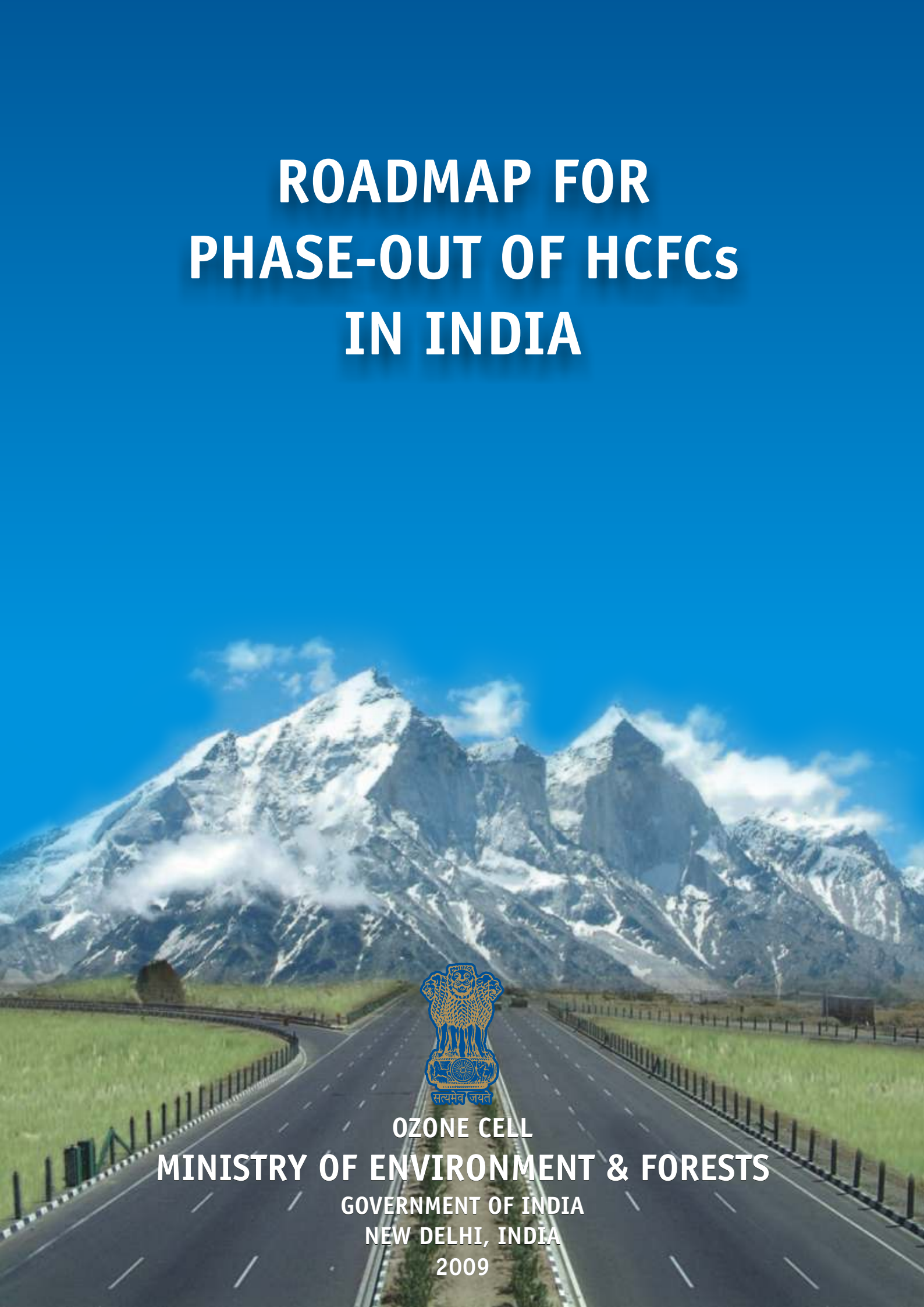
ROADMAP FOR PHASE-OUT OF HCFCs IN INDIA



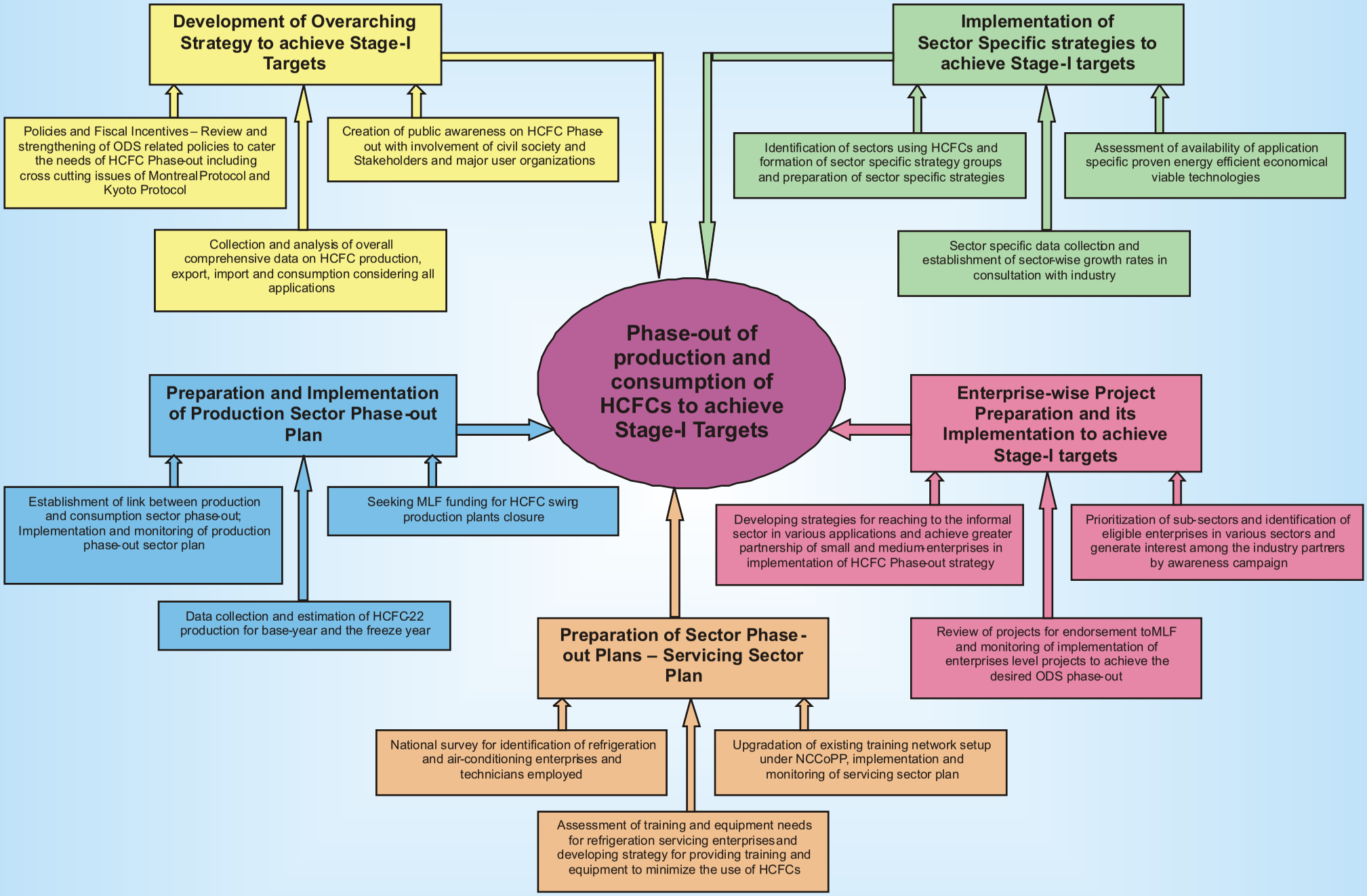
OZONE CELL

MINISTRY OF ENVIRONMENT & FORESTS

GOVERNMENT OF INDIA

NEW DELHI, INDIA

2009



ROADMAP AT A GLANCE

ROAD MAP FOR PHASE-OUT OF HCFCs IN INDIA

सत्यमेव जयते

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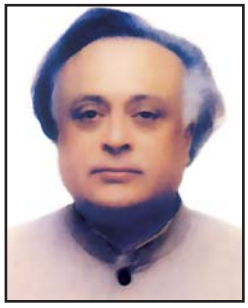
जयराम रमेश
JAIRAM RAMESH



सत्यमेव जयते

राज्य मंत्री (स्वतंत्र प्रभार)
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4th October 2009

FOREWORD

The Montreal Protocol on Substances that Deplete the Ozone Layer has been recognized as the most successful international environment treaty in history. As another testimony to its remarkable accomplishments, the Montreal Protocol has received universal ratification; all countries in the world have now ratified this landmark agreement. In the twenty years of its operation, extraordinary international cooperation under this agreement, has led to phase-out of consumption and production of several ozone depleting substances which has not only helped to protect the ozone layer, but also to save the global climate system.

One of the key factors in this successful achievement was that the developed countries acknowledged their historic responsibility for production, consumption and emissions of ozone depleting substances that had led to the ozone hole. The developing countries took on commitments for phasing out production and consumption of ozone depleting substances with a 10-year grace. A robust and transparent mechanism was created for providing technical and financial assistance to assist developing countries to meet their obligations under the Protocol's control targets. Such common but differentiated responsibilities led to the success of the Montreal Protocol, which can now serve as an example of excellent international cooperation for addressing other serious environmental challenges.

The phase-out schedule for Hydrochlorofluorocarbons (HCFCs) was accelerated through a decision of the Meeting of the Parties to the Montreal Protocol in September 2007. HCFCs are not only ozone depleting substances but also are potent Greenhouse Gases (GHGs). The transition from HCFCs to environment-friendly alternatives is a challenging task, particularly for a developing country like India, which needs to achieve its development goals in an environmentally sustainable manner. We hope that the same spirit of goodwill and common understanding that was critical in the success of the first phase of the Montreal Protocol will continue, and the developed world will remain committed to help the developing countries in effectively meeting the new challenges of HCFC phase-out before us.

India has taken early initiatives for responding to the challenges of HCFC phase-out and developed a Roadmap for Phase-out of HCFCs, which delineates our long term vision and action plan for phasing out production and consumption of HCFCs. It gives me great pleasure to dedicate this Roadmap today.

(Jairam Ramesh)

CONTENTS

ANNEXURES

EXECUTIVE SUMMARY

India acceded to the Vienna Convention for the Protection of the Ozone Layer in 1991 and ratified the Montreal Protocol on Substances that Deplete the Ozone Layer in 1992. India has also ratified all the amendments to the Montreal Protocol, as on date.

Since the finalization of India's Country Programme in 1993 incorporating the national strategy and action plan for controlling the use of Ozone Depleting substances(ODSs) and its subsequent update in 2006, India is in compliance with the Montreal Protocol control schedule for Annex-A, B and E substances, achieved through a combination of projects and programmes featuring technology transfer investments, technical assistance, training and capacity building, information dissemination and awareness-raising. Further, in compliance with Article-4B of the Montreal Protocol incorporated through the Montreal Amendment, India has established one of the most comprehensive and forward-looking regulations for controlling production, import, export, trade and use of all Annex-A, B, C and E controlled substances, which includes recovery, recycling, reclamation, and also mandatory registration and reporting requirements.

Hydrochlorofluorocarbons (HCFCs) are classified as controlled substances under Annex-C Group-I of the Montreal Protocol and therefore their use has to be reduced and eventually phased out. HCFCs additionally have a global warming impact due to their high Global Warming Potential (GWP).

Due to the economic liberalization policies since early 1990s resulting in sustained growth in the purchasing power and consequent growth in demand for consumer, commercial and industrial products, the consumption of HCFCs has grown steadily at an average annual rate of over 11% in the past 15 years. Much of this growth has occurred in the past few years. For example, since 2001, the consumption of HCFCs in India has more than tripled. This trend is expected to continue. The accelerated phase-out schedule for HCFCs adopted at the Nineteenth Meeting of the Parties to the Montreal Protocol, would present unprecedented challenges for an emerging economy like India. These challenges include cost-effective availability of sustainable environment-friendly alternatives for HCFCs and access to adequate technology and funding to facilitate transition without undue burden on the economy of the country and constraints on consumers and industry.

Recognizing these challenges, the Government of India has formulated a comprehensive roadmap for HCFC phase-out, which spells out concrete goals, actions and timelines to control and reduce production and consumption of HCFCs in line with the accelerated control schedule for HCFCs under the Montreal Protocol. These actions include strengthened and coordinated management with stakeholder representation and participation, collection and analysis of current updated data, prioritization of sectors and sub-sectors for technology transfer interventions, enhanced communication and awareness, development of sectoral strategies and overarching national strategy and policy and regulatory initiatives, to ensure compliance with the 2013/2015 targets as well as the broader phase-out targets by 2030.

1. INTRODUCTION

1.1 BACKGROUND

India became a party to the Vienna Convention for the Protection of the Ozone Layer on 19 June 1991 and acceded to the Montreal Protocol on Substances that Deplete the Ozone Layer on 17 September 1992. The table below shows the dates of ratification by India of the Protocol and its amendments:

Agreement/Amendment	Date of Ratification
Vienna Convention	19 June 1991
Montreal Protocol	17 Sept 1992
London Amendment	17 Sept 1992
Copenhagen Amendment	03 March 2003
Montreal Amendment	03 March 2003
Beijing Amendment	03 March 2003

India's Country Programme for phase-out of ODSs under the Montreal Protocol was prepared and finalized in 1993 with the assistance of United Nations Development Programme (UNDP), The Energy and Resources Institute (TERI) and representatives of various Ministries, industries and scientific institutions. The key principles underlying India's Country Programme were:

- To implement phase-out of ODS without adversely affecting industrial and economic growth in the ODS consuming sectors, while protecting consumer and public interests
- To meet the demand for substitutes for ODSs, as far as possible from indigenous sources
- To reflect India's commitment to achieve compliance with the Montreal Protocol obligations, despite the barriers and problems India would face in implementation of the Protocol.

India's Country Programme was contingent upon availability of adequate technical and financial assistance for mitigating the incremental costs of phase-out. The Country Programme was also intended to be a dynamic document and was intended to be reviewed and updated at an appropriate time to reflect the status of its implementation. Accordingly in July 2006, India's Country Programme Update was finalized. The updated country programme had identified long-term management of HCFCs as the most significant future challenge.

Due to economic liberalization policies since early 1990s resulting in sustained growth in the purchasing power and consequent growth in demand for consumer, commercial and industrial products, the consumption of HCFCs has grown steadily at an average annual rate of over 11% in the past 15 years. Much of this growth has occurred in the past few years. For example, since 2001, the consumption of HCFCs in India has more than tripled. This trend is expected to continue.

