g. The [World Bank] has agreed to be the implementing agency for this project at a fee of [- %] of project costs.

h. The funding components of this decision shall not be modified on the basis of future Executive Committee decisions that may affect the funding of the CFC production sector or any related activity.

i. The Executive Committee recalls its decision 22/75 and understands that the instant decision embodies a specific agreement between the Executive Committee and the government of China on fulfilling the requirements of Articles 5 and 10 of the Protocol as they relate to CFC production in China. In the context of this agreement, several factors that are specific to China have been taken into account. In that regard, and while the Executive Committee welcomes the innovation that is embodied in this decision, the Executive Committee recognizes that this agreement establishes no specific future precedents (including audits and eligibility or ineligibility of funding for specific levels or specific items.)

**PART III: PROJECT PROPOSAL FOR THE PHASE-OUT OF THE CFC
PRODUCTION SECTOR IN CHINA**

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FACSIMILE COVER SHEET AND MESSAGE

DATE: February 18, 1999 **NO. OF PAGES:** **MESSAGE NO.:**
(including cover sheet)

TO: Dr. Omar El-Arini **FAX NO.:** (514) 282-0068
Title: Chief Officer
Organization: Multilateral Fund Secretariat
City/Country: Montreal, Canada

FROM: Steve Gorman **FAX NO.:** 202-522-3258
Title: Unit Chief **Telephone:** 202-473-5865
Dept/Div: E/WOC **Dept./Div. No.:** MP Unit

SUBJECT: Project proposal for the China production sector

MESSAGE:

Dear Dr. El-Arini,

As agreed at the last Sub-Group on production, the Bank is pleased to submit, on behalf of the government of China, a project proposal dealing with the phase out of CFC production in China for submission to the Sub-group and the next Executive Committee Meeting. You will note that it is identical to the earlier one sent to the Secretariat at the last meeting.

We will be forwarding to the Secretariat tomorrow, on behalf of the government of India, the project proposal for the Sector Strategy for gradual phase out of production of CFC 11 and CFC 12 in India.

If the Secretariat requires an electronic version, we would be pleased to forward these proposals by e-mail.

Transmission authorized by:

If you experience any problem in receiving this transmission, inform the sender at the telephone or fax no. listed above.

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Abbreviations

ExCom:	Executive Committee of the MLF
CFC:	Chlorofluorocarbon

MLF:	Multilateral Fund
SEPA:	State Environmental Protection Administration (formally National Environmental Protection Agency)
SPCIB:	State Petroleum & Chemical Industry Bureau (formerly the Ministry of Chemical Industry [MC]. It was merged with the Ministry of Petroleum Industry in March 1998)
CP:	Country Program on Phasing Out Ozone Depleting Substances
SDPC:	State Development Planning Committee (formally State Planning Commission)
SETC:	State Economic & Trade Commission
SICA:	State Administration for Industry & Commerce
SWGPP:	Special Working Group for ODS Production Phaseout

EXECUTIVE SUMMARY

1. This proposal presents China's Sector Plan for ODS Production Phaseout (Closure Part), including: a phased reduction in CFC production to zero by 2010; strategy, policy and actions to achieve that phaseout; and the total proposed incremental cost required for that Sector Plan. The Annual Program for 1999, the first year of proposed reduction in CFC production, is also included.

2. The Sector Plan was developed on the basis of China's obligations under the Montreal Protocol, and includes: (a) phaseout targets in 1999 and 2005; (b) China's Country Program (CP) and its current draft update; and (c) the characteristics and development plan of the chemical production sector. The Sector Plan is consistent with MLF guidelines for incremental costs. The methodology adopted to calculate closure costs is based on China's and World Bank's interpretation of ExCom draft guidelines on CFC production closure.

3. The objectives of the Sector Plan are: (1) to meet China's obligations under the Montreal Protocol by phasing out CFC production and consumption in a cost-effective, coordinated program; and (2) to manage the Sector Plan through an efficient, policy-based, management system.

4. The Sector Plan excludes strategy and incremental costs for CFC substitutes production in China. The Sector Plan covers CFC 11, 12, 113 and excludes CFC 114, 115, 13. It assumes no essential uses for CFC by 2010.

5. To meet China's CFC consumption needs, production of CFC increased steadily during 1993-97. By 1997, production and consumption of CFC were almost balanced. Production and consumption of CFC are both projected to gradually decrease during 1999-2010 according to phaseout plan as presented in the CP Update. The Sector Plan targets, action plan and incremental cost estimates are based on that phased reduction.

6. The base year for the Sector Plan is 1997. In 1997, there were a total of 36 CFC plants, of which 22 produced about 51,300 MT of CFCs during the year and 14 plants were idle (i.e., no production in 1997). Total production capacity for the 22 producing units was 87,622 MT, giving an average capacity utilization level of about 59% for 1997.

7. China plans to reduce output of and eventually close all CFC producers using a production quota system similar to that in the Halon Sector Plan. For complete closures: (1) all enterprises without production in 1997 will be closed and production facilities will be dismantled in 1999; and (2) enterprises (with production in 1997) whose production will be completely phased out will be closed completely and CFC production facilities will be dismantled. For partial closures, an enterprise whose production will be partially phased out (but whose phaseout quantity is less than actual production of any of its production lines) will reduce production each year according

to its quota. Equipment will not be dismantled until quota is reduced to zero for each production line.

8. **Incremental Costs for CFC Production Sector.** Incremental costs for closure of CFC production facilities are defined as lost profit (plus labor costs) from future production resulting from premature closure/dismantling of facilities. Incremental costs are a function of the following main parameters: (1) prices/gross profit level; (2) total or remaining life of facilities; and (3) methodology for allowing growth from baseline.

9. Based on the above parameters, eligible incremental costs for CFC production closure in China were calculated using a computer model similar to the halon sector cost model, but adjusted to CFC production sector characteristics. Proposed incremental costs for CFC production closure in China are summarized below:

Eligible expenditures	US\$ million
CFC plants in production in 1997	260.4
of which labor compensation	(10.4)
Net dismantling costs	0.5
Subtotal	260.9
CFC plants not in production in 1997	2.0
Technical assistance	4.0
Total	266.9

10. Basic assumptions for this proposal include:

- a) For CFC plants in production in 1997:
 - i) actual eligible production in 1997 is the production baseline;
 - ii) compensation excludes capacity commissioned after July 1995;
 - iii) 1997 prices are average local prices (expressed in US\$) over 1993-1997;
 - iv) 1997 prices are also 1999 prices¹;
 - v) labor compensation is calculated on a two year basis;
 - vi) 5 % growth rate in production from 1997 up to defined capacity;
 - vii) 7 % discount rate for future profit loss; and
 - viii) dismantling costs of \$20,000 per enterprise, based on halon sector experience.

¹ Inflation index from World Bank shows combined 0% for 1997/1998, so 1999 price is assumed same as 1997 price.

- b) For CFC plants not in production in 1997:
 - i) labor compensation is calculated on a two year basis;
 - ii) net dismantling costs of \$20,000 per enterprise; and
 - iii) all compensation is to be paid in 1999.

11. Based on this aggregate incremental cost, the Annual Program for 1999, representing the reduction in CFC production required to meet the MP production freeze level, would require a funding level of US\$ 37 million.

12. Profit loss and the future growth rate of production are clearly two major cost variables which affect eligible incremental cost. Several sensitivity tests were undertaken to evaluate their impact and they are presented at the end of Chapter III.

13. An operating mechanism and a management system to monitor the Sector Phaseout Plan is also presented. These management tools are based on the already approved Halon Sector Plan, with appropriate adjustments to reflect the different scope and characteristics of the CFC Production Sector.

INTRODUCTION

A. Background

1. The Government ratified the *Montreal Protocol on Substances that Deplete the Ozone Layer* in 1991, and began to phase out ODS consumption from 1994 with support of the Multilateral Fund (MLF). By the end of 1997, the Government had submitted 233 projects to MLF with approved grants of about US\$ 240 million, which should phase out about 60,100 tons of ODP. By the end of 1997, 23 projects had been completed with a phaseout of 23,900 tons of ODP.

2. In contrast to the support given to the phaseout of ODS consumption, the ODS production sector in China has received limited resources from MLF (excluding halon). Since 1995, the Government has issued two policies to control the growth of new ODS production capacity. Despite this, production of CFC has continued to increase to meet CFC consumption demands. The CFC Production Sector Plan proposes an action program that will enable China to effectively control production and to meet the MP 1999 CFC production freeze target. ODS production phaseout could also create incentives for users to look for alternatives.

3. The Government is concerned that if CFC production in China cannot be controlled and reduced on a timely basis, ODS consumption phaseout may be affected. The Executive Committee (ExCom) of the Multilateral Fund for Implementation of the Montreal Protocol has given high priority to this issue and is preparing guidelines that would assist Article 5 countries in phasing out their ODS production. Starting from the twelfth ExCom meeting in 1994, the expert group for ODS production was set up, and issues related to ODS production closure have been discussed thoroughly. Draft guidelines for CFC production closure have been prepared, but there have been disagreements on some parameters in those draft guidelines. Thus, ExCom requested China and the World Bank to prepare the *Sector Plan for ODS Production Phaseout in China (Closure Part)* at its twenty-second meeting in May 1997. In March 1998, ExCom agreed to consider a production closure project for implementation in 1999.

4. The preparation of this Sector Plan was organized by State Environmental Protection Administration (SEPA), State Petroleum & Chemical Industry Bureau (SPCIB), and the World Bank. SEPA and SPCIB established a Special Working Group for the preparation and implementation of the Sector Plan. The Sector Plan was drafted by experts of the Center for Environmental Sciences of Peking University, SEPA, and SPCIB with cooperation from the World Bank.

B. Objectives

5. The objectives of the Sector Plan are to:

- (a) meet the obligations of the Government under the Montreal Protocol by phasing out CFC production and consumption in a coordinated program;
- (b) phase out CFC production cost-effectively based on experiences of the halon sector and characteristics of China's CFC production sector;
- (c) support the CFC production phaseout with policy measures and incentives;
- (d) implement and manage the Sector Plan with an efficient operating mechanism; and
- (e) develop and implement a reporting and auditing mechanism for the closure plan and fund utilization.

C. Principles

6. The Sector Plan has been developed on the basis of:

- (a) the Government's obligations under the London Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer;
- (b) the China Country Program (CP) on Phasing Out Ozone Depleting Substances completed in 1993 and the current draft CP Update in August 1998;
- (c) the related decisions taken at the Parties' Meetings;
- (d) the national strategy and planning for economic and social development; and
- (e) the characteristics and development plan of the chemical production sector.

7. The Sector Plan is consistent with the MLF's principles and guidelines for calculation of incremental costs. The methodology adopted to calculate closure costs is based on China's and the World Bank's understanding of the draft guidelines on CFC production closure. This Sector Plan revises the ODS Phaseout Strategy for Chemical Production Sector in China dated June 1995. The principles followed by this Sector Plan are:

- (a) MLF would provide eligible funds required to finance the phaseout and facilitate transfer of alternative technologies needed for the phaseout of CFC production;
- (b) the Government will phase out CFC production in a cost effective manner;
- (c) the Government commits to implement the CFC production phaseout in accordance with the targets in the Sector Plan, on the assumption that MLF approves the Sector Plan and disburses funds on a timely basis according to the Sector Plan and Annual Programs;
- (d) sufficient supply of CFCs and related substitutes to the various consumption sectors will be ensured; and

- (e) the Government will, with the support of the World Bank, engage an experienced management institution and set up a reasonable mechanism (including auditing) to:
 - (i) manage the CFC production phaseout; (ii) issue and implement necessary regulations and policy instruments; (iii) ensure supply of necessary technical support; and (iv) implement related publicity and educational activities (similar to implementation arrangements for Halon Sector plan).

D. Content

8. The contents of this paper are:

- (a) Chapter I: provides CFC production information for China;
- (b) Chapter II: determines the phaseout strategy based on MP control targets and estimated demand from CFC consumption sectors;
- (c) Chapter III: calculates incremental costs for closing CFC production;
- (d) Chapter IV: outlines policy measures to ensure CFC production phaseout;
- (e) Chapter V: outlines and action plan for CFC production phaseout; and
- (f) Chapter VI: describes the proposed operating mechanism for implementation of CFC production phaseout.

E. Announcement

9. Since ExCom has not issued guidelines on how to support the production of substitutes, the *Sector Plan for CFC Production Phaseout in China (Closure Part)* will only consider production phaseout of CFC under the London Amendment of Montreal Protocol and excludes the strategy and incremental costs of substitute production in China.

10. CTC used as solvent and process agents, and CTC used as raw material are not included in this sector phaseout plan.

11. CFC 114, 115 and 13 production plants will not be closed in 1999. The compensation for phasing out these CFC production plants is not included in this proposal, and will be requested separately at a later date. The plants will be allowed to produce within the national CFC production quota.

12. China will develop separate plans for the production of CFC substitutes, closure of HCFC production facilities, CFC recycling, and other currently undefined issues.

13. The Action Plan assumes zero CFC production in 2010 for MDIs (Metered Dose Inhalers). However, considering uncertainties about CFC substitutes used in MDIs, China will reconsider the CFC closure plan by 2009 to decide whether to maintain minimum CFC production for MDI use after 2010.

14. This Sector Plan is based on the draft CP Update dated August 1998 and on a plant survey of CFC production conducted by China in early 1998. If significant changes are made to the CP Update and in the audit to be conducted by the Secretariat in late 1998 and early 1999, this proposal would be revised accordingly.

15. China will develop policies and programs for CFC substitute production in order to provide sufficient CFC substitutes to meet the demand for CFC consumption sectors once CFC production phaseout has started. Additionally, this will ensure that CFC production phaseout does not have a negative impact on China's economy and its future growth.

I. CFC PRODUCTION IN CHINA

A. Sector Background

1. The Chemical Production Sector in China supplies CFCs to related consumption sectors and is capable of producing CFCs with sufficient quantity and quality to meet domestic consumption requirements. The quality control system and related technical standards for CFC production have already been established.

2. SPCIB is responsible for research and development of CFC substitutes in China; management and supervision of CFC production; and the formulation and revision of development plans and technical standards related to CFCs and substitutes. The organization and implementation of publicity, education and training will be jointly undertaken by SPCIB and SEPA.

B. CFC Production

3. China produces the following CFCs under Montreal Protocol (London Amendment):

(a) Annex A Group I CFC-11, 12, 113, 114, 115

(b) Annex B Group I CFC-13

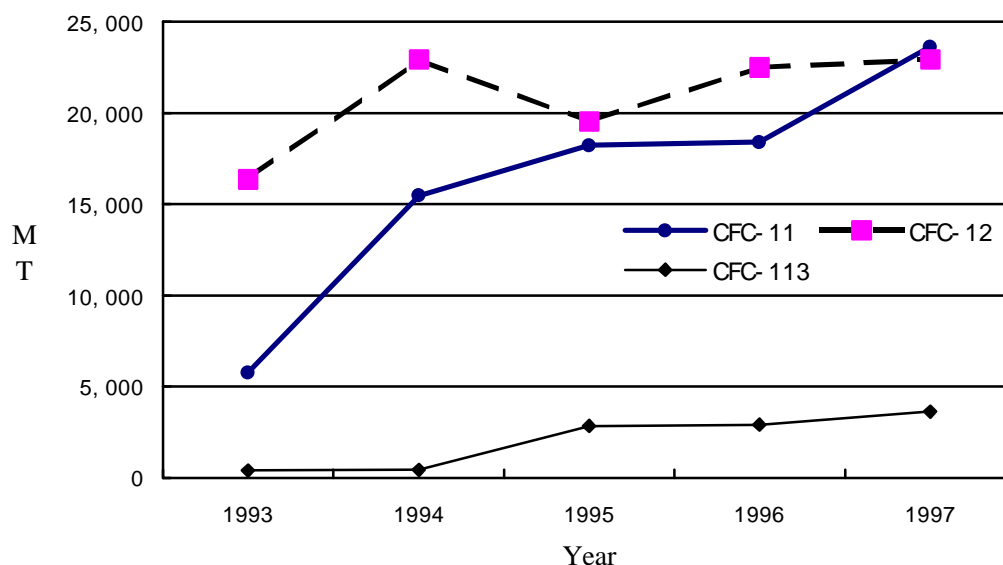
4. This Sector Plan covers only CFC 11, CFC 12, and CFC 113. Table 1 shows (all) CFC production from 1993 to 1997.

Table 1: CFC Production in 1993 to 1997 of China (MT)*

	1993	1994	1995	1996	1997
CFC-11	5,774	15,455	18,232	18,403	23,647
CFC-12	16,370	22,919	19,518	22,514	22,943
CFC-113	517	546	3532	3,637	4,538
CFC-114	6	3	1	0	11
CFC-115	2	14	26	86	154
Subtotal ODS	22,669	38,937	41,309	44,640	51,293
Subtotal ODP	22,565	38,822	40,592	43,878	50,324
CFC-13	21	20	35	17	27
CFC-13 ODP	21	20	35	17	27

* Data is from a plant survey conducted by SEPA and SPCIB in early 1998.

5. Tables 2 and 3 show weighted average sales prices and gross profit rate of CFC production from 1993 to 1997 by substances.

Figure 1: CFC Production of China in 1993-1997 (MT)²**Table 2: CFC Average Sales Prices in 1993 to 1997 of China (US\$/MT)**

	1993	1994	1995	1996	1997	Average
CFC-11	1,532	1,227	1,078	1,044	1,111	1,132
CFC-12	2,004	1,693	1,238	1,204	1,272	1,440
CFC-113	1,998	1,774	1,688	1,686	1,805	1,745

Table 3: CFC Average Gross Profit Rate in 1993 to 1997 of China (%)

	1993	1994	1995	1996	1997	Average
CFC-11	28.2	21.8	25.2	29.2	29.9	27.3
CFC-12	26.0	23.0	10.1	11.2	21.9	18.9
CFC-113	23.1	15.1	31.9	36.1	41.4	34.4

6. Production of CFC-11 in China increased significantly from 1993 to 1997, at an average annual growth rate of 22.2%. Average annual growth rate for CFC-12 from 1993 to 1997 was only 8.8%. Average annual growth rate for CFC-113 production was about 68.9%, due to high growth in electronics and metal working industries. Production of other CFCs in China is quite small.

² Production of CFC 114, 115 and 13 were insignificant, therefore not reflected in the graph.

C. CFC Producers in 1997

7. There were 36 CFC producers in 1997 with a total production capacity of 123,500 MT³, of which 22 enterprises produce only one kind of CFC, 12 enterprises produce 2 different CFCs, one enterprise produces three different CFCs, and one enterprise produces four different CFCs. Table 4 provides basic information of all 36 CFC producers in 1997.

Table 4: Basic Information of All CFC Producers in China

	Enterprise Name	Enterprise Location	Owner-ship (1)	In production in 1997					
				F11	F12	F113	F114	F115	F13
1	Jiangsu Meilan Electric Chem. Plant	Taizhou, Jiangsu	SOE	Y	Y	-	-	-	-
2	Jiangxi De'an Refrig. Plant	De'an, Jiangxi	SOE	-	Y	-	-	-	-
3	Zhejiang Juhua Florochem. Co., Ltd. (2)	Quzhou, Zhejiang	JV	Y	Y	-	-	-	-
4	Shanghai Chlor-Alkail Chem. Co. Ltd.	Shanghai	SH	-	Y	-	-	-	-
5	Shandong Jinan 3F Chem. Co. Ltd (3).	Jinan, Shandong	SOE	N	Y	-	-	-	-
6	Jiangsu Changshu Refrig. Plant (Changshu 3F)	Changshu, Jiangsu	C	Y	Y	Y	-	Y	-
7	Zhejiang Dongyang Chem. Plant	Dongyang, Zhejiang	SOE	-	Y	-	-	-	-
8	Zhejiang Lanxi Refrig. Plant	Lanxi, Zhejiang	C	Y	-	-	-	-	-
9	Shandong Dongyue Chem. Co. Ltd.	Huantai, Shandong	C	-	N	-	-	-	-
10	Zhejiang Chemical Research Institute	Hangzhou, Zhejiang	SOE	-	-	-	Y	Y	-
11	Jiangsu Wuxi Hushan Refrig. Plant	Wuxi, Jiangsu	C	Y	-	-	-	-	-
12	Jiangsu Wuxian Juxing Co. Ltd.	Wuxian, Jiangsu	SH	Y	-	-	-	-	-
13	Hubei Wuhan Changjiang Chem. Plant	Wuhan, Hubei	SOE	Y	Y	-	-	-	-
14	Shangdong Xinxing Chemical Plant	Zaozhuang, Shandong	C	-	Y	-	-	-	-
15	Sichuan Zigong Refrig. Plant	Zigong, Sichuan	C	Y	Y	-	-	-	-
16	Hunan Yiyang Chlor-Alkali Chem. Co. Ltd.	Yiyang, Hunan	SOE	-	N	-	-	-	-
17	Inner Mongolia Baotou Chem. Plant No. 1	Baotou, Inner Mongolia	SOE	-	N	-	-	-	-
18	Jiangsu Jianhu Phosphoric Fertilizer Plant	Jianhu, Jiangsu	SOE	-	N	-	-	-	-
19	Sichuan Zigong Fujiang Chem. Plant	Zigong, Sichuan	SOE	N	N	-	-	-	-
20	Zhejiang Linhai Jianxin Chem. Plant	Linhai, Zhejiang	C	N	N	-	-	-	-
21	Chongqing Tianyuan Chem. Plant General	Chongqing	SOE	Y	Y	-	-	-	-
22	Zhejiang Linhai Limin Chem. Plant	Linhai, Zhejiang	C	N	Y	-	-	-	Y
23	Guangdong Huiyang Chem. Plant	Huizhou, Guangdong	SOE	N	N	-	-	-	-
24	Jiangsu Changshu Yudong Chem. Plant	Changshu, Jiangsu	C	-	-	Y	-	-	-
25	Henan Hebi Chem. Plant No. 1	Hebei, Hebi	SOE	-	N	-	-	-	-
26	Hebei Longwei Floro-Chem. Plant No.1	Pingquan, Henan	SOE	-	N	-	-	-	-
27	Guizhou Wuling Chem. Plant	Zhunyi, Guizhou	SOE	-	N	-	-	-	N

³ Name-plate capacity

28	Guangdong Zhaoqing Chem. Co. Ltd.	Zhaoqing, Guangdong	SOE	-	N	-	-	-	-
29	Fujian Shaowu Floro-Chem. Plant	Shaowu, Fujian	SOE	N	Y	-	-	-	-
30	Shaanxi Shanzhou Chem. Plant	Shangzhou, Shaanxi	SOE	-	N	-	-	-	-
31	Jiangsu Wuxian Union Chem. Plant	Wuxian, Jiangsu	C	Y	-	-	-	-	-
32	Shanghai Shuguang Chem. Plant	Shanghai	SOE	-	-	N	-	-	-
33	Zhejiang Rui'an Haitian Chem. Co. Ltd.	Rui'an, Zhejiang	SH	Y	-	-	-	-	-
34	Suzhou Xinye Chem. Co. Ltd.	Suzhou, Jiangsu	SH	Y	-	-	-	-	-
35	Zhejiang Linhai Chem. Plant	Linhai, Zhejiang	C	-	N	-	-	-	-
36	Guangdong Xiangshen Chem. Co. Ltd.	Zengcheng, Guangdong	C	-	Y	-	-	-	-

- (1) C: Collective; SOE: State Owned Enterprises; SH: Shareholding; JV: Joint Venture.
- (2) 25% of this plant is owned by a Hong Kong company which is 100% owned by a Chinese mainland company. Thus 100% of its production and capacity are included in the calculation of compensation.
- (3) This plant had some equipment for CFC production before 1993, however until now the equipment has not been commissioned and thus is not included in the calculation of compensation, capacity and production.

