

### 3.4.1 Survey Methodology

The Survey Methodology comprised of the following steps:

- Interaction with upstream suppliers (chemicals and equipment)
- Interaction with enterprises

Interaction with upstream suppliers was carried out through regular interactions, meetings and visits. Through these interactions, lists of manufacturers were obtained. Additional inputs were obtained also through the lists maintained by UNDP/UNOPS local and international experts. MOEF also carried out a publicity campaign through all major national and regional newspapers, encouraging residual ODS users to register with MOEF. In addition, information on small and medium-sized enterprises was sought from the relevant government departments and from the AIACRA. To supplement the sources of information above, two identification and technical assistance workshops were arranged as described above, through which, additional enterprises were identified. Most of the enterprises (over 80%) were physically visited through field trips and plant visits carried out by UNDP/UNOPS national consultants and AIACRA affiliates. For the purpose of obtaining baseline information on the enterprises, a questionnaire developed by UNDP was used. The figures of ODS consumption obtained through the survey, were correlated with the records of domestic ODS sales from distributors and traders and with the information provided by the upstream chemical suppliers, to the extent available.

### 3.4.2 Survey Results

#### *CFC Consumption, eligibility and classification of enterprises*

In the survey, a total of about 240 remaining enterprises in the Refrigeration (Manufacturing) Sector were identified, which have residual CFC consumption. The enterprises were spread out all over India, with a predictable concentration in the in the proximity of major industrial areas such as Mumbai, Delhi, Bangalore, Chennai, Chandigadh, etc. Out of these, 199 enterprises met the MLF eligibility criteria for funding, i.e. their CFC-based capacities were established prior to July 25, 1995. The indicative lists of all eligible and ineligible enterprises are provided in Annex-2. The remaining eligible CFC consumption and enterprises by sub-sector are summarized as below:

**Table-4**  
**India Refrigeration (Manufacturing) Sector – Summary of remaining unfunded CFC users/consumption**

Sub-sector/Category	Number of Enterprises	CFC Consumption (MT)
<b>Eligible enterprises</b>		
Commercial Refrigeration (medium-sized)	6	66.92
Transport Refrigeration (medium-sized)	18	114.12
Commercial Refrigeration (small-sized with CFCs $\geq$ 2.5 MT/y)	58	180.32
Commercial Refrigeration (small-sized with CFCs $<$ 2.5 MT/y)	117	173.89
<b>TOTAL</b>	<b>199</b>	<b>535.25</b>
<b>Ineligible enterprises</b>	<b>41</b>	<b>29.06</b>
<b>GRAND TOTAL</b>	<b>240</b>	<b>564.31</b>

The remaining 41 enterprises, with a total of CFC consumption of 29.06 MT/y were established after July 25, 1995, and are not eligible for MLF funding. The reasons for the relatively small number of non-eligible CFC users remaining in the sector are as below:

- a) MOEF circulated and publicized the draft Ozone Rules in the industry around 1997. The rules included a provision prohibiting installation of new CFC-based capacity, upon coming into force.

- b) The industry was in recession in 1996-98 limiting new investments.
- c) Due to the awareness of the Montreal Protocol obligations, most of the new capacities established after 1995 were non-CFC-based. In addition, the Government had also extended tariff exemptions and other benefits for installing new non-ODS based technology.
- d) Most enterprises with CFC-based capacities established after 1995, converted on their own to CFC-free technologies, fully or partially, knowing that they would not be eligible for funding.

### Products manufactured

The surveyed enterprises in the commercial refrigeration sub-sector typically manufacture equipment such as chest freezers, display cabinets, bottle coolers, visi-coolers, reach-in refrigerators, hot/cold water dispensers, water coolers, ice-candy machines, etc, serving the users in the hospitality and food service industry. Many of these enterprises consume CFC-11 used as blowing agent for the rigid foam insulation and CFC-12 used as the refrigerant.

In the transport refrigeration sub-sector, the enterprises manufacture insulated bodies for refrigerated trucks and trailers and the refrigeration systems. These enterprises consume CFC-11 used as blowing agent for the rigid foam insulation and CFC-12/R-502 as the refrigerant.

### Baseline Equipment

Based on the responses to the questionnaires, as well as the inputs received from plant visits, the baseline equipment for the foam and refrigeration operations in the enterprises can be summarized as below:

*Foaming:* Medium-sized enterprises mostly use locally made (or in some cases imported) foam machines. Small-sized enterprises predominantly use manual mixing of chemicals. About 30% of the enterprises in all, use PU foam in some manner; the remaining either use other insulations or are not involved in insulation.

*Refrigeration:* Medium-sized enterprises typically have semi-automatic charging units, vacuum pumps and leak detectors suited for CFC-12. Small-sized enterprises mostly have assorted charging kits and vacuum pumps, suited for CFC-12.

### Baseline Resources

While the owners/management of the enterprises surveyed, are more or less conversant with the need to eliminate CFCs under the Montreal Protocol, most enterprises do not have the financial or technical resources to undertake and sustain conversions at their own cost. Most of the small-sized enterprises have 2-10 employees. The medium-sized enterprises employ about 10-30 persons. While the technicians have basic skills in refrigeration charging and evacuation, there is a lack of good housekeeping and related practices and lack of adequate knowledge or training on CFC-free technologies or applications. Most of the small-sized enterprises do not have well-equipped factories or workshops and lack organizational and infrastructural facilities.

### Summary

The enterprises, for the purpose of this Phase-out Plan, are classified into medium-sized (with a CFC consumption typically above 5 MT/y) and small-sized (with a CFC consumption typically below 5 MT/y). Among the small-sized enterprises, 117 enterprises with a CFC consumption of less than 2.5 MT/y have foaming operations, which can be considered negligible in terms of value addition to the product or in terms of sustainability. The remaining 58 enterprises with a total CFC consumption higher than 2.5 MT/y<sup>1</sup> are engaged in foaming on a more regular and sustainable basis and would need assistance to facilitate their conversion and maintain their sustainability.

## **I. PROJECT DESCRIPTION**

The Phase-out Plan for elimination of CFCs in the Refrigeration (Manufacturing) sector in India will be implemented through a combination of Investment, Technical support and Policy & management support components.

### **4.1 Investment Component**

The investment component of the plan will focus on enabling the participant enterprises to physically eliminate CFCs from their production activities and would comprise of the following elements:

- Assessment of the technical requirements of conversion
- Determining the scope of international and local procurement
- Development of technical specifications and terms of reference for procurement
- Prequalification and short-listing of vendors
- International/local competitive bidding
- Techno-commercial evaluation of bids and vendor selection
- Procurement contracts
- Site preparation
- Customs clearance and delivery
- Installation and start-up
- Product and process trials
- Operator training
- Commissioning and phase-in of CFC-free production
- Destruction of baseline equipment

The approach for implementing the investment component in the remaining eligible and unfunded enterprises in the sector is proposed to be through a combination of individual and group sub-projects as below:

#### To be implemented by UNDP

- Six individual sub-projects covering 6 medium-sized enterprises in the commercial refrigeration sub-sector
- Four group sub-projects covering 58 small-sized enterprises (with significant foaming baseline) in the commercial refrigeration sub-sector
- Six group sub-projects covering 117 small-sized enterprises (without significant foaming baseline) in the commercial refrigeration sub-sector

#### To be implemented by UNIDO

- One group sub-project covering 18 enterprises in the transport refrigeration sub-sector.

This approach draws on previous implementation experience and has been designed based on the size, level of organization, location and customer base of enterprises concerned and also based on ease and convenience for execution and management. Given the generally small size of the remaining enterprises in the sector, with inadequate in-house technical capabilities, the need for adequate investments for plant and process changes, supported by investments on adequate technical assistance, trials and training, is critical and will involve proportionately larger inputs. It is foreseen that the durations for the sub-projects would be set in such a way as to ensure that the verifiable annual performance targets as may be required for the Phase-out Plan, would be quantifiable and achievable. CFC phase-out in ineligible enterprises will not be funded under the sector phase-out plan and is expected to take place through the control, which the Government will have through policy and regulatory actions. Any unaccounted or unidentified eligible enterprises will be identified and accommodated within the resources approved for this sector phase-out plan.

#### 4.1.1 Plant and process investments

##### *Foam Operations*

- a) New chemicals suitable for the selected alternative technology will be required. These will be available from existing chemical suppliers. No specific investments are foreseen for handling of raw chemicals. However, activities under 4.1.2 will assist enterprises for safe handling of the chemicals.
- b) The use of new formulations will lead to a marginal change in mixing ratios and increased viscosity leading to reduced flowability of the chemical mixture. HCFC-141b based foam will have an increased thermal conductivity in relation to that produced with CFC-11, which is being replaced. The existing manual mixing process or low-pressure foam dispensers will not be able to handle the new formulations without adversely affecting the cell structure and thereby the thermal conductivity of the foam. Hand mixing is also not recommended from occupational health and safety standpoints. New high or medium-pressure foam dispensers as applicable, of equivalent effective capacity, which will provide a finer cell structure and help minimize the deterioration of thermal conductivity of the foam, and also minimize the occupational health and safety risks, will therefore be needed to be introduced, to replace the existing dispensers/hand-mixing process.
- c) The HCFC-141b based foam will have an increased molded density with respect to the CFC-11 based foam, resulting in increased requirement of chemicals. This increase will be partially offset by the savings resulting from more efficient handling of chemicals due to the new foam dispensers.

##### *Refrigerant Operation*

- a) Compressors suitable and optimized for HFC-134a/R-404a will be required. These will be available from existing suppliers.
- b) The chemical stability of HFC-134a/R-404a and of the synthetic lubricants compatible with HFC-134a/R-404a is highly sensitive to moisture and impurities in the system, as compared to that with CFC-12. The evacuation/charging process for HFC-134a/R-404a and polyolester lubricant will need to ensure the required level of cleanliness and dryness in the system. To ensure this the following is proposed:
  - The vacuum pumps will need to be suitable for use with HFC134a/R-404a. Retrofitting of vacuum pumps has not proven cost-effective or logistically feasible in the past, especially for enterprises of this size and considering non-availability of the required parts and services; therefore appropriate quantities of new vacuum pumps suitable for the conversion, consistent with the baseline capacities, will need to be provided.
  - The existing refrigerant charging units/kits are not suitable for use with HFC-134a/R-404a and cannot be retrofitted, and will therefore be replaced with automatic or portable semi-automatic charging units suitable for HFC-134a/R-404a duty.
- c) The design/sizing of the refrigeration system will need to be suitably changed, to ensure the viability of the process and to maintain product performance and reliability in manufacturing, such as:
  - Upsizing the condensers and reengineering evaporators and condensers, so as to ensure the levels of cleanliness and contamination that can be tolerated with HFC-134a/R-404a (< 5 ppm)
  - Lengthening of the capillaries or changing the thermostatic expansion valve models.
  - Use of filter-dryers with finer pores, suitable for use with HFC-134a/R-404a.
- d) The existing leak detection is unsuitable for detecting HFC-134a/R-404a leakages; therefore suitable hand-held leak detectors will need to be provided.