The accelerated phase-out schedule for HCFCs adopted at the Nineteenth Meeting of the Parties to the Montreal Protocol, would present unprecedented challenges for an emerging economy like India.

These challenges include cost-effective availability of sustainable environment-friendly alternatives for HCFCs and access to adequate technology and funding to facilitate transition without undue burden on the economy of the country and constraints on consumers and industry. The key decisions of meeting of the Parties to the Montreal Protocol and Executive Committee of the Multilateral Fund (MLF) are given in Annexure-I. The Government of India had also conducted a survey of HCFC demand and supply. A copy of the survey report is given in Annexure-II.

Recognizing these challenges, Government of India has formulated a comprehensive roadmap for HCFC phase-out, which spells out concrete goals, actions and timelines to control and reduce production and consumption of HCFCs in line with the accelerated control schedule for HCFCs under the Montreal Protocol. These actions include strengthened and coordinated management with stakeholder representation and participation, collection and analysis of current updated data, prioritization of sectors and sub-sectors for technology transfer interventions, enhanced communication and awareness, development of sectoral strategies and overarching national strategy and policy and regulatory initiatives, to ensure compliance with the 2013/2015 targets as well as the broader phase-out targets by 2030.

1.2 INSTITUTIONAL FRAMEWORK

1.2.1 Institutional Structure

The Government of India designated the Ministry of Environment & Forests (MoEF) as the national coordinating body for implementation of the Montreal Protocol in India. The institutional structure for Montreal Protocol implementation in India is shown in the Figure-1 below:

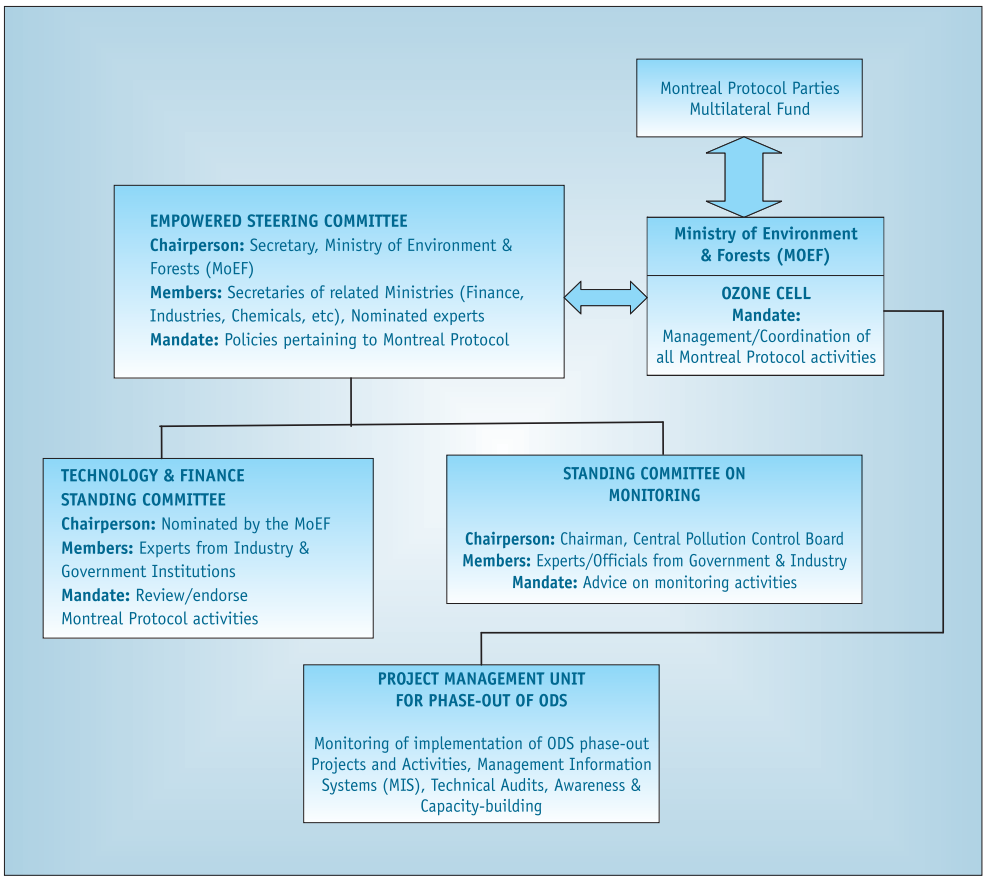


Figure-1: Institutional Structure

The functions and responsibilities MoEF as the designated national authority, include notification of regulations pertaining to the Montreal Protocol, issues related to international cooperation, maintaining and managing data on production, imports, exports and consumption of ODS, monitoring of implementation of Montreal Protocol activities, interacting with other line Ministries on technical and financial matters pertaining to implementation of activities, liaising with scientific, technical and other public institutions for technical matters, representing India at various multilateral meetings and discussions, etc. The MoEF established Ozone Cell within the Ministry, dedicated to managing and coordinating the implementation of the Montreal Protocol in India.

1.2.2 Policies

India's Country Programme for phasing out ODS, established the following guiding principles reflecting national priorities:

- ❏ To strengthen national institutions for monitoring and managing the ODS phase-out, and formulation and implementation of appropriate policies.
- ❏ To assist indigenous industries for conversion to non-ODS technologies through the Montreal Protocol financial mechanism, while ensuring that the Small and Medium Enterprises (SMEs) and other unorganized tiny enterprises are fully compensated for conversions, including retraining
- ❏ To minimize economic dislocation either through closure of manufacturing units, loss of productive capacity, or through major capital expenditure that could become obsolete in future.
- ❏ To maximize indigenous production by encouraging technology transfer for local production of non-ODS substitutes
- ❏ To give preference to one-time replacements
- ❏ To minimize obsolescence costs by promoting recycling, retrofitting and drop-in substitutes to prolong economic life of existing equipment, until new replacement technologies become mature, cost-effective and available
- ❏ To institute decentralized management of ODS phase-out activities and arrangements to facilitate feedback for smooth implementation.
- ❏ To facilitate development of new standards and certification systems for products and processes including those for safety
- ❏ To integrate the ODS phase-out activities closely with the growth in various industrial sectors, economic reforms, etc.
- ❏ To evaluate alternatives to ODS and available substitute technologies on a continuing basis, so as to lead to wider adaptation and dissemination.
- ❏ To periodically reassess and revise the Country Programme to reflect technological developments, progress in implementation of ODS phase-out activities and evolving trends in the growth of various industrial sectors.

1.2.3 Regulations

Recognizing the importance of establishing an effective regulatory framework for the successful implementation of the Country Programme, MoEF initiated a forward-looking programme to create such a framework to support the various ODS phase out measures.

In exercise of the powers conferred by sections 6, 8 and 29 of the Environment (Protection) Act, 1986, the Government of India formulated draft ODS regulations termed as the Ozone Depleting Substances (Regulation and Control) Rules, which were published in the Gazette of India in 1998 for public comments and also circulated in the industry for advance intimation and comments. These have since been officially notified and have formally come in to effect from January 2000. The provisions of this comprehensive legislation are summarized as below:

ODS Production

- ❏ Mandatory registration with MoEF
- ❏ Restriction on production levels as per "base level" and specified time-bound reductions.
- ❏ Prohibition on creating new capacity or expansion of capacity

ODS Consumption

- ❏ Ban on new capacity or expansion of capacity for production of ODS based equipment.
- ❏ Mandatory registration with designated authorities
- ❏ Declaration requirement in prescribed format at the time of procurement of ODS
- ❏ Restrictions on production of ODS-based products in various sectors from 2003

ODS Trade

- ❏ Mandatory registration for exporters & importers with designated authorities
- ❏ Import of ODS and ODS containing equipment only against license
- ❏ Export restricted to countries who are signatory to the Montreal Protocol against quota

General

- ❏ Mandatory registration for reclamation and destruction of ODS.
- ❏ Every entity that produces, uses, imports, sells, stocks, reclaims or destroys ODS has to maintain records and file reports as specified.
- ❏ Every entity, which has received technical and/or financial assistance from any international agency or financial assistance from the Government of India including duty exemptions, is required to maintain records and file reports as specified.

Other measures initiated by the Government of India include:

Trade Measures

- ❏ Trade in controlled substances with countries not party to the Montreal Protocol is prohibited.
- ❏ The export of Annex-A and Annex-B substances to Non-Article 5 Parties is prohibited.
- ❏ The import and export of all Annex-A and Annex-B substances are subject to licensing.
- ❏ Import of Equipment containing ODS was subjected to licensing

Fiscal Measures

- Full exemption from Customs and Excise tariffs on capital goods required to implement ODS phase out projects funded by the Multilateral Fund. This exemption has been extended to ODS phase-out projects, which were eligible for funding under the MLF, whether or not such enterprises actually sought assistance from the fund. These also covered projects submitted for retroactive financing. The benefit was available subject to the condition that enterprises should give a clear legal commitment to stop using ODS in all future manufacturing operations after the projects were implemented. The duty exemptions were also extended to items of recurring use, including non-ODS alternatives, for such duration for which, incremental operating costs were committed by the MLF in approved projects.

- The duty exemptions were also extended to capital goods required for establishing new capacity with non-ODS technology.

- Indian financial institutions were advised not to finance/refinance new ODS producing/consuming enterprises.

- The Tariff Advisory Committee (a statutory body under the Insurance Act, 1938) decided to grant suitable discounts on fire insurance premiums if alternative agents are used to replace Halons.

1.3 PROGRESS

The formulation of the comprehensive road map for management of HCFC phase-out in India began in 2008. Following are the progress milestones so far:

A. Assigning responsibilities to various multilateral and bilateral implementing agencies for assisting in development of sector-level and national-level strategies for HCFC phase-out

This was accomplished in March 2008. The various multilateral and bilateral implementing agencies were assigned the following responsibilities, based on comparative expertise and specialization:

UNDP: Lead Agency responsible for overall coordination, overarching strategy and preparation and implementation of strategies for all manufacturing sectors (excluding transport refrigeration and air conditioning sub-sector) as below:

- Refrigeration and Air-conditioning, Aerosols, Firefighting, Foams and Solvents

UNEP: Non-investment components (communications and awareness) of various sectors as well as customs and enforcement training

UNIDO: Strategy preparation and implementation for the Transport Refrigeration and Air-Conditioning sub-sector

World Bank: Strategy preparation and implementation for the HCFC Production Sector

Germany (GTZ): Strategy preparation and implementation for the Refrigeration and Air Conditioning Servicing Sector

B. Development of a comprehensive HCFC Phase-out Management Plan (HPMP) in accordance with the policy guidelines of the Executive Committee of the MLF:

- ❏ Stakeholder Consultation Workshop for industry, Government and other stakeholders, for initial knowledge exchange and awareness and developing initial understanding of the challenges and opportunities of accelerated HCFC phase-out were carried out in June 2008. A copy of the report is given in Annexure-III.
- ❏ Proposal for preparation of comprehensive HPMP for India submitted by UNDP as Lead Agency with other cooperating agencies, UNEP, UNIDO, The World Bank and GTZ (bilateral agency) on behalf of Ozone Cell, MoEF, Government of India, to the Executive Committee of MLF (Funding approved in November 2008).
- ❏ Consultation meetings for formation of Sectoral Working Groups organized. Sectoral working groups for three HCFC-consuming sectors, namely, Refrigeration and Air Conditioning (Manufacturing), Foams and Refrigeration and Air Conditioning (Servicing) constituted. This was accomplished in September 2009. The detailed documents and reports of the meetings of the sectoral working groups are attached in Annex-IV. The key recommendations common to all sectoral working groups are as below:
  - Need for critical evaluation of techno-economically feasible and environment-friendly alternatives technologies
  - Need to update the HCFC survey data to obtain current consumption information
  - Prioritization of sectors, sub-sectors and applications based on feasible alternative technologies
  - Need for designing forward-looking and targeted policies and regulations
  - Need for enhanced, targeted and coordinated communications and awareness measures
  - Need for adequate technical and financial assistance for supporting phase-out
  - Completion of HPMP Stage-1 preparation by July 2010.

2. ROADMAP FOR PHASE-OUT OF HCFCs IN INDIA

2.1 INTRODUCTION

This document describes the long term vision and action plan including the policy instruments for phasing out of production and consumption of HCFCs in India in accordance with Nineteenth Meeting of the Parties to the Montreal Protocol vide Decision XIX/6. HCFCs are also the potent Greenhouse Gases (GHGs) but not included in the Kyoto Protocol controlled basket of gases. The mitigation of GHGs is also one of the objectives of India's National Environment Policy adopting sustainable strategies.

2.2 BACKGROUND

HCFCs are widely used chemicals. The applications include, Refrigeration & Air-conditioning, Foam blowing, Aerosols propellents, solvents and Firefighting. There are about 40 chemicals which fall in this category. The commonly used HCFCs are HCFC-22, HCFC-141b, HCFC-142b, HCFC-123, HCFC-225 and HCFC-124. All these chemicals are the ODSs and are controlled by the Montreal Protocol in the schedule Annex C Group 1 Substances.

The London Amendment of 1990 to the Montreal Protocol recognized a list of HCFCs as transitional substances to phase out Chlorofluorocarbons (CFCs) but all Parties need to report on the Production, Import and Export of the HCFCs. The Copenhagen Amendment of 1992 included an expanded list of HCFCs in the list of controlled substances in the Protocol and prescribed control measurers for the consumption but not for production of these HCFCs by non-Article 5 Parties. At the Seventh Meeting of the Parties in 1995, the Parties prescribed control measures for Article 5 Parties to freeze in 2016 on the base year consumption of 2015 and 100% phase-out-out by 2040. In 1999, the Amendment by the Meeting of the Parties in Beijing mandated a production freeze on HCFCs by non-Article 5 Parties by the year 2004 and by Article 5 Parties by the year 2016. However, producer can produce an additional 15% of their base level production to satisfy the Basic Domestic Needs (BDN) of Article 5 Parties.

A historic decision (XIX/6) was taken at the Nineteenth Meeting of the Parties on the occasion of Twentieth Anniversary of the Protocol in September 2007 in Montreal to accelerate the phase out of HCFCs both in Article 5 and non-Article 5 Parties for the early recovery of Ozone Layer. It was in the spirit of strengthening the Protocol to make best use of the lessons learnt, momentum gained and institutional set-up developed for phase out of CFCs. This has posed challenges especially in emerging economies like India. The phase out schedule for HCFCs in non-Article 5 and Article 5 Parties are depicted through Figures 2 and 3.