8. The plant survey of all CFC producers carried out in early 1998 shows that out of 36 producers, 14 producers were without production in 1997. However, two of the 14 enterprises, No. 9 and No. 27, resumed production of CFC-12 and 13 respectively in 1998. All production facilities (except one production line in plant #34, the Suzhou Xinye Chemical Co.) were in production before July 1995. Table 5 gives details of CFC 11 producers that were in production in 1997.

Table 5: CFC-11 Producers - Plants with Production in 1997

	Name of Plant	Lines of Production (1)	Year of last Major expansion (2)	Name-plate capacity in MT	Achievable capacity (3)	Actual 1997 production in MT	Produced directly for consumers	Gross profit % of total sales in 1997
1	Jiangsu Meilan Electric Chem. Plant	1	Jun-93	3,000	1,848	1,049.9		11%
3	Zhejiang Juhua Florochem. Com., Ltd.	1	Sep-93	4,000	4,914	4,339.0		32%
6	Jiangsu Changshu Refrig. Plant	1	1992	10,000	14,400	10,232.2		34%
8	Zhejiang Lanxi Refrig. Plant	1	Oct-91	2,500	2,281	1,894.1		24%
11	Jiangsu Wuxi Hushan Refrig. Plant	1	Nov-91	4,000	2,455	1,120.1		51%
12	Jiangsu Wuxian Juxing Co. Ltd.	1	Jul-93	2,000	1,694	370.4	233.9	29%
13	Hubei Wuhan Changjiang Chem. Plant	1	Jan-93	1,500	621	100.5		17%
15	Sichuan Zigong Refrig. Plant	1	Jun-92	1,500	1,671	446.4		24%
21	Chongqing Tianyuan Chem. Plant	1	Feb-92	500	250	48.9		-8%
31	Jiangsu Wuxian Union Chem. Plant	1	Feb-86	1,800	1,800	431.4		15%
33	Zhejiang Rui'an Haitian Chem. Co. Ltd.	1	Apr-94	5,000	5,628	1082		12%
34	Suzhou Xinye Chemical Co. Ltd.	1	May-95	1,500	1,400	1323.0	189.0	31%
		1	Dec. 96	1,500 (4)	1,280	1209.0		
	Subtotal	13		38,800	40,239	23,646.9		
	Weighted Average Gross Profit Rate							30%

- (1) A production line is defined by number of distillation units from which CFC product (or products) is delivered. If a CFC plant consists of one distillation unit, and multiple reactors, it is defined as one production line.

- (2) In most Chinese enterprises, major expansion of a plant represents installation (or replacement) of all major production equipment, including supplemental facilities, and it operates as a new facility.
- (3) Defined as maximum achieved daily production in 3 continuous days multiplied by plant availability in the same year.
- (4) This line of production is not eligible for financing, thus not included in the incremental cost calculation.

Table 6: CFC-11 Producers - Plants without Production in 1997

	Name of Plant	Lines of Production	Year of last major expansion	Name-plate Capacity in MT	Achievable Capacity	Last Year in Production	Production in Last Year (MT)	Gross profit of % of total sales
5	Shandong Jinan 3F Chem. Co. Ltd.	1	1989	1,500	1,542	1995	516.0	12%
19	Sichuan Zigong Fujiang Chem. Plant	1	Dec-88	1,500	1,397	1996	166.0	-70%
20	Zhejiang Linhai Jianxin Chem. Plant	(1)*	Oct-84		0	1995	2.3	19%
22	Zhejiang Linhai Limin Chem. Plant	(1)	Nov-93	1,500	259	1995	30.0	-1%
23	Guangdong Huiyang Chem. Plant	1	Sep-93	1,000	0	1995	185.5	NA
29	Fujian Shaowu Floro-Chem. Plant	1	Jan-94	1,500	366	1996	120.6	-3%
	Subtotal	4		7,000	3,564			

* Data in parenthesis of Lines of Production means that other CFC can be produced by the same production line.

Table 7: CFC-12 Producers in China - Plants with Production in 1997

	Name of Plant	Lines of Production	Year of last major expansion	Name-plate Capacity in MT	Achievable Capacity	Actual 1997 production in MT	Produced directly for consumers	Gross profit % of total sales in 1997
1	Jiangsu Meilan Electric Chem. Plant	1	Mar-94	3,000	2,925.0	1,793.2		11.90%
2	Jiangxi De'an Refrig. Plant	1	Jan-93	3,000	1,749.0	42		-9.00%
3	Zhejiang Juhua Florochem. I Co., Ltd.	(1)	Sep-93	8,000	9,828.0	7,760		23.50%
4	Shanghai Chlor-Alkail Chem. Co. Ltd.	1	Oct-90	7,000	6,700.0	2,215.7		-13.5%
5	Shandong Jinan 3F Chem. Co. Ltd.	1	1989	3,500	3,649.0	1244		-4.80%
6	Jiangsu Changshu Refrig. Plant	1	1993	5,000	3,699.0	2,739.3		37.70%
7	Zhejiang Dongyang Chem. Plant	1	Jan-91	5,000	5,600.0	2,218.5		22.60%
13	Hubei Wuhan Changjiang Chem. Plant	1	Jan-91	4,500	4,638.0	928.5		12.10%
14	Shangdong Xinxing Chem. Plant	1	Dec-92	1,000	684.3	139.9		23.60%
15	Sichuan Zigong Refrig. Plant	1	May-93	1,500	539.5	121.6		19.50%
21	Chongqing Tianyuan Chem. Plant	1	Jan-92	500	260.0	116.2		-2.60%
22	Zhejiang Linhai Limin Chem. Plant	2	Apr-91	3,000	3,455.0	1365		17.40%
29	Fujian Shaowu Floro-Chem. Plant	1	Jan-94	3,500	1,59.0	1,159.4	538.3	9.90%
36	Guangdong Xiangshen Chem. Co. Ltd.	1	Mar-94	3,000	2,058.0	1,100.0		24.70%
	Subtotal	15		51,500	47,382.8	22,943.0		
	Weighted Average Gross Profit Rate							18.1%

* Data in parenthesis of Lines of Production means that other CFC can be produced by the same production line.

Table 8: CFC-12 Producers - Plants without Production in 1997

	Name of Plant	Lines of Production	Year of last major expansion	Name-plate Capacity in MT	Achievable Capacity	Last Year in Production	Production in Last Year (MT)	Gross profit of % of total sales
9	Shandong Dongyue Chem. Co. Ltd.	1	May-93	5,000	0.0	1995	62.3	34%
16	Hunan Yiyang Chlor-Alkali Chem. Co. Ltd.	1	Jan-87	1,000	858.0	1995	18.8	13%
17	Inner Mongolia Baotou Chem. Plant No.1	1	May-88	700	977.8	1993	91.6	6%
18	Jiangsu Jianhu Phosphoric Fertilizer Plant	1	Mar-94	500	215.0	1995	150.4	NA
19	Sichuan Zigong Fujiang Chem. Plant	1	May-85	1,000	915.6	1996	104.0	43%
20	Zhejiang Linhai Jianxin Chem. Plant	1	Feb-90	800	597.8	1995	64.3	-22%
23	Guangdong Huiyang Chem. Plant	1	Apr-91	3,000	2,219.5	1995	233.7	-3%
25	Henan Hebi Chem. Plant No. 1	1	Jan-91	1,500	2,253.4	1996	63.9	12%
26	Hebei Longwei Floro-Chem. Plant No.1	2	Jan-94	1,080	1,230.0	1994	900.0	2%
27	Guizhou Wuling Chem. Plant	1	Jan-88	1,500	0.0	1995	720.8	-77%
28	Guangdong Zhaoqing Chem. Co. Ltd.	1	Jan-87	500	816.4	1995	133.0	6%
30	Shaanxi Shanzhou Chem. Plant	1	Dec-91	2,000	1,046.5	1995	59.9	38%
35	Zhejiang Linhai Shuiyang Chem. Plant	1	Jan-91	500	321.6	1995	167.1	24%
	Subtotal	14		19,080.0	11,451.6		2,769.8	

Table 9: Other CFC Producers - Plants with Production in 1997

	Name of Plant	Lines of Production	CFC	Year of last major expansion	Name-plate Capacity in MT	Achievable Capacity	Actual 1997 production in MT	Gross profit of % of total sales in 1997
6	Jiangsu Changshu Refrig. Plant (Changshu 3F)	1	113	1994	4,000	5,760	3,858.0	44.80%
24	Jiangsu Changshu Yudong Chem. Plant	2	113	1991	1,000	990	680.6	14.50%
	Subtotal	3			5,000	6,750	4,539.0	
	Weighted Average Gross Profit Rate							39.3%
10	Zhejiang Chemical Research Institute	(1)	114	NA	NA	NA	10.6	NA
6	Jiangsu Changshu Refrig. Plant	1	115				33.6	20.50%
10	Zhejiang Chemical Research Institute	1	115		100		120.3	
	Subtotal	2					153.9	
22	Zhejiang Linhai Limin Chem. Plant	1	13	Jan-91	50	40	27.0	36.30%

* Data in parenthesis of Lines of Production means that other CFC can be produced by the same production line.

Table 10: Other CFC Producers - Plants without Production in 1997

	Name of Plant	Lines of Production	CFC	Year of last expansion	Name-plate Capacity in MT	Achievable Capacity	Last Year in Production	Production in Last Year (MT)	Gross profit of % of total sales in 1997
32	Shanghai Shuguang Chem. Plant	2	113	Feb-94	1,000	495	1995	60	12.90%
27	Guizhou Wuling Chem. Plant	1	F13		50		1995	9	21.00%

D. CFC Production Technologies in China

9. With a long history of CFC production, most technologies adopted by Chinese CFC producers have been developed locally. The technologies and quality of products improved greatly towards the end of the 1980s, and reached or came close to international technical standards. CFC production in China is capable of meeting domestic demand of consumption industries.

10. Process technologies adopted for CFC production in China are:

- (a) CFC-11 and CFC-12: Liquid phase catalytic fluorination with carbon tetrachloride (CTC) and anhydrous hydrogen fluoride (AHF) as raw materials;
- (b) CFC-113: Mainly liquid phase chlorination/fluorination with tetrachloroethylene, liquid chlorine and AHF as raw materials; while small amount by liquid phase fluorination process with hexachloroethane and AHF as raw materials;
- (c) CFC-114 and CFC-115: Gas phase fluorination with CFC-113 and AHF as raw material; and
- (d) CFC-13: Catalytic reaction of CFC-12 on a small scale.

11. **Swing plants (from CFC 11/12 to HCFC-22) (refer also to footnote #4 on pg.19).** All CFC-11 and CFC-12 production facilities (except Zhejiang Juhua, plant #3 in Table 4) have low pressure designs and could not be converted to HCFC-22 production. Thus, the most cost effective technical option is closing their production facilities. Zhejiang Juhua CFC plant has a high pressure design and is technically capable of swing to HCFC-22 production.

12. Table 11 shows the raw materials consumption level in CFC production of 1997 in China, as well as the output level of by-products of CFC-11 and CFC-12.

Table 11: Consumption of Raw Materials for CFC Production in 1997 (MT raw material /MT CFC)

CFC	Raw materials	(a) /CFC ratio	(b) /CFC ratio	By-product/ CFC ratio:
CFC-11	CTC (a), AHF (b)	1.22	0.18	HCl ratio: 1
CFC-12	CTC (a), AHF (b)	1.39	0.36	HCl ratio: 2.5
CFC-113 (Process I)	Tetrachloroethylene (a), AHF (b)	1.13	0.49	--
CFC-115	CFC-113 (a), AHF (b)	2.38	1.12	--
CFC-13	CFC-12 (a)	2.12	--	--

E. Previous Phaseout Activities

13. The Government has introduced several measures to control CFC production:
- (a) prepared a CFC Phaseout Strategy for Chemical Production Sector in June 1995;
 - (b) established a Center for CFC Substitutes Engineering and Technology in June 1994;
 - (c) established a Quality Checking and Testing Center for CFC and Substitutes with support of MLF in Shanghai in 1997;
 - (d) conducted several surveys with the support of the Multilateral Fund;
 - (e) issued the "Circular on Enhancing the management on expansion projects for CFC production" in 1995 to control expansion of CFC production capacity;
 - (f) issued the "Circular on Bans for new construction of production facilities of ODS production and consumption" in 1997 to ban new installations for CFC production from November 11, 1997;
 - (g) established a Special Working Group for CFC Production Phaseout in 1997 to prepare and coordinate CFC production phaseout activities in China;
 - (h) held several workshops, training courses for CFC production enterprises to publicize CFC phaseout among CFC producers; and
 - (i) published a series of publications and journals for ozone layer protection.

F. Existing Problems

14. China is facing or will face the following problems in CFC production phaseout:
- (a) Existing capacity is much larger than current production. This excess capacity presents problems in efficient control of CFC production in China; and

- (b) Currently, China has no effective mechanism to control import and export of CFC.

II. PHASEOUT STRATEGY

A. Goal

15. Based on MP control targets and estimated demand from consumption sectors, China will:
- (a) freeze production and consumption levels of CFCs in Annex A: (a) on January 1, 1999 to levels not exceeding the average of 1995 to 1997; (b) by January 1, 2005, reduce to less than 50% of the freeze level; and (c) finally by January 1, 2010, stop production and consumption of all CFCs in China;
 - (b) reduce production and consumption level of CFCs in Annex B: (a) on January 1, 2003 to less 20% of the average level of 1998 to 2000; (b) by January 1, 2007 reduce to less than 85% of the average; and (c) finally by January 1, 2010, stop production and consumption of all CFCs in China.
16. Strategic measures to achieve these goals include:
- (a) the gradual reduction of CFC production in different production facilities;
 - (b) adoption of various policy measures and a technical support system in coordination with consumption phaseout and substitute production; and
 - (c) recycling of CFCs to meet servicing requirements and to reduce CFC emission.

B. Freeze Levels of CFCs in MP Annex A

17. The freeze level of CFCs in MP Annex A substances is shown in Table 12.

Table 12: CFC Freeze Level in Annex A for China (in MT)

	Actual Production			MP Freeze level		
	1995	1996	1997	1999	2005	2010
CFC (ODP)	40,592	43,878	50,324	44,931	22,466	0

C. Estimated CFC Consumption Demand

18. Table 13 shows estimated CFC consumption demand based on phaseout strategies and action plans for all consumption sectors (as reported in the draft CP Update).

Table 13: Estimated CFC Consumption Demand of China (ODP, MT)*

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Annex A												
CFC-11	22,900	18,900	16,700	16,400	15,000	13,100	10,400	7,700	4,700	3,600	200	100
CFC-12	19,100	17,600	16,600	14,100	13,100	10,900	7,600	5,600	4,700	3,600	2,800	1,400
CFC-113	4,100	3,300	2,700	2,200	1,700	1,100	550	0				
CFC-114	20	20	20	20	20	20	20	20	20	20	20	0
CFC-115	180	180	180	180	180	180	180	180	180	180	180	0
Subtotal	46,300	40,000	36,200	32,900	30,000	25,300	18,750	13,500	9,600	7,400	3,200	1,500
Annex B												
CFC-13	70	80	100	100	50	50	50	50	10	10	10	0

* Data from CP Update.

** The CFC in 2010 is used for the servicing demand of consumption sectors.

Table 14: Estimated CFC Production in China (ODP, MT)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Annex A												
CFC-11	22,900	18,900	16,700	16,400	15,000	13,100	10,400	7,700	4,710	3,600	200	0
CFC-12	17,731	17,600	16,600	14,100	13,100	10,900	7,600	5,600	4,700	3,600	2,800	0
CFC-113	4,100	3,300	2,700	2,200	1,700	1,100	550	0	0	0	0	0
CFC-114	20	20	20	20	20	20	20	20	20	20	20	0
CFC-115	180	180	180	180	180	180	180	180	180	180	180	0
Subtotal	44,931	40,000	36,200	32,900	30,000	25,300	18,750	13,500	9,600	7,400	3,200	0
Annex B												
CFC-13	70	80	100	100	50	50	50	50	10	10	10	0

D. CFC Phaseout Approach and Schedule

19. Based on Table 13, it is estimated that consumption of CFCs in Annex A in 1999 will be higher than the production freeze level (but below the consumption freeze level). Thus, China would need to either import CFCs to meet consumption demand, or replace CFCs with substitutes. This minor imbalance (about 1,400 tons of CFC12) in 1999 will not present a significant problem for the closure program. During 2000-2009, consumption and production levels of CFCs in Annex A are substantially the same. If minor imbalances do occur during this period, they could be solved through import/export trade, increased use of CFC substitutes and/or increased use of recycled CFCs. China will completely phase out CFC production by January 1, 2010.

20. According to the draft Country Program Update, the remaining difference between production and consumption in 2010 and consumption for non-essential uses after 2010 will be met through recycling CFC in the refrigeration industries. Availability of recycled CFCs could also reduce the risk of production exceeding the quota due to continuing demand.

21. China plans to close all CFC producers with the following approaches to achieve production phaseout⁴. In all approaches, the production quota system will be the main policy measure, to be accompanied by control and monitoring.

a) Complete closures --

- i) All enterprises without production in 1997 will be closed completely⁵, and the CFC production facilities will be dismantled in Phase 1;
- ii) Enterprises whose production will be completely phased out will be closed completely, and all CFC production facilities will be dismantled according to the Action Plan;

b) Partial closures --.

- i) An enterprise whose production will be partially phased out (but whose proposed phaseout quantity is less than actual production of any of its production lines) will reduce production each year according to the quota assigned. Equipment will not be dismantled until the quota is reduced to zero for each production line.

c) Import/export control by policies measures. Details in Chapter 4; and

⁴ This Sector Plan is limited to production closure activities and compensation. Activities and compensation related to substitute production (including HCFC 22) are not included. One eligible CFC plant, the Zhejiang Juhua (para 11) is technically capable of swinging to HCFC22 production. However, due to halon closures which reduce demand of HCFC 22, there is no market for additional HCFC22 in China in the near term. Also, Zhejiang Juhua is more profitable than most CFC producers in China, thus Juhua is expected to be one of the last CFC plants to be closed.

⁵ If those plants that resumed CFC production in 1998, as mentioned in para. 8, are not closed in 1999, they will be replaced by other CFC producers. Production will be controlled by the national quota.

d) Recycling-

- i) CFC stored in equipment will be recycled,
- ii) Recycled CFC with unsatisfactory quality will be destroyed.

III. INCREMENTAL COST

A. Introduction

22. This chapter covers: (a) scope of incremental costs for production closure; (b) factors affecting incremental costs; (c) calculation results and their explanations; and (d) assumptions, inputs, calculation methodology, and sensitivity tests to key parameters. An Action Plan to meet specific phaseout targets is presented in Chapter V. Incremental costs are calculated based on a computer model.

B. Scope of incremental cost for cost analysis

23. Incremental costs include:

- (a) Dismantling costs of close a CFC facilities, lost profits from premature closure, and workers' compensation caused by the closures; and
- (b) Costs of technical assistance activities related to CFC phaseout, including design and implementation of policies and regulations, publicity, technical assistance to enterprises, testing equipment and management information systems (to monitor CFC phaseout).

C. Incremental cost model

24. The model includes the following three steps:

- (a) identification of parameters related to CFC production phaseout that affect incremental cost;
- (b) determination of a timetable for CFC production phaseout and annual production based on the phaseout schedules for consumption sectors in draft China Country Program Update; and
- (c) calculation of incremental costs based on the phaseout plan and production sector parameters.

25. The closure plan will start in 1999 to enable China to meet its 1999 production freeze. Incremental costs are presented in 1999 US dollar terms as defined herein. The production level in 1998 is not controlled and not a factor in incremental cost calculations. The analysis herein is quite specific to China and should not be inferred to apply to any other country.