#### 4.1.2 Technical assistance

Technical assistance will be required to be provided through international experts and, when available, national experts to ensure a smooth transition to the new replacement technology. The experts would need to be process specialists and their functions will include overall technical supervision of conversion projects and technical coordination between equipment/chemical suppliers, recipient enterprises and the implementing and/or executing agency. Their specific responsibilities include:

- a) Technical assistance for preparing specifications of equipment to be procured in the sub-project
- b) Technical equipment bid evaluation from suppliers during the competitive bidding process
- c) Technical guidance to the recipient enterprise during start-up with the new equipment and process
- d) Resolving technical issues with the phase-in of the new equipment and processes
- e) Technical evaluation of the results of production and product quality trials jointly with the recipient enterprise
- f) Technical project commissioning including final technical inspection of equipment and process for establishing completion and compliance with project objectives such as the destruction of the baseline CFC-based equipment where applicable, verification of depletion of CFC stocks, and verifying that the non-CFC production process is in operation
- g) Technical evaluation of enterprise reimbursement claims on equipment, raw materials, local works and other items and certification of the same
- h) Technical clearance of project completion, so that the project assets can be handed over and the project closed.
- i) Technical assistance for completion and other reporting requirements.

#### 4.1.3 Product and Process Trials

Trials will be required to validate the new/retrofitted equipment as well as the production process using the new technology, specifically to establish their performance and suitability for the conversion in accordance with specifications and project objectives. Trials will also be needed to evaluate and establish satisfactory end product properties. Trial costs will cover the cost of chemicals, raw materials, components, consumables and utilities required during site preparation and commissioning.

#### 4.1.4 Application and Process Training

Training will be needed to acquaint the production personnel in the enterprise with the new equipment and processes. Training will also be required to address safety and industrial hygiene issues, such as flammability, ventilation, and health hazards and to institute the required industrial practices as applicable to the replacement technology.

### **4.2 Technical Support Component**

Since the Sector Phase-out Plan will address the entire Refrigeration (Manufacturing) Sector, the industry as a whole will need to be supported through provision of a technical support component for ensuring that their phase-out actions and initiatives are not only technically sound but also sustainable, and consistent with the important priorities of the Government, which are to prevent industrial dislocation and obsolescence. The Technical Support component will assist the Refrigeration (Manufacturing) Sector as a whole, for the following:

- a) Establishment of quality and performance standards for the CFC-free products and applications within the sector.
- b) Interaction with the user industry for providing technology assistance for sustainability of CFC-free refrigeration applications, through technical workshops and meetings
- c) Establishment of a training, certification and licensing program for refrigeration system production operators and technicians, for sustaining the CFC-free technologies.

### 4.3 Policy & Management Support Component

The implementation of the Phase-out Plan will need to be closely aligned and coordinated with the various policy, regulatory, fiscal, awareness and capacity-building actions the Government of India is taking and will need to take in future, in order to ensure that the implementation of the Phase-out Plan is consistent with the Government priorities, such as promotion of indigenization and decentralized management. Further, in view of the annual performance-based targets needed to be achieved under the terms of the Phase-out Plan, the implementation of the Plan will need to be closely and efficiently managed and will introduce additional coordinating, reporting and monitoring activities.

The Phase-out Plan for the Refrigeration (Manufacturing) Sector will be managed by a dedicated management team, comprising of a coordinator to be designated by the Government and supported by representatives and experts from the implementing/executing agencies and the necessary support infrastructure. The Policy & Management Support component of the Phase-out Plan will include the following activities, for the duration of the Plan:

- a) Management and coordination of the Plan implementation with the various Government policy actions pertaining to the Refrigeration Sector
- b) Establishment of a policy development and enforcement program, covering various legislative, regulatory, incentive, disincentive and punitive actions to enable the Government to acquire and exercise the required mandates in order to ensure compliance by the industry with the phase-out obligations.
- c) Development and implementation of training, awareness and capacity-building activities for key government departments, legislators, decision-makers and other institutional stakeholders, to ensure a high-level commitment to the Plan objectives and obligations.
- d) Awareness creation of the Phase-out Plan and the Government initiatives in the Sector among consumers and public, through workshops, media publicity and other information dissemination measures.
- e) Preparation of annual implementation plans including determining the sequence of enterprise participation in the planned sub-projects.
- f) Verification and certification of CFC phase-out in completed sub-projects within the Plan through plant visits and performance auditing.
- g) Establishment and operation of a reporting system of usage of CFCs/substitutes by users
- h) Reporting of implementation progress of the Plan for the annual performance-based disbursement.
- i) Establishment and operation of a decentralized mechanism for monitoring and evaluation of Plan outputs, in association with provincial regulatory environmental bodies for ensuring sustainability.

## 5. TECHNOLOGY

The selection of the alternative technology for conversion would be governed by the following:

- a) Proven and reasonably mature technology
- b) Cost-effective conversion.
- c) Availability of the systems at favorable pricing.
- d) Critical properties that have to be obtained in the end product
- e) Compliance with established (local and international) standards on safety and environment.

The technology selected would also need to be easily adaptable at the (generally small-sized) recipient enterprises, which predominantly would be participating in this project. The selection of the technology would also need to be consistent with the priorities of the Government and industry and to ensure sustainability of the technology in the long-term.

## 5.1 Foam Operation

The presently available/emerging CFC-phase-out technologies, for rigid polyurethane insulating foams are:

CLASSIFICATION	LIQUID TECHNOLOGY	GASEOUS TECHNOLOGY
Low ODP technologies (Interim)	HCFC-141b, HCFC-141b + water	HCFCs (22, 142b, 22 + 142b/141b)
Zero ODP technologies (Permanent)	Water, Pentanes (n, iso, cyclo) HFC-245fa, HFC-365mfc, HFC-365/227	HFCs (134a, 152a)

### *Interim Technologies*

HCFC-22 (independently or in combination with HCFC-142b and more recently with HCFC-141b) based systems, due to the low boiling point of HCFC-22, cannot be supplied pre-blended and will require investments in full-fledged in-house blending facilities. HCFC-22 also has residual ODP.

HCFC-141b has a boiling point near ambient temperatures. HCFC-141b based systems are technically mature and commercially available. They also provide relatively the most acceptable insulation value and energy efficiency, and the lowest investment and operating costs vis-à-vis other options. No major changes in the auxiliary equipment/tooling in the production program, such as jig/mold redesign, are needed. However, HCFC-141b has residual ODP and is also an aggressive solvent.

### *Permanent Technologies*

Pentane based (n-, iso-, cyclo) systems require extensive safety related provisions/investments due to their flammability. Due to safety considerations, the use of pre-blended systems is not viable and additional investments for in-house pre-mixing are required. Cyclopentane has miscibility limitations with polyols. The molded densities and insulation values are still inferior to those obtained with HCFC-141b. The advantages are their relatively lower operating costs; they are environmentally relatively safe (no ODP/GWP or health hazards) and constitute a permanent technology. Hydrocarbons are thus, the preferred conversion technology for large and organized users, where safety requirements can be complied with and investments can be economically justified. In the present scenario, since most of the enterprises are small or medium-sized, application of hydrocarbon-based systems is not considered feasible.

Gaseous HFCs have been used successfully but cannot be applied widely at the present time, due to cost and availability factors.

For water-based systems, the insulation values, density and commercial availability are unsatisfactory at present. However, these systems have acceptable processing characteristics and are expected to be mature and commercially viable in the near future, especially for applications where insulation values are not very critical. In addition, they are environmentally safe (zero ODP/GWP, no health or safety hazards) and constitute a permanent technology. Since in the current situation the rigid foam is for insulation applications, applying water-based technology is not considered feasible.

Chemical and systems suppliers and the appliance industry have extensively evaluated liquid HFC-based systems. Preliminary trials with non-optimized formulations indicate lower molded foam densities, insulation values comparable to HCFC-141b and no solvent action. On the whole, liquid HFCs are considered to be the only potential zero-ODP alternatives to hydrocarbons. HFC-245fa is expected to be commercially produced beginning the mid-2002. Another candidate, a non-flammable blend of HFC-365mfc and HFC-227, is also planned for commercial production in the second half of 2002. Provided that the commercial and availability considerations are addressed, these substances can be considered to be viable long-term substitutes.

Based on the above considerations, the enterprises will convert to CFC-free systems in future, for their rigid polyurethane foam operations. Until the commercial introduction of mature CFC-free systems, HCFC-141b based systems will need to be used as an interim technology, to maintain product standards and acceptability.

## 5.2 Refrigerant Operation

The alternative technologies for replacement of CFC-12 in small capacity hermetic/semi-hermetic refrigeration systems are as below:

HCFCs: HCFC-22, Blends  
HFCs: HFC-134a, HFC-152a  
Hydrocarbons: HC-290 (Propane), HC-600a (Isobutane), and HC290/600a (1:1 mixture of both)

HCFCs are not preferred long-term substitutes, due to their residual ODP.

Hydrocarbon technologies though environmentally safe (no ODP/GWP or health hazards) and technically acceptable, require elaborate safety/monitoring provisions and investments due to their flammability and will not be suitable for cost-effective and financially sustainable transfer to small and medium-sized enterprises.

HFC-152a has higher discharge temperatures/pressures, is flammable and less stable at high temperatures and the technology for the same is not widely available.

HFC-134a technology as a replacement for CFC-12 based refrigeration systems, is universally accepted, especially in small hermetic/semi-hermetic systems. HFC-134a is a zero ODP option. The technology is commercially available. Hermetic compressors optimized for HFC-134a are commercially available. This technology is therefore the preferred conversion technology in this project. For low-temperature applications using R-502, based on similar lines as above, R-404a will be the selected replacement technology.

## 5.3 Technology Selection

Based on the selection parameters for the technologies for foam and refrigerant operations described earlier, the selection of the CFC replacement technologies in the remaining enterprises can be summarized as below:

Sub-sector	CFC Consumption (MT)	Technology Selected
Foam operation	393.78	HCFC-141b + partial water-based systems
Refrigerant operation	170.53	HFC-134a/R-404a

## 5.4 Additional Justification for HCFC technology

The implementing agency experts prior to the preparation of this proposal appraised the prospective recipient participating enterprises and had detailed discussions with the technical and managerial personnel of the enterprises, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprises were briefed in detail about the following:

1. An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
2. The techno-economic impact of each technology on the products manufactured, and the processes and practices employed by them.
3. The possible implication of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, fire and explosion hazards.
4. It was emphasized to them that HCFC technologies are interim in nature due to their residual ODP and therefore may continue to adversely affect the environment, though at a lower scale than CFCs.
5. It was further explained that HCFCs use may become restricted under present or future international conventions and may also need to be phased out at a future date, and any investments required for their phase-out and for conversion to safer technologies, may have to be borne by them.