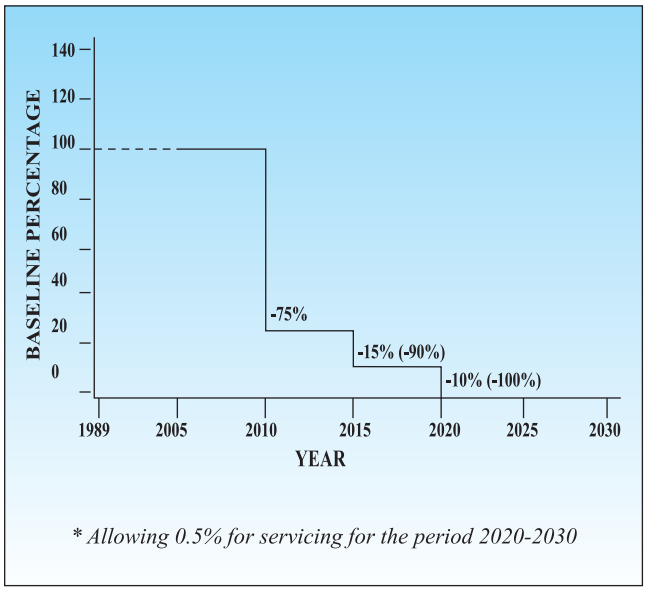


Figure-2: HCFC Phase-out Schedule for non-Article 5 Parties

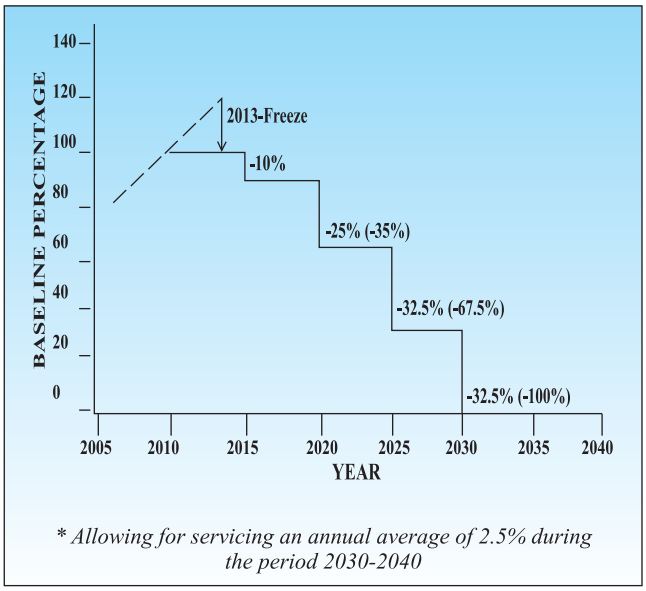


Figure-3: HCFC Phase-out Schedule for Article 5 Parties

It may be noticed through Figure-3 that the accelerated phase out schedule for HCFCs is the challenging task to achieve 2013 freeze and 10 percent reduction in 2015, especially in emerging economies like India where there is a high growth in the use of these chemicals in refrigeration, air-conditioning, foam blowing and other fields to cater the needs of growing industrialization and GDP of the country. The annual growth is in the range of 10 to 15 percent. In actual sense this sets the phase-out targets of 30 to 40 percent by 2015 which is quite significant reduction in a very short time frame. This would require a long term vision and planning to successfully meet the obligations of phase-out the next category of chemicals (HCFCs) as per the revised schedule of the Montreal Protocol.

2.3 OVERALL OBJECTIVES

The overall objective is to phase out Production and Consumption of HCFCs in various applications as per the reduction targets of the Montreal Protocol in a well coordinated manner without any commercial and financial dislocations in the country.

This would necessitate initiation of the activities as early as possible, prioritize the sectors based on the surveys to be conducted and develop policy instruments to guide the industry, informal sector and the servicing sector where a large number of small enterprises and individuals are involved, scattered all over the country.

2.4 INITIATIVES

In order to achieve the above objective, it may be necessary to take certain initiatives which are classified as under:

Objectives	Initiatives	Actions
Phase out of Production and Consumption of HCFCs in India for achieving the compliance target set by the Montreal Protocol for Stage One: - Determination of Base Year Production and Consumption sectors which is an average of 2009 and 2010 for production and consumption respectively -2013 freeze - 10 percent reduction of base line in 2015.	Developing a comprehensive HCFC Phase out Management Plan (HPMP): A. Assigning the activities to the Implementing Agencies UNDP, UNEP, UNIDO, World Bank and GTZ, Govt. of Germany (Bilateral Agency) and Co-ordination to UNDP as lead agency.	- Project proposal for preparation of comprehensive HPMP for India was submitted by UNDP as lead agency with other cooperating agencies, UNEP,UNIOD, World Bank and GTZ (bilateral agency) on behalf of Ozone Cell, MoEF, Government of India to the MLF Secretariat for approval of Executive Committee of MLF. The Executive Committee approved the proposal in its 56th meeting held in November 2008. -Time-line for the activities proposed in this document will be decided in consultation with the stakeholders and keeping in view the phase-out schedule of the Protocol during the preparation of HPMP -Review of Policies to establish the Base year consumption addressing the changing scenarios -Identification of Implementing Agencies as per the expertise and experience for strategy preparation and implementation UNDP:- Lead Implementing Agency responsible for coordination and strategy preparation and its implementation for the following sectors: -Aerosol Sector, -Firefighting Sector, -Foam Sector, and -Refrigeration and air-conditioning sector. -Solvent Sector

Objectives	Initiatives	Actions
		-UNIDO:- Transport Refrigeration and Air-Conditioning -UNEP:- Non-investment component of various sectors and custom policy training activities -World Bank:- Production Sector Strategy preparation, project preparation and its implementation GTZ- Refrigeration and air-conditioning servicing sector strategy preparation and its implementation
	B. Overarching strategy for phasing out HCFCs to achieve the Stage One targets including: -Policy support, -Data collection & its analysis -Strategy preparation	-Review of existing National policy instruments including Ozone Depleting Substances (Regulation and control) Rules, 2000 & its amendments and align them to the needs of HCFCs phase out - Policies to address the interface between the Montreal Protocol and the Kyoto Protocol - Strengthening of existing Empowered Steering Committee (ESC) and its Standing Committees to cater to the needs of HCFCs phase out regime - Strengthening of institutional setup in the Ozone Cell, MoEF including Project Management Unit (PMU) and Sector Phase-out Plan Unit (SPPU) - Review and strengthening of ODS control enforcement Measures and strengthening the Custom policies with regard to ODS to prevent illegal trade, if any -Review of existing fiscal incentives to promote non-ODS technologies for smooth

Objectives	Initiatives	Actions
		transition from HCFCs to non-ODS technologies - Creation of Public awareness on HCFC phase-out with involvement of civil society. -Identification of Stakeholders -Initiation of stakeholder interactions at the regional and national level -Creating awareness among the Stake holders and users -Ensuring participation of all the relevant key stakeholders including National Strategic and large institutional Users (Defense, Space Research, Shipping, Indian Railways etc.) - Analysis of HCFC Survey for India conducted by UNDP in 2005 and its updation -Collection of overall comprehensive data on HCFC production, export, import and consumption considering all the applications and changing scenarios for the strategy year -Establishing the overall growth rates of HCFCs consumption in consultation with stakeholders and commensurate with National GDP and Economic growth -Estimation of unconstrained HCFC consumptions demand in the country ascertaining that all the applications are on board -Analysis of overall data collected and strategy preparation

Objectives	Initiatives	Actions
	C. Sector specific strategies to achieve the Stage One HCFC phase out targets taking into account the current and estimated growth rates and GDP. Identification of sectors using HCFCs: -Establishing the interlinkages in various sectors especially in Production and Consumption sectors -Strategy preparation for Aerosol Sector - Strategy preparation for Firefighting Sector - Strategy preparation for Foam Sector - Strategy preparation for Refrigeration and Air-conditioning Sector -Strategy preparation for Transport Refrigeration and Air-conditioning Sector -Strategy preparation for Refrigeration and Air-conditioning servicing Sector	-Formation of Sector Strategy Groups with Industry Association(s), User Organizations, Research Institutions and other stake holders: -Sector specific data collection to arrive at the consumption in the strategy preparation year taking in to account all the applications which use HCFCs -Establishment of sector-wise and/or sub-sector-wise growth rates in consultation with industry stakeholders - Estimation of consumption for the freeze year in the sectors and arrive at the overall consumption - Prioritization of sub-sectors in consultation with industry to achieve the targets - Assessment of availability of application specific, proven energy efficient economically viable technologies - Assessment of process of technology transfer through financial mechanism of MLF to replace HCFCs -Information dissemination on alternative technologies through regional and national level workshops and conferences
	D. Enterprise-wise project preparation and its implementation by Implementing Agencies in various sectors:	-Identification of eligible enterprises for MLF assistance in various sub-sectors - Prioritization of the sub-sectors to achieve the Stage One targets

Objectives	Initiatives	Actions
	-Aerosol sector -Firefighting sector -Foam sector -Refrigeration and Air-conditioning sector -Transport refrigeration and Air-conditioning	- Generate interest among the industry partners by awareness campaign to convert their manufacturing facilities to non-ODS at an early stage - Strategy for reaching to the informal sector in various applications - Technical assistance for project preparation through International/ National experts -Review of projects and endorsement - Monitoring of implementation of enterprise level projects to achieve the desired ODS reduction impacts - Review of the strategy at regular intervals
	E. Preparation of Umbrella projects for a cluster of Small/ Medium Enterprises in various sub-sectors	-Identification of cluster of enterprises and their needs related to phase-out of HCFCs - Greater partnership of Small and Medium Enterprises in implementation of HCFC phase out strategy -Demonstration of proven and adaptable technologies -Technical assistance through MLF funding mechanism for implementation of projects and monitoring
	F. Preparation of Sector Phase-out Plans 1. Refrigeration & Air-conditioning Servicing sector plan	-National survey for identification of refrigeration and Air-conditioning servicing enterprises and technicians employed

Objectives	Initiatives	Actions
		-Assessment of training and equipment needs of refrigeration servicing enterprises -Up-gradation of existing training network set-up under National CFC Phase-out Plan (NCCoPP) to cater to the needs of HCFC phase-out - Develop strategy for providing training to minimize the use of HCFCs and adoption of alternative technologies - Implementation and monitoring of servicing sector plan
	2. Sector Phase-out Plan for foam	- Identification of small/tiny enterprises engaged in foaming operations - Assessment of equipment and technical assistance needs to convert their operations from HCFCs to non-ODS technologies - Project preparation in association with enterprises - Implementation and monitoring
	G. Preparation of production sector phase-out Plan and its implementation	- Data collection and estimation of HCFC-22 production for the Base-year and the Freeze-year - Amendment of ODS regulations to align to the needs of Phase-out schedule as mentioned under "Review of existing National policy instruments" - Assessment of impact of changed economic scenario on HCFC Production and Consumption - Establish link between Production and Consumption Sector Phase-out schedule

Objectives	Initiatives	Actions
		- Seeking MLF funding for HCFC swing production plants closure - Implementation and monitoring of production phase-out sector plan
-Phase-out of production and consumption of HCFCs to achieve the Second Stage reduction targets 2020 and 2025 and the complete phase-out in 2030 while allowing for servicing an annual average of 2.5% during the period 2030-2040.	- Updating the HCFC phase-out strategy and align to the final phase-out targets of the Protocol in consultation with Stake-holders.	-Review of above actions and modify/ adjust them to achieve the final objectives

3. ACTION PLAN FOR IMPLEMENTATION OF ROADMAP FOR PHASE-OUT OF HCFCs IN INDIA

3.1 INTRODUCTION

The Phase-out of HCFCs has been accelerated by ten years as per the decision XIX/6 taken at the 19th Meeting of the Parties to the Montreal Protocol held in September 2007 at Montreal. Accordingly, a Roadmap was developed describing the long term vision and action plan including the policy instruments for phasing out of production and consumption of HCFCs in India.

The overall objective of the Roadmap is to reduce production and consumption of HCFCs in various applications as per the reduction targets of the Montreal Protocol in a well coordinated manner without causing industrial obsolescence and financial dislocations in the country.

In order to achieve the above objective, it is necessary to have an action plan in place. The major actions are listed as under along with implementing organization/agency and respective time lines:

3.2 ROLE OF IMPLEMENTING AGENCIES

Implementation	Timeline
Ozone Cell, MoEF	March 2008 - May 2010

Project proposal for preparation of HPMP for India has been approved by the 56th Executive Committee of the MLF in November, 2008. The HPMP is to be prepared by UNDP as lead agency with other cooperating agencies, UNEP, UNIDO, The World Bank and GTZ (bilateral agency) on behalf of the Ozone Cell, MoEF, Government of India. The following agencies have been assigned the responsibility to prepare HPMP for India based on their experience and expertise.

UNDP:- Lead Implementing agency responsible for coordination and strategy preparation and its implementation for the following sectors:

-Aerosol Sector,
-Firefighting Sector,
-Foam Sector
-Refrigeration and Air-conditioning Sector
-Solvent Sector

UNIDO:- Transport Refrigeration and Air-Conditioning

The World Bank:- Production Sector Strategy preparation, project preparation and its implementation

GTZ- Refrigeration and Air-conditioning servicing sector strategy preparation and its implementation

UNEP:- Non-investment component of the various sectors with other implementing agencies and custom policy related activities

3.3 POLICY AND REGULATORY MEASURES

Implementation	Timeline
Ozone Cell, MoEF	January 2009 - December 2011

- ❑ Review of existing National policy instruments including Ozone Depleting Substances (Regulation and control) Rules, 2000 & its amendments and align them to the needs of accelerated phase-out of HCFCs
- ❑ Policies to address the interlinkages between the ozone depletion and climate change, particularly focusing on energy efficiency and promoting projects and programmes highlighting such linkages
- ❑ Strengthening of existing Empowered Steering Committee (ESC) and its Standing Committees to cater to the challenges of accelerated control measures for HCFCs
- ❑ Strengthening of institutional capacity in the Ozone Cell, MoEF including that in the existing Project Management Unit (PMU) and Sector Phase-out Plan Unit (SPPU)
- ❑ Review and strengthening enforcement of ODS Rules, strengthening the Customs policies and practices and establishing effective coordination mechanism with Directorate General of Foreign Trade with regard to ODS, to prevent illegal trade
- ❑ Review of existing fiscal incentives to promote non-ODS technologies for smooth transition from HCFCs to non-ODS technologies

3.4 AWARENESS FOR ACCELERATED PHASE-OUT OF HCFCs

Implementation	Timeline
UNDP and UNEP with the guidance of the Ozone Cell, MoEF	March 2009 onwards

- ❑ Public awareness on HCFC phase-out with the involvement of civil society and industry associations
- ❑ Identification of Stakeholders
- ❑ Initiation of stakeholder interactions at the regional and national level
- ❑ Creating awareness among the Stakeholders and end-users
- ❑ Information dissemination on alternative technologies for different sectors and applications
- ❑ Ensuring participation of all the relevant key stakeholders including national scientific and strategic organizations, public sector organizations (Defence, Atomic Energy, Space Research, Health & Family Welfare, Road Transport & Shipping, Indian Railways etc.)