D. Basic parameters in the cost calculation**Table 15: Basic Parameters for Plants in production in 1997**

Production capacity for eligible enterprises (MT)	
CFC11	38,962
CFC12	47,383
CFC113	6,750
Production capacity for ineligible enterprises (MT)	
CFC11 (ref. Table 5, plant #34, Suzhou Xinye)	1,280
CFC12	0
CFC113	0
Actual production in 1997 by eligible enterprises (MT in ODS)	
CFC11	22,438
CFC12	22,942
CFC113	4,538
Actual production in 1997 by ineligible enterprises	
CFC11	1,209
CFC12	0
CFC113	0
Average life time remaining at end of 1997	18 Years
Average prices for 1993-97	
CFC11	\$1,132/ton
CFC12	\$1,440/ton
CFC113	\$1,745/ton
Gross profit rate of CFCs	22.5% of sales revenue
Labor cost of CFCs plants	7.3% of sales revenue
Net Dismantling Cost (based on halon experience)	\$20,000 per enterprise
Unconstrained demand on CFCs (up to capacity)	5% p.a.
Discount rate for future profit loss for each year's closure⁶	7% p.a.
Average annual inflation rate after 1999	2.5% p.a.

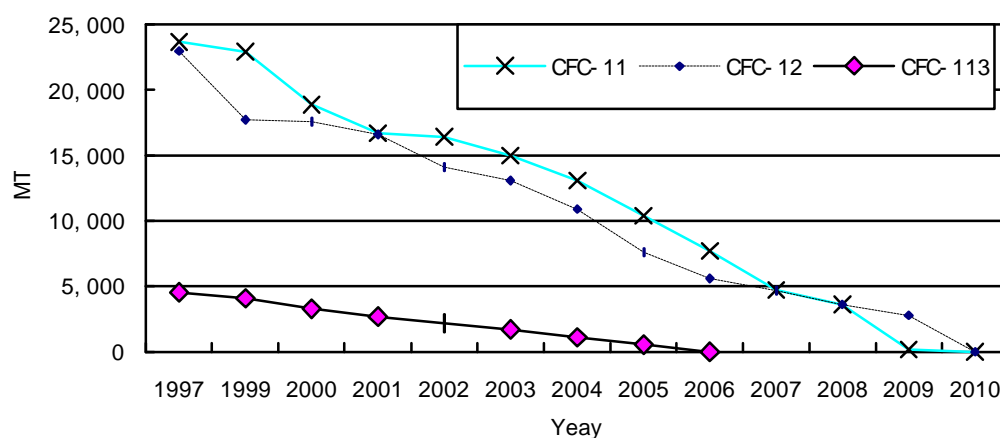
⁶ Current long term lending rate (10 years) of Chinese commercial banks is 7%.

Table 16: Key Parameters for Plants not in production in 1997

Labor cost for CFC plants for two years	7.3% of sales revenue
Net Dismantling Cost (based on halon sector experience)	\$20,000 per enterprise

E. Phaseout Plan for CFCs

26. According to the draft Country Program Update, the phaseout profile of CFC consumption is shown in figure 2.

Figure 2: CFC Phaseout Profile**F. Eligible Incremental Costs for CFC phaseout**

27. Based on the above parameters, eligible incremental costs for CFC production closure in China were calculated using a computer model with characteristics similar to the halon sector cost model, but adjusted for specific CFC production sector features. Proposed incremental costs for CFC production closure in China are summarized below:

Eligible expenditures	US\$ million
CFC plants in production in 1997	260.4
of which: labor compensation	(10.4)
Net dismantling costs	0.5
Subtotal	260.9
CFC plants not in production in 1997	2.0
Technical assistance	4.0
Total	266.9

28. Basic assumptions for this proposal include:
- a) For CFC plants in production in 1997:
 - i) actual eligible production in 1997 is the production baseline;
 - ii) compensation excludes capacity commissioned after July 1995;
 - iii) 1997 prices are average local prices (expressed in US\$) over 1993-1997;
 - iv) 1999 prices are assumed to be the same as 1997 prices⁷; and
 - v) labor compensation is calculated on a two year basis
 - vi) 5% growth rate in production from 1997 up to defined capacity
 - vii) 7% discount rate for future profit loss
 - b) For CFC plants not in production in 1997:
 - i) labor compensation is calculated on a two year basis
 - ii) all compensation is to be paid in 1999.

G. Sensitivity Analysis

29. Since profit loss is clearly the major cost item, several sensitivity tests were undertaken to evaluate the importance of key variables as summarized below:

\$260,921	Proposed case. This amount does not include compensation for plants not in production in 1997
Sensitivity analysis	
\$218,842	3% growth in CFC production instead of 5% growth, other parameters remaining the same.
\$279,316	8% growth in CFC production instead of 5% growth, other parameters remaining the same.
\$288,618	25% gross profit margin, other parameters remains the same.
\$210,923	22 years total life, other parameters remain the same.
\$301,734	28 years total life, other parameters remain the same.

30. *Incremental Costs for CFC production Sector.* Incremental costs for CFC production sector closure are defined as lost profit (plus labor costs) from future production resulting from premature closure/dismantling of facilities. Incremental costs are a function of the following main parameters:

- (a) prices/gross profit level;

⁷ The latest inflation index from the World Bank shows inflation in 1997 and 1998 to be 0%, so 1999 prices are assumed to be equal to 1997 prices.

- (b) total and remaining life of facilities; and
- (c) methodology for allowable growth from baseline.

The impact of each factor is discussed below, along with results of each scenario.

31. *Price/Profit Level.* A gross profit margin (as percent of sales revenue, and before debt service and taxes) of 22.5% in the base case was derived from a relatively long (5 year) period based on actual results. Since it contains no significant distortions resulting from taxes/trade barriers, it is considered realistic. Prices are based on the average prices prevailing in China during 1993-97. This five year period was selected to reflect local conditions and to minimize impact from short term fluctuations. A three year period was considered too short to reflect long term sustainable basis. An inflation adjusted price from 1986 was also considered, but rejected due to:

- (a) 11 year period of inflation factor introduces significant distortions;
- (b) 1986 prices were controlled and distorted compared to 1998, when a free market prevails;
- (c) three major currency devaluations occurred between 1986 and 1998.

Increasing the gross profit margin to 25% of sales revenue (11% increase) resulted in an increase in incremental costs by US\$ 28 million (11% increase).

32. *Total/ Remaining Life of Facilities.* Determination of useful life of industrial facilities in any situation is not an exact science and requires judgment concerning industrial practices in the country and enterprises concerned. Typically, industrial chemical facilities in developing countries and particularly in China operate well beyond what would be considered normal practice in developed countries. The draft production sector guidelines mention 25 years total life of facilities with apparently little or no dissension. For purposes of evaluation of *economic* viability, World Bank standard practice would be to use about 12-15 years as a basis for determining economic rates of return for industrial chemical facilities. This does not mean that the facility would be retired at the end of 15 years, merely that it would need to compete on a cash basis against newer, larger, more modern technology competitor if it were to operate beyond the nominal 15 years lifetime.

33. On the basis of normal practices in China, the high cost of capital, and the age and condition of most of CFC production facilities in operation during 1997, it was decided to use a period of 25 years total life as a reasonable base case. A sensitivity test at 22 years was performed for purposes of illustrating the impact of plant life. Changing plant life from 25 years to 22 and 28 years, respectively, changes incremental costs by US\$ -47.8 million and US\$ + 41.3 million respectively. These changes are significant, indicating that the life of a facility is a critical parameter in incremental cost calculations.

34. *Methodology for allowable Growth.* This factor is more difficult to analyze and reach a consensus on, since it derives from the unique situation represented by the MP phase out objective, high economic growth in China and Chinese policy for self-sufficiency in most chemical production. Since the mid-1980's, most CFC consumer industries have been developing rapidly, while CFC production has been keeping pace. It is clear that, without MP, CFC production could continue to grow to reach full output of present capacity without any new capital requirements (beyond normal maintenance) on a long term sustainable basis at about the same rate as projected growth in GDP. During 1991-96, GDP grew at about 12-15 %, and CFC sectors grew at even higher rates. However, this high growth is not sustainable on a long term basis. China is projecting an 8% short term growth rate, but an even lower rate is likely on a longer term basis. A reasonable projected growth over the assumed remaining life of CFC facilities would appear to be about 5% and that level is used for the base case. Sensitivity tests for 3% and 8% p.a. growth have been included to show the impact of different growth rates. These sensitivity tests change the incremental costs by -US\$ 40 million and +US\$ 18 million, respectively. The smaller increase with 8% growth is due to already reaching the capacity level relatively quickly in the base case. The large decrease in the 3% case is due to not reaching the capacity level during the assumed lifetime in the calculations. All costs presented are future present values. Table 17 shows these costs year by year.

Table 17: Cost for Phaseout CFCs Production in Years (US\$ 000)

	Subtotal	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Plants in production during 1997</u>													
CFC11 Production (MT)		22,850	18,900	16,675	16,335	14,965	13,088	10,345	7,625	4,710	3,630	180	0
Profit	\$92,776	\$8,240	\$13,687	\$9,189	\$4,373	\$7,044	\$8,279	\$10,242	\$9,960	\$10,071	\$5,909	\$5,780	0
Labor	\$4,231	\$132	\$669	\$386	\$61	\$250	\$351	\$526	\$534	\$587	\$223	\$512	0
Subtotal	\$97,007	\$8,372	\$14,357	\$9,576	\$4,433	\$7,294	\$8,630	\$10,768	\$10,495	\$10,658	\$6,132	\$6,292	0
CFC12 Production (MT)		17,728	17,625	16,620	14,080	13,050	10,847	7,590	5,850	4,670	3,580	2,760	0
Profit	\$130,348	\$26,972	\$5,638	\$7,739	\$12,846	\$7,976	\$11,652	\$14,685	\$9,942	\$8,145	\$7,649	\$6,653	\$10,451
Labor	\$5,478	\$1,096	\$22	\$222	\$575	\$239	\$524	\$794	\$435	\$302	\$286	\$221	\$761
Subtotal	\$135,826	\$28,069	\$5,660	\$7,961	\$13,421	\$8,215	\$12,176	\$15,479	\$10,376	\$8,447	\$7,935	\$6,874	\$11,212
CFC113 Production (MT)		5,125	4,125	3,375	2,750	2,063	1,375	688	0	0	0	0	0
Profit	\$26,152	0	\$7,450	\$2,338	\$3,618	\$3,840	\$3,802	\$2,691	\$2,413	0	0	0	0
Labor	\$1,436	0	\$261	\$201	\$171	\$193	\$198	\$203	\$208	0	0	0	0
Subtotal	\$27,589	0	\$7,711	\$2,539	\$3,789	\$4,033	\$4,000	\$2,894	\$2,621	0	0	0	0
Net dismantling cost	\$499	\$40	\$41	\$42	\$43	\$44	\$45	\$46	\$48	\$49	\$50	\$51	0
Subtotal	\$260,921	\$36,480	\$27,769	\$20,118	\$21,686	\$19,587	\$24,852	\$29,187	\$23,540	\$19,154	\$14,117	\$13,218	\$11,212
<u>Plants not in production in 1997</u>													
Labor	\$1,701	\$1,701											
Net dismantling cost	\$280	\$280											
Subtotal	\$1,981	\$1,981											
TA	\$4,000	\$350	\$900	\$800	\$600	\$500	\$300	\$200	\$100	\$100	\$100	\$50	0
Total	\$266,902	\$38,811	\$28,669	\$20,918	\$22,286	\$20,087	\$25,152	\$29,387	\$23,640	\$19,254	\$14,217	\$13,268	\$11,212

IV. POLICY

A. Introduction

35. After reviewing the implementation of existing policies and lessons learned from the implementation of the Country Program, the Government will introduce policy instruments to guide and control CFC production phaseout activities with the following features:

- (a) CFC phaseout strategy set up by the draft Country Program Update;
- (b) challenges facing China in CFC production and consumption phaseout;
- (c) current situation of CFC and substitute production;
- (d) restructuring of governmental agencies; and
- (e) other factors affecting CFC production phaseout.

B. Policy Objectives

36. According to the Country Program Update, the principal objective of policy formulation is to establish a set of supporting policies and measures that could promote CFC production phaseout in China. Other necessary policy instruments include those that provide incentives in the consumption of substitutes to reduce the demand of CFCs. Ultimately, China needs sufficient substitute production to meet the demand of CFC consumption sectors so that economic growth would not be affected.

C. Policy Framework

37. Principles for policy design include the following:

- (a) characteristics of this sector and its phaseout should be considered in order ensure its compatibility with current financial and enterprise reform systems;
- (b) use related policy instruments currently available at national and sectoral levels;
- (c) ensure that the policies are feasible, efficient and easy to monitor; and
- (d) learn from the lessons of CFC phaseout policies both domestic and foreign.

38. Based on the above considerations, China will introduce new policy instruments to guarantee that CFC phaseout is achieved in the most cost effective matter. The policies to be designed would include command and control instruments, market-based instruments, and voluntary participation.

39. The policy framework is designed to: (1) control CFC production; (2) ensure sufficient production of substitutes to meet demand of consumption sectors in terms of quality and quantity; (3) manage and monitor ODS import and export; (4) strengthen monitoring and supervision to ensure effective implementation of related policies; and (5) strengthen management for CFC recycling.

40. Table 18 summarizes the policy framework.

Table 18 -- Policy Framework for CFC Production Phaseout in China

	Name of policy	Date of issuance	Agencies involved
CFC production management	Circular on enhancing the management on expansion projects for CFCs production	1995	SPCIB
	Circular on Bans for new construction of production facilities of ODS production and consumption	1997	SEPA, SDPC, SETC, SAIC
Import/export management	CFC import licensing system	(1)	SEPA, Custom, SPCIB
	CFC export application and registration system	(1)	SEPA, Custom, SPCIB
Monitoring and supervision	Circular on enhancing the monitoring and supervision function for Ozone Layer Protection by local EPBs	1997	SEPA
	Circular on data reporting for ODSs production, consumption, and import and export	1994	SEPA
	Circular on implementing discharge reporting and registration	1997	SEPA
Promotion and training	Training workshops to be conducted and training for CFC producers	1998 and future years	SEPA, SPCIB

(1) Preparation work has already started. Application of these two systems will likely be effective by 2000.

D. Policies already introduced and to be introduced.

D.1. Circular on enhancing the management on expansion projects for CFCs production

41. Focusing on the problems related to CFCs substitute production, SPCIB issued this circular in 1995. It regulated that:

- (a) any expansion project for CFC production facilities should submit an application to SPCIB in advance. Only after approval by SPCIB, could construction take place following the usual procedures; and

- (b) after receiving SPCIB and SEPA's agreement of the proposals, could local chemical industry agencies approve the expansion proposal. The local agency is then responsible for sending related documents to SPCIB for approval.

D.2. *Circular on Bans for new production facilities of ODS production and consumption.*

42. In 1997, SEPA, State Development Planning Commission, State Economic and Trade Commission, and the State Administration for Industry and Commerce jointly issued this document. It prohibits the construction of new expansion, and installation of CFC production facilities (production lines) after November 1997.

43. Ministries and agencies concerned monitor the implementation of this policy in the following manner:

- (a) local environmental protection bureaus (EPBs) at all levels should not approve the environmental impact assessment report (or table) for the production facilities (lines) banned;
- (b) government agencies responsible for planning, economic and trade, and sector management at all levels should not approve the construction and operation of the facilities (lines) banned;
- (c) financial institutions at all levels should not provide financial support and favorable policies for the construction; and
- (d) local EPBs should report and ask local governments to dismantle production facilities (lines) that violate this regulation. If the facilities could not be dismantled on time, the responsible person will be fined either administratively or legislatively. Industry and commercial administrative agencies would not process registration of such enterprises.

D.3. *Tradable production quota regulation for CFCs*

44. A regulation on tradable production quota system will be issued following approval of the Sector Plan by ExCom. The Regulation will specify the responsibilities of different government agencies, CFC producers, quota system and trading administrative procedures, reporting requirements and penalties in case of violations.

45. Based on the production phaseout target decided by this Sector Plan, SEPA will issue a tradable production quota to existing CFC producers. The quota issued will clearly state the types and amount of CFCs allowed to be produced by each producer. Management of the CFC production quota will follow the Halon production quota procedure. The quota may be traded among quota holders.

D.4. CFC Import Licensing System

46. A CFC import licensing system will be issued and implemented while implementing the CFC production quota system. All enterprises and organizations importing CFC must submit import licensing application to SEPA and obtain SEPA's approval. It would also help China to control illegal trade.

D.5. CFC export application and registration system.

47. All enterprises and organizations which export CFC must report and register the type, quantity, and destination of CFC exports to SEPA in advance of the actual trade. SEPA will issue export permits for exporters based on registered information after confirmation that the export does not violate requirements on CFC trade by the MP. Customs will allow exports based on the export permits issued by SEPA.

48. Implementing the CFC export application and registration system will: (i) control illegal trade of ODS; (ii) help SEPA to learn more about domestic consumption; and (iii) enable SEPA to adjust the total import quota based on export data.

D.6. Bidding System

49. This system introduces a market mechanism in the phaseout process and producers are free to bid based on their corporate strategies and market outlooks. By introducing a competitive bidding system into CFC production phaseout, China will disburse funds to prospective participants who submit competitive unit bid price (\$/kg) for closing certain units of CFC production. This system was first adopted in the implementation of the *Sector Plan for Halon Phaseout in China*.

D.7. Promotion in the application of CFC Substitutes.

50. China will promote the consumption of substitutes by introducing appropriate incentives for consumer industries.

D.8. Data registration, reporting and monitoring system.

51. Based on the requirement of the (i) Circular on data reporting for ODS production, consumption, and import and export (NEPA, 1994), (ii) Circular on implementing discharge registration (NEPA, 1997), and (iii) Circular on using the reporting and registration data base management system for ODS (NEPA, 1997), SEPA will ask all CFC producers to register their production and other required data. The management agencies concerned (for example, local EPBs and local chemical industrial bureau) should report to their higher administrative level on data and information collected both from enterprises and by other channels.

52. These agencies are also responsible for regular and spot inspections of CFC producers for data and information accuracy. This would allow SEPA to follow production, import and export trends on a regular and timely basis.

53. *Strengthening Local EPBs Monitoring and Supervision.* Based on the current reform of government agencies and to ensure the phaseout process progresses smoothly, it is necessary to strengthen the monitoring and supervision capacities of EPBs at different government levels, especially local EPBs. Acknowledging the importance of local EPBs and the need of CFC phaseout in China, SEPA had issued a “Circular on enhancing the monitoring and supervision function for Ozone Layer Protection by local EPBs” in 1997. This circular requires local governments to consider the protection of the Ozone Layer as their responsibility and to link the monitoring of CFC phaseout into the pollution control management framework. The Circular also asked for sufficient staff or officials to take charge of this work. The specific requirements are:

- (a) to utilize the pollution discharge registration policy by collecting data on local CFC production and consumption. Local EPBs should design local CFC phase out plan and measures;
- (b) to assist the organization concerned to take the financial assessment and investigation on data on production and consumption of ODS;
- (c) to implement the environmental impact assessment;
- (d) to monitor and manage the MLF project at the local level and to enforce the project being implemented following the agreed project plan;
- (e) to ensure that the products and production equipment being phased out are not transferred to other producers using/producing ODS;
- (f) to actively organize education and training activities for policies and regulations, and to provide information on Ozone Layer protection development and other information; and
- (g) to provide assistance to independent audit agency in carrying out the audit.

V. ACTION PLAN

A. Introduction

54. This chapter presents the action plan for implementing the CFC production phaseout schedule proposed in Chapter III, including annual phaseout targets, MLF funds required to meet those targets (based on cost analysis presented in Chapter III), and key policies and other actions that will be implemented to achieve the phaseout objectives. As long as funds are made available in a timely manner, the Government commits to phaseout CFCs according to the proposed Action Plan. The proposed Action Plan has three phases:

- a) **Phase one--1999.** CFC production phaseout will begin upon ExCom's approval of funds. In 1999, CFCs in Annex 1 will be reduced from 50,324 MT to 44,931 MT (ODP), the freeze level of China CFCs production, while CFC-13 (Annex B) production remains unconstrained;
- b) **Phase two--2001-2005.** During this period, annual production (ODP) of CFC in Annex 1 will be reduced to 22,466 MT in 2005; and CFC-13 (Annex B) production will follow MP phaseout schedule.
- c) **Phase three--2006-2010.** During this period, production of all CFCs will be reduced to zero by 2010.

B. Phase One -- 1999

55. Phase one will begin on January 1, 1999 after ExCom approval of the Sector Plan and the 1999 Annual Program in November 1998, and continue through December 31, 1999. The phaseout amount, funding request and main phaseout activities for this Phase are listed in Tables 19 and 20. To achieve its target, i.e. to freeze the production in 1999 to the average of 1995-1997 production, the Government will take actions in two aspects:

- (a) for those enterprise/production lines with no production in 1997 -- they will be required to dismantle their production facility and demolish name-plate capacity. This will be done through the Government not granting them any production quota in 1999 and with MLF assistance for plant closures; and
- (b) for those production lines in production in 1997 -- a production quota system will be introduced at the end of 1998 and plants in production in 1997 will be allocated a production quota based on their production level. These enterprises will be allowed to bid for grant funds, also at the end of 1998. The production quota and bidding system will be similar to the halon sector, but adjusted for CFC sector characteristics.