The enterprises indicated their preference for selection of HCFC-141b based technology, in their rigid foam operation. The specific justifications offered by them are as below:

Water-based systems were considered, but are unsuitable due to the unsatisfactory insulation values, density and other end-product properties, which will affect their competitiveness. They considered hydrocarbon-based systems unsuitable due to the following factors:

- a) The fire, explosion and security hazard and compliance with local safety regulations involved in the storage and handling of hydrocarbons, in view of their flammability. In the present premises of these enterprises such compliance is not possible. At the present time, it would not be cost-effective or viable for them to relocate their manufacturing facilities to ensure such compliance.
- b) Since hydrocarbons cannot be pre-mixed in polyols due to the safety hazard they present in transportation, additional investments on in-house premixing equipment will be required. Considering their low volume of production, such investments are not economically viable.

In view of safety considerations, additional and continuous monitoring of plant operations by statutory authorities will be needed. The plant operators will need additional retraining for safety practices. The insurance premiums will increase. This will add to the burden of recurring costs.

In view of the above, the enterprises selected HCFC-141b (+ partial water) based systems for their rigid foam operations as the interim conversion technology, which will ensure quick phase-out of most of the ODP, while maintaining products competitive and the properties at acceptable levels.

## INCREMENTAL COSTS

### 6.1 Summary of incremental costs

The incremental capital and operating costs for the Phase-out Plan are calculated based on the guidance provided by the various Executive Committee Decisions and precedents and agreements reached with MLF during recently approved similar projects in this Sector. The basis and detailed calculations for the various cost elements are presented in Annex-3 and Annex-4. The total costs worked out are as below:

Incremental Capital Costs:	US\$ 3,326,050
Contingencies:	US\$ 283,136
Incremental Operating Costs:	US\$ 0
<b>Total:</b>	<b>US\$ 3,609,186</b>

### 6.2 Economies

The incremental costs of the Plan are budgeted on the basis that the sector-wide phase-out approach will result in economies through adoption of cost-effective execution strategies and also through dynamics of the market forces, while providing the Government with the flexibility and the resources to align its policy and regulatory actions with the technical actions, for ensuring a timely, systematic and sustainable phase-out. Some of the salient provisions of the economies considered for calculating the incremental costs of the sector-wide approach as compared to the individual project-to-project approach, are as below (more details are provided in Annex-3):

- a) In the investment component, budgets for technical assistance, trials and training are reduced to reflect the savings in the group/sector-wide approach, based on prior agreements for similar projects.
- b) Only those enterprises with significant or meaningful foaming baselines have been considered for supporting the foaming operations.

- c) The proposals for replacing the baseline CFC-based equipment have been based on functionality rather than eligibility alone, resulting in savings in the overall costs of the replacement equipment, in accordance with prior agreements with MLF on similar projects.
- d) To account for the impact of market forces in shaping the incremental operating costs, projected price differentials are considered only for foam chemicals and refrigerants (and not for other components).

## 7. COST EFFECTIVENESS

The Cost Effectiveness (ratio of the total incremental costs to the net ODP phased out per year post-project) of this project works out to US\$ 6.74/kg/y. This has been calculated from the net incremental project costs of US\$ 3,609,186 and the total CFCs, reflecting the net ODP value after deducting the residual ODS of HCFC-141b amounting to 28.88 MT) 535.43 MT, to be phased out upon completion. Details are provided in Annex-5. As per available guidance from Executive Committee Decisions, sector-wide phase-out plans are not subjected to a cost-effectiveness threshold.

## 8. FINANCING

The total requested grant funding is US\$ 3,609,186 plus agency support costs.

## 9. IMPLEMENTATION

### 9.1 Management and execution

The overall management of the Plan will be carried out as described in Section 4.3, by Government of India with the assistance of UNDP.

The CFC phase-out activities for the estimated 18 enterprises in the transport refrigeration sub-sector would be implemented by UNIDO. The CFC phase-out activities in all remaining eligible enterprises would be implemented by UNDP.

The Ozone Cell, Ministry of Environment & Forests, will be responsible for monitoring of the implementation of the Phase-out Plan. The Ozone Cell will be responsible for tracking the promulgation and enforcement of policy/legislations and assist UNDP with the preparation of annual implementation plans and progress report to the Executive Committee. UNDP would conduct an annual independent audit for verifying CFC consumption levels including spot checks and random visits, and supervise implementation activities.

### 9.2 Performance and Disbursement Schedule

Year (as of 31 Dec)	ODS phase-out target (MT)			Remaining ODS Consumption in Ref (Mfg) Sector (MT)	Disbursement (US\$)		
	From approved ongoing projects	From Phase-out Plan	Total		UNIDO	UNDP	Total
2002	0	0	0	1,373	500,000	2,000,000	2,500,000
2003	200	0	200	1,173	173,200	476,536	649,736
2004	200	181	381	792	0	250,000	250,000
2005	200	180	380	412	0	150,000	150,000
2006	209	203	412	0	0	59,450	59,450
<b>TOTAL</b>	<b>809</b>	<b>564</b>	<b>1,373</b>		<b>673,200</b>	<b>2,935,986</b>	<b>3,609,186</b>

### 9.3 Funding Arrangements

Upon approval by MLF of the Phase-out Plan, the Government of India, through UNDP, requests the Executive Committee to authorize disbursement of funding in advance for 2003, the implementation plan for which, is as below:

- a) Establishment of operational mechanism for management and monitoring of the Phase-out Plan.
- b) Formulation of detailed terms of reference and work plans for various activities under the Technical Support and Policy & Management Support components
- c) Establishment of an operational mechanism for participation in the Phase-out Plan and for obtaining phase-out commitments from enterprises.
- d) Initiating CFC phase-out activities for 14 enterprises in the transport refrigeration sub-sector (UNIDO)
- e) Initiating CFC phase-out activities for the 6 medium-sized enterprises in the commercial refrigeration sub-sector through individual sub-projects (UNDP)
- f) Selection of the enterprises for group projects in the commercial refrigeration sub-sector (UNDP)
- g) Two workshops under the Technical Support Component for technology assistance to prospective participant enterprises in the sector.
- h) One workshop for public awareness and information dissemination under the Policy and Management Support component.

Since the average duration for completion of a sub-project is expected to be about 18 months, the phase-out activities initiated in 2003 will not produce results until mid or end-2004, contributing to the reduction of consumption starting 2005. Therefore, the Government of India through UNDP, will request the disbursement of the 2004 funding not later than the last Meeting of the Executive Committee in 2003, against satisfactory reporting of activities carried out in 2003. The funds for 2005 and 2006 will be transferred to UNDP at the first meeting of the Executive Committee in these years, for the amounts listed in the table above, upon approval of the annual implementation plan and upon confirmation by UNDP, that the agreed reduction targets and relevant performance milestones of the respective preceding years have been achieved.

### 0. RESULTS

This project will completely eliminate the use of CFCs in the Refrigeration (Manufacturing) Sector in India.

### ANNEXES

- nnex-1: List of Approved Investment Projects in the Refrigeration (Manufacturing) Sector in India
- nnex-2: List of remaining enterprises in the Refrigeration (Manufacturing) Sector in India
- nnex-3: Incremental Capital Costs
- nnex-4: Cost-effectiveness
- nnex-5: Environmental Assessment
- nnex-6: Cover Sheet (UNIDO component)
- nnex-7: Cover Sheet (UNDP component)
- nnex-8: Draft Agreement
- nnex-9: Technical Reviews

**ANNEX-1**

**India - Refrigeration (Manufacturing) Sector: Historical Approvals**

MLF Number	Agency	Sub-Sector	Title	Impact	Grant	Approval	CE	Status
<b>Domestic Refrigeration</b>								
IND/REF/20/INV/104	IBRD	Domestic	Godrej-GE Appliances (Foam)	568.0	2,691,570	Oct-1996	4.74	COM
IND/REF/22/INV/125	IBRD	Domestic	Maharaja International	59.80	510,000	May-1997	9.58	ONG
IND/REF/22/INV/126	IBRD	Domestic	Volta Ltd.	354.00	2,724,378	May-1997	7.73	COM
IND/REF/22/INV/134	IBRD	Domestic	Videocon Appliances Ltd.	351.70	1,835,115	May-1997	6.82	COM
IND/REF/25/INV/183	IBRD	Domestic	BPL Refrigeration Ltd.	136.00	722,906	Jul-1998	7.76	ONG
IND/REF/27/INV/204	IBRD	Domestic	Whirlpool of India Ltd.	200.60	675,165	Mar-1999	4.84	ONG
IND/REF/30/INV/337	IBRD	Domestic	Godrej-GE Appliances (Ref)	71.7	2,050,000	Mar-2000	28.59	ONG
<b>TOTAL (Domestic Refrigeration - 7 projects)</b>				<b>1,742</b>	<b>11,209,134</b>		<b>6.44</b>	
<b>Commercial Refrigeration</b>								
IND/REF/18/INV/61	IBRD	Commercial	Meghdoot Refrigeration	18.00	164,590	Nov-1995	9.14	COM
IND/REF/18/INV/62	IBRD	Commercial	V. Krishna & Co.	14.80	147,020	Nov-1995	9.80	COM
IND/REF/18/INV/63	IBRD	Commercial	V. Krishna Engineers	17.00	202,790	Nov-1995	11.93	COM
IND/REF/18/INV/64	IBRD	Commercial	Friz-Tech P. Ltd.	12.00	132,920	Nov-1995	11.08	COM
IND/REF/19/INV/89	IBRD	Commercial	Rabi-Run Refrigeration	14.00	142,622	May-1996	10.83	COM
IND/REF/19/INV/90	IBRD	Commercial	Seepra Refrigeration	15.00	171,910	May-1996	12.12	COM
IND/REF/19/INV/91	IBRD	Commercial	Shakti Fabricators	13.50	159,230	May-1996	12.43	ONG
IND/REF/19/INV/92	IBRD	Commercial	Chandra Frig Co.	9.40	130,984	May-1996	13.98	ONG
IND/REF/19/INV/93	IBRD	Commercial	Rockwell Industries	18.00	181,004	May-1996	10.60	COM
IND/REF/19/INV/94	IBRD	Commercial	Sethia Appliances	16.00	173,384	May-1996	11.38	COM
IND/REF/20/INV/105	IBRD	Commercial	Supercold Refrigeration	11.00	133,770	Oct-1996	12.16	ONG
IND/REF/20/INV/106	IBRD	Commercial	Murali Refrigeration	9.00	126,485	Oct-1996	14.05	COM
IND/REF/22/INV/110	IBRD	Commercial	Ref. Comp. & Accessories	9.50	125,370	May-1997	13.92	ONG
IND/REF/22/INV/120	IBRD	Commercial	Standard Refrig. Appliances	18.80	170,180	May-1997	9.06	COM
IND/REF/22/INV/122	IBRD	Commercial	Sheetal Engineering	8.70	127,630	May-1997	14.64	COM
IND/REF/22/INV/123	IBRD	Commercial	Hindustan Refrig. Industries	10.10	132,320	May-1997	13.04	ONG
IND/REF/22/INV/124	IBRD	Commercial	Refrig. and Home Appliances	11.30	147,300	May-1997	12.98	ONG
IND/REF/22/INV/131	IBRD	Commercial	Polar Enterprises	10.80	138,190	May-1997	12.75	COM
IND/REF/23/INV/144	IBRD	Commercial	Aarkay Industries	19.80	135,798	Nov-1997	7.62	COM
IND/REF/23/INV/145	IBRD	Commercial	Saikrupa Industries	14.80	125,618	Nov-1997	9.20	COM
IND/REF/23/INV/152	IBRD	Commercial	Sarkar Refrigeration	12.00	117,100	Nov-1997	10.35	COM
IND/REF/23/INV/160	IBRD	Commercial	Sidwal Refrigeration	11.70	169,744	Nov-1997	14.95	COM
IND/REF/25/INV/180	IBRD	Commercial	Sandeep Refrigeration	9.90	107,684	Jul-1998	10.83	COM
IND/REF/25/INV/182	IBRD	Commercial	Prashant Refrigeration	0	0	Jul-1998	0	Canceled
IND/REF/31/INV/257	UNDP	Commercial	Fedders Lloyd Corporation	21.20	257,428	Jul-2000	12.15	COM
IND/REF/32/INV/282	UNDP	Commercial	Sandlas Air-Con Systems	23.30	228,517	Dec-2000	9.80	ONG
IND/REF/32/INV/286	UNDP	Commercial	Group - 9 Enterprises	53.50	789,425	Dec-2000	14.75	ONG
IND/REF/32/INV/290	UNIDO	Commercial	Umbrella - 3 enterprises	27.30	328,894	Dec-2000	12.04	ONG
IND/REF/34/INV/323	UNDP	Commercial	Group - 5 enterprises	22.00	323,627	Jul-2001	14.73	ONG
IND/REF/35/INV	UNDP	Commercial	Ice-Make Refrigeration	12.40	157,305	Dec-01	12.72	ONG
IND/REF/35/INV	UNDP	Commercial	Group - 9 Enterprises	56.50	726,448	Dec-01	12.85	ONG
IND/REF/35/INV	UNDP	Commercial	Konark Refrigeration	13.10	182,684	Dec-01	13.98	ONG
IND/REF/35/INV	UNDP	Commercial	Group - 14 enterprises	68.00	960,097	Dec-01	15.21	ONG
<b>TOTAL (Commercial Refrigeration - 33 projects)</b>				<b>602</b>	<b>7,318,068</b>		<b>12.16</b>	
<b>GRAND TOTAL (40 projects)</b>				<b>2,344</b>	<b>18,527,202</b>		<b>7.90</b>	