3.5 DATA COLLECTION AND ITS ANALYSIS

Implementation	Timeline
UNDP in association with the Ozone Cell, MoEF	June 2009 - January 2010

- ❏ Analysis of HCFC Survey for India conducted by UNDP in 2005 and its updation
- ❏ Collection of overall comprehensive data on HCFC production, export, import and consumption considering all the applications and changing scenarios for the strategy year
- ❏ Establishing the overall growth rates of HCFCs consumption in consultation with stakeholders and commensurate with National GDP and Economic growth
- ❏ Estimation of unconstrained HCFC consumptions demand in the country ascertaining that all the applications are included
- ❏ Analysis of overall data collected and strategy preparation to address the 2013 freeze at the baseline which is the average of 2009 & 2010 for production and consumption respectively and 10% reduction in 2015

3.6 SECTOR SPECIFIC HCFC PHASE-OUT STRATEGIES

Implementation	Timeline
UNDP in association with other Implementing Agencies under the guidance of the Ozone Cell, MoEF	April 2009 - February 2010

- ❏ Formation of Sectoral Working Groups with Industry Association(s), User Organizations, Research Institutions and other stakeholders:
- ❏ Sector specific data collection to arrive at the consumption in the strategy preparation year taking in to account all the applications which use HCFCs:
  - Aerosol Sector
  - Fire Fighting Sector
  - Foam Sector
  - Refrigeration and Air-Conditioning Sector
  - Transport Refrigeration and Air-Conditioning Sector
  - HCFC Production Sector
  - Refrigeration and Air-Conditioning Servicing Sector
  - Solvent Sector
- ❏ Establishment of sector-wise and/or sub-sector-wise growth rates in consultation with industry stakeholders
- ❏ Estimation of consumption for the freeze year in the sectors and arrive at the overall consumption
- ❏ Prioritization of sub-sectors in consultation with industry to achieve the targets

3.7 ASSESSMENT OF ALTERNATIVE TECHNOLOGIES AND TECHNOLOGY TRANSFER ISSUES

Implementation	Timeline
UNDP with other Implementing Agencies; UNEP, UNIDO and GTZ in association with industry and technical experts	June 2009 onwards

- ❏ Assessment of availability of application specific, proven, energy efficient, and economically viable technologies
- ❏ Selection of technologies keeping in view the linkages between the Montreal Protocol and the Kyoto Protocol
- ❏ Assessment of process of technology transfer through financial mechanism of MLF to replace HCFCs
- ❏ Information dissemination on alternative technologies through regional and national level workshops and conferences

3.8 ENTERPRISE-WISE PROJECT PREPARATION AND IMPLEMENTATION IN VARIOUS SECTORS

Implementation	Timeline
UNDP with other Implementing Agencies viz. UNEP, UNIDO, The World Bank and GTZ under the guidance of the Ozone Cell, MoEF	March 2010 onwards

- ❏ Identification of eligible enterprises for MLF assistance in various sub-sectors
- ❏ Prioritization of the sub-sectors to achieve the Stage One targets
- ❏ Generate interest among the industry partners by awareness campaign to convert their manufacturing facilities to non-ODS at an early stage
- ❏ Strategy for reaching to the informal sector in various applications
- ❏ Technical assistance for project preparation through International/National experts
- ❏ Review of projects and endorsement
- ❏ Monitoring of implementation of enterprise level projects to achieve the desired ODS reduction impacts
- ❏ Review and updating of the strategy at regular intervals

3.9 UMBRELLA PROJECTS FOR CLUSTER OF SMALL/MEDIUM ENTERPRISES

Implementation	Timeline
UNDP and Sector-wise other Implementing Agencies, UNEP, UNIDO, The World Bank and GTZ under the guidance of the Ozone Cell, MoEF	January 2011 onwards

- ❏ Identification of cluster of enterprises and their needs related to phase-out of HCFCs
- ❏ Greater partnership of Small and Medium Enterprises in implementation of HCFC phase out strategy
- ❏ Demonstration of proven and adaptable technologies
- ❏ Technical assistance through MLF funding mechanism for implementation of projects and monitoring

3.10 SECTOR PLAN - REFRIGERATION AND FOAM MANUFACTURING

Implementation	Timeline
UNDP, UNIDO and UNEP under the guidance of the Ozone Cell, MoEF	January 2013 onwards

- ❏ Identification of small/tiny enterprises engaged in refrigeration and foam manufacturing operations
- ❏ Assessment of equipment and technical assistance needs to convert their operations from HCFCs to non-ODS technologies
- ❏ Project preparation in association with enterprises
- ❏ Implementation and monitoring

3.11 SECTOR PLAN - SERVICING SECTOR

Implementation	Timeline
GTZ in association with UNEP and UNDP under the guidance of the Ozone Cell, MoEF	June 2009 - January 2015

- ❏ National survey for identification of refrigeration and air-conditioning servicing enterprises and technicians employed
- ❏ Develop strategy for retrofitting of existing HCFC based equipments/appliances to reduce servicing requirements
- ❏ Develop equipment support scheme to equip servicing enterprises using HCFCs for adopting good servicing practices
- ❏ Assessment of training and equipment needs of refrigeration servicing enterprises
- ❏ Up-gradation of existing training network set-up under NCCoPP to cater to the needs of HCFC phase-out
- ❏ Develop strategy for providing training to minimize the use of HCFCs and adoption of alternative technologies
- ❏ Implementation and monitoring of servicing sector plan

3.12 HCFC PRODUCTION SECTOR PLAN

Implementation	Timeline
The World Bank, UNEP and UNDP under the guidance of the Ozone Cell, MoEF	September 2009 onwards

- ❏ Data collection and estimation of HCFC-22 production for the Base-year and the Freeze-year
- ❏ Amendment of production specific ODS regulations to align to the needs of Phase-out schedule as mentioned under "Review of existing National Policy Instruments"
- ❏ Assessment of impact of changed economic scenario on HCFC Production and Consumption
- ❏ Reassurance of linkage between production and consumption sector phase-out schedule in the country
- ❏ Seeking MLF funding for HCFC swing production plants closure
- ❏ Implementation and monitoring of production phase-out sector plan

ANNEXURE-1

KEY DECISIONS OF

MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL

AND

EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR IMPLEMENTATION OF THE MONTREAL PROTOCOL

SUMMARY OF KEY DECISIONS OF MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL AND THE EXECUTIVE COMMITTEE OF THE MLF FOR IMPLEMENTATION OF THE MONTREAL PROTOCOL

- HCFCs became Controlled Substances through the Copenhagen Amendment to the Montreal Protocol in the Fourth Meeting of the Parties (November 1992)
- The Fifth Meeting of the Parties decided to request Parties to give consideration to Copenhagen Amendment, in selecting alternatives to CFCs (November 1993)
- The 12th Executive Committee Meeting (Decision 12/37) decided that the use of HCFCs in MLF projects, as CFC alternatives should be sector-specific and approved only where more environment-friendly and viable alternatives are not available (March 1994)
- The 17th Executive Committee Meeting (Decision 17/17) requested the implementing agencies to note a presumption against HCFCs and wherever HCFCs were proposed as alternatives to CFCs, full justification has to be provided along with estimated future costs of conversion to zero-ODP alternatives (July 1995)
- The Seventh Meeting of the Parties (Decision VII/3) adopted a control schedule for HCFCs for Article-5 Parties, stipulating a freeze in HCFC consumption at 2015 levels, starting from 2016 and complete phase-out by 2040 (December 1995)
- The 19th Executive Committee Meeting (Decision 19/2) decided that MLF projects with HCFCs as alternatives to CFCs should be considered in light of Meeting of the Parties Decision VII/3, and such projects should explain fully why HCFCs were chosen and make clear that the enterprises concerned had agreed to bear the cost of future conversion to non-ODP technology (May 1996)
- The 20th Executive Committee Meeting (Decision 20/48) decided to request the implementing agencies to ensure that adequate information on all alternative technologies to CFCs, had been provided to enterprises and to reaffirm its earlier Decision 19/2 together with supporting documentation that its requirements were met (October 1996)
- The 27th Executive Committee Meeting (Decision 27/13) decided that for future projects using HCFCs as alternatives, implementing agencies shall provide a letter from the concerned Article-5 Government, confirming that it has reviewed the specific circumstances of the project suggesting conversion to HCFCs and that the project needed to use HCFCs as interim technology and that it understood that no funding will be available for future conversion to non-ODP technologies (March 1999)
- The Eleventh Meeting of the Parties (Decision XI/5) adopted an amendment to the Montreal Protocol (the Beijing Amendment), which provided for ban on exports of HCFCs to non-Parties from 01 January 2004. It also banned import of HCFCs from non-Parties from date of entry into force of this amendment (December 1999)
- The 30th Executive Committee Meeting (Decision 30/1) decided to establish an open-ended

contact group with Sweden as the convener, to consider the question policy on HCFC use as an interim technology (March 2000)

- The 43rd Executive Committee Meeting (Decision 43/19) approved funding for a development of a suitable strategy for long-term management of HCFCs in China by Germany (July 2004)
- The 45th Executive Committee Meeting (Decision 45/28) approved funding for carrying out HCFC surveys in 12 countries (Argentina, Brazil, Colombia, India, Indonesia, Iran, Lebanon, Malaysia, Mexico, Sri Lanka, Syria and Venezuela) by UNDP (April 2005)
- The Nineteenth Meeting of the Parties (Decision XIX/6) decided to adopt an adjustment to the Montreal Protocol, accelerating the phase-out schedule for HCFCs and affirming stable and sufficient funding to Article-5 Parties for compliance with the new schedule. It also directed the Executive Committee to assist Article-5 Parties in preparing their HCFC Phase-out Management Plans. It further requested selection of HCFC alternatives considering their impact on climate change (September 2007)
- The 53rd Executive Committee Meeting (Decision 53/37) decided that ratification of the Copenhagen Amendment was a prerequisite to access funding from MLF for phase-out of HCFC consumption and ratification of the Beijing Amendment was prerequisite to access funding from MLF for phase-out of HCFC production. It also requested MLF Secretariat to prepare papers for proposing guidelines for HPMPs and also to study incremental cost issues surrounding HCFC phase-out (November 2007)
- The 54th Executive Committee Meeting (Decision 54/39) decided to adopt guidelines for preparation of HPMPs. The guidelines provide indicative outline and content for HPMPs and recommend a staged approach for HPMPs, in which the first stage would target compliance with the 2013 and 2015 milestones (April 2008)
- The 55th Executive Committee Meeting (Decision 55/13) decided on parameters governing the funding for preparation of HPMPs. For those countries which had previously been funded for carrying out surveys, a discount of 25% would be applied to the survey component of the funding for HPMP preparation. For those countries which had reported zero consumption of HCFCs, US$ 30,000 would be provided for HPMP preparation. The Secretariat was requested to prepare a paper for a proposed cost structure for funding of HPMP preparation to be presented to the 56th Executive Committee Meeting. This meeting also decided (Decision 55/47) on criteria for approval of a limited number of demonstration projects in the Foam Sector particularly for system house and Refrigeration & Air Conditioning Sector. The meeting also approved funding for preparation of overarching HPMPs for a large number of countries.
- The 56th Executive Committee Meeting (Decision 56/16) decided to adopt a detailed cost structure for preparation of HPMPs and preparation of investment and associated activates for HPMPs, including funding for preparation of individual, group and sector-level projects. The decision also defined five manufacturing sectors that consume HCFCs, namely, Polyurethane Foam, XPS Foam, Refrigeration, Air Conditioning and Solvents.
- The Twentieth Meeting of the Parties to the Montreal Protocol (Decision XX/8) decides to organize a workshop for a dialogue on high-GWP alternatives to HCFCs at the sidelines of the twenty-ninth meeting of the Open Ended Working Group (OEWG) to be held in July 2009.

DECISION XIX/6 OF THE MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL

(Extract from Document UNEP/OzL.Pro.19/7)

Decision XIX/6: Adjustments to the Montreal Protocol with regard to Annex-C, Group-I Substances (Hydrochlorofluorocarbons)

The Parties agree to accelerate the phase-out of production and consumption of HCFCs, by way of an adjustment in accordance with paragraph 9 of Article 2 of the Montreal Protocol and as contained in Annex III to the report of the Nineteenth Meeting of the Parties, on the basis of the following:

1. For Parties operating under paragraph 1 of Article 5 of the Protocol (Article 5 Parties), to choose as the baseline the average of the 2009 and 2010 levels of, respectively, consumption and production; and

2. To freeze, at that baseline level, consumption and production in 2013;

3. For Parties operating under Article 2 of the Protocol (Article 2 Parties) to have completed the accelerated phase-out of production and consumption in 2020, on the basis of the following reduction steps:
   a) By 2010 of 75 per cent;
   b) By 2015 of 90 per cent;
   c) While allowing 0.5 per cent for servicing the period 2020-2030;

4. For Article 5 Parties to have completed the accelerated phase-out of production and consumption in 2030, on the basis of the following reduction steps:
   a) By 2015 of 10 per cent;
   b) By 2020 of 35 per cent;
   c) By 2025 of 67.5 per cent;
   d) While allowing for servicing an annual average of 2.5per cent during the period 2030-2040;

5. To agree that the funding available through the MLF for Implementation of the Montreal Protocol in the upcoming replenishments shall be stable and sufficient to meet all agreed incremental costs to enable Article 5 Parties to comply with the accelerated phase-out schedule both for production and consumption sectors as set out above, and based on that understanding, to also direct the Executive Committee of the MLFto make the necessary changes to the eligibility criteria related to the post-1995 facilities and second conversions;

6. To direct the Executive Committee, in providing technical and financial assistance, to pay particular attention to Article 5 Parties with low volume and very low volume consumption of HCFCs;

7. To direct the Executive Committee to assist Parties in preparing their phase-out management plans for an accelerated HCFC phase-out;

8. To direct the Executive Committee, as a matter of priority, to assist Article 5 Parties in conducting surveys to improve reliability in establishing their baseline data on HCFCs;

9. To encourage Parties to promote the selection of alternatives to HCFCs that minimize environmental impacts, in particular impacts on climate, as well as meeting other health, safety and economic considerations;

10. To request Parties to report regularly on their implementation of paragraph 7 of Article 2F of the Protocol;

11. To agree that the Executive Committee, when developing and applying funding criteria for projects and programmes, and taking into account paragraph 6, give priority to cost-effective projects and programmes which focus on, inter alia:
    a) Phasing-out first those HCFCs with higher ODP, taking into account national circumstances;
    b) Substitutes and alternatives that minimize other impacts on the environment, including on the climate, taking into account GWP, energy use and other relevant factors;
    c) Small and medium-size enterprises;

12. To agree to address the possibilities or need for essential use exemptions, no later than 2015 where this relates to Article 2 Parties, and no later than 2020 where this relates to Article 5 Parties;

13. To agree to review in 2015 the need for the 0.5 per cent for servicing provided for in paragraph 3, and to review in 2025 the need for the annual average of 2.5 per cent for servicing provided for in paragraph 4 (d);

14. In order to satisfy basic domestic needs, to agree to allow for up to 10% of baseline levels until 2020, and, for the period after that, to consider no later than 2015 further reductions of production for basic domestic needs;

15. In accelerating the HCFC phase-out, to agree that Parties are to take every practicable step consistent with MLF programmes, to ensure that the best available and environmentally-safe substitutes and related technologies are transferred from Article 2 Parties to Article 5 Parties under fair and most favorable conditions.