Table 19: Phase one - Shut down lines without production in 1997 and funding requests

CFCs	Number of Lines	Name-plate Capacity (MT)	Funding Request (US\$ mil)
CFC-11	4	7,000	
CFC-12	14	19,080	
CFC-113	2	1,000	
Total	20	27,080	1.98

Table 20: Phase One - Phaseout Targets, Funding Requests, and Actions

Phaseout and funds	Baseline 1997	1999
Production Target(MT ODP)		
CFC-11	23,647	22,900
CFC-12	22,943	17,731
CFC-113	3,630	4,100
CFC-114	11	20
CFC-115	93	180
Total ODP for Annex A	50,324	44,931
Phaseout Target ⁸ (MT ODP)		
CFC-11		747
CFC-12		5,212
CFC-113		-470
CFC-114		-9
CFC-115		-87
Total ODP for Annex A		5,393
Funding request from MLF in PV terms (\$ mill)		38.81
of which, TA activities ⁹ (\$ mill)		0.35
Phaseout measures	<ul style="list-style-type: none"> · Close 2 CFC11 production lines · Close 5-6 CFC12 production lines 	
Policy measures	<ul style="list-style-type: none"> · Introduction of bidding scheme to support for closure of CFCs production; · Enforcement of CFCs Production Quota System; and · Strengthening of data reporting and check system and supervision and management of CFCs production, as well as for import and export. 	

⁸ The "phaseout amount" is based on reductions from previously reported 1997 baseline production figures. Actual phaseout would be the amount needed so that production target is not exceeded.

⁹ The "funding request from MLF" is derived from the cost analysis described in Chapter III.

Technical Assistance Activities	<ul style="list-style-type: none">· Workshops for officials of EPBs, customers, manager of CFC producers, and auditors;· Develop CFCs import and export management policy· Develop MIS for CFCs production;
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C. Phase Two -- 2000-2005

56. Phase two will begin on January 1, 2000 and end on December 31, 2005. The phaseout timetable, funding request and main phaseout activities for this Phase are listed in Table 21. During this stage, the Government will continue to close a certain number of CFCs producers (or specific production lines) through the bidding and quota systems.

Table 21: Phase Two - Phaseout targets, funding requests and Actions

Phaseout and Funds	2000	2001	2002	2003	2004	2005
Production Targets(MT ODP)						
CFC-11	18,900	16,700	16,400	15,000	13,100	10,400
CFC-12	17,600	16,600	14,100	13,100	10,900	7,600
CFC-113	3,300	2,700	2,200	1,700	1,100	550
CFC-114	20	20	20	20	20	20
CFC-115	180	180	180	180	180	180
Total ODP for Annex A	40,000	36,200	32,900	30,000	25,300	18,750
CFC-13	80	100	100	50	50	50
Phaseout Targets ¹⁰ (MT ODP)						
CFC-11	4,000	2,200	300	1,400	1,900	2,700
CFC-12	131	1,000	2,500	1,000	2,200	3,300
CFC-113	800	600	500	500	600	550
CFC-114	0	0	0	0	0	0
CFC-115	0	0	0	0	0	0
Total ODP for Annex A	4,931	3,800	3,300	2,900	4,700	6,550
CFC-13	0	0	0	0	0	0
Funding request from MLF(PV of each year, in 1999 \$ mill) ¹¹	28.67	20.92	22.29	20.09	25.15	29.39
Of which TA activities	0.90	0.8	0.60	0.50	0.30	0.20
Policy and other actions	2000-2005					
Phaseout Measures	· Shut down CFCs enterprises/production lines					
Policy measures	· CFCs import licensing system; · CFCs export application and registration system;					
Technical Assistance Activities	· Publicize CFCs production phaseout plan and educate officials, managers and the public; · Training workshops; and · Evaluate effect of policies to date.					

D. Phase Three: 2006-2010

57. Phase three begins on January 1, 2006 and ends December 31, 2010. The phaseout time table, funding request and main phaseout actions for this Phase are listed in Table 22. During this stage, the Government of China will close all CFCs producers (or production lines) through the bidding.

¹⁰ The "phaseout amount" is based on reductions from previously reported 1997 baseline production figures. Actual annual phaseouts would be the amount needed so that production target is not exceeded.

¹¹ The "funding request from MLF" is derived from the cost analysis described in Chapter III.

Table 22: Phase Three - Phaseout, Funding Requests, and Actions

Phaseout and funds	2006	2007	2008	2009	2010
Production Targets(MT ODP)					
CFC-11	7,700	4,710	3,600	200	0
CFC-12	5,600	4,700	3,600	2,800	0
CFC-113	550	0	0	0	0
CFC-114	20	20	20	20	0
CFC-115	180	180	180	180	0
Total ODP for Annex A	13,500	9,600	7,400	3,200	0
CFC-13	10	10	10	10	0
Phaseout Targets ¹² (MT ODP)					
CFC-11	2,700	2,990	1,110	3,400	200
CFC-12	2,000	900	1,100	800	2,800
CFC-113	550	0	0	0	0
CFC-114	0	0	0	0	20
CFC-115	0	0	0	0	180
Total ODP for Annex A	5,250	3,890	2,210	4,200	3,200
CFC-13	0	0	0	0	10
Funding request from MLF(PV of each year, in 1999 \$ mill)	23.64	19.25	14.22	13.27	11.21
Of which, TA	0.10	0.10	0.10	0.05	0
Policies and other actions	2006-2010				
Phaseout measures	<ul style="list-style-type: none"> Gradually shut down all the CFCs production lines 				
Policy measures	<ul style="list-style-type: none"> Continue to carry out bidding and production quota systems 				
Technical assistance activities	<ul style="list-style-type: none"> Training workshops Publicize CFCs production phaseout plan and educate officials, managers and the public; and Evaluate effects of policies to date. 				

¹² The "phaseout amount" is based on reductions from previously reported 1997 baseline production figures. Actual phaseout would be the amount needed so that production target is not exceeded.

Table 23: Action Plan for CFCs Production Phaseout, January 1, 1999---January 1, 2010

		Phase one	Phase two						Phase three					Total funding request*
Year	Baseline production	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
CFC11 (MT ODP)														
Production target	23,647	22,900	18,900	16,700	16,400	15,000	13,100	10,400	7,700	4,710	3,600	200	0	
Production phaseout target		747	4,000	2,200	300	1,400	1,900	2,700	2,700	2,990	1,110	3,400	200	
CFC12 (MT ODP)														
Production target	22,942	17,731	17,600	16,600	14,100	13,100	10,900	7,600	5,600	4,700	3,600	2,800	0	
Production phaseout target		5,212	131	1,000	2,500	1,000	2,200	3,300	2,000	900	1,100	800	2,800	
CFC113 (MT ODP)														
Production target	3,630	4,100	3,300	2,700	2,200	1,700	1,100	550	0	0	0	0	0	
Production phaseout target		(470)	800	600	500	500	600	550	550	0	0	0	0	
CFC114 (MT ODP)														
Production target	11	20	20	20	20	20	20	20	20	20	20	20	0	
Production phaseout target		(9)	0	0	0	0	0	0	0	0	0	0	20	
CFC115 (MT ODP)														
Production target	93	180	180	180	180	180	180	180	180	180	180	180	0	
Production phaseout target		(87)	0	0	0	0	0	0	0	0	0	0	180	
Total ODP for Annex A														
Production target	50,324	44,931	40,000	36,200	32,900	30,000	25,300	18,750	13,500	9,600	7,400	3,200	0	
Production phaseout target		5,393	4,931	3,800	3,300	2,900	4,700	6,550	5,250	3,890	2,210	4,200	3,200	
CFC13 (MT ODP)														
Production target			80	100	100	50	50	50	50	10	10	10	0	
Production phaseout target			0	0	0	0	0	0	0	0	0	0	10	
Funding request from MLF		38.81	28.67	20.92	22.29	20.09	25.15	29.39	23.64	19.25	14.22	13.27	11.21	266.9
(\$ mill) (PV of each year, in 1999) of which, TA activities		0.35	0.90	0.80	0.60	0.50	0.30	0.20	0.10	0.10	0.10	0.05	0	

* Including for enterprises closed in 1997(PV in1999 \$'000)

VI. OPERATING MECHANISMS

A. Introduction

58. Upon approval of the Sector Plan, the Government will introduce necessary policy measures and take relevant actions, as described in Chapter V, so that a rapid, cost-effective CFC phaseout, as indicated in the Sector Plan implementation schedule, can be achieved. This chapter explains funding arrangements, operating mechanisms, and responsibilities of various institutions involved in implementation of this Sector Plan.

B. Umbrella Grant Agreement

59. The World Bank and China have signed an Umbrella Grant Agreement which sets forth the terms under which grant resources approved by the ExCom sector approach programs in China would be carried out. This Umbrella Grant Agreement is similar to the umbrella grant agreements under which project-by-project activities are carried out. However, it includes provisions which allow the Bank to disburse funds to China based on performance indicators in terms of CFCs phaseout at the national level rather than for procurement of goods and services at the enterprise level. The Umbrella Grant Agreement was signed in December, 1997 after the Sector Plan for Halon Phaseout in China was approved by ExCom in November 1997.

C. Funding Arrangements

60. *MLF Approval.* Funds for the CFC Sector Plan would be approved in two steps:

- a) First, the Government, through the World Bank, requests that the ExCom consider this overall sector phaseout plan and agree to fund CFC Production phaseout with annual advances, as described in Chapters III and V, provided that China meets the annual phaseout targets in Chapter V. At the same time, China requests ExCom to fund the 1999 Annual Program in November 1998. The 1999 Annual Program has been submitted as a separate document.
- b) Second, the Government, through the World Bank, would submit its request for release of funds at the last meeting of the ExCom of each subsequent year to implement annual phaseout plans for following years beginning with the 2000 Annual Program funding request. This annual funding request would be consistent with amounts in the overall sector plan. For example, The World Bank, on behalf of the Government, would submit the 2000 Annual Program to the ExCom in time to allow for funds to be released before the end of 1999. The ExCom would be asked to release funds at the levels agreed to in this Sector Plan, based on achievement of phaseout targets of previous years. In general, annual release of funds would be based on achievement of CFC production phaseout targets (production targets for the previous year not exceeded).

- c) As the 1999 production target would be achieved only at the end of 1999 and confirmed in early 2000, the 2000 Annual Program funding request would be based on the semi-annual progress report of 1999.
- d) Annual program funding requests for the years 2001-2010 would be based on achievement of CFC production phaseout targets of the previous year and the semi-annual progress report of the current year. For example, year 2001 funds would be released based on 1999 phaseout results and the 2000 semi-annual progress report, 2002 funds on 2000 phaseout results and 2001 semi-annual progress report, and so on.

61. In the unlikely event that China were to fall short of phaseout targets for a given year (that is CFC production exceeds the target), the Bank and China would agree on remedial actions. New funding requests to the ExCom would go forward only after phaseout targets had been met.

62. *Remedial actions* have been built into the CFC production quota regulation and would go into effect should production exceed the quota. A national quota equal to the national production targets would be allocated annually to enterprises. Enterprises exceeding their production quota in a given year would be fined according to the quota regulation, and the subsequent year's quota would also be proportionally reduced. For example, if an enterprise exceeded its CFC production quota in 1999 by 100 tons, its eligible quota for 2000 would be reduced by 100 tons. Depending on circumstances that have caused the delay in program implementation, other specific remedial actions would be agreed between the Bank and China as the need arises.

63. By the time any over-production for a previous year is confirmed, the current year's Annual Program would most likely already be funded and be underway. Thus, the proposed approach to remedial action is to bring the program back on track by the end of the current year. For example, if over-production occurred in 1999, remedial actions would ensure that, by the end of 2000, cumulative production for the two years 1999 and 2000 would not exceed the combined targets for those years. The remedial actions taken to assure this result would be submitted along with the next year's funding request (the 2001 Annual Program, using the above example). The ExCom would then be in a position to either release funds or condition release of funds for the next year's Annual Program upon evidence that the remedial actions were successful and that the combined two year production did not exceed combined targets. This approach to remedial action allows the program to maintain momentum and keeps the phaseout schedule on track even if difficulties arise in a particular year.

64. If within two years the program is still not back on-track, continued funding of the program could be based on a reduced level of compensation. For example, future funding eligibility could be reduced based on the slower phaseout schedule. As production phaseout is based on compensation for lost profits and plants have continued to produce, it would reduce the level of profits that would be foregone, grant compensation could be reduced proportionally. Under this plan, grant funds would be released for Annual Programs and advanced through the World Bank to China to achieve specific phaseout targets. As such, the Government requests use of these funds to achieve those targets even in the face of delays. However, if it becomes clear

that a delay is persistent and the phaseout targets would not be achieved within schedule of Montreal Protocol controls, funds proportional to phaseout shortfall would be reimbursed to the Multilateral Fund.

65. *Annual Programs* would comprise of the following sections:

- a) sector phaseout schedule;
- b) performance of activities of previous years and any agreed remedial actions for the current year (not required for the 1999 Annual Program);
- c) performance of activities of current year (not required for 1999 Annual Program);
- d) objectives of following year's Annual Program -- its phaseout targets and funding requirements for different activities in the following year¹³;
- e) description of activities in the following year -- policies to be implemented and technical assistance activities;
- f) tables --
 - i) Table I: 1999 Annual Program -- targets and activities with details on policy actions, enterprise actions and technical assistance; and
 - ii) Table II: 1999 Annual Program on Performance Indicators; and

66. The World Bank would approve technical assistance activities consistent with the Annual Program based on agreed terms of reference up to level of TA funding approved under the Annual Program for that year.

D. Disbursement mechanisms

67. World Bank Disbursement to China -- following approval of funds for Annual Programs, the Bank will transfer grant funds to China's ODS phaseout account in accordance with the agreed disbursement conditions. There would be four disbursements into the ODS phaseout account for each Annual Program's activities. The Government would be allowed to request these four disbursements at any time during the year, provided disbursement conditions have been met. Disbursement conditions and amounts to be disbursed are:

- a) *First disbursement* -- funds for technical assistance and other services

Conditions --

- i) Annual Program has been approved by ExCom and the Bank; and

¹³ Total grant funding for each year would be agreed along with this sector plan proposal. However, China would have flexibility in each Annual Program to allocate funds within enterprise-level or TA activities to achieve phaseout targets.

ii) regulation on production quota is effective (1999 only).

c) *Second disbursement* -- 50 percent of funds allocated to enterprise activities

Conditions --

i) China confirms that CFC production has not exceeded production target set for the preceding program year or CFC production during the first nine months of the preceding year has not exceeded 80 percent of the production target set for the preceding program year (not applicable to 1999); and

ii) any other conditions as specified in the current Annual Program.

c) *Third disbursement* -- 30 percent of funds allocated to enterprise activities

Conditions --

i) China reports that actual CFC production has not exceeded the production target set for the preceding year (not applicable to 1999);

ii) all contracts for closure and other enterprises activities have been signed;

iii) signed closure contracts or appropriate government actions (e.g., quota allocation) which indicate that the production target set for the current program year is achievable;

iv) progress report on Annual Program implementation is satisfactory to the Bank; and

v) any other conditions as specified in the current Annual Program .

d) *Fourth disbursement* -- 20 percent of funds allocated to enterprise activities

Conditions --

i) China announces production quota of following year to remaining CFC producers;

ii) production audit (for 1999 only) and performance audits (2000 and after) are satisfactory to the Bank;

iii) progress report satisfactory to the Bank; and

iv) any other conditions as specified in the current Annual Program.

68. If the Bank finds implementation progress is unsatisfactory, either by reviewing the progress reports or during supervision missions, there would be no further disbursements. The Bank would resume disbursements only after China and the Bank agree on remedial actions to rectify implementation deficiencies.

69. *Chinese Government allocation of funds to CFCs production enterprises for phaseout activities.* Grant funds for phaseout activities of enterprises closed in 1997 will be directly allocated to the recipient enterprises; while grant funds for phaseout activities of enterprises which did have production in 1997 will be allocated to the recipient through a bidding system. The bidding system as a means of grant allocation is new to both China and the MLF, thus it is expected that the system will be improved over time as experience is gained. The first bidding would be offered at the end of 1998, following ExCom approval of the 1999 Annual Program. Since mid-1998, the Government has been laying the ground work for the grant bidding system, including preparation of bidding documents, introducing the bidding process to local environmental protection bureaus and CFC production enterprises, and preparing the regulation on production quota which is the basis of the bidding process. All will be in place for the bidding to proceed at the end of 1998. Preparation of bidding in subsequent years will start in the second half of each year and would be concluded after ExCom releases the following year's funds (e.g., bidding for funds for activities to be undertaken in 2000 would be completed by the end of 1999).

70. All the enterprises without production and the bid winning enterprises would sign "ODS reduction contracts" with the Government. As defined in the Umbrella Grant Agreement, under an "ODS reduction contract," the Government of China agrees to pay the beneficiary a specified amount per unit of ODS production to be reduced. In this way, grant allocation and payment are linked directly to enterprise-level CFCs phaseout activities which have been agreed as part of the Annual Program.

71. *Disbursement from MOF's ODS phaseout account to grant recipients.* Grant funds would be disbursed directly from the ODS phaseout account to recipients based on terms contained in "ODS reduction contracts" or, in the case of technical assistance activities, the terms contained in consultant or training contracts. For example:

- a) Closure projects -- ODS reduction contracts would specify disbursement as follows:
 - i) 10 percent -- initial payment upon signing of ODS reduction contract,
 - ii) 70 percent -- payment following dismantling production equipment, and
 - iii) 20 percent -- payment upon confirmation from Special Working Group for ODS Production Phaseout (SWGPP) that enterprise decommissioning is complete.
- b) Technical assistance activities -- grant funds would be disbursed to consultant firms or institutions in charge of training and technical assistance based on implementation progress.

72. If project implementation is lagging behind schedule, appropriate government authorities would be notified to take necessary actions. Disbursements would proceed only after progress toward project implementation and CFC phaseout is evidenced.

E. Management and Coordination

73. This Sector Plan for CFC Production Phaseout will be executed by the Government of China. The Special Working Group for ODS Production Phaseout (SWGPP) will manage and coordinate execution of each year's Annual Program. In addition, SEPA has selected a qualified firm¹⁴ to help manage day-to-day enterprise-level activities. The World Bank will supervise overall implementation of this Sector Plan, replenish the local project bank account, report to the ExCom on implementation progress, and submit future funding requests to the ExCom.

74. The national execution management and coordination functions are as follows:

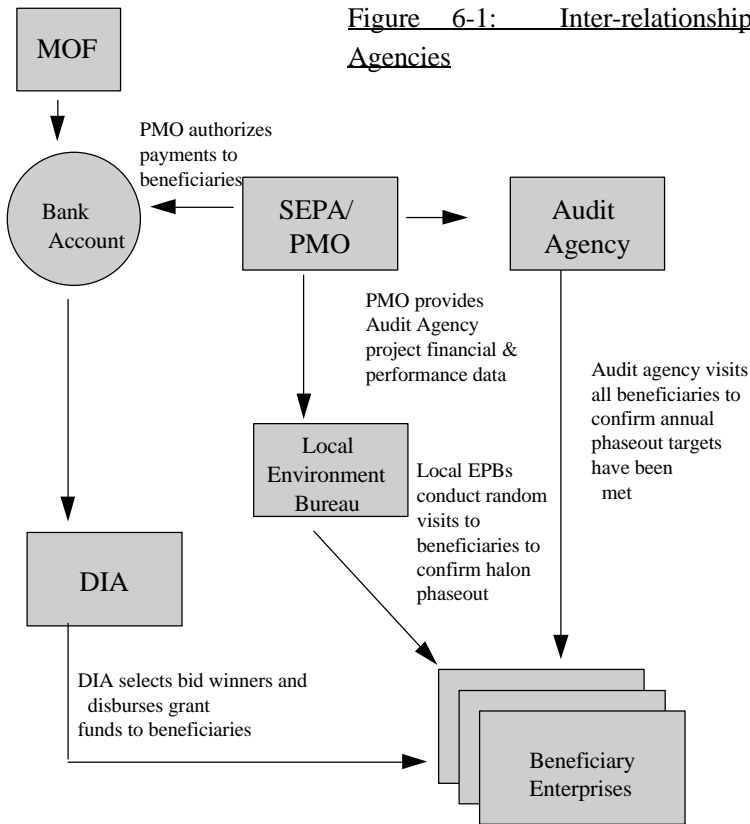
- a) *Project Management Office* (PMO) is an administrative office within the State Environmental Protection Agency (SEPA) with overall responsibility for implementation of China's ODS Phaseout Country Program including the Sector Plan for CFC Production Phaseout. In December 1997, the PMO established Unit called a special working group for ODS production phaseout (SWGPP) comprised of officials from PMO, the consultant team who helped design the overall policy framework for China's CFC production phaseout plan, technical consultants and the domestic implementing agency (DIA). With support from the PMO, this Unit will handle the following work related to the CFC production sector plan:
 - i) set up and implement a monitoring and reporting system including an MIS to track implementation of Annual Programs and all activities related to CFCs production phaseout;
 - ii) report to the World Bank quarterly on Annual Program implementation;
 - iii) review bid winner selection;
 - iv) authorize disbursement requests to enterprises, as prepared by DIA;
 - v) monitor and enforce the CFCs production quota system;
 - vi) implement technical assistance activities with relevant ministries, and
 - vii) verify CFCs phaseout for completed enterprise-level activities and oversee preparation of performance and financial audit reports.
 - viii) development, implementation, and enforcement of CFCs production phaseout policies; and

¹⁴ SEPA will sign a contract with the firm following approval of funds for the 1999 Annual Program.