**ANNEX-2**

**India – Refrigeration (Manufacturing) Sector: Indicative Lists of Remaining Enterprises**

**Table 2.1: Medium-sized Enterprises (Commercial Refrigeration)**

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
1	Beeco Aircon	Meerut	CR	1 LPD (local)	2 SACU, 10VP, 3 LD
2	Cheerag Refrigeration	Mysore	CR	1 LPD	2 SACU, 2 VP, 1 LD
3	Hello Mineral Water Industries	Noida	CR	1 LPD	1 SACU, 4 VP, 2 LD
4	Hemair	Hyderabad	CR	1 LPD	1 SACU, 3 VP, 1 LD
5	Mec Air	Vadodara	CR	1 LPD	2 SACU, 3 VP, 1 LD
6	Tristar	Nasik	CR	1 LPD (local)	2 SACU, 4 VP, 2 LD
<b>TOTAL (6 medium-sized enterprises – commercial refrigeration)</b>				<b>CFC-11: 48.57 MT, CFC-12: 18.35 MT, Total: 66.92 MT</b>	

**Table 2.2: Medium-sized Enterprises (Transport Refrigeration)**

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
1	Anand Body Builders	Delhi	TR	HM	4 MCK, 3 VP, 2 LD
2	Anand Ishwar Body Builders	Delhi	TR	HM	3 MCK, 2 VP, 2 LD
3	Anil Transport	Delhi	TR	HM	2 MCK, 2 VP, 2 LD
4	Asian Perishables	Delhi	TR	HM	3 MCK, 3 VP, 2 LD
5	Bright India	Delhi	TR	HM	4 MCK, 2 VP, 2 LD
6	Evergreen Transport	Mumbai	TR	HM	2 MCK, 1 VP, 1 LD
7	Golden Temple Enterprises	Delhi	TR	HM	4 MCK, 2 VP, 2 LD
8	Harish Body Builders	Delhi	TR	HM	3 MCK, 1 VP, 1 LD
9	HS Body Builders	Faridabad	TR	HM	2 MCK, 2 VP, 1 LD
10	Indo Gulf Enterprises	Gurgaon	TR	HM	3 MCK, 1 VP, 1 LD
11	JK Refrigerated Vans	Faridabad	TR	HM	3 MCK, 2 VP, 1 LD
12	Raghubir Body Builders	Delhi	TR	HM	2 MCK, 1 VP, 1 LD
13	RK Body Builders	Delhi	TR	HM	3 MCK, 1 VP, 1 LD
14	Sai Baba Refrigeration	Delhi	TR	HM	5 MCK, 4 VP, 2 LD
15	Shalu Enterprises	Delhi	TR	HM	4 MCK, 1 VP, 1 LD
16	Sheetal Perishable Cargo Carr.	Mumbai	TR	HM	1 SACU, 1 MCK, 2 VP
17	Suashish International	Delhi	TR	HM	2 MCK, 1 VP, 1 LD
18	Trans Gulf	Delhi	TR	HM	5 MCK, 3 VP, 2 LD
<b>TOTAL (18 medium-sized enterprises – transport refrigeration)</b>				<b>CFC-11: 93.78 MT, CFC-12 20.34 MT, Total: 114.12 MT</b>	

**Table 2.3: Small-sized Enterprises (Commercial Refrigeration) with CFC consumption > 2.5 MT/v**

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
1	Aaco Refrigeration	Amritsar	CR	HM	Assorted MCK, VP, LD
2	Air Control Systems	Lucknow	CR	HM	
3	Amber Enterprises	Rajpura	CR	HM	
4	Avon Enterprises	Delhi	CR	HM	
5	Best Refrigeration	Udaipur	CR	HM	
6	Bharat Refrigeration Mfg. Co.	Delhi	CR	HM	

Annex-2: India – Refrigeration (Manufacturing) Sector: Indicative List of Remaining Enterprises (cont'd)

Table 2.3: Small-sized Enterprises (Commercial Refrigeration) with CFC consumption > 2.5 MT/y (cont'd)

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
7	Birla Aircon	Delhi	CR	HM	Assorted MCK, VP, LD
8	Biswal Refrigeration Industries	Cuttack	CR	HM	
9	Bristol India	Fazilka	CR	HM	
10	Chandra Refrigeration	Hyderabad	CR	HM	
11	Chirag Refrigeration P. Ltd.	Jaipur	CR	HM	
12	Cool Age	Faridabad	CR	HM	
13	Cool Breeze	Palakkad	CR	HM	
14	Daffoo Engineering	Delhi	CR	HM	
15	Dairy Den	Gandhinagar	CR	HM	
16	DD Refrigeration	Delhi	CR	HM	
17	Delair	Gurgaon	CR	HM	
18	Freezon	Delhi	CR	HM	
19	Glacier Refrigeration	Delhi	CR	HM	
20	GN Cool Systems	Amritsar	CR	HM	
21	GS Enterprises	Delhi	CR	HM	
22	Guru Nanak Enterprises	Delhi	CR	HM	
23	ICE Enterprises	Alwar	CR	HM	
24	Indian Catering Equipment Co	Bhiwadi	CR	HM	
25	Kalyan Cooling Corporation	Kanpur	CR	HM	
26	Kamal Cool	Gurgaon	CR	HM	
27	Kanakdhara Refrigeration	Jaipur	CR	HM	
28	Khanna Engineers	Faridabad	CR	HM	
29	Khatir Refrigeration	Delhi	CR	HM	
30	Kohinoor Industries	Ludhiana	CR	HM	
31	Krishna Refrigeration	Junagarh	CR	HM	
32	Malhotra & Co	Chandigadh	CR	HM	
33	Metro Enterprises	Delhi	CR	HM	
34	Moonstar Refrigeration	Lucknow	CR	HM	
35	Paramount Industries	Delhi	CR	HM	
36	Prakash Cooling	Delhi	CR	HM	
37	Pooma Enterprises	Palakkad	CR	HM	
38	Pury's Refrigeration	Lucknow	CR	HM	
39	Relief Industries	Delhi	CR	HM	
40	Royal Refrigeration Works	Delhi	CR	HM	
41	Sagar Refrigeration	Pathankot	CR	HM	
42	Sant Refrigeration	Delhi	CR	HM	
43	Semko	Ambala	CR	HM	
44	Siddharth Refrigeration	Rudrapur	CR	HM	
45	Simran Refrigeration	Faridabad	CR	HM	
46	Super Coolpoint	Agra	CR	HM	
47	Super Refrigeration Industries	Delhi	CR	HM	
48	Taj Cooling Cabinets	Agra	CR	HM	
49	Techcons Refrigeration	Mumbai	CR	HM	

Annex-2: India – Refrigeration (Manufacturing) Sector: Indicative List of Remaining Enterprises (cont'd)

Table 2.3: Small-sized Enterprises (Commercial Refrigeration) with CFC consumption > 2.5 MT/y (cont'd)

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
50	Thermotech	Jaipur	CR	HM	Assorted MCK, VP, LD
51	Udaya Enterprises	Udipi	CR	HM	
52	Veerm's Engineers	Nagpur	CR	HM	
53	Vijay Refrigeration	Jamnagar	CR	HM	
54	Vijay Udyog	Jaipur	CR	HM	
55	Volga Refrigeration	Kanpur	CR	HM	
56	Western Refrigeration Ind.	Palakkad	CR	HM	
57	Yamuna Telefridge	Yamunanagar	CR	HM	
58	Yog Trading Co.	Kanpur	CR	HM	
<b>TOTAL (58 small-sized enterprises with CFCs &gt; 2.5 MT/y)</b>				<b>CFC-11: 127.90 MT, CFC-12: 52.42 MT, Total: 180.32 MT</b>	

Table 2.4: Small-sized Enterprises (Commercial Refrigeration) with CFC consumption < 2.5 MT/y