DECISION 54/39 OF THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND

Guidelines for development of HPMPs

170. After having considered the revised text submitted by the contact group, the Executive Committee decided to adopt the following guidelines:

(a) Countries should adopt a staged approach to the implementation of an HPMP, within the framework of their over-arching-strategy;

(b) As soon as possible and depending on the availability of resources, countries should employ the guidelines herein to develop, in detail, stage one of the HPMPs, which would address how countries would meet the freeze in 2013 and the 10 per cent reduction in 2015, with an estimate of related cost considerations and applying cost guidelines as they were developed;

(c) The elaboration of stage one of the HPMP and subsequent stages should be developed as follows:

  (i) For countries with consumption in the servicing sector only:
    a. To be consistent with existing guidelines for the preparation of RMPs/RMP updates pursuant to decisions 31/48 and 35/57; and, if applicable, with the preparation of Terminal Phase-out Management Plans (TPMPs) pursuant to decision 45/54;
    b. To contain commitments to achieve the 2013 and 2015 HCFC control measures and include a performance-based system for HPMPs based on the completion of activities in the HPMP to enable the annual release of funding for the HPMP;

  (ii) For countries with manufacturing sectors using HCFCs, HPMPs should contain a National Performance-based Phase-out Plan (NPP) with one or several substance or Sector-based Phase-out Plans (SPP) consistent with decision 38/65 addressing consumption reduction levels sufficient to achieve the 2013 and 2015 HCFC control measures and provide starting points for aggregate reductions, together with annual reduction targets;

(d) For countries that choose to implement investment projects in advance of completion of the HPMP:
  (i) The approval of each project should result in a phase-out of HCFCs to count against the consumption identified in the HPMP and no such projects could be approved after 2010 unless they were part of the HPMP;
  (ii) If the individual project approach was used, the submission of the first project should provide an indication of how the demonstration projects related to the HPMP and an indication of when the HPMP would be submitted;

(e) Consideration should be given to providing funding for assistance to include HCFC control measures in legislation, regulations and licensing systems as part of the funding of HPMP preparation as necessary and confirmation of the implementation of the same should be required as a prerequisite for funding implementation of the HPMP;

(f) In cases where there were multiple implementing agencies in one country, a lead agency should be designated to coordinate the overall development of stage one of the HPMP;

(g) HPMPs should contain cost information at the time of their submission based on and addressing:
  (i) The most current HCFC cost guidelines at the time of submission;
  (ii) Alternative cost scenarios based on different potential cut-off dates for new capacity if a specific cut-off date had not yet been decided, for funding eligibility of manufacturing facilities as specified in decision 53/37(k), as well as the current policy for a 25 July 1995 cut-off date;
  (iii) Alternative cost scenarios for the operational and capital costs for second conversions;
  (iv) The incremental costs of regulating import and supply to the market of HCFC dependent equipment once proven alternatives were commercially available in the country and describing the benefits to the servicing sector of associated reduced demand;
  (v) Cost and benefit information based on the full range of alternatives considered, and associated ODP and other impacts on the environment including on the climate, taking into account global-warming potential, energy use and other relevant factors;

(h) Countries and agencies were encouraged to explore potential financial incentives and opportunities for additional resources to maximize the environmental benefits from HPMPs pursuant to paragraph 11(b) of decision XIX/6 of the Nineteenth Meeting of the Parties;

(i) HPMPs should address:
  (i) The use of institutional arrangements mentioned in decision 53/37(e) and (f);
  (ii) The roles and responsibilities of associations of refrigeration technicians and other industry associations and how they could contribute to HCFC phase-out; and

(j) HPMPs should, as a minimum, fulfill the data and information requirements, as applicable, listed in the indicative outline for the development of HPMPs, as set out in Annex XIX to the present report.

(Decision 54/39)

ANNEXURE-II

HCFC SURVEY IN INDIA (2005 - 2007)

SURVEY OF HCFCs IN INDIA

FINAL REPORT

Ozone Cell, Ministry of Environment & Forests
United Nations Development Programme (UNDP)

January 2007

EXECUTIVE SUMMARY

India acceded to the Vienna Convention in 1991 and ratified the Montreal Protocol on Substances that deplete the Ozone Layer in 1992. India ratified the London Amendment to the Montreal Protocol in 1992 and the Copenhagen Amendment in 2003.

The annual calculated consumption in India of controlled substances listed in Annex-A of the Montreal Protocol, was less than 0.3 Kg per capita, India was classified as a party operating under Paragraph-1, Article-5 of the Montreal Protocol and thus qualified for technical and financial assistance, including transfer of technology, through the financial mechanism of the Montreal Protocol.

India's Country Programme incorporating the national strategy and action plan for controlling the use of Ozone Depleting substances was approved at the 11th Meeting of the Executive Committee of the Multilateral Fund for Implementation of the Montreal Protocol in November 1993. India's Country Programme Update was submitted to and approved at the 49th Meeting of the Executive Committee in July 2006. Until date, India is in compliance with the Montreal Protocol control schedule for Annex-A, B and E substances, through a combination of projects and programmes featuring technology transfer investments, technical assistance, training & capacity building, information dissemination and awareness-raising and institution of a proactive regulatory framework.

In compliance with Article-4B of the Montreal Protocol incorporated through the Montreal Amendment, India has established one of the most comprehensive and forward-looking regulations for controlling production, import, export, trade and use of all Annex-A, B, C and E controlled substances, which includes recovery, recycling and reclamation. All users of these substances are subject to mandatory registration and reporting requirements in addition to these controls.

Hydrochlorofluorocarbons (HCFCs) are classified as controlled substances under Annex-C Group-I of the Montreal Protocol and therefore their use has to be reduced and eventually phased out. In accordance with the control schedule of the Montreal Protocol for Article-5 parties, production and consumption of HCFCs will be subject to a freeze at 2015 levels from 01 January 2016 and are required to be completely eliminated by 2040. HCFCs are used in India mainly in the Aerosols, Foams, Refrigeration & Air Conditioning and Solvent sectors, predominantly HCFC-141b and HCFC-22.

Due to the economic liberalization policies since early 1990s resulting in sustained growth in the purchasing power and consequent growth in demand for consumer and commercial products, the consumption of HCFCs in India increased from about 3,792 metric tonnes in 1994 to 11,027 metric tonnes in 2005, signifying an average annual growth rate of 11.3%. Much of this growth has occurred in the past few years. For example, since 2001, the consumption of HCFCs in India has increased from about 4,153 metric tonnes to 11,027 metric tonnes in 2005, signifying an average annual growth of about 27.7%. Based on projected annual growth rates in demand forecasted for HCFCs until 2015, it is estimated that the consumption of HCFCs in India is likely to reach about 27,103 metric tonnes in 2015. HCFCs additionally have a global warming impact due to their high global warming potential (GWP).

Concrete actions by Article-5 parties to control and reduce consumption of HCFCs to ensure compliance with the 2016 freeze would need to be formulated and initiated at the earliest. Challenges and

constraints for such actions include sustained and cost-effective availability of environment-friendly substitutes for HCFCs and access to technology and funding to facilitate transition without undue burden on the economy of the country and constraints on consumers and industry. India expects that the international community will recognize these challenges and provide technical and financial assistance to Article-5 countries to meet the first control on HCFC use, i.e., the freeze in consumption at 2015 levels from 2016.

1. INTRODUCTION

1.1 BACKGROUND

India became a party to the Vienna Convention for the Protection of the Ozone Layer on 19 June 1991 and acceded to the Montreal Protocol on Substances that Deplete the Ozone Layer on 17 September 1992. Table-1 shows the dates of ratification by India of the Protocol and its amendments. Since the annual calculated consumption of controlled substances in India, listed in Annex-A of the Montreal Protocol, was less than 0.3 Kg per capita, India was classified as a party operating under Paragraph-1, Article-5 of the Montreal Protocol and thus qualified for technical and financial assistance, including transfer of technology, through the financial mechanism of the Montreal Protocol.

Table-1: India - Dates of Ratification of Montreal Protocol and Amendments

Agreement/Amendment	Date of Ratification
Vienna Convention	19 June 1991
Montreal Protocol	17 Sept 1992
London Amendment	17 Sept 1992
Copenhagen Amendment	03 March 2003
Montreal Amendment	03 March 2003
Beijing Amendment	03 March 2003

India's Country Programme for phase-out of ozone depleting substances under the Montreal Protocol was prepared and finalized in August 1993 with the assistance of United Nations Development Programme (UNDP), The Energy and Resources Institute (TERI) and representatives of various ministries, industries and scientific institutions. The Country Programme was submitted to and approved at the 11th Meeting of the Executive Committee of the Multilateral Fund for Implementation of the Montreal Protocol, in November 1993.

The key principles underlying India's Country Programme were:

- To implement phase-out of ODS without adversely affecting industrial and economic growth in the ODS consuming sectors, while protecting consumer and public interests
- To meet the demand for substitutes for ozone depleting substances, as far as possible from indigenous sources
- To reflect India's commitment to achieve compliance with the Montreal Protocol obligations, despite the barriers and problems India would face in the implementation of the Protocol.

India's Country Programme was contingent upon availability of adequate technical and financial assistance for mitigating the incremental costs of phase-out. The Country Programme was also intended to be a dynamic document and was intended to be reviewed and updated at an appropriate time to reflect the status of its implementation.

India requested funding for the preparation of their Country Programme Update under the Montreal Protocol, which was approved at the 36th Meeting of the Executive Committee of the Multilateral Fund in March 2002, with UNDP as the implementing agency. India's Country Programme Update was approved at the 49th Meeting of the Executive Committee of the Multilateral Fund in July 2006.

Since the approval of the original Country Programme for Phase-out of Ozone Depleting Substances in 1993, India has made significant progress in controlling the production and consumption of ODS. From a consumption level of 10,370 metric tonnes of ODS in 1991, the unconstrained demand was forecasted at about 96,000 metric tonnes by 2005.

The consumption of ODS by end-2004 was only about 9,000 metric tonnes annually. These reductions were achieved with technical and financial assistance from the Multilateral Fund, support from implementing agencies and due to proactive policy and regulatory actions by Government of India. Table-2 below summarizes the ODS phase-out activities, both completed and ongoing, in various sectors:

Table-2: Summary of ODS Phase-out Activities in All Sectors

Sector	Number of Projects	Funding (US$)	Phase-out (ODP metric tonnes)
Aerosols Sector	27	3,227,739	689
Foams Sector	159	34,785,641	4,373
Firefighting Sector (Halons)	18	2,458,701	2,162
Refrigeration & Air Conditioning Sector	49	32,254,823	3,203
Solvents Sector	41	61,358,042	12,966
Production Sector (including Halons)	2	84,600,000	22,988
Total	**296**	**218,684,946**	**46,381**

Of the above-mentioned activities, over 70% of the activities in terms of ODS phase-out are now completed. Almost all of the individually approved projects have been completed. The implementation of performance-based sector and national-level phase-out plans in the Foams, Refrigeration & Air Conditioning, Solvents and Production sectors is well on course, with the respective agreed annual phase-out targets met or exceeded so far.

Three main national/sector-level ODS phase-out activities, governed by multi-year performance-based agreements between Government of India and the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, are currently under implementation:

NCCOPP (National CFC consumption phase-out Plan)

This project combines the CFC phase-out activities in the Foams, Refrigeration (Manufacturing) and Refrigeration (Servicing) Sectors, into a single agreement beginning March 2004. The agreed annual phase-out targets under the NCCOPP are as below:

Table-3: Agreed Annual CFC Phase-out Targets under NCCOPP from 2004-2010

Year	2004	2005	2006	2007	2008	2009	2010
ODS Phase-out (ODP MT)	1,675	854	496	147	145	173	0

From 2007, when the activities under the Foam Sector and Refrigeration (Manufacturing) Sectors are expected to be substantially completed, the focus of the NCCOPP would be expected to be predominantly on activities in the Refrigeration (Servicing) Sector. The key challenges identified are as below:

- ❏ Availability of adequate CFCs for servicing needs beyond 2010, through stockpiling, recovery/ recycling and reclamation
- ❏ Accelerating retrofitting/replacement of CFC-based equipment to reduce dependence on CFCs for servicing
- ❏ Adequate capacity building and awareness at the field-level service establishments and technicians to minimize CFC emissions and losses

Intensive monitoring of the investment, technical assistance, training and capacity building components would be needed to ensure that India complies with the agreed phase-out targets. Appropriate institutional arrangements are in place to address the additional obligations such as performance verification and reporting.

CTC Phase-out Plan

The project addresses the production and consumption of non-feedstock CTC. The agreed annual production and consumption targets are as below:

Table-4: Agreed Production and Consumption Targets under CTC Phase-out Plan

Year	2005	2006	2007	2008	2009	2010
Maximum Consumption (ODP MT)	1,726	1,147	708	268	48	0
Maximum Production (ODP MT)	1,726	1,147	708	268	48	0

The implementation of this project is underway. The key challenges identified are as below:

- ❏ Adequate assistance to small scale CTC users in the textile and metal cleaning industry, including cost-effective availability of substitutes
- ❏ Ensuring timely phase-out of CTC in the large users in the process agent and solvents sectors

Intensive monitoring of the investment, technical assistance, training and capacity building components would be needed to ensure that India complies with the agreed phase-out targets. Appropriate institutional arrangements are in place to address the additional obligations such as performance verification and reporting.

Production Sector Gradual phase-out plan

This agreement is in place since 1999. The agreed annual limits on production are already shown in Table-5 below:

Table-5: Agreed Maximum Allowable CFC Production Levels from 1999-2010

Year	Production (MT)	Year	Production (MT)
1999	22,588	2005	11,294
2000	20,706	2006	7,342
2001	18,824	2007	3,389
2002	16,941	2008	2,259
2003	15,058	2009	1,130
2004	13,176	2010	0

Mechanisms for monitoring, reporting and verification as per the agreed protocols are already established and would continue to be implemented. So far India has complied with all provisions of the agreement governing this project.