- ix) monitoring CFCs producer compliance with quota system.
- b) On a day-to-day basis, the local environmental protection bureaus will, on behalf of the PMO, conduct random visits to beneficiary enterprises to confirm CFC production phaseout.
- c) **The Domestic Implementation Agent (DIA)** -- In May 1997 a DIA was selected by the PMO through a competitive bidding process¹⁵ for the halon sector. It has not been decided yet whether a new DIA will be selected for the production sector. Under the guidance of the PMO, it will carry out day-to-day supervision of enterprise-level activities, including:
 - i) run the annual bidding process and evaluate bid documents to select winners according to lowest bid following bidding principles;
 - ii) supervise implementation of enterprise-level activities selected through the bidding process and enterprises without production in 1997;
 - iii) review disbursement requests from beneficiaries and prepare disbursement requests to PMO for authorization;
 - iv) report to PMO on status of enterprise project implementation; and
 - v) identify and alert PMO to any issues identified during its supervision of enterprise-level activities.
- d) On a day-to-day basis, the EPBs will monitor compliance with policies and on behalf of the PMO, EPBs will conduct random visits to beneficiary enterprises to confirm project progress.

75. The inter-relationships among Chinese agencies involved in implementation of sector plan for CFCs production phaseout is diagrammed in Figure 6-1.

¹⁵ The DIA was selected by NEPA from a short list of consultant firms agreed with the World Bank that are experienced in financial and project management.



F. Monitoring and Evaluation

76. The PMO is the focal point for monitoring implementation of annual CFC sector phaseout plans and reporting to the World Bank. Figure 6-1 diagrams information flows related to project monitoring, reporting, supervision, and evaluation. Progress on CFC reduction projects (which have been selected through the bidding scheme) will be tracked by the DIA who will submit written progress reports to the PMO four times a year. Implementation of policy measures and technical assistance activities will also be tracked by the PMO. The PMO will formally report to the Bank four times a year. The reporting tables to be prepared by the Special Group for ODS Production Phaseout have been agreed between the Bank and China. These will be revised each year as needed during Annual Program preparation as more experience is gained. The World Bank will report twice annually to the ExCom based on indicators agreed in the Annual Program. A mid-year progress report would be submitted each year along with the Annual Program funding request for the next year. The end-of year report would be submitted along with the Bank's technical assessment of annual program performance by July of the next year.

77. *Audits.* Throughout implementation of this CFC production sector phaseout plan, as agreed in the Umbrella Grant Agreement, the Government of China will commission an independent performance audit of each year's Annual Program and an independent financial audit of the ODS phaseout account. In addition, the Bank will conduct an independent technical assessment to verify annual CFC production levels. The World Bank will supervise the implementation of Annual Programs including spot checks of program records in China and random visits to CFC sector enterprises.

**PART IV: SECTOR STRATEGY FOR GRADUAL PHASE-OUT OF CFC-11 & CFC-12
PRODUCTION IN INDIA**

**MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL
PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER**

PROJECT COVER SHEET

COUNTRY	India
PROJECT TITLE	Sector Strategy for gradual phaseout of CFC-11 & CFC-12 production in India
SECTOR COVERED	CFC Production Sector
IN CURRENT BUSINESS PLAN	Yes
PROJECT IMPACT	22,589 MT
PROJECT DURATION	11 years
TOTAL PROJECT COST	
Production Compensation	US\$179.8 million (NPV, 1999)
Labor Compensation	US\$5.23 million (NPV, 1999)
Technical Assistance	US\$2.09 million (NPV, 1999)
LOCAL OWNERSHIP	100 percent
EXPORT COMPONENT (1997)	Non-Article 5 Countries: 0. Article 5 countries: 68% of production.
PROPOSED OTF FINANCING	US\$187.12 million
IMPLEMENTING ENTERPRISES	Chemplast Ltd. Gujarat Fluorochemicals Ltd. Navin Fluorine Ltd. SRF Limited
COORDINATING NATIONAL BODY	Ozone Cell, Ministry of Environment and Forests, India.
IMPLEMENTING AGENCY	The World Bank

PROJECT SUMMARY: Under an agreed gradual phaseout sector strategy program with the implementing enterprises and the Ministry of Environment and Forests (MoEF), India will phase out production of CFC-11 and CFC-12 on a linear basis ahead of the phase-out required under the Montreal Protocol. India has requested that the Net Present Value of proposed compensation for phaseout of CFC production be presented as a request for a single payment in 1999. In order to fulfill its fiduciary obligations to the Multilateral Fund, the World Bank cannot, however, transfer these resources in one payment, but will require execution of a Grant Agreement clearly stating the legal and financial obligations of the parties involved, the terms of transfer, the required bench-marks, triggers for enabling disbursements, and other milestones and monitoring arrangements.

Technical Assessment: The proposal has been reviewed by the OORG Reviewer, Dr. Mike Harris. His comments are attached (Annex III).

Executive Summary

A. OBJECTIVES AND PRINCIPLES

1. The objectives of the Sector Strategy For Complete phaseout of CFC-11 & CFC-12 Production in India are to meet the obligations of India under the Montreal Protocol by phasing out production of CFCs (specifically CFC-11 and CFC-12) in a coordinated program by 2010, without unduly harming industrial and economic growth or consumer interests in affected sectors. Towards this end, MoEF will use policies and incentives to support and promote the phaseout of CFC production, channel MLF funds to beneficiaries through an efficient mechanism that encourages compliance with the goals of the Phaseout Plan, and develop and implement reporting and auditing mechanisms that permit India to demonstrate to the Montreal Protocol that phaseout has been accomplished according to the plan.

2. The CFC Production Sector Phaseout Plan has been developed on the basis of India's obligations under the London Amendment of the Montreal Protocol, the Country Program (currently being updated), recommendations made by the Multilateral Fund's MLF Secretariat's Expert Group on Production to the Executive Committee's Sub-group on Production, data collected from the producing enterprises, and field visits and discussions with the four companies producing CFCs in India. The Sector Plan is consistent with the MLF principles and guidelines for calculation of incremental costs, and the methodology adopted to calculate complete phaseout costs is based on India's and the World Bank's understanding of the draft guidelines for production phaseout. The plan assumes that the MLF would provide eligible funds required to finance the phaseout of CFC production and disburse them on agreed terms and in a timely fashion, and that the Government of India (GOI) in return will phase out CFC in a cost-effective manner, in accordance with agreed overall and annual targets. The Ministry of Environment and Forests (MoEF), GOI will also, with the initial support of the World Bank, establish a project management unit (PMU) to monitor, ensure and evaluate adherence to the program. The Sector Plan seeks funding only for costs of phaseout for CFC production and excludes a strategy and incremental costs of substitute production in India, for which GOI reserves the right to make a separate request once guidelines for substitutes have been agreed by ExCom.

B. CALCULATION OF COMPENSATION

3. The incremental costs of phasing out CFCs in India are based on the results of calculations done with a computer-based model (described in detail in Chapter IV), which was developed to provide a basis for choosing a cost-effective phaseout profile for India and to determine both total incremental costs to the Indian economy and eligible incremental costs for which funding is being requested. The analysis estimates a total compensation package including lost profits from premature closure, workers' compensation, and costs of technical assistance activities, including design and implementation of policies and regulations, publicity, technical assistance to enterprises, verification and testing equipment and management information systems (to monitor CFC phaseout).

4. The calculation of compensation for CFC producers includes identification of parameters related to CFC production phaseout that determine future profit streams, and collection of data to determine local costs that are used in the model.

Capacity A net eligible capacity of 55,971 MT for CFC production has been calculated, based on total verified capacity, excluding expansion commissioned after July 1995 in one of the plants and subtracting capacity used for HCFC-22 production.

Actual production The reported average of annual CFC production in calendar years 1995–1997 was 22,589 MT. This is taken to represent both the calculated freeze level effective from July 1, 1999, and also the baseline production level for calculating compensation.

Plant life Three out of four plants in India, Chemplast, SRF and GFL, are single-stream plants that were commissioned in 1988 or 1989. The fourth plant (Navin) is a dual-stream plant with one stream starting in 1968 and the second stream in 1980. For the three single-stream plants and the older Navin line (which was substantially expanded in 1988 and 1995), an eligible life of 25 years has been assumed. The second stream at Navin was given an eligible life of 88 months, assuming approval of the India proposal in 1999 and applying option (b) of the calculation procedure recommended in the draft guidelines.

C. POLICIES TO SUPPORT PHASE-OUT

5. Chapter V includes a description of policies that will be introduced to support the phaseout strategy and its implementation, in light of experiences to date with policies and actions already taken to influence growth of production and consumption of CFCs in India. As indicated in its original Country Program, GOI has adopted a policy approach that uses a mix of instruments, in the form of voluntary agreements, legislation and regulation, fiscal incentives, educational programs and informational campaigns. GOI intends to continue this approach during implementation of the phaseout in the CFC Production Sector. GOI is also planning to augment the existing regime with additional measures, including the ODS (Regulation) Rules that will take effect later in 1999.

D. ACTION PLAN AND OPERATING MECHANISMS

6. The Action plan for implementing the Phaseout Program is summarized in Chapter VI, and the operating mechanisms are described in Chapter VII.

E. TECHNICAL ANNEX

A Technical Annex describing the individual operations of the four enterprises that manufacture CFCs in India is attached to the proposal (Annex I).

CHAPTER I. Introduction

A. BACKGROUND

1. India became a party to the Vienna Convention on June 19, 1991 and signed the Montreal Protocol on Substances that Deplete the Ozone Layer on September 17, 1992. Since its annual calculated level of consumption of controlled substances listed in Annex A of the Protocol was less than 0.3 kg per capita, India falls under paragraph 1 of Article 5 of the Protocol, and therefore qualifies for financial and technical assistance, including transfer of technologies, through the Financial Mechanism of the Protocol in order to permit compliance with the control measures of the Protocol.

2. India began to phase out ODS consumption in 1994 under its National Program for Phaseout of Ozone Depleting Substances with support from the Multilateral Fund (MLF). Including approvals given at the 26th ExCom meeting, the Government had received approval for grants amounting to approximately \$50.4 million which should result in a phaseout of 6,239 tons of ODP. In spite of these projects, the overall consumption of ODS in India has not shown any appreciable decline, reflecting the sustained and rapid growth of domestic demand for products that use ODS in their manufacture or operation, such as refrigeration, air-conditioning, and solvents.

3. In contrast to the support given by MLF for the phaseout of ODS consumption, the ODS production sector in India has not received any assistance to date. Production of CFCs has been rising both to meet demands for CFCs within India and also to supply the global market in Article 5 countries. GOI is conscious that CFC production in India must be controlled and reduced over time in order for the country to meet its obligations to the Protocol to phase out ODS consumption.

4. This CFC Production Sector Phaseout Plan proposes a phaseout strategy and an action program that will allow India to control production effectively and to meet the phase-down targets to which the country has committed itself. The Phaseout Plan is consistent with the draft guidelines for CFC production phaseout that have been developed by the MLF Secretariat's expert group on production, which was established by the 12th ExCom meeting in 1994 (Decision UNEP/Ozl.Pro/ExCom/12/37, paragraph 109).

5. The preparation of this CFC Production Sector Phaseout Plan was organized by the Ozone Cell of MoEF and the World Bank.

B. SECTOR APPROACH

6. The objectives of the CFC Production Sector Phaseout Plan are to:

i) meet the obligations of the GOI under the Montreal Protocol by gradually phasing out CFC (specifically CFC-11 and CFC-12) production and consumption in a coordinated program without harming unduly industrial and economic growth in affected sectors and while protecting consumer interests;

- ii) phase out CFC production in a manner that is cost-effective for both India and the MLF, while assuring that demands for substitutes are also met in a cost-effective manner;
- iii) use policies and incentives to support and promote the phaseout of CFC production;
- iv) channel MLF funds to beneficiaries through an efficient mechanism that encourages compliance with the goals of the Phaseout Plan; and
- v) develop and implement reporting and auditing mechanisms that permit India to demonstrate to the ExCom that phaseout has been accomplished according to the plan.

C. PRINCIPLES AND CONTENT OF PROPOSAL

7. The CFC Production Sector Phaseout Plan has been developed on the basis of:
- i) the GOI's obligations under the London Amendment of the Montreal Protocol;
 - ii) the India Country Program on "Phaseout of Ozone Depleting Substances under the Montreal Protocol", which is currently being updated;
 - iii) the draft guidelines prepared by the production sector expert group, as summarized in the "Report of the Third and Fourth Meetings of the Expert Group on the Production of Substitutes for Ozone-Depleting Substances";
 - iv) data collected through questionnaires and plant visits from the producing enterprises for the financial year ending March 1998; and
 - v) discussions with the companies currently producing CFCs in India.
8. The Sector Plan is consistent with the MLF's principles and guidelines for calculation of incremental costs, and the methodology adopted to calculate phaseout costs is based on India's and the World Bank's understanding of the draft guidelines on CFC production phaseout. The principles under which this plan is submitted for ExCom approval are that:
- i) MLF would provide funding for eligible incremental costs related to the phaseout of CFC production in India;
 - ii) GOI in return will phase out CFC in a cost-effective manner, and commits to implement the phaseout plan in accordance with the overall and annual targets, on the assumption that MLF approves the plan and disburses funds on a timely basis;
 - iii) GOI will, with the support of the World Bank in the initial stages, establish a reasonable mechanism to manage the phaseout process, including monitoring, evaluation and auditing required to document achievement of phaseout targets, issue and implement necessary regulations and policies, provide technical support, and carry out educational and public relations activities related to the phaseout;
 - iv) the Sector Plan seeks funding only for costs of phaseout for CFC production and excludes a strategy and incremental costs of substitute production in India, for which GOI reserves the right to make a separate request once guidelines for substitutes have been agreed by ExCom;
 - v) the Sector Plan does not seek funding for phaseout and dismantling of CFC-113 facilities, which have nameplate capacity of 660 TPA, on the grounds that production has been suspended for two years and capacity is no longer serviceable without substantial investment; and

vi) the Sector Plan does not seek funding for the costs of phasing out Halon production in India, on the understanding that a separate proposal for this sector will be submitted by GOI at a later date.

CHAPTER II. CFC Production and Consumption in India

A. INTRODUCTION

1. The use of CFCs in India dates back to the early 1960s, when most of the CFCs were embodied in imported goods. The industrialization process in India led to the establishment of domestic production of CFC-using industries over the past thirty or so years, starting in the 1960s with domestic and commercial refrigeration and chilling equipment, and followed by air-conditioning, foam products and aerosols in the 1970s. After initially importing its CFCs, India started domestic production in the late 1960s as the demand from CFC-consuming industries reached levels that enabled local production, based on imported technology, to compete with imports, albeit behind high tariff barriers. In the late 1980s, capacity for production of CFC-11 and CFC-12 was expanded ahead of domestic demand, and subsequently India has become a significant exporter of CFCs.

B. PAST GROWTH OF DEMAND AND MARKETS FOR CFCs IN INDIA

2. The task of establishing accurate data on the past evolution of markets for and consumption of CFCs is formidable in any economy, because of the diverse range of end-users and the number of products using CFCs. The task is made even more difficult in India because few efforts have been made to collect statistics in a form that allows such a perspective. However, this section attempts to provide as accurate a picture of the past market growth for CFC-using industries as possible, so as to provide a reasonable baseline for the projection of future market demands in both non-MP and with-MP scenarios.

Table 2.1: Past Consumption of Products using CFCs, 1991-2/97-98

Item	Unit	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98
Domestic Refrigerators	million	1.05	1.25	1.5	1.74	2.13	2.27	2.41
Chest Freezers	Units	34,600	36,400	38,200	41,000	43,000	44,000	45,000
Overall Refrigeration	% growth		19	20	16	22	7	6
Auto air-conditioners (MAC)	Units	62,000	56,000	74,000	100,000	185,000	195,000	213,000
MAC	% growth		-19	32	31	85	5.4	9.2
Water Coolers	Units	35,000	42,000	51,000	63,000	70,000	77,000	84,000
	% growth		20	21	23	11	10	9
Aerosols	MT	550	640	732	795	875	864	894
	% growth		16	14	9	10	-5	8
PUF	MT	460	380	386	675	829	998	691
	% growth		-17	2	75	23	20	-30

3. Domestic sales of CFCs over the period 1991-97 grew at an average of 8 % per annum, significantly slower than the expansion of CFC-using industries. Table 2.2 below summarizes the local consumption of CFC-11 and 12. The relatively slow growth reflects the impact of CFC phaseout in various industries, the result of implementation of both MLF-funded conversions and conversions funded by enterprises themselves.

Table 2.2: Domestic Consumption of CFCs, 1991-97

	1991	1992	1993	1994	1995	1996	1997
CFC-11	1,390	1,599	1,462	2,111	2,534	2,756	2,984
% of total sales	32.8	36.1	27.8	33.5	40.4	39.9	44.6
CFC-12	2,850	2,825	3,789	4,188	3,740	4,159	3,710
% of total sales	67.2	63.9	72.2	66.5	59.6	60.1	55.4
Total	4,240	4,424	5,251	6,399	6,274	6,915	6,694

C. PAST GROWTH OF CFC SUPPLY IN INDIA

4. *Production Facilities and Capacity* CFC production in India began in 1968, with the commissioning of a 1,200 ton capacity plant for production of CFC-11 and CFC-12 at Navin Fluorine Industries, located in Gujarat. A second line with 2,700 ton capacity was added in 1980. In 1987, Navin's second line was expanded to 6,600 tons; in 1988, Navin's first line was also expanded to 6,600 tons. In the same year, a 4,100 ton capacity facility was constructed at Chemplast Sanmar in Tamil Nadu; and, in the following year, two new plants with single lines of 25,000 tons and 19,000 tons capacity for CFC-11 and CFC-12 were opened by SRF in Rajasthan and by Gujarat Fluorochemicals in Gujarat respectively. All these CFC plants were operational by 1989, at a time when complete phaseout of CFCs was not being planned under the original Montreal Protocol.¹ Subsequently, in early 1995, Navin expanded its first line to 9,900 tons and in 1996 carried out a similar expansion of its second line, bringing its total nameplate capacity to 19,800 tons.

5. As of December 1998, total capacity for CFC-11/12 and for CFC-113 amounts to 67,900 TPA and 660 TPA in nameplate terms, respectively. Effective capacity for CFC-11/12 appears to be substantially the same as nameplate capacity, when measured by definitions developed by the Production Sector Working Group. Capacity eligible for compensation, using the same definition and verified by the World Bank through discussions with plant management and examination of production logs, has been calculated at 61,325 TPA (see Table 2.4 below.)

6. *Production Developments* Between 1991-92 and 1997-98, production of CFCs in India increased at an average growth rate of 31 %, to supply increasing domestic demand and the international market. Production trends for the industry as a whole are summarized in Table 2.3 below.

¹ Under the original (1987) Montreal Protocol, a 50% reduction in production by 1999 was mandated, with 50% of production and consumption to continue beyond 1999.

Table 2.3: CFC Production in India, 1991-97

	1991	1992	1993	1994	1995	1996	1997
CFC-11	1,450	1,732	2,892	4,202	6,608	7,282	8,635
CFC-12	3,280	4,312	8,520	12,356	15,042	15,176	15,024
Sub-total, CFC-11 & CFC-12	4,730	6,044	11,412	16,558	21,650	22,458	23,659
CFC-113				181	47	0	0
TOTAL	4,730	6,044	11,412	16,741	21,697	22,458	23,659

D. CFC PRODUCERS

7. Currently, there are four CFC producers in India: SRF Limited; Gujarat Fluorochemicals Limited; Navin Fluorine Industries, a branch of Mafatlal Industries Limited; and Chemplast Sanmar Limited (detailed profiles of each company are included in Annex I). Basic information on the plants is summarized in Table 2.4 below:

Table 2.4: Basic Data on CFC Producers in India

Name	Location	Product	Nominal Capacity, by line	Effective and Eligible Capacity*	Original Construction Date	1997 Production (tons) a/	1997 Exports (tons)
Shriram <u>b/</u>	Jhiwana, Rajasthan	CFC-11/12	25,000 TPA	25,000 TPA	March 1989	1,978 CFC-11 4,689 CFC-12	936 CFC 11 3,537 CFC 12
Gujarat	Ranjit Nagar, Gujarat	CFC-11/12	19,000 TPA	18,975 TPA	October 1989	3,730 CFC-11 4,795 CFC-12	2,968 CFC 11 3,363 CFC 12
Navin <u>c/</u>	Surat, Gujarat	CFC-11/12	9,900 TPA	8,250 TPA	1968	2,210 CFC-11 4,358 CFC-12	1,085 CFC 11 3,320 CFC 12
		CFC-11/12	9,900 TPA	5,000 TPA	1980		
		CFC-113	660 TPA	0	1990	0	
Chemplast	Mettur Dam, Tamil Nadu	CFC-11/12	4,100 TPA	4,100 TPA	1988	835 CFC-11 1,326 CFC-12	662 CFC 11 1,094 CFC 12

a/ Calendar year.

b/ SRF also has a 500 tpa plant, commissioned in 1994, for producing Halon 1211 and 1301.

c/ Navin also has a 300 tpa plant, commissioned in April 1992, for producing Halon 1211.

* Eligible capacity figures were obtained by World Bank staff through discussions with plant personnel and verification of production logs, using the definition of effective capacity provided in the draft guidelines. The figure for eligible effective capacity includes capacity that is used for producing HCFC-22 as well as CFCs, but excludes an estimate of effective capacity for the de-bottlenecking expansion carried out after July 1995.

E. CFC PRODUCTION TECHNOLOGY

8. All four plants in India make CFCs using carbon tetrachloride (CTC) and anhydrous hydrogen fluoride (AHF) with an antimony chlorofluoride catalyst in a liquid phase process. Technology has been imported from internationally-recognized sources. Navin's plants were supplied by von Heyden (later Hoechst); Chemplast's technology came from Navin; and SRF and Gujarat collaborated with Allied-Signal and Pennwalt, respectively.