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
1	Acme Refrigeration	Goa	CR	HM	Assorted MCK, VP, LD
2	Aditi Refrigeration	Delhi	CR	HM	
3	Advance Refrigeration	Delhi	CR	HM	
4	Alaska Industries	Nagpur	CR	HM	
5	Allied Refrigeration	Ghaziabad	CR	HM	
6	Amancio Refrigeration	Vadodara	CR	HM	
7	Anucool Engineers	Kolhapur	CR	HM	
8	AP Industrial Components	Nainital	CR	HM	
9	AR Corporation	Cuttack	CR	HM	
10	Arctic Aircon	Hyderabad	CR	HM	
11	Arctic Freezers	Trichur	CR	HM	
12	Asiatic Refrigeration	Delhi	CR	HM	
13	Associated Engineers	Mumbai	CR	HM	
14	Balaji Refrigeration	Hyderabad	CR	HM	
15	Bcool Refrigeration	Delhi	CR	HM	
16	Benner Enterprises	Pondicherry	CR	HM	
17	Bharat Aircon	Chennai	CR	HM	
18	Bharat Refrigeration Industries	Chennai	CR	HM	
19	Bhargava Refrigeration	Jaipur	CR	HM	
20	Bhaskar Refrigeration	Belgaum	CR	HM	
21	Bombay Refrigeration	Ahmednagar	CR	HM	
22	Canara Refrigeration	Udipi	CR	HM	
23	Carriers Refrigeration	Trivendram	CR	HM	
24	Chefaid Equipments	Delhi	CR	HM	
25	Climate Creators	Bangalore	CR	HM	
26	Comfort Refrigeration	Jaipur	CR	HM	
27	Commercial Refrigeration Ent.	Delhi	CR	HM	
28	Coolpack	Kanpur	CR	HM	

Annex-2: India – Refrigeration (Manufacturing) Sector: Indicative List of Remaining Enterprises (cont'd)

Table 2.4: Small-sized Enterprises (Commercial Refrigeration) with CFC consumption < 2.5 MT/y (cont'd)

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
29	Cooltech Corporation	Chandigarh	CR	HM	Assorted MCK, VP, LD
30	Cool Tech Ref. Systems	Delhi	CR	HM	
31	Cosmos Aircond. & Ref. Ind.	Cuttack	CR	HM	
32	Craisler Refrigeration	Delhi	CR	HM	
33	Crystal Refrigeration	Calcutta	CR	HM	
34	Data Refrigeration	Delhi	CR	HM	
35	DS Freezing	Kanpur	CR	HM	
36	Durga Refrigeration	Jaipur	CR	HM	
37	Elite Refrigeration	Delhi	CR	HM	
38	Eros Refrigeration	Nagpur	CR	HM	
39	Everest Engineers	Mumbai	CR	HM	
40	Everest Industries	Jalandhar	CR	HM	
41	Excel Refrigeration	Bangalore	CR	HM	
42	Expo Refrigeration	Jammu	CR	HM	
43	Freeze Cool	Nagpur	CR	HM	
44	Freezotech	Hyderabad	CR	HM	
45	Freezeking Enterprises	Bangalore	CR	HM	
46	Gemko Engineers	Ambala	CR	HM	
47	Gilly Enterprises	Aurangabad	CR	HM	
48	Gossons Air	Mohali	CR	HM	
49	GY Cooling	Kanpur	CR	HM	
50	Himalaya Cooling	Calcutta	CR	HM	
51	Imperial Refrigeration	Calcutta	CR	HM	
52	India Refrigeration	Hyderabad	CR	HM	
53	India Refrigeration Enterprises	Yamunanagar	CR	HM	
54	Indo German Refrig.	Amritsar	CR	HM	
55	Indo Tech Engineers	Saharanpur	CR	HM	
56	Industrial Refrigeration	Mumbai	CR	HM	
57	Jai Refrigeration Industries	Jammu	CR	HM	
58	Jamshed Refrigeration	Kanpur	CR	HM	
59	Jashan Refrigeration	Kanpur	CR	HM	
60	JK Industries	Kolhapur	CR	HM	
61	Jolly Refrigeration	Dehra Dun	CR	HM	
62	JVG Enterprises	Delhi	CR	HM	
63	Kadam Engineering	Kolhapur	CR	HM	
64	Kalsi Frost Engineering Co	Jalandhar	CR	HM	
65	KP Cooling Corporation	Kanpur	CR	HM	
66	Ladhar Enterprises	Ludhiana	CR	HM	
67	Lalwani Refrigeration	Sangli	CR	HM	
68	Lexus Engineering	Ludhiana	CR	HM	
69	Mittal International	Delhi	CR	HM	
70	Mohan Refrigeration	Ludhiana	CR	HM	
71	National Refrigeration	Chennai	CR	HM	



Annex-2: India – Refrigeration (Manufacturing) Sector: Indicative List of Remaining Enterprises (cont'd)

Table 2.4: Small-sized Enterprises (Commercial Refrigeration) with CFC consumption < 2.5 MT/y (cont'd)

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
72	Neptune Refrigeration	Chennai	CR	HM	Assorted MCK, VP, LD
73	New Coolwell Enterprises	Delhi	CR	HM	
74	Newcool India	Kanpur	CR	HM	
75	New India Refrigeration	Delhi	CR	HM	
76	New Saarkar Refrig.	Karnal	CR	HM	
77	Nikhil Enterprises	Kolhapur	CR	HM	
78	Perfect Refrigeration	Hyderabad	CR	HM	
79	Pooja Refrigeration	Jalandhar	CR	HM	
80	Prachi Enterprises	Jaipur	CR	HM	
81	Pritam Refrigeration	Nagpur	CR	HM	
82	Ranjana Frost	Chandigadh	CR	HM	
83	R. E. Airtech Industries	Calcutta	CR	HM	
84	Refrigeration Engg	Delhi	CR	HM	
85	Refrigeration Engg	Calcutta	CR	HM	
86	Refrigeration Eqpt Co	Calcutta	CR	HM	
87	Refrig. Machinery Mart	Calcutta	CR	HM	
88	Remi Instruments	Mumbai	CR	HM	
89	Renu Refrigeration	Delhi	CR	HM	
90	Sanan Refrigeration	Jalandhar	CR	HM	
91	Saturn Industries	Mohali	CR	HM	
92	Satkar Refrigeration	Ambala	CR	HM	
93	S-Cool Systems	Chennai	CR	HM	
94	Shankar Refrigeration	Amravati	CR	HM	
95	Sheetal Aircon	Delhi	CR	HM	
96	Sheetal Refrigeration Industries	Akola	CR	HM	
97	Shiva Frost	Mahadpur	CR	HM	
98	Shivalik Products	Ambala	CR	HM	
99	Shome's Refrigeration	Calcutta	CR	HM	
100	Subhash Chander & Bros.	Delhi	CR	HM	
101	Sunfrost Refrigeration	Ambala	CR	HM	
102	Supra Refrigeration	Hyderabad	CR	HM	
103	Teevem Freezers	Trivendram	CR	HM	
104	Tempkin	Calcutta	CR	HM	
105	Trikuta Cooling	Delhi	CR	HM	
106	Uniair Enterprises	Chandigadh	CR	HM	
107	United Brothers	Delhi	CR	HM	
108	Unitemp	Ludhiana	CR	HM	
109	Upfront Engineering	Chennai	CR	HM	
110	Vanguard Refrigeration	Hyderabad	CR	HM	
111	Varsha Refrigeration	Kolhapur	CR	HM	
112	Vijay Refrigeration	Ambala	CR	HM	
113	Vishwakarma Refrig	Yamunanagar	CR	HM	
114	Vita Ice Candy	Jaipur	CR	HM	

Annex-2: India – Refrigeration (Manufacturing) Sector: Indicative List of Remaining Enterprises (cont'd)

Table 2.4: Small-sized Enterprises (Commercial Refrigeration) with CFC consumption < 2.5 MT/y (cont'd)

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
115	Weathermakers	Calcutta	CR	HM	Assorted MCK, VP, LD
116	You-like Refrigeration	Karnal	CR	HM	
117	3-Star Refrigeration	Ludhiana	CR	HM	
TOTAL (117 small-sized enterprises) with CFCs < 2.5 MT/y				CFC-11: 105.99 MT, CFC-12: 67.90 MT, Total: 173.89 MT	

Table 2.5: List of ineligible enterprises

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
1	Abhishek Aircon Appliances	Delhi	CR	HM	Assorted MCK, VP, LD
2	Abohar Aircare	Abohar	CR	HM	
3	Aircare	Delhi	CR	HM	
4	Amigo Dispensing Solutions	Baroda	CR	HM	
5	Ascon Refrigeration	Faridabad	CR	HM	
6	BP Industries	Delhi	CR	HM	
7	Band Box Electric	Ludhiana	CR	HM	
8	Bawa Joginder Singh & Co	Chandigarh	CR	HM	
9	Bhandari Engg & Electricals	Bhatinda	CR	HM	
10	Bliss Engineers	Jalandhar	CR	HM	
11	Climatic Equipments	Delhi	CR	HM	
12	Cool Connection	Delhi	CR	HM	
13	Cool Makers	Tennur	CR	HM	
14	Cool-N-Cool	Faridabad	CR	HM	
15	Cool Palace	Delhi	CR	HM	
16	Cryoscientific Instruments	Chennai	CR	HM	
17	Fauji Refrigeration	Chandigarh	CR	HM	
18	Fridge India	Faridabad	CR	HM	
19	Gulshan Engineers	Delhi	CR	HM	
20	Hemkunt Electricals	Delhi	CR	HM	
21	Jogi Refrigeration	Chandigarh	CR	HM	
22	Khera Instruments	Delhi	CR	HM	
23	Marito Appliances	Mehsana	CR	HM	
24	Marplex Appliances	Ankleshwar	CR	HM	
25	Naarang Scientific Works	Delhi	CR	HM	
26	Noble Refrigeration	Delhi	CR	HM	
27	Osho Home Appliances	Delhi	CR	HM	
28	Paras Enterprises	Parwanoo	CR	HM	
29	Parkaire Engg Co	Delhi	CR	HM	
30	Rakesh Industries	Delhi	CR	HM	
31	Rattan Refrigeration	Delhi	CR	HM	
32	Refco & Wassamat Appliances	Delhi	CR	HM	
33	Saraf Cooling Co	Kanpur	CR	HM	
34			CR	HM	
	SK Refrigeration Co	Delhi			

Annex-2: India – Refrigeration (Manufacturing) Sector: Indicative List of Remaining Enterprises (cont'd)

Table 2.5: List of ineligible enterprises (Cont'd)