Among the priorities highlighted in India's Country Programme Update for the future, Government of India considered the long-term management of HCFCs as an important area of activity. As per the Montreal Protocol, controls on Annex-C Group-I substances (HCFCs) for Article-5 parties, begin in 2016. The production and consumption of HCFCs have to be frozen at 2015 levels from 2016. HCFCs are widely used as refrigerants in the Refrigeration & Air Conditioning Sector and as blowing agents in the Foams Sector. In 2005, India's production of HCFCs for non-feedstock use was 23,880 metric tonnes and the net consumption was 11,027 metric tonnes. The sectors using HCFCs in India are experiencing significant growth due to substantial increase in economic activity in the country and resultant GDP growth. It is expected that these sectors, and therefore the consumption of HCFCs would grow by 10-15% annually for the next decade.

Based on this, by 2015, India's consumption of HCFCs would cross 27,000 metric tonnes. In 2005, India exported 15,026 metric tonnes of HCFCs mostly to countries in Asia Pacific and Middle East, whose economies are also on a growth path and may thus show corresponding consumption growth, leading to increased demand for exports.

Expansion of HCFC production facilities to meet the growing demand may result in additional global environmental impacts. Increased production of HCFC-22 will require increased production of chloroform, which is used as a raw material for producing HCFC-22. Production of chloroform will result in additional production of CTC. As demand for HCFC-22 as feedstock for production of fluoropolymers is increasing in both developed and developing countries, proper management systems may be needed to address unwanted production of CTC, which has an ODP of 1.2 and GWP of 1,400.

Given the restrictions on HCFC use beginning 2016, given the unintended global environmental impacts of increased HCFC production and considering that important sectors of the economy would be affected, urgent steps are needed to ensure that sectors dependent on HCFCs are properly equipped to deal with the imminent restrictions after 2015. Based on these projections, Government of India has identified the long-term management of HCFCs as a crucial activity to be undertaken at the earliest, with the expectation of adequate technical and financial assistance from the Multilateral Fund to support the same.

Accordingly, at the 45th Meeting of the Executive Committee, funding was approved for UNDP to carry out HCFC surveys in 12 countries. India is one of the countries which requested to be a part of this activity.

1.2 APPROACH AND PREPARATION

The Executive Committee of the Multilateral Fund at its 45th Meeting, approved activities to be implemented by UNDP, which aimed to conduct limited surveys of HCFC use in selected countries, with a goal of enabling the Executive Committee to establish a national aggregate level of HCFC consumption in the future for these countries, against which projects and activities may be funded. The selected countries were:

Latin America:	Argentina, Brazil, Colombia, Mexico, Venezuela
Middle East:	Iran, Lebanon, Syria
South Asia:	India, Sri Lanka
Southeast Asia:	Indonesia, Malaysia

To ensure effective coordination of survey activities in this global project involving 12 countries and to better address cross-regional issues, UNDP planned the activities to be carried out, using a three-stage process:

- ❏ Data collection and survey at the national level
- ❏ Compilation and analysis of survey data
- ❏ Presentation and reporting of survey data

The national-level data collection and survey work was to be carried out through recruitment of a local consultant entity (either an individual or a firm/institution) recommended by the respective governments. The compilation and analysis of the survey data was carried out through UNDP's international experts and researchers to impart credibility and quality. The presentation and reporting of survey data was carried out in consultation with the country governments, which in turn ensured the required country-level consultations within the respective industry and expert institutions.

In India, Ark International, a local consulting and technical services firm, was retained by UNDP in consultation with Government of India to carry out the national-level survey activities. The main tasks to be carried out in close coordination with UNDP and the NOU were as below:

- ❏ Conduct a Desk Study, with the aim of preparing a situation analysis on HCFC consumption in-country.
- ❏ To interact with various chemical and equipment suppliers/importers and/or their representatives and relevant industry associations for identifying all current users of HCFCs in the Aerosols, Halons, Foams, Refrigeration & Air Conditioning, Solvents and any other sectors where HCFCs are used, maintain continuous contact with these users and maintain an updated list of all such users.
- ❏ With the prior approval of UNDP and NOU, undertake plant visits to selected users and collect enterprise baseline information and other documentation as may be required by UNDP and NOU from all users, in accordance with the pro-forma/questionnaire provided for this purpose. The HCFC consumption data from users shall be collected from 1995 or the date of their establishment, whichever is later.

- ❏ Classify the data generated from a) and b) above, as below:
  - HCFC consumption by sector
  - List of HCFC users, segregated by sector
  - List of HCFC users who received assistance under the Montreal Protocol Programme
  - List of HCFC users who did not receive assistance under the Montreal Protocol Programme
  - Approximate population of HCFC-based equipment segregated by sector
- ❏ Collect and compile the following data on HCFCs, segregated by substance at the national level:
  - Historical production data preferably from 1995
  - Historical export data preferably from 1995 and segregated by destination countries
  - Historical import data preferably from 1995 and segregated by originating countries
- ❏ To assist in obtaining any other confirmations, documentation or information from the identified HCFC users as may be required by UNDP and/or NOU from time to time.
- ❏ To set up meetings for UNDP designated international experts and/or representatives, to meet with key managerial and technical personnel from the HCFC users and for plant visits as required, in line with their mission schedules in the country.
- ❏ To assist UNDP and/or NOU in arranging workshops or similar information dissemination activities as may be requested, including assistance for ensuring participation of HCFC users selected for participating in such activities
- ❏ To provide UNDP with interim progress reports on activities on a monthly basis and a final report incorporating the expected outcomes as mentioned above, at the end of the contract period.

Ark International was contracted by UNDP and carried out the above-mentioned tasks during 2006 and provided interim and final report as per the terms of reference. The draft final report was submitted to UNDP in December 2006. The final report was reviewed by UNDP's international technical experts and was then submitted to the Government for review and endorsement.

1.3 SURVEY METHODOLOGY

The sources of data collected were as below:

- ❏ Existing records of production, consumption and export of HCFCs available with the Ozone Cell, Ministry of Environment and Forests.
- ❏ Existing records of users generated during the implementation of ongoing CFC phase-out projects and programs/activities.
- ❏ Industry associations, namely AIACRA (All India Air Conditioning and Refrigeration Association), RAMA (Refrigeration and Air Conditioning Manufacturers Association), NIRATA (North India Refrigeration and Air Conditioning Trade Association) etc. and their publications.
- ❏ End users and original equipment manufacturers of HCFCs/HCFC-based products

Questionnaires in the prescribed format were obtained from select users.

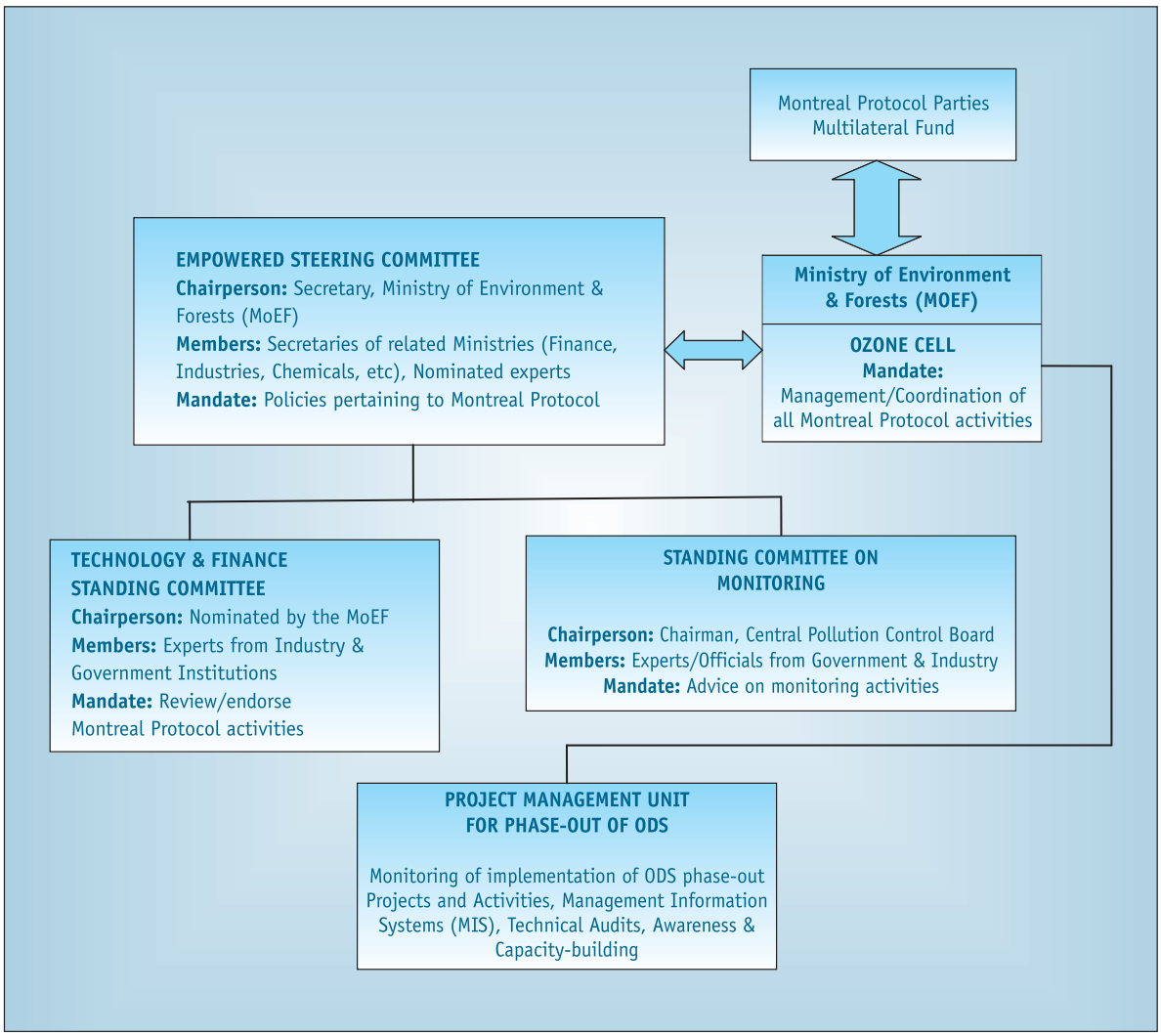
2. OBSERVATIONS

2.1 INSTITUTIONAL FRAMEWORK

2.1.1 Institutional Structure

Government of India designated the Ministry of Environment & Forests as the national coordinating body for implementation of the Montreal Protocol in India. The functions and responsibilities of the Ministry of Environment & Forests as the designated national authority, include notification of regulations pertaining to the Montreal Protocol, issues related to international cooperation, maintaining and managing data on production, imports, exports and consumption of ODS, monitoring of implementation of Montreal Protocol activities, interacting with other line ministries on technical and financial matters pertaining to implementation of activities, liaising with scientific, technical and other public institutions for technical matters, representing India at various multilateral meetings and discussions, etc. The Ministry of Environment & Forests established a special directorate (Ozone Cell) within the Ministry, dedicated to managing and coordinating the implementation of the Montreal Protocol in India. The institutional framework for Montreal Protocol implementation in India is shown in Figure-1 below.

Figure-1: Institutional Structure



2.1.2 Policies

India's Country Programme for phasing out ODS, established the following guiding principles reflecting national priorities:

- ❏ To strengthen national institutions for monitoring and managing the ODS phase-out, and formulation and implementation of appropriate policies.
- ❏ To assist indigenous industries for conversion to non-ODS technologies through the Montreal Protocol financial mechanism, while ensuring that the SMEs and other unorganized tiny enterprises are fully compensated for conversions, including retraining
- ❏ To minimize economic dislocation either through closure of manufacturing units, loss of productive capacity, or through major capital expenditure that could become obsolete in future.
- ❏ To maximize indigenous production by encouraging technology transfer for and local production of non-ODS substitutes
- ❏ To give preference to one-time replacements
- ❏ To minimize obsolescence costs by promoting recycling, retrofitting and drop-in substitutes to prolong economic life of existing equipment, until new replacement technologies become mature, cost-effective and available
- ❏ To institute decentralized management of ODS phase-out activities and arrangements to facilitate feedback for smooth implementation.
- ❏ To facilitate development of new standards and certification systems for products and processes including those for safety
- ❏ To integrate the ODS phase-out activities closely with the growth in the various industrial sectors, economic reforms, etc.
- ❏ To evaluate alternatives to ODS and the available substitute technologies on a continuing basis, so as to lead to wider adaptation and dissemination.
- ❏ To periodically reassess and revise the Country Programme to reflect technological developments, progress in implementation of ODS phase-out activities and evolving trends in the growth of the various industrial sectors.

2.1.3 Regulations

Recognizing the importance of establishing an effective regulatory framework for the successful implementation of the Country Programme, MOEF initiated a forward-looking programme to create such a framework to support the various ODS phase out measures.

In exercise of the powers conferred by sections 6, 8 and 29 of the Environment Protection Act of 1986, Government of India formulated draft ODS regulations termed as the Ozone Depleting Substances Rules, which were published in the Gazette of India in 1998 for public comments and also circulated in the industry for advance intimation and comments. These have been since been officially notified

and have formally come in to effect from January 2000. The provisions of this comprehensive legislation are summarized as below:

ODS Production

- ❏ Mandatory registration with MOEF
- ❏ Restriction on production levels as per "base level" and specified time-bound reductions.
- ❏ Prohibition on creating new capacity or expansion of capacity

ODS Consumption

- ❏ Ban on new capacity or expansion of capacity for production of ODS based equipment.
- ❏ Mandatory registration with designated authorities
- ❏ Declaration requirement in prescribed format at the time of procurement of ODS
- ❏ Restrictions on production of ODS-based products in various sectors from 2003

ODS Trade

- ❏ Mandatory registration for exporters & importers with designated authorities
- ❏ Import of ODS and ODS containing equipment only against license
- ❏ Export restricted to countries who are signatory to the Montreal Protocol against quota

General

- ❏ Mandatory registration for reclamation and destruction of ODS. All registrations will be valid for specified periods, after which, they are required to be renewed.
- ❏ Every entity that produces, uses, imports, sells, stocks, reclaims or destroys ODS has to maintain records and file reports as specified.
- ❏ Every entity, which has received technical and/or financial assistance from any international agency or financial assistance from Government of India including duty exemptions, is required to maintain records and file reports as specified.

Other measures initiated by Government of India include:

Trade Measures

- ❏ Trade in controlled substances with countries not party to the Montreal Protocol is prohibited.
- ❏ The export of Annex-A and Annex-B substances to Non-Article 5 Parties is prohibited.
- ❏ The import and export of all Annex-A and Annex-B substances are subject to licensing.
- ❏ Import of Equipment containing ODS was subjected to licensing

Fiscal Measures

- ❏ Full exemption from Customs and Excise tariffs on capital goods required to implement ODS phase out projects funded by the Multilateral Fund. This exemption has been extended to ODS phase-out projects, which were eligible for funding under the Multilateral Fund, whether or not such enterprises actually sought assistance from the fund. These also covered projects submitted for retroactive financing. The benefit was available subject to the condition that enterprises should give a clear legal commitment to stop using ODS in all future manufacturing operations after the projects were implemented. The duty exemptions were also extended to items of recurring use, including non-ODS alternatives, for such duration for which, incremental operating costs were committed by the Multilateral Fund in approved projects.