9. All plants were designed as "swing plants", that is, to produce either CFC-11 / CFC-12 or HCFC-22, but not at the same time. Changeover from one reaction to the other is achieved by shutting off the feed of, say, CTC (carbon tetrachloride), purging the plant of all traces of CFC-11 and CFC-12, then starting a feed of CFM (chloroform). Details of changeover vary from company to company. At Gujarat Fluorochemicals and Chemplast the catalyst from one type of reaction is removed from the reactor to a holding tank and stored until needed for that reaction again. At Navin Fluorine, there are two separate production lines so that CFC-11 and CFC-12 and HCFC-22 can be produced simultaneously on the separate lines. If it is ever necessary to produce CFCs on both lines, the HCFC-22 catalyst is removed to a holding tank as at Gujarat. SRF have dedicated reactors for CFC-11/12 and for HCFC-22 production, but both feed into a single purification / distillation stream. The non-operational reactor is sealed off. In all cases, the changeover takes one to two days, and minor maintenance work is usually carried out during the shutdown period.

10. In CFC production, the general style of operation is to produce a mix of CFC-11 and CFC-12, which are then purified and separated by distillation. The ratio of CFC-11 to CFC-12 can be varied to meet market demand within a range of 30/70 and 70/30. If the market should require only CFC-12 at any time, this can be achieved by recycling CFC-11 for further fluorination, at the penalty of reducing the output rate by 20 to 30%.

F. CFC SUBSTITUTES

11. CFC substitutes are used, but not produced in India. Increased use of CFC substitutes is evident in MACs and foam sectors. The ODS regulations being finalized (described in more detail in Chapter V) envisage rapid phaseout in use of CFCs in original equipment manufacturers' plants.

Approximately 150 MT of HCFC-141b was imported in 1997. Some HFC-134a is also imported for use in auto air-conditioners by manufacturers and multi-national corporations, with major car producers expressing preference for non-CFC refrigerant and demand for substitutes in this sector is expected to grow rapidly in the next few years.

CHAPTER III. CFC Phaseout Strategy

A. PHASEOUT OBJECTIVES

1. The objectives of the CFC phaseout program in India are to meet the country's obligations under the Montreal Protocol by phasing out CFC production and consumption in a cost-effective manner while ensuring that the economic dislocation to industries that are currently involved in production and use of CFCs is minimized and that supplies of substitutes for CFCs are made available in a timely and efficient manner. In keeping with these objectives, GOI proposes to phase out production of CFCs by 2010 on an "accelerated basis", that is, at a faster rate than required by the phase-down levels established under the Montreal Protocol. This phaseout profile, which envisages annual decreases in production and sales to both domestic and international markets, is the basis for calculation of compensation for phaseout sought by India through this proposal. Details of the phaseout profile are provided in Section E of this chapter.

B. PREVIOUS PHASEOUT ACTIVITIES

2. All previous phaseout activities have been only in the consumption sector; as indicated earlier, total funding of \$ 50.4 million targeting an ODS phase-out of 6,239 MT has been provided to India up to the 26th ExCom.

C. CFC FREEZE LEVELS IN MP ANNEX A

3. The freeze level for CFC production in terms of MP Annex A substances is shown in Table 3.1. The freeze level of 22,589 tons (which applies to the period July 1, 1999 to June 30, 2000) has been calculated on the basis of data reported to the Ozone Cell by the four producing enterprises for the period 1995-97.

Table 3.1: Production Freeze Levels for CFCs under Annex A for India (in MT)

	Actual Production			MP Phase-down level			
	1995	1996	1997	1999	2005	2007	2010
CFC (ODP MT)	21,650	22,458	23,659	22,589	11,295	3,388	0

D. ESTIMATED DEMAND FOR CFCs IN DOMESTIC AND INTERNATIONAL MARKETS

4. The freeze level for CFC consumption in terms of MP Annex A substances is shown in Table 3.2. The freeze level of 3,314 MT for July to December 1999 and 6,075 MT in the year 2000 has been calculated on the basis of the average reported consumption for the years 1995-97.

Table 3.2: Consumption Freeze Levels for CFCs under Annex A for India (in MT)

	Estimated Consumption			MP Phase-down level			
	1995	1996	1997	1999	2005	2007	2010
CFC (ODP MT)	6,274	6,915	6,694	6,627	3,315	994	0

5. On the basis of current consumption levels and projects in CFC-using sectors already under implementation or in the planning stages, GOI has constructed a phaseout profile for consumption of CFCs, which is shown below in Table 3.3.

6. While the domestic market for CFCs is expected to decline gradually and in a linear fashion over the 1999-2010 period in response to phaseout activities in CFC-using sectors of the economy, the Indian CFC producers, who currently export approximately two-thirds of their production, anticipate that there will continue to be a significant demand for CFCs for the next few years in international markets that India has developed a capacity to supply. As Table 3.3 shows, the accelerated gradual production phaseout profile has been developed to allow India to continue exporting in the future at significant levels. In recognition of the fact that other countries are also phasing out their use of CFCs, it is anticipated that the market for Indian exports will also decline, from the current level of approximately 16,000 tons to approximately half that amount by 2005, after which the decline in exports will accelerate, both because of falling international demand and because of a continuing “tail” for demand in India itself.

7. In preserving, as part of the production phaseout profile, the right to continue exports at a significant level, the Indian producers are accepting the risk that these markets may disappear more quickly than estimated. As domestic consumption will be frozen and cannot exceed its own phaseout profile, if export sales in any year should be less robust than planned, it will be necessary for the GOI to prevent surpluses from being shifted to the domestic market. In this circumstance, GOI and the Indian producers accept that no further compensation for a more rapid phaseout will be provided by the MLF.

E. CFC PHASEOUT APPROACH AND SCHEDULE

8. Under the MP control targets for CFCs under Group I of Annex A, Article 5 countries are required to freeze production and consumption

- i) on July 1, 1999, to levels not exceeding the average of 1995 to 1997;
- (ii) by January 1, 2005, to reduce to less than 50% of the freeze level;
- (iii) by January 1, 2007 reduce to less than 15% of the freeze level; and
- (iv) finally by January 1, 2010, stop production and consumption of all CFCs.

9. Based on estimated demands from consumption sectors in India and from the international markets, India will comply with these targets by the proposed phaseout schedule for CFC production and consumption (compared to target requirements) as shown below in Table 3.3.

Table 3.3: Phaseout Profiles for Production, Consumption and Export of CFCs in India, 1999-2010

Year	Production		Consumption		Export
	Entitlement under MP	Target under Program	Entitlement under MP	Target under Program	
1999 (July-December)	11295	11295	3314	3314	7981
2000	22589	20706	6,627	6075	14632
2001	22589	18824	6,627	5522	13302
2002	22589	16941	6,627	4970	11971
2003	22589	15058	6,627	4418	10640
2004	22589	13176	6,627	3866	9311
2005	11295	11294	3,314	3313	7981
2006	11295	7342	3,314	2154	5188
2007	3388	3389	994	994	2394
2008	3388	2259	994	663	1596
2009		1130	994	331	798
2010	0	0	0	0	0

10. The major policy instrument for implementing and managing the phaseout will be a production quota system, which is described in Chapter V. It is anticipated that the quota will be tradable among producers, so that each producer can determine when to exit the industry. Because of the small number of producers in the Indian industry, it is anticipated that reduction of national production of CFCs will initially be achieved by a reduction in the level of production at all sites rather than a closure and destruction of particular facilities. Nonetheless, at some stage, it may be preferable for producers to close their lines rather than to produce ever smaller quantities, and the quota system will be designed to allow producers to sell quotas back to government or to other existing producers.

11. In order to bring about the phaseout of CFCs under this sector plan, India will adopt the following measures:

- a) the gradual reduction of CFC production at the national level;
- b) adoption of various policy measures and a technical support system in coordination with consumption phaseout and substitute production;
- c) recycling and reclamation of CFCs to meet servicing requirements and to reduce CFC emission; and
- d) campaigns of public education and awareness to promote the CFC phaseout program.
- e) Technical standards and codes will be designed for substitutes, particularly to develop a system of quality control;
- f) Policies and regulations to support the phaseout plan will be designed and introduced, including a production quota system to be applied to national production levels and each producing enterprise;
- g) A licensing system for CFC imports and exports has been set up, and modification will be introduced in the import regime for CFC substitutes so as to promote their use; and
- k) An effective monitoring and enforcement system, including a management information system (MIS).

12. The policies outlined above are also discussed in more detail in Chapter V.

CHAPTER IV. Calculation of Incremental Costs of Phaseout

A. INTRODUCTION

1. This chapter discusses the incremental costs of phasing out CFCs in India and explains the results of calculations done with a computer-based model. The chapter covers: (a) scope of compensation for CFC production phaseout; (b) factors affecting compensation; (c) calculation results and their explanations; and (d) assumptions, inputs, calculation methodology, and sensitivity tests to key parameters. The total compensation is calculated based on a computer model, which was developed to provide a basis for choosing a cost-effective phaseout profile for India and to determine both the total incremental costs to the Indian economy and the eligible incremental costs for which funding is being requested.

B. SCOPE OF COMPENSATION FOR CFC PRODUCTION PHASEOUT

2. The total compensation includes:

- a) lost profits from premature closure
- b) compensation of workers for loss of employment caused by the production phaseout; and
- c) costs of technical assistance activities related to CFC phaseout, including the design and implementation of policies and regulations, publicity, technical assistance to enterprises, and information management systems (to monitor CFC phaseout).

C. LOST PROFIT COMPENSATION CALCULATION MODEL

3. The phaseout plan will start in 1999 to enable India to meet its 1999 production freeze. The calculation of the compensation to the CFC producers includes the following steps:

- (a) identification of parameters related to CFC production phaseout that determine the future profit streams;
- (b) collection of data to determine the local costs that are used in the model;
- (c) calculation of the 1999 net present value (after tax) of compensation based on the phaseout plan and production sector parameters.

D. BASIC PARAMETERS OF THE MODEL

4. The basic plant capacity and production data are given in Table 4.1. The total verified capacity for CFC production is 61,325 metric tons (MT). This capacity excludes expansion after July 1995. The plants in India are currently producing an annual average of 5,354 MT of HCFC-22, and this amount has been subtracted from the total available capacity, giving a net eligible capacity of 55,971 MT.

5. The average of annual CFC production in calendar years 1995–1997 was 22,589 MT. This represents the freeze level effective July 1999. The freeze level was also taken as the baseline production level for calculating the compensation.

6. Three out of four plants in India came on stream in 1988 or 1989. One of the enterprises, NFI, has two plants which came on stream in 1968 and 1980 respectively. The former plant was expanded from 1,200 t/y to 6,600 t/y in 1988, and to 9,900 MT in 1995. Expansion of this magnitude essentially requires rebuilding of the plant, and hence this plant was given an eligible life of 25 years beginning in 1988. The second plant at NFI was given an eligible life of 88 months, assuming the acceptance of the India proposal in 1999 and applying option (b) of the calculation procedure recommended by the Expert Group as follows:

$$8 \text{ months} \times (\text{December 2010} - \text{date of proposal acceptance, some time in 1999}) =$$

$$8 \text{ months} \times 11 \text{ years} = 88 \text{ months.}$$

Table 4.1: Basic plant capacity and production data

Verified production capacity for CFC-11 and -12 (MT)	61,325
Average annual HCFC-22 production (MT) for last three years	5,354
Net eligible capacity for CFC-11 and CFC-12 (MT)	55,971
Freeze level based on average annual production 1995-1997 (MT)	22,589
Original commissioning date of each plant	
SRF	1989
GFL	1989
NFI	1980/1988
Chemplast	1988

7. The basic assumptions of this model are summarized in Table 4.2. For labor, utilities, maintenance and SARE (sales, administration and research expenses), the actual expenses incurred in the three financial years 1995/96 to 1997/98 were converted to US Dollars, averaged to represent the 1996 costs, and inflated by 3% per annum to give the 1999 figures.

8. Several of the assumptions were taken directly from the Report of the Third and Fourth Meeting of the Expert Group on the Production of Substitutes for Ozone-Depleting Substances. More specifically, the 1986 international bulk list prices for CFC-11 and CFC-12 of \$1.32/kg and \$1.56/kg were discounted by 15% to reflect the prices at which business was actually conducted with respect to published list prices, and then inflated at 3% per annum to 1999. A local price premium of 10% was applied for products sold on the domestic market. Only Chemplast purchases anhydrous hydrogen fluoride (AHF); the remaining three firms purchase fluorspar. The prices used for raw materials in the compensation calculation were 1986 international prices shown in Table 4.2, increased by 3% per annum to 1999. The Report of the Third and Fourth Meeting of the Expert Group on the Production of Substitutes for Ozone-Depleting Substances noted that the raw material costs did not change between 1986 and 1996. In this model all input

costs, including raw materials, were increased by 3% per annum until 1999 to be on the consistent basis with product prices.

9. Packaging costs were subtracted from the production cost, and a packaging premium of 5% was applied to the sale prices of all packaged materials. The percentages of CFCs sold as packaged as well as the breakdown into domestic and export sales were based on the average of the data collected in the three financial years 1995/96 – 1997/98.

10. Based on the historical growth of refrigeration, aerosol and foam industries, a conservative estimate of 10% for the domestic market growth rate was used. For the export market, the same growth rate of 10% was used.

11. Lastly, depreciation of fixed assets and interest payments were subtracted from gross profits to arrive at net profits, which formed the basis for computing corporate tax.

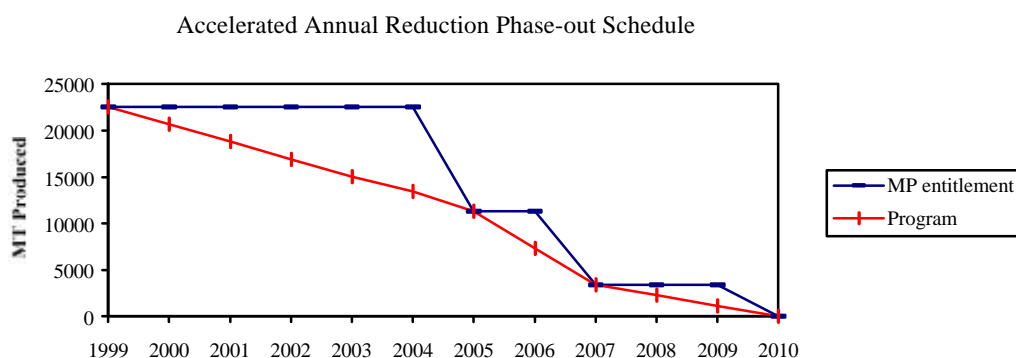
12. After converting all input and output prices to 1999 US Dollars, the calculations of future profit streams were carried out in real terms, viz., the effective inflation rate was set equal to 0% between 1999 and the end of plant life. For the purpose of computing the stream of payments, the values which were expressed in 1999 US Dollars were converted to relevant years' values using the World Bank's estimate for the annual international inflation rate of 2.5%.

Table 4.2: Assumptions used in the model

1986 price of CFC-11, US\$/ton	1320
1986 price of CFC-12, US\$/ton	1560
List price discount	15%
Local premium for CFC prices	10%
Packaging premium	5%
Inflation rate for CFCs and raw materials	3%
1986 price of anhydrous hydrogen fluoride (AHF), US\$/ton	1200
1986 price of fluorspar, US\$/ton	100
1986 price of carbon tetrachloride, US\$/t	275
Pre-1999 inflation rate for fixed and variable costs	3%
Plant life for plants coming on stream in 1988 or 1989	25 years
Real discount rate	7%
Baseline production volume, MT	22,589
Market growth rate (up to capacity)	10%
Corporate tax	30%
International inflation rate post-1999	2.5%

E. PHASEOUT PLAN FOR CFCs

12. An accelerated phaseout schedule was selected as shown below.



The production volume is reduced linearly to 50% of the freeze level by the year 2005, to 15% by the year 2007, and to 0% by the year 2010.

F. LABOR COMPENSATION

13. The average of total labor costs for CFC-11 and -12 production over three financial years 1995/1996 – 1997/98 was \$2.0 million. In 1997/98, the total wage bill was \$1.92 million for a total of 840 employees associated with CFC-11 and CFC-12 production. The Supreme Court of India has recently issued a ruling requiring that compensation for labor redundancy resulting from closure of business on environmental grounds be a minimum of six years' annual salary and admissible benefits. The total number of jobs lost as a result of production phaseout is estimated to be 618, corresponding to a total labor compensation package of \$8.07 million which corresponds to an NPV figure of \$5.23 million. A natural attrition rate of 5% per annum was assumed in the calculations. The enterprises plan to retain 40% of the separated workforce until the end of 2009 to run the plants for CFC production.

G. TECHNICAL ASSISTANCE

14. A Technical Assistance component will finance training, institution-building and promotional activities related to the implementation of the phase-out. This component will fund national execution management and coordination by a Project Management Unit (PMU) within the Ministry of Environment and Forests, and will handle, inter alia, the following: a monitoring and reporting system, including an MIS, to track implementation of Annual Programs and other activities related to CFCs production phaseout; reporting to the World Bank; requesting disbursements to be made to enterprises, by confirming that Program bench-marks have been met; monitoring and enforcing the CFCs production quota system; implementing technical assistance activities

with relevant ministries, and verifying CFC phaseout performance. Details of these activities are provided in Annex II. Table 4.3 explains the proposed total allocation over the duration of the project.

Table 4.3: Allocations under Technical Assistance Component (amounts in US\$)

PMU	1,017,154
Audits	200,000
Training	150,000
Misc. (public awareness, standards, clean-up)	450,000
Research for Substitutes	400,000
Total	2,217,154
NPV	2,094,470

H. ELIGIBLE COMPENSATION FOR CFC PHASEOUT

15. Based on the above parameters, eligible compensation for CFC production phaseout in India was calculated using the computer model. The calculation of the NPV of compensation as an up-front payment (after tax and for gradual closure, payable in 1999) is based on the following considerations:

- Producers need to establish substitute or alternative businesses to protect the shareholders' interests.
- The NPV for gradual phaseout option by all four plants has been calculated by discounting the annual stream of lost profits (after tax), expressed in 1999 dollars, by a real discount rate of 7%. If a one-time payment is not acceptable, then a stream of annual payment would be required, determined by reversing the discount at the same 7% rate and adding an international inflation rate of 2.5% per year from 1999 onwards. This would increase the total amount of compensation significantly. Proposed compensation for CFC production phaseout in India expressed in NPV terms is summarized below.

Table 4.4: Summary of compensation and technical assistance (US \$ NPV)

Eligible expenditures	US\$ million
Compensation for lost profit streams	179.8
Subtotal	179.8
Labor compensation	5.23
Technical assistance	2.09
Total	187.12

16. Sensitivity Analysis

Several sensitivity tests were undertaken to evaluate the importance of key variables (Table 4.5).

Table 4.5: Sensitivity analysis

Parameter varied		<i>Base case</i>	
<i>(1) List discount</i>	<i>10%</i>	<i>15%</i>	<i>20%</i>
<i>Compensation, US\$ million</i>	339.1 (200.6)	304.4 (179.8)	269.7 (159.2)
<i>(2) Local premium</i>	<i>0%</i>	<i>10%</i>	<i>15%</i>
<i>Compensation, US\$ million</i>	288.6 (170.6)	304.4 (179.8)	312.3 (184.4)
<i>(3) Market growth rate</i>	<i>7%</i>	<i>10%</i>	<i>13%</i>
<i>Compensation, US\$ million</i>	259.2 (149.9)	304.4 (179.8)	325.1 (200.2)

Note: The numbers in parentheses represent NPV in 1999.

Compensation for loss of future profits. The compensation for CFC production sector phaseout is a function of the CFC price level, input costs, and volume growth from the baseline. In the sensitivity analysis the effect of varying the list price discount and the local premium—both of which affect the price level—and of the market growth rate was studied.

Overall price Level. The effect of changing the list discount rate to 10 and 20% was examined. This is equivalent to changing the overall price level by $\pm 6\%$. The compensation package changes by 11% in both cases.

Domestic price Level. The local premium was changed to 0% and 15% to examine the impact of changing domestic prices on the overall compensation. Eliminating the local premium altogether lowers the compensation by 5%. Increasing the local premium to 15% raises the compensation by 3%.

Growth rate. The historical data on the refrigeration, aerosol and foam industries in India give a growth rate which is several-fold higher than the GDP growth rate. This is consistent with strong demand for consumer goods historically using CFCs in a country with a rapidly expanding middle class. Lowering the growth rate to 7% reduces the compensation by 15%. Increasing the growth rate to 13% increases the compensation package by 7%.

CHAPTER V. Policies for Phaseout

A. INTRODUCTION

1. This chapter discusses the policies that will be introduced to support the phaseout strategy and its implementation, in the light of the experiences to date with the policies and actions already taken to influence the growth of production and consumption of CFCs in India. As indicated in its original Country Program, the GOI has adopted a policy approach that uses a mix of instruments, in the form of voluntary agreements, legislation and regulation, fiscal incentives, educational programs and informational campaigns, and the government intends to continue this approach during the implementation of the phaseout in the CFC Production Sector.

B. PAST POLICIES AND ACTIONS FOR PHASEOUT

2. The policy framework for CFCs in the past has focused mainly on the use of CFCs and substitutes, but recent measures also address the control of production and supply of CFCs.

a) “Ecomark” scheme: In 1991, the GOI launched the “Ecomark” scheme to identify environment-friendly products and to increase consumer awareness about the environment. The label known as “Ecomark”² is given to consumer products that meet specified environmental criteria as well as quality requirements. All products are required to meet quality, safety and performance standards of the Bureau of Indian Standards; manufacturers are required to provide documentary evidence of compliance with Water, Air and Environment (Protection) Acts and associated regulations; the products must be labeled showing critical ingredients and the criteria by which it has been classified as environmentally-friendly and must be accompanied by instructions on proper use; and the materials used for packaging must be recyclable, reusable or bio-degradable.