No	Enterprise name	Location	Products	Baseline equipment	
				Foam	Refrigerant
35	Solar Engineering Co.	Bangalore	CR	HM	Assorted MCK, VP, LD
36	Surendra Fabricators	Delhi	CR	HM	
37	Surendra Refrigeration Works	Khanna	CR	HM	
38	Swastik Industries	Delhi	CR	HM	
39	Triveni Refrig & Elect. Ent.	Allahabad	CR	HM	
40	United Refrigeration Works	Kanpur	CR	HM	
41	Unity Aircon Systems	Delhi	CR	HM	
<b>TOTAL (41 ineligible enterprises)</b>				<b>CFC-11: 17.54 MT, CFC-12: 11.52 MT, Total: 29.06 MT</b>	

Table 2.6: Summary

Sub-sector	Indicative Number of Enterprises	CFC Consumption (MT/y)		
		CFC-11	CFC-12	Total
Commercial Refrigeration (medium-sized)	6	48.57	18.35	66.92
Transport Refrigeration (medium-sized)	18	93.78	20.34	114.12
Commercial Refrigeration (small-sized with CFCs $\geq$ 2.5 MT/y)	58	127.90	52.42	180.32
Commercial Refrigeration (small-sized with CFCs $<$ 2.5 MT/y)	117	105.99	67.90	173.89
Ineligible enterprises	41	17.54	11.52	29.06
<b>GRAND TOTAL</b>	<b>240</b>	<b>393.78</b>	<b>170.53</b>	<b>564.31</b>

KEYS FOR TABLE:

DR: Domestic Refrigeration	HM: Hand-mixing	MCK: Manual charging kits
CR: Commercial Refrigeration	LPD: Low-pressure foam dispenser	SACU: Semi-automatic charging units
TR: Transport Refrigeration	HPD: High-pressure foam dispenser	ACU: Automatic charging units
IR: Industrial Refrigeration		VP: Vacuum pumps
CS: Cold storage		LD: Leak detectors

**ANNEX-3**  
**INCREMENTAL CAPITAL COSTS**

**A. Investment Component**

The following table summarizes the basis and considerations for calculating the incremental capital costs, for the remaining unfunded eligible participant enterprises in the Phase-out Plan:

Sub-sector	Incremental Capital Costs (US\$)				Contingencies (US\$)	Total (US\$)
	Equipment	Trials and Training	Technical Assistance	Sub-total		
DR, CR and IR	2,000,000	104,050	350,000	2,454,050	221,936	2,675,986
Transport Refrigeration	450,000	62,000	100,000	612,000	61,200	673,200
<b>TOTAL</b>				<b>3,066,050</b>	<b>283,136</b>	<b>3,349,186</b>

**B. Policy & Management Support Component**

Activity	Cost (US\$)
Management, coordination and monitoring (200 days/y x 4 y = 800 days) @US\$ 200 /day	160,000
Training and capacity-building activities for government/industry stakeholders and decision makers through workshops (1 workshop/year = 4 workshops)	40,000
Awareness programs (4 workshops + information dissemination)	40,000
Verification and certification (25 days/y x 4 y = 100 days) @US\$ 200/day	20,000
<b>Total</b>	<b>260,000</b>

**C. SUMMARY**

Activity	Cost (US\$)
Investment Component	3,349,186
Policy & Management Support Component	260,000
<b>TOTAL</b>	<b>3,609,186</b>

**ANNEX-4**  
**COST-EFFECTIVENESS**

**A. ODP Impact of the Project**

SUBSTANCE	ODP	CONSUMPTION (KG)	NET ODP KG
CFC-11	1.00	393,780	393,780
Substitute: HCFC-141b	0.11	262,920	28,877
CFC-12	1.00	170,530	170,530
Substitute: HFC-134a	0.00	153,477	0
<b>Remaining ODP Consumption in the sector</b>			<b>28,877</b>

**B. Cost-effectiveness Calculation**

PARAMETER/COST HEAD	UNIT	TOTAL
<b>Total Project Costs</b>		
A. Incremental Capital Costs	US\$	3,609,186
B. Contingencies (10% of A)	US\$	Included
C. Incremental Operating Costs	US\$	0
D. Total Project Costs (A + B + C)	US\$	3,609,186
<b>Adjustments to Project Costs</b>		
E. Adjustment for non-Article-5 ownership	US\$	0
F. Adjustment for export to non-Article-5	US\$	0
G. Adjustment for technological upgrade	US\$	0
<b>Net Project Costs</b>		
H. Net Project costs (D - [E + F + G])	US\$	3,609,186
<b>ODS Phase-out</b>		
I. Total ODS phase-out	Kg	564,310
J. Net ODP phase-out	ODP Kg	535,433
<b>Cost-effectiveness</b>		
K. Cost-effectiveness (H/J)	US\$/kg/y	6.741
<b>Eligible MLF Funding</b>		<b>3,609,186</b>

**ANNEX-5**  
**ENVIRONMENTAL ASSESSMENT**

HCFC-141b has an ODP of 0.11 and GWP of 630, which are considered acceptable for rigid polyurethane foam application. HCFC-141b is considered non-flammable as a liquid and moderately flammable as a gas (7.6% to 17.7% in air by volume), and is considered safe in applications where the exposure level is less than 500 ppm on a 8-hour time weighted average basis, which is marginally lower than the existing technology. The smog potential of HCFC-141b is about ten times that of CFC-11, although with an emission rate of about 3% during production, this is not an issue. No changes in the current occupational safety practices are envisaged.

HFC-134a has zero ODP and GWP of 1,300. For this application, this is considered acceptable. HFC-134a is non-flammable, and has been extensively tested for toxicity, and is considered safe in applications where the exposure level is less than 1000 ppm on a 8-hour time weighted average basis, which is the same as that for CFC-12, the existing technology. Therefore no changes in the current occupational safety practices are envisaged in this project.

This project thus uses environmentally safe and acceptable technology

The enterprises participating in this project have obtained the necessary statutory environmental clearances for their present operations. Additional clearances if any, for implementing this project, will be obtained as and when required from the relevant competent authorities.

**ANNEX-6**  
**Cover Sheet – UNIDO Component**

<b>COUNTRY</b>	INDIA	<b>IMPLEMENTING AGENCY</b>	UNIDO
<b>PROJECT TITLE</b>	Plan for elimination of CFCs in the transport refrigeration sub-sector in India.		
<b>PROJECT IN CURRENT BUSINESS PLAN</b>	Yes		
<b>SECTOR</b>	Refrigeration (Manufacturing)		
<b>SUBSECTOR</b>	Transport Refrigeration		
<b>ODS USE IN SECTOR</b>	Baseline (Average of 1995-97)	2.770	MT ODP (All sub-sectors)
	Current (2000)	2.297	MT ODP (All sub-sectors)
<b>ODS USE IN ENTERPRISE</b>	Current (2000)	114.12	MT ODP
<b>PROJECT IMPACT</b>		107.24	MT ODP
<b>PROJECT DURATION</b>	2 years		
<b>PROJECT COSTS</b>	Incremental Capital Costs	US\$	612,000
	Contingencies	US\$	61,200
	Incremental Operating Costs	US\$	0
	Total Project Costs	US\$	673,200
<b>LOCAL OWNERSHIP</b>	100%		
<b>EXPORT COMPONENT</b>	0%		
<b>REQUESTED GRANT</b>	US\$	673,200	
<b>COST EFFECTIVENESS</b>	US\$/kg/y	6.28	
<b>IMPLEMENTING AGENCY SUPPORT COSTS</b>	US\$	TBD	
<b>TOTAL COST OF PROJECT TO MULTILATERAL FUND</b>	US\$	TBD	
<b>STATUS OF COUNTERPART FUNDING</b>	N/A		
<b>PROJECT MONITORING MILESTONES</b>	Included		
<b>NATIONAL COORDINATING BODY</b>	Ministry of Environment & Forests		

**PROJECT SUMMARY**

This project will phase out 93.78 MT of CFC-11 and 20.34 MT of CFC-12 consumption annually, in the production of transport refrigeration equipment at 18 enterprises, by converting foam operations to HCFC-141b as the blowing agent (as the interim technology, with later conversion to ODS-free technology) and to HFC-134a/R-404a as the refrigerant. This conversion constitutes the complete phase-out of CFCs in this sub-sector in India. The enterprises use manual mixing of polyurethane chemicals and CFC-12-based refrigeration charging, evacuation and leak detection equipment in the baseline, which will be replaced/retrofitted. The project will include incremental capital costs for the 18 enterprises, covering (partial) costs of medium-pressure foam dispensers, refrigerant charging units, vacuum pumps, leak detectors, re-design, testing, trials, technical assistance and training. The total eligible incremental costs amount to 673,200 inclusive of contingencies.

**IMPACT OF THE PROJECT ON THE COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS**

The approval of this project will help India in meeting its Montreal Protocol obligations, such as the phased reductions in ODS consumption as per the agreed schedules and its obligations under the Phase-out Plan for eliminating CFCs in the Refrigeration (Manufacturing) Sector.

<b>PREPARED BY</b>	UNDP (in consultation with MOEF and UNIDO)	<b>DATE</b>	August 2002
<b>REVIEWED BY</b>	Dr. Hubert Creyf (Foams), Dr. Lambert Kuijpers (Refrigeration)	<b>DATE</b>	August 2002

**ANNEX-7**  
**Cover Sheet – UNDP Component**

<b>COUNTRY</b>	INDIA	<b>IMPLEMENTING AGENCY</b>	UNDP
<b>PROJECT TITLE</b>	Plan for elimination of CFCs in the Refrigeration (Manufacturing) Sector in India (except transport refrigeration)		
<b>PROJECT IN CURRENT BUSINESS PLAN</b>	Yes		
<b>SECTOR</b>	Refrigeration (Manufacturing)		
<b>SUBSECTOR</b>	All (except Transport Refrigeration)		
<b>ODS USE IN SECTOR</b>	Baseline (Average of 1995-97)	2,770	MT ODP
	Current (2000)	2,297	MT ODP
	From remaining enterprises	450.19	MT ODP (except Trans. Ref.)
<b>PROJECT IMPACT</b>		428.19	MT ODP
<b>PROJECT DURATION</b>	4 years		
<b>PROJECT COSTS</b>	Incremental Capital Costs	US\$	2,714,050
	Contingencies	US\$	221,936
	Incremental Operating Costs	US\$	0
	Total Project Costs	US\$	2,935,986
<b>LOCAL OWNERSHIP</b>	100%		
<b>EXPORT COMPONENT</b>	0%		
<b>REQUESTED GRANT</b>	US\$	<b>2,935,986</b>	
<b>COST EFFECTIVENESS</b>	US\$/kg/y	6.86	
<b>IMPLEMENTING AGENCY SUPPORT COSTS</b>	US\$	255,950	
<b>TOTAL COST OF PROJECT TO MULTILATERAL FUND</b>	US\$	3,191,936	
<b>STATUS OF COUNTERPART FUNDING</b>	N/A		
<b>PROJECT MONITORING MILESTONES</b>	Included		
<b>NATIONAL COORDINATING BODY</b>	Ministry of Environment & Forests		

**PROJECT SUMMARY**

This project will eliminate all the remaining eligible CFC consumption in the Refrigeration (Manufacturing) Sector in India (except Transport Refrigeration) upon completion. The Phase-out Plan will be implemented through four annual implementation programmes and together with the implementation of the approved ongoing projects, will result in the complete phase-out of CFCs in the Refrigeration (Manufacturing) Sector in India in four years. The Phase-out Plan will cover the technology conversions in the remaining eligible enterprises in the Refrigeration (Manufacturing) Sector and ensure timely, sustainable and cost-effective phase-out through a combination of investment, technical support and policy/management support components. The Refrigeration (Servicing) sector is being addressed through a separate phase-out plan being submitted to the 38<sup>th</sup> EC Meeting. The total eligible incremental costs and the requested grant for the Phase-out Plan for the Refrigeration (Manufacturing) Sector (except Transport Refrigeration) are US\$ 2,959,050.