- The duty exemptions were also extended to capital goods required for establishing new capacity with non-ODS technology.
- Indian financial institutions were advised not to finance/refinance new ODS producing/consuming enterprises.
- The Tariff Advisory Committee (a statutory body under the Insurance Act, 1938) decided to grant suitable discounts on fire insurance premiums if alternative agents are used to replace Halons.

2.2 HCFC SUPPLY SCENARIO

2.2.1 Production

India has indigenous production of only HCFC-22. Other HCFCs are imported. There are four active producers of HCFC-22 in India. Table below shows the 2005 production levels at these four producers:

Table-6: HCFC-22 Production in India in 2005

Producer	HCFC-22 production in 2005 (Metric Tonnes)
Gujarat Fluorocarbons Ltd	9,573
Hindustan Fluorocarbons Ltd	909
Navin Fluorine Industries	5,521
SRF Ltd	8,786
Total	**24,789**

The production by Hindustan Fluorocarbons Ltd. of 909 metric tonnes was entirely consumed for feedstock use, which is not controlled under the Montreal Protocol. The historical production of HCFC-22 in India is depicted in Table-7 below:

Table-7: Historical HCFC-22 Production in India in 1994-2005

Year	Production (MT)	Year	Production (MT)
1994	5,844	2000	14,061
1995	6,693	2001	14,868
1996	6,152	2002	14,606
1997	6,301	2003	19,216
1998	11,426	2004	25,592
1999	15,412	2005	24,789

2.2.2 Exports

In India, the exports of HCFCs are of HCFC-22. The historical exports of HCFC-22 are depicted in Table-8 below:

Table-8: Historical HCFC-22 Exports from India 1994-2005

Year	Exports (MT)	Year	Exports (MT)
1994	2,052	2000	10,478
1995	2,830	2001	10,917
1996	1,766	2002	11,400
1997	2,537	2003	14,568
1998	3,818	2004	19,285
1999	5,895	2005	15,026

In 2005, the total exports of 15,026 metric tonnes of HCFC-22 were made by two of the HCFC-22 producers, namely Gujarat Fluorocarbons Ltd (7,612 metric tonnes) and SRF Ltd (7,414 metric tonnes).

The export of HCFC-22 is mainly to South/Southeast Asia, Middle East and also to Latin America and Caribbean.

2.2.3 Imports

The main HCFCs imported in India are HCFC-141b, HCFC-123 and HCFC-124. In 2005, the quantities imported for these HCFCs are shown in Table-9 below:

Table-9: HCFC Imports in India in 2005

HCFC	Imports in 2005 (MT)
HCFC-123	15
HCFC-124	2
HCFC-141b	2,156
Total	**2,173**

2.2.4 Consumption

The predominant consumption of HCFCs in India is of HCFC-22, HCFC-141b and small amounts of HCFC-123/124. Other HCFCs are consumed in very small quantities. Table-10 below shows the historical consumption of HCFC-22, HCFC-141b and HCFC-123 in India.

Table-10: Historical HCFC-22, HCFC-141b and HCFC-123 consumption in India 1994-2005

Year	HCFC-22 (MT)	HCFC-141b (MT)	HCFC-123 (MT)
1994	3,792	---	---
1995	3,800	---	---
1996	4,386	---	---
1997	3,764	---	---
1998	7,608	107	---
1999	9,517	518	18
2000	3,583	483	20
2001	3,769	359	25
2002	3,206	1,401	25
2003	3,648	952	0
2004	7,228	1,357	60
2005	8,854	2,156	17

The predominant use of HCFC-22 is as a refrigerant in the Refrigeration and Air Conditioning Sector. The predominant use of HCFC-141b is as a blowing agent in the Foams Sector.

2.2.5 Distribution and supply chain

HCFCs are distributed in India through distributors and wholesale stockists located in major cities, who in turn route the supplies through hundreds of small and medium retailers.

2.3 HCFC CONSUMPTION

2.3.1 Aerosols Sector

In the aerosols sector presently, hydrocarbons are the preferred propellant technology employed for non-medical use, though HCFCs can be potentially used. In 2005, one identified manufacturer of industrial aerosols consumed 56 metric tonnes of HCFC-141b, as a propellant. There are likely to be additional small manufacturers in the informal sector, with a consumption estimated around 15 metric tonnes. In medicated aerosols, currently CFCs are used. There is no identified usage of HCFCs in medicated aerosols.

2.3.2 Foam Sector

Since the beginning of phase-out activities for CFCs in 1995 in India, HCFC-141b was the preferred substitute blowing agent especially in small and medium-sized enterprises in the rigid and integral skin polyurethane foam sub-sectors (as well as in insulation of domestic/commercial refrigeration equipment, covered in section 2.3.4). HCFC-22 is used as a blowing agent only in trace quantities.

The EPE and phenolic foam manufacturers converted to hydrocarbons. In 2005, the total estimated consumption of HCFC-141b in the Foams Sector is shown in Table-11.

Table-11: HCFC consumption in the Foams Sector in 2005

Rigid Polyurethane Foam (MT)	Integral Skin Polyurethane Foam (MT)	Total (MT)
963	72	1,035

The HCFC-141b consumption in India steeply increased in the past five years; from 359 metric tonnes in 2001 to 2,156 metric tonnes in 2005 (See Table-10). This increase is ascribed to conversions of CFC-based capacity carried out under the Montreal Protocol and due to introduction and expansion of capacity of HCFC-141b based production.

Based on the baseline data available from HCFC-141b users and upstream chemical suppliers in the Foams Sector, it is estimated that in 2005, close to 60% of the above consumption of 1,035 metric tonnes, amounting to about 621 metric tonnes, originates from new and/or expanded capacity of HCFC-141b based production. The remaining about 414 metric tonnes originates from enterprises which converted to HCFCs under Montreal Protocol assistance. It may be noted that additional quantities of HCFC-141b could be consumed as a component of imported pre-blended polyols, particularly in converted enterprises.

2.3.3 Firefighting Sector

Under the Montreal Protocol programme in India, the Firefighting Sector phased out use of CFCs. The conversion technologies used were FM200, ABC powder, CO2, etc. Thus, there is no residual use of HCFCs in the Firefighting Sector.

2.3.4 Refrigeration & Air Conditioning Sector

The Refrigeration and Air Conditioning Sector is by far the largest consumer of HCFCs in India. HCFC-22 is the predominant substance, used as a refrigerant and to a lesser extent HCFC-123. HCFC-141b is used as a blowing agent for the rigid foam component in the manufacture of domestic, commercial and industrial refrigerant equipment.

HCFC-123

HCFC-123 is typically used as a refrigerant in large capacity centrifugal chillers, serving the central air conditioning sub-sector. However, in 2005, the there was no import of HCFC-123 for such use, in the Refrigeration and Air Conditioning Sector.

HCFC-141b

HCFC-141b is used as a blowing agent in the manufacture of rigid polyurethane foam for insulation of domestic, commercial, industrial and transport refrigeration equipment. One manufacturer of domestic refrigeration equipment (Whirlpool) used HCFC-141b as the blowing agent for the polyurethane foam insulation. All other manufacturers of domestic refrigerators have converted to hydrocarbons as a foam blowing agent.

In the commercial refrigeration sub-sector, most manufacturers are predominantly small and medium-sized enterprises and consequently use HCFC-141b as a blowing agent for the polyurethane foam. HCFC-141b is also used as a blowing agent for rigid polyurethane foam used for insulation applications in the industrial refrigeration (process cooling, cold stores) and transport refrigeration and air conditioning (insulation of trucks and buses) sub-sectors.

Table-12 shows the breakdown of consumption of HCFC-141b as a blowing agent for the polyurethane foam used as insulation in the Refrigeration and Air Conditioning Sector.

Table-12: HCFC-141b use in the Refrigeration and Air Conditioning Sector in 2005

Sub-sector	HCFC-141b Consumption (MT)
Domestic Refrigeration	585
Commercial Refrigeration	310
Industrial Refrigeration	105
Transport Refrigeration and Air Conditioning	50
Total	**1,050**

Excluding the consumption in the domestic refrigeration sub-sector for 2005, amounting to 585 metric tonnes, which was directly imported by the user(s), the remaining consumption of 465 metric tonnes, originates from two sources. Based on data available from users and upstream suppliers, it is estimated that in 2005, about 60% of this consumption (amounting to about 279 metric tonnes) originated from new and/or expanded capacity of HCFC-141b based production. The remaining consumption, (amounting to about 186 metric tonnes) is estimated at capacities covered by the Montreal Protocol assistance.

HCFC-22

HCFC-22 is the most widely used refrigerant in the Refrigeration and Air Conditioning Sector in India. In 2005, the total consumption of HCFC-22 was 6,640 metric tonnes in manufacturing of new equipment and 2,214 metric tonnes used in servicing of existing equipment.

In the Residential & Commercial Air Conditioning sub-sector, there are 6 major manufacturers accounting for about 75% of the total production and about 30-50 medium-sized manufacturers and several hundred unorganized and informal manufacturers (or assemblers) accounting for the remaining production.

In the Industrial Air Conditioning/Chillers sub-sector covering production of reciprocating, scroll and screw compressor-based chillers for central air conditioning applications there are about 8 major manufacturers and many small and medium-sized manufacturers.

In the Commercial Refrigeration sub-sector, which mainly manufactures high/medium temperature refrigeration equipment (display cabinets, beverage coolers, etc.) there are about 300 small and medium-sized manufacturers

In the Industrial Refrigeration (process chillers, cold stores, etc.) sub-sector manufacturing HCFC-22 based equipment serving process cooling/chilling applications for the food, chemical and pharmaceutical industries, there are about 20 main manufacturers and up to 50 small and medium-sized enterprises.

In the Transport Air Conditioning & Refrigeration sub-sector covering air conditioning and refrigeration systems for buses, trucks and truck cabs, vans, railway coaches, etc., there are about 15-20 major manufacturers and up to 100 small and medium-sized manufacturers.

None of the manufacturers of the HCFC-22 based equipment, as described above, have been assisted so far under the Montreal Protocol programme in India. Also none of the above, including consumption figures, covers HCFC-22 contained in any of the imported equipment in each of these sub-sectors.

Table-13 below provides estimated levels of the manufacturing of Refrigeration and Air Conditioning equipment for 2005, by application.

Table-13: Refrigeration and Air Conditioning Equipment Production in India in 2005

Sub-sector	Products	Production in 2005 (units)
Residential/Commercial Air Conditioning	Window units	900,000
	Split units	600,000
Industrial Air Conditioning/Chillers	Centrifugal	30
	Reciprocating	1,350
	Scroll	1,000
	Screw	180
Commercial Refrigeration	All	100,000
Industrial Refrigeration	All	1,320
Transport Air Conditioning/Refrigeration	All	1,500

All the applications/products mentioned above, use HCFC-22 as a primary refrigerant. Table-14 below shows the estimated consumption of HCFC-22 in 2005, in the manufacture of the various applications/ products, none of which was funded earlier by the Montreal Protocol assistance.

Table-14: HCFC-22 consumption in manufacturing of Refrigeration & Air Conditioning Equipment in 2005

Sub-sector	HCFC-22 Consumption (MT)
Residential/Commercial Air Conditioning	4,510
Industrial Air Conditioning/Chillers	470
Commercial Refrigeration	790
Industrial Refrigeration	480
Transport Air Conditioning/Refrigeration	390
Total	**6,640**

2.3.5 Solvent Sector

In 2005, about 17 metric tonnes of HCFC-123 and HCFC-124 were used for metal cleaning applications. There were trace quantities of HCFC-141b also used for cleaning of electronic parts.

2.3.6 Feedstock Applications

India has indigenous production of PTFE/Teflon, for which about 909 metric tonnes of HCFC-22 was used as feedstock in 2005. This quantity, however, being not controlled under the Montreal Protocol, is not included in the HCFC-22 production, export and consumption figures discussed earlier.

2.3.7 Summary and Conclusions

In India, the main HCFCs in use are HCFC-141b, HCFC-22 and to a smaller extent, HCFC-123, used in the Aerosols, Foams and Refrigeration & Air Conditioning Sectors. Table-15 below shows the summary of the consumption of these substances in various sectors/sub-sectors.

It may be noted that the consumption figures for HCFC-22, HCFC-141b and HCFC-123 mentioned above, do not include quantities imported as a part of products, e.g., pre-charged refrigeration and air conditioning systems, imported pre-blended polyols, etc. and also do not include quantities produced/ sold for feedstock uses.

Table-15: Summary of HCFC Consumption in India in 2005

Sector	Sub-sector	HCFC Consumption (metric tonnes)			
		HCFC-22	HCFC-141b	HCFC-123	Total
MANUFACTURING					
Aerosols	Industrial applications		71		71
Foams	Rigid Polyurethane Foam	---	963	---	963
	Integral Skin PU Foam	---	72	---	72
	Domestic Refrigeration	---	585	---	585
Refrigeration and Air Conditioning	Residential/Commercial AC	4,510	---	---	4,510
	Industrial Air Conditioning	470	---	---	470
	Commercial Refrigeration	790	310	---	1,100
	Industrial Refrigeration	480	105	---	585
	Transport Ref & AC	390	50	---	440
Solvents	Metal cleaning	---	---	17	---
Total (Manufacturing)		**6,640**	**2,156**	**---**	**8,796**
SERVICING					
Refrigeration & Air Conditioning	All	2,214	---	---	2,214
Total (Servicing)		**2,214**	**---**	**---**	**2,214**
GRAND TOTAL		**8,854**	**2,156**	**17**	**11,027**

3. ANALYSIS

3.1 DEMAND FORECASTS

3.1.1 Factors affecting demand

The consumption of HCFCs in India is predominantly in the Aerosols, Foams, Refrigeration & Air Conditioning and Solvents Sectors, which primarily manufacture consumer, commercial and industrial products. The demand for HCFCs in India is expected to grow significantly in the next decade due to the following developments:

- ❏ Progressive liberalization in economic policies
- ❏ Expansion of commercial and industrial activities due to sustained economic growth
- ❏ Burgeoning middle class and increasing per capita incomes
- ❏ Expansion of rural electrification and other infrastructures and growth of urban and suburban areas
- ❏ Increased penetration of consumer, commercial and industrial products

3.1.2 Projected growth rates

Table-16 shows the expected annual growth rates in demand for the various HCFC consuming sectors/ sub-sectors from 2007 to 2015. These projected growth rates are guided by growth rates recorded in previous years, estimates provided by end-users, suppliers and industry associations and projected macro-economic growth rates (GDP) for the next decade.