To date, criteria for fourteen categories of goods have been finalized. Of these, two categories, electrical goods and aerosols, include criteria relating to avoidance of CFCs. In the case of refrigerators, refrigerants and foam-blowing agents shall contain no ODS, and in the case of aerosols, propellants shall contain no ODS. While a number of compressor manufacturers in India have received funding for design and subsequent manufacture of non-CFC compressors for use by Indian commercial or domestic refrigeration and air-conditioning manufacturers, industrial applications of these are not yet available in the market, and manufacturers continue to use CFCs for blowing or as a refrigerant. Therefore, no refrigerator manufacturers in India have yet become eligible for participation in the “Ecomark” scheme, but all the major producers have projects, most to be funded by the MLF, for conversion to non-CFC manufacture that will be in operation before the end of this decade. In the

² An earthen pot was chosen as the logo for the scheme. This familiar object uses a renewable resource, does not produce hazardous wastes or consume much energy in its manufacture, and its solid form and graceful shape capture the concepts of strength and fragility, which characterize the eco-system.

case of aerosols, several conversion projects have been funded and are now starting to go on-stream. The Ecomark label will only be available to products using non-ODS propellants.

b) Government funding of research into substitute technologies: the Indian Institute of Chemical Technology has been engaged in the development of HFC-134a, and of a suitable catalyst, since 1992. This research has been sponsored jointly by the Government and two of the four CFC producers; it has now reached a pilot plant stage and trials will be conducted in 1999.

c) Tax incentives for substitutes: in January, 1995, the government announced that it would exempt payment of customs and central excise duties on capital goods required to implement ODS phaseout projects funded by the MLF. At that time, the concession entailed partial exemptions from customs duties on c.i.f. prices and from central excise duties on the landed price³. In September, 1995 this benefit was extended to all MLF eligible projects and items of recurring use, whether or not MLF assistance was requested or was available at the time of purchase of the goods. Moreover, in 1997, the government announced that it would allow the customs and excise duty exemption for new investments in non-ODS technology similar to those that were eligible under conversion projects, and in 1998 the government extended this to all goods that are designed exclusively for non-ODS technology.

d) Credit restrictions on plants with ODS technologies: in September, 1997 the Reserve Bank of India advised all commercial banks not to finance / refinance any new investments with ODS technologies.

3. One area where the government has introduced a specific policy for controlling production and supply of CFCs is for exports and imports. A number of separate steps have been taken:

- a) In 1992, a notification banning CFC imports from and exports to non-parties was issued by the Chief Controller of Imports and Exports, Ministry of Commerce⁴.
- b) In June 1996, the government instituted a licensing system for CFC imports and exports, in order to comply with Decision VII/9 of the Seventh Meeting of the Parties held in Geneva in December 1995 and subsequent Decisions IX/8 and IX/22 of the Ninth Meeting of the Parties held in Montreal. The licensing system was designed and is implemented by the Directorate General of Foreign Trade, Ministry of Commerce, in consultation with the Ozone Cell.

4. The objectives of the licensing system are as follows:

³ Imports were still subject to state/local excise taxes which ranged between 25% and 30% of the landed price.

⁴ The notification also applied to halons.

- (i) to regulate production and consumption of controlled substances as defined in Article 2 of the Montreal Protocol;
- (ii) to regulate trade in controlled substances with non-parties as defined in Article 4 of the Montreal Protocol;
- (iii) to regulate trade in controlled substances among Article 5 countries; and
- (iv) to generate information to allow India to report data required under Article 7.

5. Under the licensing system, exports of CFC are permitted only by holders of an export license and only for exports to Article 5 parties. The system provides for a bulk export license to be issued on a calendar basis to each producer for a specified quantity of CFC at an expected price; the quantity is based on the amount exported in the previous year. If a producer exports the entire quantity before the end of the calendar year, it may apply for a license to export additional quantities, and the Directorate General may issue an additional license on the recommendation of the Ministry of Environment and Forests. If the exporter fails to export the licensed quantity, then the license for the remaining quantity lapses and the following year's license will be reduced. Finally, each container of CFCs exported has to be labeled "New Produced CFC".

6. Imports of CFCs are permitted only from Montreal Protocol parties and against an import license, which is issued in principle only to users; however, licenses for traders can also be issued on the basis of demands for CFCs from small enterprises. Importers are required to submit annual reports to the Ozone Cell, as a basis for its monitoring of trade and reporting to the Secretariat of the Montreal Protocol.

7. Experience to date with the licensing system is based on its operation for approximately two years, and conclusions about its effectiveness should be regarded as provisional. However, to date, the system has operated smoothly because of the high degree of cooperation between the Ozone Cell and the DGFT. This is expected to continue into the future when the phaseout of production starts in earnest, since the Ozone Cell has concluded that the licensing system for exports and imports must be closely integrated with the production quota system, policies to prevent new installations using CFCs and steps to reduce domestic consumption of CFCs. In addition, the operation of the licensing system is considered to be a central part of the overall monitoring program, by providing important information about the evolution of domestic and international markets, thereby contributing to more effective management of the phaseout program. Finally, the Ozone Cell has concluded that the risk of illegal imports may make it necessary to contemplate actions targeting end-users of CFCs, including consultations with end-user representatives, once production starts to decline, so as to avoid providing incentives for illegal imports.

C. POLICY OBJECTIVES AND INSTRUMENTS

GOI is planning to augment the current policy regime for ODS with additional measures to ensure that production and consumption of ODS is brought under effective control and can be monitored to ensure that the phaseout plans are accomplished as planned.

a) Ozone Regulations

The Government has already drafted detailed regulations, under the Environment (Protection) Act, 1986, to monitor and control production and use of CFCs to start in July 1999. These regulations, dated April 28, 1998, have been circulated for public comment through publication in official gazettes, and will be finalized in the first half of 1999. The salient features of the proposed Ozone Regulations are as follows:

- i) All producers and consumers of CFCs will be required to register with government departments and maintain records and file reports, which, inter alia, will also provide the basis of the MIS for the CFC phaseout program established in this document. CFC producers will register, within three months of the promulgation of the regulations, with the Ministry of Environment and Forests, Original Equipment Manufacturers (OEMs) using CFCs will register with the Small Industries Development Organization, Ministry of Industry, and other sellers of CFCs will have to register with CFC producers or importers, both within one year of promulgation. In essence, any business that produces, imports, exports, sells, stocks or distributes any ODS will be required to maintain records and file regular reports, in formats that are laid out in the draft regulation. Producers of CFCs, for example, will be required to maintain records of actual quantities produced, ODS used as feedstock, quantities sold and to whom and for what purpose/use.
- ii) The regulation also covers registration of businesses carrying out reclamation, recycling and destruction of CFCs, and the manufacture, export and import of compressors.
- iii) The regulations establish a clear ban on creation and expansion of capacities for CFCs, CTC and CFC-based products with immediate effect, with capacities for HCFC-22 exempted.
- iv) The draft regulations also incorporate the regulations already promulgated with respect to export and import of ODS.
- v) Finally, the draft regulations establish deadlines, ahead of the MP's deadlines, for phaseout for consumption of ODS in various end-user industries, as detailed in Table 5.1 below with regard to CFCs. ODS producers will be required to report their sales to users in terms of the categories of end-use established in the table, as follows.

Table 5.1: Phaseout Dates for CFCs

	Name of Activity	ODS Group	Phaseout Date
1.	Manufacture of aerosol products (excluding MDI)	Group I	Jan. 1, 2003
2.	Manufacture of foam products (including domestic refrigerators)	Group I	Jan. 1, 2003
4.	Manufacture of MACs	Group I	Jan. 1, 2003
5.	Manufacture of other refrigeration and air-conditioning products	Group I	Jan. 1, 2003
6.	Manufacture of other products	Groups I, III, IV and V	Jan. 1, 2010
8.	Manufacture of MDI	Group I	Jan. 1, 2010

b) Production Quota System

In order to ensure that India's CFC production sector meets the requirements of the 1999 freeze, the GOI intends to introduce by July 1, 1999 a production quota system once funding issues are resolved. The production quota system will also be the key policy element for implementing the CFC production phaseout strategy. The major contents of the quota system can be summarized as following:

- (i) in accordance with a regulation to be published by MoEF, MoEF and the Ministry of Chemicals and Fertilizers will issue production quotas for each year to those enterprises eligible to produce CFCs, and only those enterprises with production permits will be eligible for issuance of quota;
- (ii) the relative size of each enterprise's quota in the first year of operation of the quota system will be based on the structure and level of the average of their declared production in 1995-97 (the baseline level). For the 18-month period from July 1, 1999 to December 31, 2000, the quota would be set at 142%⁵ of the baseline level. Subsequently, the quota will be reissued on an annual basis to cover the calendar year and the amount will be reduced in accordance with the overall phaseout plan;
- (iii) producers of CFCs will not be allowed to exceed the allocated yearly production quota. Enterprises would be subject to monitoring of their production, through quarterly reporting to MoEF's MIS of monthly production and through periodic inspection and visits, and the quota regulation would include arrangements for penalties and fines;
- (iv) enterprises will be able to trade their quota either for that year, or as a permanent trade, so that enterprises wishing to do so can exit the industry before 2010. Enterprises that trade their quotas must report trades to MoEF which will reallocate quota accordingly; and

⁵ During the period July 1, 1999—December 31, 2000, the production level for the country and for each enterprise will be constrained by two quota amounts. First, production between July 1, 1999 and June 30, 2000 can not exceed the freeze level of 22,589 tons. Second, production between January 1, 2000 and December 31, 2000 can also not exceed the production target established for 2000 under the phaseout program, i.e. 20,679 tons. Thus, production over the 18 month period can not exceed at the national level 31,959 tons, or 141% of the annual freeze level.

- (v) enterprises whose quota falls to zero or which decide to stop production completely and exit the market would be required to sign a contract with MoEF to disable and dismantle their CFC production facilities. After the contract is in effect, the production quota and production permit would be taken back.

The monitoring and enforcement mechanism for the quota system is expected to be:

- (i) Enterprises holding a quota must report CFC production figures to MoEF;
- (ii) Enterprises will be subject to periodic visits from MoEF staff or other authorized personnel to check production information and activities;
- (iii) MoEF will monitor and supervise implementation of the quota system;
- (iv) Any enterprise giving false information will be warned and fined;
- (v) Any enterprise that fails to report or delays its report will be fined;
- (vi) Any enterprise whose production exceeds the quota will be fined and its production quota would be correspondingly reduced in the following year or, if appropriate, its production would be sealed off.

c) ODS Trade Policy

To date, the Indian government has not placed any constraints on the amount of ODS that can be exported under the permit system. In the future, the export permit system will be used more actively to reduce on an annual basis the total volume of exports and ensure adherence to targets under the phaseout plan.

D. MONITORING, SUPERVISION AND INSTITUTIONAL RESPONSIBILITIES

A Project Management Unit (PMU) will be created under the jurisdiction of the Ozone Cell of the MoEF, funded as a technical assistance activity by the MLF, to oversee and manage the phaseout program (described in detail in Chapter VII and Annex II). Specifically, its responsibilities will include:

- i) preparation of Annual Programs for submission to the World Bank;
- ii) management of the MIS established to support the phaseout program and the implementation of the Ozone Regulations;
- iii) inspection of enterprises and verification of CFC production and phaseout activities;
- iv) preparation of reports on the phaseout program for submission to the World Bank and ExCom;
- v) maintain records of all production and sales to dealers and end-users; and
- vi) maintain and update registration lists.

CHAPTER VI. Action Plan

A. INTRODUCTION

1. This chapter presents the plan for implementing the CFC phaseout schedule proposed in Chapter III, including annual phaseout targets, MLF funds required to meet those targets (based on cost analysis presented in Chapter IV), and key policy and other actions that will be implemented to achieve the phaseout objectives. Subject to funding being made available, the GOI commits to realizing the CFC phaseout by carrying out the following action plan which is divided into three stages:

- Stage one will begin following the ExCom's approval of funds and will continue through 2000. During this time, production of CFCs will be reduced to 11,295 MT for the period July – December 1999, and 20,706 MT for the year 2000;
- Stage two will extend from 2001-2005, during which time annual CFC production will be further reduced to 11,302 MT;
- Stage three will extend from 2006-2010, during which the remaining 11,302 MT of CFC production will be eliminated.

B. PHASE I--1999-2000

2. Phase one will begin on July 1, 1999 and continue through December 31, 2000. The phaseout amounts, funding request and main phaseout activities for this Phase are listed in Tables 6.1 and 6.2. To achieve the target, a production quota system will be introduced by July 1, 1999.

Table 6.1 Phase One - Phaseout Targets, Funding Requests, and Actions

Phaseout and funds		Freeze Level 1999	July 1, 1999-June 30, 2000	Jan.,1-Dec. 31, 2000
Production Target(MT ODP)		22,589	22,589	20,706
Phaseout Target (MT ODP)			0	1,883
Funding request from MLF (\$ mill)				
of which, TA activities (\$ mill)				
Phaseout measures	Producing enterprises reduce production and exports in accordance with overall quota for production and overall export authorization			
Policy measures	a) introduction of production quota system to take effect on July 1, 1999, and establishment of quota levels at both national and individual levels to meet 1999 production freeze and 2000 phaseout target; b) establishment of maximum levels for Indian exports of CFCs in 1999 and 2000; c) modification of relative levels of taxation on CFCs and CFC substitutes so as to promote CFC substitute use; and d) enactment of Ozone Regulations.			
Technical Assistance Activities	a) design and implementation of public awareness and education campaigns to promote phaseout of CFCs b) design and implementation of training of CFC producers and traders in relation to the obligations for reporting introduced under the Ozone Regulations c) design of a MIS in the Ozone Cell to collect required data relating to the phaseout of CFCs d) training of Ozone Cell staff in the operation of the MIS.			

C. PHASE TWO -- 2001-2005

3. Phase two will begin on January 1, 2001 and end on December 31, 2005. The phaseout timetable, funding request and main phaseout activities for this Phase are listed in Table 6.2. During this stage, the Government will continue to reduce CFC production and exports so as to meet the phaseout targets on a year-by-year basis. It is expected that at least one producer will choose to close down its whole production at some time during this phase, and its remaining quota will be re-distributed to the remaining producers.

Table 6.2 Phase Two - Phaseout targets, Funding Requests and Actions

Phaseout and Funds	2001	2002	2003	2004	2005
Production Targets (MT ODP)	18,824	16,941	15,058	13,176	11,294
Phaseout Targets (MT ODP)	1,882	1,881	1,883	1,882	1,882
Funding request from MLF (PV of each year, in current \$ mill) Of which: TA activities					
Policy and other actions	2001-2005				
Phaseout Measures	Producing enterprises continue to reduce production and exports, and one or more producers closes down entirely				
Policy measures	Continued implementation of policies introduced during 1999 and 2000				
Technical Assistance Activities	Continued public awareness and staff training, where necessary; And Mid-term evaluation and assessment of policies and phaseout activities to date.				

D. PHASE THREE: 2006-2010

4. Phase three begins on January 1, 2006 and ends on December 31, 2010. The phaseout time table, funding request and main phaseout actions for this Phase are listed in Table 6.3. During this stage, CFCs producers will continue to reduce production, first to meet the 2007 MP limit and then to close all CFC production lines by the end of 2009 to meet the target of zero production in 2010.

Table 6.3 Phase Three - Phaseout, Funding Requests, and Actions

Phaseout and funds	2006	2007	2008	2009	2010
Production Targets(MT ODP)	7,342	3,389	2,259	1,130	0
Phaseout Targets ⁶ (MT ODP)	3,952	3,953	1,130	1,129	1,130
Funding request from MLF (PV of each year, in current \$ mill) Of which: TA					
Policies and other actions	2006-2010				
Phaseout measures	Gradually close down all production lines, and eliminate exports and consumption of new CFCs				
Policy measures	Continue to implement the production quota system and other policies				
Technical assistance activities	End of project evaluation and assessment.				

CHAPTER VII. Operating Mechanisms

A. INTRODUCTION

1. Upon approval of the Sector Plan, the GOI will introduce necessary policy measures and take relevant actions, as described in Chapter V, so that the CFC phaseout indicated in the Sector Plan implementation schedule can be achieved and the funds approved by the MLF can be disbursed to India. This chapter explains funding arrangements, operating mechanisms, and responsibilities of various institutions involved in implementation of this Sector Plan.

B. UMBRELLA GRANT AGREEMENT

2. The World Bank and India will sign, before the start of implementation of the sector phaseout program, an Umbrella Grant Agreement to establish the terms under which grant resources approved by the ExCom for India will be transferred within the sector phaseout program. This Umbrella Grant Agreement will be similar to the umbrella grant agreements under which project-by-project activities are carried out. However, it will include provisions allowing the Bank to disburse funds to India on the basis of performance indicators in terms of CFCs phaseout at the national level rather than for procurement of goods and services at the enterprise level.

C. FUNDING ARRANGEMENTS

3. The World Bank has, on behalf of the GOI, requested the ExCom to consider and approve the overall sector phaseout plan and to agree to fund the eligible incremental costs of CFC production phaseout, as described in Chapters III and V, provided that India meets the annual phaseout targets laid out in Chapter V.

4. In the unlikely event that India were to fall short of phaseout targets for a given year (that is, CFC production exceeds the target), the Bank and India would agree on remedial actions. New funding clearances would be given only after phaseout targets had been met. Remedial actions will be built into the CFC production quota regulation and would go into effect should production exceed the quota. Enterprises exceeding their production quota in a given year would be fined according to the quota regulation, and the subsequent year's quota would also be proportionally reduced. For example, if an enterprise exceeded its CFC production quota in any one year by 100 tons, its eligible quota for the following year would be reduced by 100 tons. Depending on circumstances that have caused the delay in program implementation, other specific remedial actions would be agreed between the Bank and India as the need arises.

D. ANNUAL PROGRAMS TO MONITOR PHASEOUT

5. Annual programs would comprise the following sections:

- a) sector phaseout schedule;
- b) performance of activities of previous years and any agreed remedial actions for the current year {not required for the First (1999 and 2000) Annual Program};
- c) performance of activities of the current year (not required for the First Annual Program);
- d) objectives of following year's Annual Program -- its phaseout targets and funding requirements for different activities in the following year⁷;
- e) description of activities in the following year -- policies to be implemented and technical assistance activities;

7. The World Bank would approve technical assistance activities consistent with the Annual Program based on agreed terms of reference up to level of TA funding approved under the Annual Program for that year.

E. DISBURSEMENT MECHANISMS

8. World Bank Disbursement to India: Following approval of funds and their crediting to the World Bank's Ozone Trust Fund, the Bank will transfer grant funds to a special account established by the GOI's financial intermediary in accordance with the agreed disbursement conditions. There would be [four] disbursements into the ODS phaseout account for each Annual Program. The Government would be allowed to request these four disbursements at any time during the year, provided disbursement conditions have been met. Disbursement conditions and amounts to be disbursed are:

- a) *First disbursement* -- funds for technical assistance and other services
Conditions --
 - i) Annual Program has been approved by the Bank; and
 - ii) regulation on production quota is effective (1999 only).
- b) *Second disbursement* -- 50 percent of funds allocated to enterprise activities

⁷ Total grant funding for each year would be agreed along with this sector plan proposal. However, India would have flexibility in each Annual Program to allocate funds within enterprise-level or TA activities to achieve phaseout targets.

Conditions --

- i) India confirms that CFC production has not exceeded production target set for the preceding program year or CFC production during the first nine months of the preceding year has not exceeded 80 percent of the production target set for the preceding program year (not applicable to the First Annual Program); and
 - ii) any other conditions as specified in the current Annual Program.
- c) *Third disbursement* -- 30 percent of funds allocated to enterprise activities

Conditions --

- i) India reports that actual CFC production has not exceeded the production target set for the preceding year (not applicable to the First Annual Program);
 - ii) all contracts for closure and other enterprises activities have been signed;
 - iii) signed phaseout contracts or appropriate government actions (e.g., quota allocation) which indicate that the production target set for the current program year is achievable;
 - iv) progress report on Annual Program implementation is satisfactory to the Bank; and
 - v) any other conditions as specified in the current Annual Program .
- d) *Fourth disbursement* -- 20 percent of funds allocated to enterprise activities

Conditions --

- i) India announces a production quota for the following year for remaining CFC producers;
- ii) production audit (for 1999 only) and performance audits (2000 and after) are satisfactory to the Bank;
- iii) progress report satisfactory to the Bank; and
- iv) any other conditions as specified in the current Annual Program.

9. If the Bank finds implementation progress is unsatisfactory, either by reviewing the progress reports or during supervision missions, there would be no further disbursements until India and the Bank agree on remedial actions to rectify implementation deficiencies.

10. *Disbursement from ODS phaseout account to grant recipients.* After authorization from the Bank, Grant funds would be disbursed through the nominated

financial intermediary from the ODS phaseout account to enterprises based on terms contained in “ODS reduction contracts” or, in the case of technical assistance activities, the terms contained in consultant or training contracts. For example:

- a) Phaseout projects -- ODS reduction contracts would specify disbursement as follows:
 - i) 10 percent -- initial payment upon signing of ODS reduction contract between enterprise and PMU,
 - ii) 70 percent -- payment following dismantling production equipment, and
 - iii) 20 percent -- payment upon confirmation from PMU that enterprise decommissioning is complete.
- b) Technical assistance activities — grant funds would be disbursed to consultants, firms or public and private institutions in charge of training and technical assistance, based on implementation progress.