**IMPACT OF THE PROJECT ON THE COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS**

The approval of this project will help India in meeting its Montreal Protocol obligations, such as the phased reductions in ODS consumption as per the agreed schedules.

**PREPARED BY** Nandan Chirmulay, UNDP Expert  
**REVIEWED BY** Dr. Hubert Creyf (Foams), Dr. Lambert Kuijpers (Refrigeration)

**DATE** July 2002  
**DATE** August 2002



**ANNEX-8**  
**AGREEMENT FOR THE PLAN FOR PHASE-OUT OF CFCs IN**  
**THE REFRIGERATION (MANUFACTURING) SECTOR IN INDIA**

(Ref. UNEP/OzL.Pro/ExCom/38/70, Annex-X)

1. The Government of India acknowledges that prior to this agreement, the remaining national aggregate CFC consumption including project approvals determined on the basis of Decisions 35/57 and 37/66, was 1,530.4 ODP tonnes. The Executive Committee approves in principle a total of US\$ 3,609,186 as the total eligible incremental costs for the phased reduction of the national aggregate CFC consumption through the implementation of the Plan for phase-out of CFCs in the Refrigeration (Manufacturing) Sector in India, by 1 January 2007. Under this agreement, the total remaining eligible CFC consumption in India will be reduced from the current level of 1,530.4 ODP tonnes by 535 ODP tonnes, leaving 995.4 ODP tonnes as the maximum remaining consumption eligible for funding. The annual reduction in consumption in the Refrigeration (Manufacturing) Sector of 535 ODP tonnes, will be achieved according to the reduction schedule outlined in Table-1 below. The Government of India commits through this agreement to permanently sustain these reductions.

2. The agreed level of funding would be disbursed in installments as indicated in Table-1 and on the understanding set out in this agreement.

Table-1  
Disbursement Schedule and Reduction Targets for CFC Consumption  
and Phase-out in the Refrigeration (Manufacturing) Sector in India

Parameter		2002	2003	2004	2005	2006	2007	Total
Annual CFC Consumption limit in the Refrigeration (Mfg) Sector (ODP MT)		1,373	1,173	923	555	203	0	N/A
A. Phase-out from approved ongoing projects (ODP MT)		200	250	187	172	0	0	809
B. Phase-out from current Plan excluding ineligible enterprises (UNDP)		0	0	140	108	180	0	428
C. Phase-out from current Plan excluding ineligible enterprises (UNIDO)		0	0	40	67	0	0	107
D. Phase-out from ineligible enterprises (through legislative measures)		0	0	1	5	23	0	29
<b>Total Annual CFC phase-out target in the Refrigeration Mfg) Sector (ODP MT)</b>		<b>200</b>	<b>250</b>	<b>368</b>	<b>352</b>	<b>203</b>	<b>0</b>	<b>1,373</b>
Annual funding instalment (US\$)	UNIDO	500,000	173,200	0	0	0	0	673,200
	UNDP	2,000,000	476,536	250,000	150,000	59,450	0	2,935,986
	<b>Total</b>	<b>2,500,000</b>	<b>649,736</b>	<b>250,000</b>	<b>150,000</b>	<b>59,450</b>	<b>0</b>	<b>3,609,186</b>
Agency support costs (US\$)	UNIDO	65,000	19,052	0	0	0	0	84,052
	UNDP	172,971	43,243	21,621	12,973	5,142	0	255,950
	<b>Total</b>	<b>237,971</b>	<b>62,295</b>	<b>21,621</b>	<b>12,973</b>	<b>5,142</b>	<b>0</b>	<b>340,002</b>
Total cost to Multilateral Fund (US\$)		2,737,971	712,031	271,621	162,973	64,592	0	3,949,188

3. The phase-out of CFCs achieved through the implementation of the Sector Plan for the Refrigeration (Manufacturing) Sector in excess of the specified target for a given year will contribute to achievement of the phase-out targets in subsequent years. Any deficit will be added to the target for the next year in accordance with the provisions of the agreement.

4. The Executive Committee also agrees in principle to endeavor to provide the funds for the implementation of the annual programme for any given year, at the last meeting of the Executive Committee in the preceding year, in accordance with the disbursement schedule in Table-1, for the exact amount listed for that year and on the basis of the implementation programme for the year, subject to the performance requirements contained in this agreement. The funding installments for 2004, 2005 and 2006 will be released subject to:

- a) The confirmation that all agreed phase-out targets and consumption limits for the previous year have been achieved;
- b) The verification that the activities planned for the previous year, were undertaken in accordance with the annual implementation programme.

5. The Government of India agrees to ensure accurate monitoring of the phase-out. The Government of India will provide regular reports, as required by its obligations under the Montreal Protocol and this Agreement. The consumption figures provided under this agreement will be consistent with India's reports to the Ozone Secretariat under Article 7 of the Montreal Protocol, which must be provided no later than 30 September. The Government of India also agrees to allow independent verification audits as provided for in this agreement, and in addition, external evaluation as may be directed by the Executive Committee, to verify that annual CFC consumption levels correspond to those agreed and that the implementation of the Refrigeration (Manufacturing) Sector Phase-out Plan proceeds as scheduled and agreed in annual implementation programmes.

6. The Executive Committee agrees to provide India with flexibility in using the agreed funds to meet the consumption limits indicated in Table-1. The Executive Committee has the understanding that during implementation, as long as it is consistent with this Agreement, the funds provided to India pursuant to this Agreement may be used in the manner that India considers will achieve the smoothest possible CFC phase-out, consistent with operational procedures as agreed between India and UNDP/UNIDO in the Refrigeration (Manufacturing) Sector Phase-out Plan as revised and as indicated in the annual implementation programmes. In the Executive Committee's acknowledgement of the flexibility available to India in achieving a complete CFC phase-out in the Refrigeration (Manufacturing) Sector, it is understood that India is committing to provide the necessary level of resources as may be required for the implementation of the plan and for achieving the consumption limits indicated in Table-1 above.

7. The Government of India agrees that the funds being agreed in principle by the Executive Committee at its 38<sup>th</sup> Meeting for the complete phase-out of CFCs in the Refrigeration (Manufacturing) Sector are the total funding that will be available to India to enable its full compliance with the reduction and phase-out as agreed with the Executive Committee, and that no additional Multilateral Fund resources will be forthcoming for any related activities in the Refrigeration (Manufacturing) Sector. It is also understood that aside from the agency fees referred to in paragraph 9 below, the Government of India, the Multilateral Fund, and its Implementing Agencies, and bilateral donors will neither request nor provide further Multilateral Fund related funding for the accomplishment of the total phase-out of CFCs in the Refrigeration (Manufacturing) Sector in India.

8. The Government of India agrees that if the Executive Committee meets its obligations under this Agreement, but India does not meet the reduction requirements outlined in Table-1 and other requirements outlined in this Agreement, the Implementing Agency and the Multilateral Fund will withhold subsequent tranches of funding outlined in Table-1, until such time as the required reduction has been met. It is clearly understood that the fulfillment of this Agreement depends on the satisfactory performance by both the Government of India and the Executive Committee of their obligations. In addition, India understands that with respect to all calendar year targets beginning with 2004, the Multilateral Fund will reduce the subsequent tranches and therefore the total funding for Annex-A Group-I substances in the amount of US\$ 13,480 per ODP tonne (double the CE of the programme) of reductions in consumption not achieved in any year, unless the Executive Committee decides otherwise.

UNDP is the lead Implementing Agency for the implementation of this Phase-out Plan, which will be completed by the end of 2006, while UNIDO will be responsible for the refrigeration transportation sector. For UNDP, a fee of a total of 5% of the annual funding for the project implementation and monitoring and 9% of the annual funding for all other activities has been agreed in accordance with provisions of this Agreement and distributed as shown in Table-1. Since UNIDO's implementation modalities will be different, the support costs are calculated separately, using 13% for the first US\$ 500,000 and 11% thereafter for UNIDO share of the total funding level. As the main implementing agency, UNDP would be responsible for the following:

- ) Ensuring performance and financial verification in accordance with specific UNDP procedures and requirements as specified in the Refrigeration (Manufacturing) Sector Phase-out Plan;
- ) Reporting on the implementation of the annual implementation programmes to be included as part of each annual programme starting with the submission for the 2003 annual implementation programme prepared in 2002;
- ) Providing verification to the Executive Committee that the control targets listed Table-1 and the associated activities have been met;
- ) Ensuring that technical reviews undertaken by UNDP are undertaken by appropriate independent technical experts;
- ) Assisting India in preparation of annual implementation programmes, which will incorporate achievements in previous annual programmes;
- ) Carrying out required supervision missions;
- ) Ensuring the presence of an operating mechanism to enable effective, transparent implementation of the programme, and accurate data reporting;
- ) Verifying to the Executive Committee that CFC consumption phase-out in the Refrigeration (Manufacturing) Sector has been completed based on the schedules listed in Table-1;
- ) Ensuring that disbursements are made to India based on agreed performance targets in the project and provisions in this Agreement;
- ) Providing assistance for policy, management and technical support for implementation of the Sector Phase-out Plan, as and when required.

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**Standard annex to sub-programme documents for use in countries, which are not party to the Standard Basic Assistance Agreement (SBAA).**

1. The standard text below must be attached to and will become an integral part of every sub-programme document to be signed by a Government, which has not yet signed the SBAA. The attachment of annex is a pre-condition to the approval of any new sub-programme in those countries, whether the approval takes place at headquarters of the field. It is the Resident Representative's responsibility to ensure that annexe is incorporated in all sub-programme documents prior to signature by the Government.
2. The regional bureaux are responsible for monitoring adherence to this required procedure. If a country refuses to sign the annex, this becomes a matter of policy that must be referred to the Administrator.
3. Subsection 2.0, below, lists that Government, which have signed the SBAA. The standard annex to the sub-programme document set out below is required only if the country does not appear on this list.

1.0 Standard Text: Supplemental Provisions to the Sub-programme  
Document: The legal context

General responsibilities of the Government, UNDP and the executing agency

1. All phase and aspects of UNDP assistance to this sub-programme shall be governed by and carried out in accordance with the relevant and applicable resolutions and decisions of the competent United Nations organs and in accordance with UNDP policies and procedures for such sub-programmes, and subject to the requirements under UNDP Monitoring, Evaluation and Reporting System.
2. The Government shall remain responsible for this UNDP-assisted development sub-programme and the realisation of its objectives as described in this Sub-programme Document.
3. Assistance under this sub-programme document being provided for the benefit of the Government and the people of (the particular country or territory), the Government shall bear all risks of operations in respect of this sub-programme.
4. The Government shall provide to the sub-programme the national counterpart personnel training facilities, land, buildings, equipment and other required services and facilities. It shall designate the Government Co-operating Agency named in the cover page of this document (hereinafter referred to as the "Co-operations Agency"), which shall be directly responsible for the implementation of the Government contribution to the sub-programme.
5. The UNDP undertakes to complement and supplement the Government participation and will provide through the Executing Agency the required expert services, training, equipment and other services within the funds available to the sub-programme.

6. Upon commencement of the sub-programme the Executing Agency shall assume the responsibility for sub-programme execution and shall have the status of an independent contractor for this purpose. However, that primary responsibility shall be exercised in consultation with UNDP and in agreement with the Co-operating Agency Arrangements to this effect shall be stipulated in the Sub-programme Document as well as for the transfer of this responsibility to the Government or to an entity designated by the Government during the execution of the sub-programme.

7. Part of the Government's participation may take the form of cash contribution to UNDP. In such cases, the Executing Agency will provide the related services and facilities and will account annually to the UNDP and to the Government for expenditure incurred.

(a) Participation of the Government

1. The Government shall provide to the sub-programme the services, equipment and facilities in the quantities and at the time specified in the Sub-programme Document. Budgetary provision, either in kind or in cash, for the Government's participation so specified shall be set forth in the Sub-programme Budgets.
2. The estimated cost of items included in the Government contribution, as detailed in the Sub-programme Budget, shall be based on the best information available at the time of drafting the sub-programme proposal. It is understood that price fluctuations during the period of execution of the sub-programme may necessitate an adjustment of said contribution in monetary terms; the latter shall at all times be determined by the value of the services, equipment and facilities required for the proper execution of the sub-programme.
3. Within the given number of man-months of personnel services described in the sub-programme document, minor adjustments of individual assignments of sub-programme personnel provided by the Government, may be made in consultation with the Executive Agency, if this is found to be in the best interest of the sub-programme. UNDP shall be so informed in all instances where such minor adjustments involve financial implications.
4. The Government shall continue to pay the local salaries and appropriate allowances of national counterpart personnel during the period of their absence from the sub-programme while on UNDP fellowships.
5. The Government shall defray any customs duties and other charges related to the clearance of sub-programme equipment, its transportation, handling, storage and related expenses within the country. It shall be responsible for its installation and maintenance, insurance and replacement, if necessary, after delivery to the sub-programme site.
6. The Government shall make available to the sub-programme - subject to existing security provisions - any published and unpublished reports, maps, records and other data, which are considered necessary to the implementation of the sub-programme.
7. Patent rights, copyrights and other similar rights to any discoveries or work resulting from UNDP assistance in respect of this sub-programme.

Unless otherwise agreed by the parties in each case, however, the Government shall have the right to use any such discoveries or work within the country free of royalty and any charge of similar nature.

8. The Government shall assist all sub-programme personnel in finding suitable housing accommodation at reasonable rents.
9. The services and facilities specified in the Sub-programme Document which are to be provided to the sub-programme by the Government by means of a contribution in cash shall be set forth in the sub-programme Budget. Payment of this amount shall be made to the UNDP in accordance with the Schedule of Payments by the Government.
10. Payment of the above mentioned contribution to the UNDP on or before the dates specified in the Schedule of Payments by the Government is a prerequisites to the commencement or continuation of sub-programme operations.

(b) Participation of the UNDP and the executing agency

1. The UNDP shall provide to the sub-programme through the Executing Agency the services, equipment and facilities described in the Sub-programme Document. Budgetary provision for the UNDP contribution as specified shall be set forth in the Sub-programme Budget.
2. The Executing Agency shall consult with the Government and UNDP on the candidature of the Sub-programme Manager\* who, under the direction of the Executing Agency, will be responsible in the country for the Executing Agency's participation in the sub-programme. The Sub-programme Manager shall supervise the experts and other agency personnel assigned to the sub-programme, and the on-the-job training of national counterpart personnel. He shall be responsible for the management and efficient utilisation of all UNDP-financed inputs, including equipment provided to the sub-programme.
3. The Executing Agency, in consultation with the Government and UNDP, shall assign international staff and other personnel to the sub-programme as specified in the sub-programme Document, select candidates for fellowships and determine standards for the training of national counterpart personnel.
4. Fellowships shall be administered in accordance with the fellowship regulations of the Executing Agency.
5. The Executing Agency may, in agreement with the Government and UNDP, execute part or all of the sub-programme by subcontract. The selection of subcontractors shall be made, after consultation with the Government and UNDP, in accordance with the Executing Agency's procedures.
6. All material, equipment and supplies which are purchased from UNDP resources will be used exclusively for the execution of the sub-programme, and will remain the property of the UNDP in whose name it will be held by the Executing Agency. Equipment supplied by the UNDP shall be marked with the insignia of the UNDP and of the Executing Agency.

7. Arrangements may be made, if necessary, for a temporary transfer of custody of equipment to local authorities during the life of the sub-programme, without prejudice to the final transfer.
8. Prior to completion of UNDP assistance to the sub-programme, the Government, the UNDP and the Executing Agency shall consult as to the disposition of all sub-programme equipment provided by the UNDP. Title to such equipment shall normally be transferred to the Government, or to an entity nominated by the Government, when it is required for continued operation of the sub-programme or for activities following directly therefrom. The UNDP may, however, at its discretion, retain title to part or all of such equipment.
9. At an agreed time after the completion of UNDP assistance to the sub-programme, the Government and the UNDP, and if necessary the Executing Agency, shall review the activities continuing from or consequent upon the sub-programme with a view to evaluating its results.
10. UNDP may release information relating to any investment oriented sub-programme or potential investors, unless and until the Government has requested the UNDP in writing to restrict the release of information relating to such sub-programme.

\* May also be designated Sub-programme Co-ordinator or Chief Technical Adviser, as appropriate.

#### Rights, Facilities, Privileges and Immunities

1. In accordance with the Agreement concluded by the United Nations (UNDP) and the Government concerning the provision of assistance by UNDP, the personnel of UNDP and other United Nations Organisation associated with the sub-programme shall be accorded rights, facilities, privileges and immunities specified in said Agreement.
2. The Government shall grant UN volunteers, if such services are requested by the Government, the same rights, facilities, privileges and immunities as are granted to the personnel of UNDP.
3. The Executing Agency's contractors and their personnel (except nationals of the host country employed locally) shall:
  - (a) Be immune from legal process in respect of all acts performed by them in their official capacity in the execution of the sub-programme;
  - (b) Be immune from national service obligations;
  - (c) Be immune together with their spouses and relatives dependent on them from immigration restrictions;
  - (d) Be accorded the privileges of bringing into the country reasonable amounts of foreign currency for the purposes of the sub-programme or for personal use of such personnel, and of withdrawing any such amounts brought into the country, or in accordance with the relevant foreign exchange regulations, such amounts as may be earned therein by such personnel in the execution of the sub-programme; and



- (e) Be accord together with their spouses and relatives dependent on them the same repatriation facilities in the event of international crisis as diplomatic envoys.
4. All personnel of the Executing Agency's contractors shall enjoy inviolability for all papers a documents relating to the sub-programme.
  5. The Government shall either exempt from or bear the cost of any taxes, duties, fees or levies which it may impose on any firm or organisation which may be retained by the Executing Agency and on the personnel of any such firm or organisation, except for nationals of the host country employed locally, in respect of:
    - (a) The salaries or wages earned by such personnel in the execution of the sub-programme;
    - (b) Any equipment of the sub-programme or which, after having been brought into the country, may be subsequently withdrawn therefrom;
    - (c) Any substantial quantities of equipment, materials and supplies obtained locally for the execution of the sub-programme, such as, for example, petrol and spare parts for the operation and maintenance of equipment mentioned under (b), above, with the provision that the types and approximate quantities to be exempted and relevant procedures to be followed shall be agreed upon with the Government and, as appropriate, recorded in the Sub-programme Document; and
    - (d) As in the case of concessions currently granted to UNDP and Executing Agency's personnel, any property brought, including one privately owned automobile per employee, by the firm or organisation or its personnel for their personal use or consumption or which after having been brought into the country, may subsequently be withdrawn therefrom upon departure of such personnel.
  6. The Government shall ensure
    - (a) Prompt clearance of experts and other persons performing services in respect of this sub-programme; and
    - (b) The prompt release from customs of:
      - (i) Equipment, materials and supplies required in connection with this sub-programme; and
      - (ii) Property belonging to and intended for the personal use or consumption of the personnel of the UNDP, its Executing Agencies, or other persons performing services on their behalf in respect of this sub-programme, except for locally recruited personnel.
  7. The privileges and immunities referred to in the paragraph above, to which firm or organisation and its personnel may be entitled, may be waived by the Executing agency where, in its opinion or in the opinion of the UNDP, the immunity would impede the course of justice and can be waived without prejudice to the successful completion of the sub-programme or to the interest of the UNDP or the Executing Agency.
  8. The Executing Agency shall provide the Government through the Resident Representative with the list of the personnel to whom the privileges and immunities enumerated above shall apply.

9. Nothing in this Sub-programme Document or Annex shall be construed to limit the rights, facilities, privileges or immunities conferred in any other instrument upon any person, natural or juridical, referred to hereunder.

#### Suspension or termination of assistance

1. The UNDP may be written notice to the Government and to the Executing Agency concerned to suspend its assistance to any sub-programme if in the judgement of the UNDP any circumstance arises which interferes with or threatens to integration of the successful completion of the sub-programme or the accomplishment of its purpose UNDP may, in the same or subsequent written notice, indicate the under which it is prepared to resume its assistance to the sub-programme. Any such suspension shall continue until such time as such conditions are accepted by the Government and as the UNDP shall give written notice to the Government and the Executing Agency that is prepared to resume its assistance.
2. If any situation referred to in paragraph 1, above, shall continue for a period of fourteen days after notice thereof and of suspension shall have been given by the UNDP to the Government and the Executing Agency, then at any time thereafter during the continuance thereof, the UNDP may be written notice to the Government and the Executing Agency terminate the sub-programme.
3. The provisions of this paragraph shall be without prejudice to any other rights or remedies the UNDP may have in the circumstances, whether under general principles of law or otherwise.