F. MANAGEMENT AND COORDINATION

11. This Sector Plan for CFC Production Phaseout will be executed by the GOI. The World Bank will supervise overall implementation of this Sector Plan, replenish the special account, and report to the ExCom on implementation progress.

12. The national execution management and coordination functions are as follows:

- a) *Project Management Unit* (PMU) is an administrative office within the Ozone Cell of the Ministry of Environment and Forests. The PMU, which will be established before the start of the CFC Production Sector phaseout plan, will handle the following work related to the CFC production sector plan:
 - i) set up and implement a monitoring and reporting system, including an MIS, to track implementation of Annual Programs and all activities related to CFCs production phaseout;
 - ii) report to the World Bank on a quarterly basis on Annual Program implementation;
 - iii) request disbursements be made to enterprises, by confirming that Program bench-marks have been met;
 - iv) monitor and enforce the CFCs production quota system;
 - v) implement technical assistance activities with relevant ministries,
 - vii) verify CFC phaseout and oversee preparation of performance;

- viii) develop, implement, and enforce of phaseout policies; and
 - ix) monitoring CFC producers' compliance with quota system.
- b) *Financial Intermediary* (FI) is a public financial institution or bank that will be nominated by GOI for carrying out transactions under the Plan, and will be responsible for the following:
- i) Opening and maintaining a special account for transactions;
 - ii) Arranging annual audits of the account by independent auditors acceptable to the Bank;
 - iii) Upon being authorized, disbursing funds towards compensation or technical assistance; and
 - iv) filing applications for reimbursement to the special account from the World Bank.

Details of the activities proposed to be funded and managed through the PMU are provided in Annex II. The proposed operations of the FI will, as in other ODS projects in India, be financed out of an agency fee to be determined during negotiations.

TECHNICAL PROFILES OF CFC PLANTS

A. Introduction

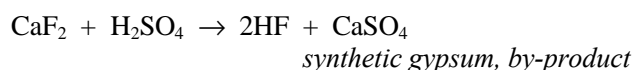
The following notes and observations were made following visits to the plants by a World Bank project preparation mission between December 6-12, 1998.

B. CFC Technology

The basic chemical reactions for the production in Indian plants of CFC-11 and -12, HCFC-22, and anhydrous hydrogen fluoride (AHF) are the same at all locations.

i) AHF

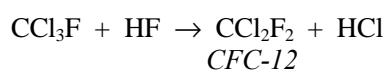
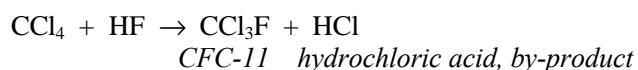
Raw materials — Calcium fluoride (fluorspar) and sulfuric acid



ii) CFC-11/12

Raw materials — Carbon tetrachloride (CTC) and anhydrous hydrogen fluoride (AHF), with an antimony chlorofluoride catalyst

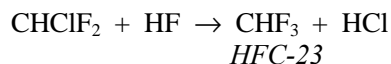
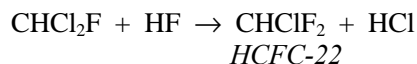
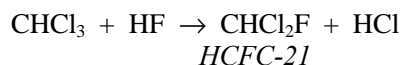
Process technology — liquid phase



In practice, all these reactions occur simultaneously. There is always some degree of over-fluorination of CFC-12 to give CFC-13; to the extent that CFC-13 is not required, this is a waste of AHF, but it can usually be kept down to around 1%. The mixture of CFC-11 and -12 is then purified before separation by distillation. The ratio of 11 to 12 can be varied to meet market needs within the range 30/70 70/30. If there is a need to produce only CFC-12, this can be done by recycling CFC-11 for further fluorination at the penalty of reducing the output rate by around 20%.

iii) HCFC-22

Raw materials — Chloroform (CFM) and AHF, again with an antimony chlorofluoride catalyst and liquid phase technology



There is no market for HCFC-21, so it is recycled with fresh chloroform for further fluorination, with the result that the production rate for HCFC-22 is lower than that for CFC-11/12 by a factor of about 50%. There is a very small demand for HFC-23, partly in low temperature refrigeration and partly as a raw material for production of Halon 1301. At SRF Fluorochemicals, HFC-23 is recovered for these purposes, while at the other plants it is a waste material, is kept down to around 1–2% and vented to the atmosphere. Because HFC-23 has a high global warming potential, and is covered by the Kyoto Protocol, good environmental practice in Europe/USA now requires either the recovery of HFC-23 or the routing of vent gases through an incineration stage to destroy it.

iv) “Swing” Operation

All of the plants were designed to produce both CFC-11/12 and HCFC-22, but not at the same time, this being usually referred to as “swing operation”. Changeover from one reaction to the other is done by shutting off the feed of, say, CTC, purging the plant of all traces of CFC-11/12, and then starting to feed CFM. Details of the changeover technique vary from company to company and are detailed in the company reports given below, but the changeover always takes 1 to 2 days. Use is made of this downtime to carry out minor maintenance work.

C. Plant Reports

i) NAVIN FLUORINE INDUSTRIES (Division of Mafatlal Industries Ltd.)

Trade name “MAFRON”

The CFC plant was commissioned in 1968 using technology from Von Heyden (later Hoechst) to supply India’s refrigerant needs. Technology for HF came from Buss, and Navin has developed an extensive fluorochemicals business based on HF.

<u>Product Range</u>	<i>Nominal Capacity, MT/year</i>
Anhydrous/aqueous hydrofluoric acid	30,000
Aluminium fluoride	7,500
Synthetic cryolite	6,000
Ammonium bifluoride	500
Boron trifluoride complexes	
MAFRONs 11 and 12 (2 lines)	19,800
MAFRON 22 (assuming no CFC-11/12 production)	10,000

MAFRON 113 (now closed)	660
Halon 1211 (now closed)	300
Hydrochloric acid from Mafron production	Some sold
Synthetic Gypsum from AHF manufacture	Some sold

At research laboratory/pilot plant level, Navin is now developing HFC-134a and HCFC-141b, plus fluoroaromatic compounds that are used as intermediates for pharmaceuticals and herbicides/pesticides.

The CFC-113 plant was built in 1990 and closed in 1996. Its maximum production, 214 tons, was in 1994/5. The Halon 1211 plant was piloted in 1990, and enlarged to commercial scale in 1992; its maximum production, 214 tones, was also in 1994/5.

The general appearance, layout and condition of the site is typical of a varied fluorochemicals operation developed over a 30-year period. It is functional and basically tidy, but does not have the smart appearance of a modern facility constructed as an entity on a green field site.

Fluorspar is imported, mainly from China, and CTC and CFM come from within the Mafatlal Group.

Verification of Capacity

Line 1: Nominal capacity 9,900 MT/year. The best 72-hour operation figures were reported and verified at 25 MT per day. At 330 days per year, this gives a capacity of 8,250 MT/year of CFC-11/12.

Line 2: Nominal capacity 9,900 MT/year. As with Line 1, 72-hour figures averaging 25 MT per day give an annual capacity of 8,250 MT. However, since the last stage of expansion took place after the MP deadline of July 1995, the previous capacity of 6600 MT was taken for verification. The best 72-hour figure found was 12.6 MT per day when the plant was producing only CFC-12. Applying a factor of 20 % reduction for CFC-11 recycle, 330 days operation gives a capacity of 5,198 MT per year and a company (i.e., line 1 and 2) total of 13,448 MT. Copies were taken of the relevant entries from the production records. For the purpose of computing compensation a figure of 5,000 MT/year was taken.

With two separate process lines, effectively two plants but in the same structure, Navin can produce 11/12 and 22 simultaneously. In practice, the company keeps one line producing CFC-11/12, and swings the other. At changeover, the catalyst is removed to a holding vessel until needed for the next changeover. Line 2 (1980) originally had two reactors working in series, with about 95% of the reaction achieved in the first and the remainder in the second. At the 1987 expansion, this system was changed to a single, much larger, reactor.

Production in Relation to Verified Capacity

In the following presentation, actual tons of HCFC 22 have been doubled to give an equivalent 11/12 tonnage.

<i>Financial Year</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>
Actual 11/12	1,660	1,708	2,186	3,642	5,294	7,058	6,569
Equivalent 11/12	1,833	2,447	1,943	3,200	2,952	2,931	2,875
Total	3,493	4,155	4,129	6,842	8,246	9,989	9,444

Capacity		13,448 MT/year					
% of capacity	26.0	30.9	30.7	50.9	61.3	74.3	70.2

General Comments

- The Mafron operation is the most profitable on site, and supports the other less profitable products.
- Quality is claimed to be to international standards.
- Navin is aiming for ISO 9002 accreditation in 1999.
- Instrumentation in the analytical laboratory is somewhat old, although this does not necessarily reflect on accuracy.
- The most obvious difference from a similar European operation is heavy over-manning. 89 people are directly associated with the Mafron plant, plus a proportion of all maintenance, services, laboratory, sales and administration. The total of all Mafron-associated staff was given as 278.

ii) CHEMPLAST SANMAR Ltd. (Division of Sanmar Group)

Trade name "METTRON"

Established in 1937 to produce chlorine / caustic soda, the Chlorochemicals Division of Chemplast Sanmar now operates on five adjoining sites at Mettur Dam, producing a wide range of basic and specialty chemicals. The refrigerant gases operation is a very small part of the Chlorochemicals Division, and its turnover of \$1.8 million is minute compared with the Sanmar Group turnover of over \$500 million.

Chlorochemicals Division Products

Nominal Capacity, MT/year

Salt	10 million
Caustic soda	48,000
Chlorine	42,200
Hydrogen	1,200
Chloromethanes	30,000
Tri- / perchloroethylene	5,125
P V C Resins	64,000
Silicon tetrachloride, ethyl silicate	1,200
Mafron 11,12 and 22	4,100
Industrial alcohol	38 million litres
Poly silicon	25
Silicon wafers	1.5 million
Fumed silica (joint with Cabot Carbon), just on-stream	500

The Mettron operation was commenced in 1988, using technology sourced from Navin which, at that time, had a monopoly position in India. The plant looks modern and was built with room for a second production line.

AHF is purchased from Tanfac in ton drums, the largest unit that is permitted on the roads. These are emptied into two 25 MT capacity tanks, with a spare tank in case of emergency. These are sited well away from any other operation. CTC and CFM come from the neighboring chloromethanes operation by road tanker.

Verification of Capacity

The logbook entry showed a 72-hour figure of 12.44 MT per day which, at 330 days operation, gives a capacity of 4,100 MT of 11/12. Copies of the entries were provided to the mission.

Chemplast operates with two reactors in series, the system used by Navin prior to its 1988 up-grading. Production cycles between CFC-11/12 and HCFC-22 in response to demand, with average runs lasting about 6 weeks. At changeover, the catalyst is removed to a holding vessel, as at Navin.

Production in Relation to Verified Capacity

Again, actual HCFC-22 production has been converted to equivalent CFC-11/12 tons.

<i>Financial Year</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>
Actual 11/12	298	374	1,129	1,168	1,625	2,446	1,954
Equivalent 11/12	—	—	898	556	488	348	732
Total	298	374	2,027	1,724	2,113	2,694	2,656
Capacity		4,100 MT/year					
% of capacity	7.3	9.1	49.4	42.0	51.5	65.7	64.8

General Comments

- This small but efficient operation clearly contributes a useful profit to the division, but closure would not be a significant blow.
- Quality is claimed to be to international standards.
- Laboratory instrumentation was somewhat old. In particular, the gas chromatographs are antiques and obsolete. They could not have been new in 1988.
- In manpower terms, this is a fairly lean operation. 40 people are associated with the production operation, with a further 9 in sales.

iii) GUJARAT FLUOROCHEMICALS

Trade name "REFRON"

This is a stand-alone operation in a rural location, established through government initiatives to create industrial jobs in country areas. Discussions with Pennwalt on technology began in 1985, construction began in 1987 and production started in 1989.

	Nominal Capacity, MT/ yr.
Refron 11/ 12 / 22	19,000
AHF	5,000

Technology for the AHF plant was sourced from Rhone-Poulenc. Production is essentially for captive consumption, with only rare sales of surplus. Fluorspar originally came from a local source, but this is now worked out and supplies currently come from China. CTC and CFM are generally imported, with some purchases from Indian producers.

The site is extremely tidy in appearance and the plant looks to be in very good condition. The reactor was said to be of Incolloy and very corrosion-resistant. Gujarat operates with a single reactor and single purification / distillation stream, removing catalyst from the reactor to a holding vessel at changeover.

Verification of Capacity

Plant logbooks showed a 72-hour average of 55.63 MT per day. Gujarat claims 341 operating days per year, giving a total capacity for CFC-11/12 of 18,975 MT per year. Photocopies of logbook entries were provided.

Production in Relation to Verified Capacity

Again, actual HCFC-22 tons have been converted to equivalent CFC-11/12.

<i>Financial Year</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>
Actual 11/12	1,206	1,884	5,246	6,453	7,807	8,024	7,731
Equivalent 11/12	1,402	2,430	2,190	1,984	1,864	2,266	4,436
Total	2,608	4,314	7,436	8,437	9,671	10,290	12,167
Capacity		18,975 MT/year					
% of capacity	13.7	22.7	39.2	44.5	51.0	54.2	64.1

General Comments

- This is an impressive operation, clearly operating to high quality standards. ISO 9002 accreditation was gained in 1997.
- There is very little revenue from by-product hydrochloric acid and none from synthetic gypsum.
- The laboratory is well equipped with modern instrumentation.
- The main area for comment concerns the very high manpower. Admittedly, the isolated location requires them to be totally self-sufficient in all support services, and

the job-creation basis of the original project has led to generous manning. Also, around 65% of Refron is exported, much of it in 13.6 kg. non-returnable cylinders, so there is a large number of workers associated with cylinder handling/filling.

- Gujarat has created a local source of small non-returnable cylinders, which are otherwise produced mainly by Worthington and Amtrol in the USA. The Indian producer is committed to supplying only Gujarat.
- Total employees, including the AHF plant, number 502; 319 are associated with CFC-11 and -12 production.

iv) SRF Ltd., Fluorochemicals Division

Trade name “FLORON”

SRF (Shri Ram Fibres) was established in 1970 to produce nylon tire cord and industrial fibres, not at this location. The Fluorochemicals Division was set up in 1989 using Allied Chemical technology. In 1994, SRF commissioned a Halon 1211/1301 plant using in-house technology, and in 1995 licenced technology from Atochem for chloromethanes. It claims that Floron holds a 40% share of the domestic market for refrigerants, and also that SRF is one of the largest exporters, with sales to 45 countries. The site has an extremely impressive appearance, very well laid out on a 70 acre greenfield lot with lawns, flower beds and many trees.

<u>Product Range</u>	<i>Nominal Capacity, MY/year</i>
AHF	7,500
Floron 11 and 12	25,000
Floron 22 (if no 11/12 production)	10,000
Halons 1211 and 1301	500
Chloromethanes (CM)	18,750
Hydrochloric acid from Floron and CM plants	All sold
Synthetic Gypsum from AHF plant	All sold

SRF claims to have a process for HFC-134a and to be setting up a pilot plant. Fluorspar is imported from China and elsewhere, CTC and CFM come from the chloromethanes plant. The Floron and AHF plants are side by side, with a common control room.

The SRF plant has a duplicated reaction section with both the CFC-11/12 reactor and the separate HCFC-22 reactor leading to a single purification/distillation stream, so only one can be operated at a time. During HCFC-22 production, HCFC-23 by-product is collected for sale as a low temperature refrigerant or as a feedstock for Halon 1301 production.

The Halons plant, inspected by the mission, has been shut down for around 6 months because of high (60 MT) stocks. This is also operated on a campaign basis, either with HCFC-22 and bromine for Halon 1211, or with HFC-23 and bromine for Halon 1301.

Verification of Capacity

Plant logs showed a 72-hour average of 75.2 MT per day, and SRF claims plant availability of 356 days per year. 75.2 MT per day over 356 days gives an 11/12 capacity of 26,771 MT. This high availability figure was initially challenged by the mission team, but SRF claimed that their records substantiated it. Because of the separate reactors, changeover time is much reduced and the company claims that an annual shutdown is unnecessary. Most routine maintenance is carried out during changeovers. Logbook copies were provided to verify the company's claims. For the purpose of computing compensation, a figure of 25,000 MT/year was taken, corresponding to 332 operating days per year.

Production in Relation to Verified Capacity

Actual HCFC-22 production converted to equivalent CFC-11/12 tons.

<i>Financial Year</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>
Actual 11/12	1,775	2,672	5,074	5,727	7,230	6,948	5,670
Equivalent 11/12	----	-----	3,398	5,404	5,974	3,670	3,482
Total	1,775	2,672	8,472	11,131	13,204	10,618	9,152
Capacity		26,771 MT/year					
% of capacity	6.6	10.0	31.6	41.6	49.3	39.7	34.2

General Comments

- This is an extremely impressive operation, working to very high standards.
- All by-product synthetic gypsum and hydrochloric acid is sold, generating some income.
- The laboratory is excellent, very well equipped and spotlessly clean. Staff leave their shoes at the door and work in socks or indoor sandals on a gleaming tile floor.
- There was no sign of surplus manpower, and the total number associated with Floron activity and related AHF production is 194 persons. This was the only packaging line in India that has any degree of mechanization.

TECHNICAL ASSISTANCE COMPONENT**Description of Activities Covered**

1. *Project Management Unit:* The Ozone Cell would allocate a maximum of two professional staff positions, assisted by a maximum of two support staff positions for maintaining financial and statistical records, to manage this phaseout program. In addition, a one-time initial capital outlay for office equipment and monthly provisions for office rent, travel, utilities, communications are proposed.
2. *Audits:* Two audits will be conducted each year, comprising a financial audit for the project account (to be covered under the Financial Intermediary's fee) by an independent auditor acceptable to the Bank, and a performance audit of the project itself. The performance audit provision would cover, on an annual basis, costs inspection and reporting for one domestic and one international expert.
3. *Training:* This will include training of PMU staff, plus workshops and seminars for various participants in the phaseout program, with most intensive needs in the first two years, but some additional training in later years as issues emerge. Provisions for training in reclamation and re-cycling are also included. A lump sum provision for five years is suggested.
4. *Research for Market Prospects for Closure Enterprises:* this could be proposed as a lump-sum per enterprise, to finance investigations into alternative products/business.
5. *TA/Consultancy for environmental clean-up design at closing plants:* A lump sum per plant is proposed.
6. *TA/Consultancy for designing standards, systems and procedures for recovery and destruction of CFCs.* A lump sum provision is proposed.
7. *Public Awareness campaign:* A lump sum is proposed.

The proposed TA costs are summarized in the Table below.

Proposed TA Costs

	Unit	Total costs	
		Rupees	US\$
PMU			
<i>Recurring costs (@ 10 years)</i>			
Professional staff	2	14,400,000	339,303
Support staff	2	5,280,000	124,411
Running costs (rents etc.)		15,000,000	353,440
<i>One-time start-up expenses</i>	Lump-sum	8,488,000	200,000
Sub-total		43,168,000	1,017,154
AUDITS			
Performance audit	Lump-sum	8,488,000	200,000
TRAINING	Lump-sum	6,366,000	150,000
TA for environmental cleanup		8,488,000	200,000
TA for standards etc. for recovery	Lump-sum	4,244,000	100,000
Public Awareness Campaign	Lump-sum	6,366,000	150,000
Research for substitutes	Lump-sum	16,976,000	400,000
	Total	94,096,000	2,217,154

The corresponding net present value of PMU costs (excluding start-up) and all other costs at current rates is \$2,094,470

An exchange rate of US\$ 1 = Rupees 42.44 (date of value February 18, 1999) is used.

Text of OORG review by Mike Harris

I have carefully reviewed the current draft of the India proposal and look forward to seeing the latest draft in which I understand you have incorporated some of my comments and suggestions.

In general, the actions and activities proposed are sensible and entirely appropriate to meet the goal of closing down Indian CFC production by the end of the year 2010 in keeping with India's obligations under the Montreal Protocol as amended. The technical annex seems to be a credible analysis of the technical situations of the plants involved, and the overall plan appears to be technically feasible.

In the absence of more detailed information (e.g. on the timing of activities at the plant-specific level) it is not possible to state whether the proposal is the MOST cost-effective approach to the objective, but at a general level the plan is technically feasible and does not include any obviously inappropriate activities.

As you are aware, I have considerable reservations on the financial content of the plan. In the absence of considerably more financial data it is not possible to give an opinion on the validity of the compensation sum proposed. You have separately informed me that the compensation sum is equivalent to a calculated after-tax gross margin of about 35% which seems very unusual indeed for any operation producing bulk commodity chemicals in a free market situation. However, I appreciate that the calculation of the actual compensation figure involves political as well as technical considerations and therefore reserve further comment. A much more detailed analysis of the proposal and the financial questions raised has already been provided to you under separate cover.

It is, of course, for others to decide whether any further analysis of the proposal is required before submission to the Executive Committee. However, if such further analysis is deemed helpful then I would suggest that it include further sensitivity analyses along the lines mentioned in my detailed comment document, together with a careful consideration of the eligibility criteria in the light of the recommendations made by the Expert Group to the Secretariat of the Multilateral Fund in their report to the Sub-Group on Production of the Executive Committee.

In summary, therefore:

1. Thank you for the opportunity to review this interesting proposal.
2. The plan appears to be appropriate and technically feasible to meet the objective of a closure of India's CFC production by end-2010.
3. I maintain considerable reservations regarding the quantification of costs and therefore regarding the actual figures presented relating to the compensation sum requested. These are set out, with explanations, in the detailed comment document already provided."

Kind regards from ancient Windsor Castle - no telephones (in keeping with the history!) - thank goodness for a lap-top which works over a mobile phone!

MikH