Table-16: Expected growth rates in HCFC consumption in various sectors

Sector	Sub-sector	Projected Annual Growth in Consumption (%)	
		2006-2010	2011-2015
MANUFACTURING			
Aerosols	Industrial applications	10	10
Foams	Rigid PU Foam	15	10
	Integral Skin PU Foam	10	10
Refrigeration and Air Conditioning	Domestic Refrigeration	10	10
	Residential/Commercial AC	15	10
	Industrial Air Conditioning	10	10
	Commercial Refrigeration	15	10
	Industrial Refrigeration	10	10
	Transport Ref & AC	10	10
Solvents	Metal cleaning	10	10
SERVICING			
Refrigeration & Air Conditioning	All	10	15

3.1.3 Unconstrained demand scenario

Based on the projected growth in demand tabulated in Table-16 above, the projected consumption figures for each sector/sub-sector and substance are worked out applying compounded annual growth rates mentioned therein.

The projected consumption figures by sector and substance for 2010 and 2015 when no interventions are made and the demand is allowed to grow without constraints are shown in Table-17 below.

Table-17: Projected unconstrained demand for HCFCs in 2010 and 2015

Sector	Sub-sector	Projected HCFC Demand (metric tonnes)					
		2010			2015		
		141b	22	123	141b	22	123
MANUFACTURING							
Aerosols	Industrial applications	114	---	---	184	---	---
Foams	Rigid PU Foam	1,937	---	---	3,120	---	---
	Integral Skin PU Foam	116	---	---	187	---	---
Refrigeration and Air Conditioning	Domestic Refrigeration	942	---	---	1,517	---	---
	Residential/Commercial AC	---	9,071	---	---	14,609	---
	Industrial Air Conditioning	---	757	---	---	1,219	---
	Commercial Refrigeration	624	1,589	---	1,005	2,559	---
	Industrial Refrigeration	169	773	---	272	1,245	---
	Transport Ref & AC	81	628	---	131	1,011	---
Solvents	Metal cleaning	---	---	27	---	---	44
SERVICING							
Refrigeration & Air Conditioning	All	---	3,566	---	---	7,173	---
GRAND TOTAL		**3,983**	**12,818**	**27**	**6,416**	**20,643**	**44**

Table-18 below shows the projected unconstrained demand by substance in 2010 and 2015.

Table-18: Projected unconstrained demand by substance in 2010 and 2015

Substance	Projected unconstrained demand			
	2010		2015	
	(metric tonnes)	(ODP tonnes)	(metric tonnes)	(ODP tonnes)
HCFC-141b	3,983	438.13	6,416	705.76
HCFC-22	12,818	640.90	20,643	1,032.15
HCFC-123	27	0.41	44	0.66
Total	**16,828**	**1,079.44**	**27,103**	**1,738.57**

3.2 AVAILABILITY SCENARIOS AND PRICES

3.2.1 Availability Scenarios

India has indigenous production capacity for HCFC-22. The total installed production capacity at all four producers in India is estimated at about 42,000 metric tonnes annually, when adjusted for HCFC-22 production, since these are swing plants capable of producing both CFCs and HCFC-22.

As shown in Tables 17 and 18, unconstrained demand for HCFC-22 is expected to reach 12,818 metric tonnes in 2010 and 20,643 metric tonnes in 2015, by conservative estimates. In 2005, the total production of HCFC-22 in India was 24,789 metric tonnes, which includes 909 metric tonnes for feedstock use. The existing plants are swing plants, which also produce CFCs (11,446 metric tonnes of CFC-11 and CFC-12 combined in 2005). By 2010, the CFC production would be discontinued and the capacity currently used for production of CFCs would become available for producing HCFC-22.

In light of the above, no constraints on availability are foreseen for HCFC-22, to meet the unconstrained demand of 20,643 metric tonnes by 2015.

For HCFC-141b or HCFC-123, there is no indigenous manufacturing capacity in India presently. Based on the current regulations governing HCFC-141b production and exports in major non-Article-5 countries as well as China, and based on observations in the TEAP HCFC Task Force Report, availability of HCFC-141b in 2015 will not be constrained. Given that the unconstrained demand in India for HCFC-141b in 2015 is projected at 6,416 metric tonnes, it does not seem likely that there would a pressure on supply of HCFC-141b to meet this demand.

3.2.2 Price Trends

The current average retail market price in India for HCFC-22 is about US$ 8.00/kg and for HCFC-141b is about US$ 3.10/kg, excluding sales tax, but including excise and import duties, which amount to 16% to 38% of the basic price. Adjusted for an average annual inflation rate of about 5%, in 2015 these prices would reach about US$ 13.50/kg for HCFC-22 and US$ 5.10/kg for HCFC-141b.

3.3 TECHNOLOGY

The general factors affecting the selection of alternatives to HCFCs are as below:

- ❏ Suitable thermophysical properties
- ❏ Proven performance
- ❏ Acceptable processing characteristics
- ❏ Economic and convenient availability
- ❏ Environmental and occupational safety

In addition to zero ODP, it is preferable that the alternatives either have low GWP and/or sufficiently higher energy efficiency to compensate for the higher GWP.

3.3.1 Replacements for HCFC-141b

HCFC-141b is used predominantly as a blowing agent for polyurethane foam, in which rigid foam insulation is the main application. It is also used as a propellant in aerosols.

Aerosol Sector

For replacing HCFC-141b use in non-medical aerosols, HFCs (134a, 152a, 227ea) as well as hydrocarbons (where flammability is not a concern) are the commercially available alternative propellant technologies.

Foam Sector

In **rigid polyurethane foams**, comparison of properties of major currently available alternative blowing agents to HCFC-141b is shown in Table-19 below:

Table-19: Comparison of Zero-ODP alternatives to HCFC-141b in rigid polyurethane foam

Parameter	HCFC-141b	Cyclopentane	HFC-134a	HFC-245fa	HFC-365mfc
Boiling Point (oC)	32	49	-26.5	15.3	40.2
ODP	0.11	0	0	0	0
GWP	630	11	1,300	820	840
VOC	No	Yes	No	No	No
Conductivity (W/m-K)	9.70	12.00	13.6	12.2	10.6
Flash point (oC)	None	-37	None	None	-25
Flammability (% volume)	7.4 - 15.5	1.5 - 8.7	None	None	3.5 - 13.0

HFC-245fa and HFC-365mfc have been commercially introduced in the last few years in US and other developed countries and their performance has been largely established, however their prices are still high and availability is not wide. Their application may involve some changes to existing processing equipment. Since HFC-365mfc is flammable, safety issues need to be addressed.

Pentane isomers including Cyclopentane are in commercial use, however, due to their flammability, their use is limited to high-volume applications in organized sectors, where additional challenges and costs for safety can be more effectively managed.

HFC-134a is not popularly applied in rigid polyurethane foams, where thermal conductivity is a critical property, due to its relatively lower insulation performance and also its poor miscibility with polyols.

Recent commercial introduction of additional organic chemicals (Methylal, Methyl Formate) as blowing agents for in rigid polyurethane foam systems has generated interest. While field validation of these technologies continues, safety issues resulting from their flammability need to be addressed.

In **integral skin polyurethane foams**, alternatives to HCFC-141b include water/CO2 blown systems, as well as HFC-134a, both of which have been commercially applied for the last few years.

3.3.2 Replacements for HCFC-22

HCFC-22 is primarily used as a refrigerant in refrigeration and air conditioning systems.

In general, pure fluid alternatives are preferred, as they tend to provide stable and predictable performance, more efficient heat transfer, avoid temperature glides in the evaporator and have relatively less issues from leakage. On the other hand, blends can be better optimized for performance, but are accompanied by less efficient heat transfer, evaporator temperature glide and leakage issues.

New Equipment

Table-20 below shows available alternative technologies to HCFC-22 for new equipment.

Table-20: Select Zero-ODP Alternative Technologies to HCFC-22 in New Equipment

Substance	GWP	Application	Remark
Hydrocarbons	0	Small-capacity domestic and commercial refrigeration equipment	Flammability issues
Ammonia	0	Industrial refrigeration and process chillers	Flammability and toxicity issues
CO_2	0	Supermarket refrigeration in a secondary loop and in stationary and mobile air conditioning systems	Major redesign of system components needed.
HFC-134a	1,300	Domestic and commercial refrigeration, medium temperature applications	Not efficient in low-temperature systems. Needs synthetic lubricants
R-407C	1,520	Most applications	Properties closely match R22 Temperature glide, synthetic lubricants needed, slightly less efficient than R22
R-410A	1,710	Most applications	Higher pressures, better cooling capacity, low temperature glide, high GWP, synthetic lubricants needed
R-404A	3,260	Low temperature applications	High GWP, less efficient at medium temperatures, synthetic lubricants needed

Existing Equipment

For replacement of HCFC-22 in existing systems, the main considerations are compatibility with the lubricant, performance and ease of retrofitting. Table-21 below shows the available technologies for replacing HCFC-22 in existing systems as drop-in replacements:

Table-21: Select Zero-ODP Alternative Technologies to HCFC-22 in Existing Equipment

Substance	GWP	Application	Remark
Hydrocarbons	0	Small-capacity commercial refrigeration equipment	Flammability issues
R-417A	1,950	Residential and commercial air conditioning and commercial refrigeration	Slightly less efficient than R22, High temperature glide, high GWP, compatible with mineral oil
R-422D	2,290	Low and medium temperature commercial refrigeration, water chillers	About 5% less cooling capacity, lower discharge temperature and comparable efficiency with R22, high GWP, compatible with mineral oil
R-424A (RS-44)	NA	Most applications	Comparable performance to R22, compatible with mineral oil, lower discharge temperatures than R22

Most of the blends described have been recently introduced in the past 1-4 years. While being commercially available, their prices are still quite high and supplies are not predictable at present. It is expected that the prices and availability would improve as the demand for HCFC-22 replacements gathers more momentum.

3.4 ENVIRONMENTAL IMPACT

3.4.1 Ozone Depletion

Based on the projected unconstrained demand for HCFCs in India, as described in section 3.1.3, the impact of their consumption on ozone depletion is shown in Table-22 below:

Table-22: Ozone Depletion Impact of HCFC consumption in India

Substance/Impact	HCFC-123	HCFC-141b	HCFC-22
ODP	0.015	0.11	0.05
Projected Consumption in 2010 (metric tonnes)	27	3,983	12,818
Impact in 2010 (ODP tonnes)	**0.41**	**438.13**	**640.90**
Projected Consumption in 2015 (metric tonnes)	44	6,416	20,643
Impact in 2015 (ODP tonnes)	**0.66**	**705.76**	**1,032.15**

3.4.2 Global Warming

The overall global warming impact of the projected unconstrained HCFC consumption in India in 2010 and 2015 is difficult to estimate, considering that energy efficiency, leakage, atmospheric lifetime and other factors external to the use of these substances strongly influence the overall global warming impact. Moreover, direct emissions of these substances, which would actually contribute to global warming, are also difficult to estimate.

Based on the respective global warming potentials of the three predominant HCFCs, the impact on global warming of the projected unconstrained HCFC consumption in India for 2010 and 2015 is shown in Table-23 below:

Table-22: Global Warming Impact of HCFC consumption in India

Substance/Impact	HCFC-123	HCFC-141b	HCFC-22
GWP	76	720	1,780
Projected Consumption in 2010 (metric tonnes)	27	3,983	12,818
Impact in 2010 (tonnes per tonne CO_2)	**2,052**	**2,867,760**	**22,816,040**
Projected Consumption in 2015 (metric tonnes)	44	6,416	20,643
Impact in 2015 (tonnes per tonne CO_2)	**3,344**	**4,619,520**	**36,744,540**

3.5 COMPLIANCE CHALLENGES AND OPPORTUNITIES

3.5.1 Availability and Prices of HCFCs

For HCFC-22, as discussed in Section 3.2.1, the existing production capacity in India of about 42,000 metric tonnes for HCFC-22, is adequate to meet the projected unconstrained demand of 20,643 metric tonnes by 2015.

For HCFC-141b, based on projected availability quoted from other sources (TEAP HCFC Task Force Report and others), the projected unconstrained demand in India of 6,416 metric tonnes by 2015, would be met.

For HCFC-123/124 the consumption projected for 2015 is quite small.

Considering the above, there appears that it would not be a major challenge to meet the projected unconstrained demand for HCFCs in India by 2015.

The current domestic street prices for HCFCs in India, especially for HCFC-22, are quite high as compared to other markets due to higher taxes, thus proving the inelasticity of demand and therefore modulating the demand through further taxes or levies would have only a limited effect.

In accordance with the control schedule of the Montreal Protocol applicable to Article-5 parties, the consumption of HCFCs has to be frozen at the 2015 levels, from 01 January 2016. Thus, the critical challenge in meeting this control milestone effective from 01 January 2016 is the relatively comfortable availability of HCFCs to meet the growing demand.

3.5.2 Regulations

India has one of the most proactive and progressive regulatory frameworks for controlled substances under the Montreal Protocol, including HCFCs.

The key regulations in India governing HCFCs, which came into effect from 2000 and which are being enforced vigorously, are as below:

- ❏ Import of HCFCs is restricted (subject to licensing)
- ❏ Import of HCFCs from non-Parties to the Montreal Protocol is prohibited
- ❏ Import of equipment containing HCFCs is restricted (subject to licensing)
- ❏ Installation of new capacity to manufacture HCFCs is prohibited
- ❏ Expansion of existing capacity to manufacture HCFCs is prohibited
- ❏ Distribution, sale, purchase and all other uses of HCFCs are subjected to registration and reporting

Thus it is seen that Government of India has gone a long way towards effectively controlling HCFC production and consumption in India. Table-23 below shows the current regulations governing HCFCs in major non-Article-5 parties:

Table-23: Summary of HCFC Regulations in major non-Article-5 parties

Country	Substance	Year	Regulation/Remarks
Australia	HCFCs	2007	Does not manufacture HCFCs. Maximum imports 130 ODP tonnes in 2007. (In 2005, 8 licenses for HCFCs and 592 licenses for products containing HCFCs were issued)
Canada	HCFC-141b HCFC-142b HCFC-22	2010	Zero production/imports for equipment
	All HCFCs	2020	Zero production/imports for equipment
		2030	Complete phase-out
European Union	HCFCs (Foams)	2004	Complete phase-out
	HCFCs (RAC)	2004	Zero production/import for equipment
		2010	Zero service with virgin HCFCs
		2015	Zero service with all HCFCs
	All HCFCs	2010	Complete phase-out in consumption
		2025	Zero production
Japan	HCFC-141b	2004	Complete phase-out
	HCFC-22/142b	2010	Complete phase-out for equipment
	HCFC-22	2020	Complete phase-out
United States	HCFC-141b	2003	Zero production/import
	HCFC-22/142b	2010	Zero production/import for equipment
		2020	Complete phase-out
	All HCFCs	2015	Zero production/import for equipment
		2030	Complete phase-out

Comparing regulations in non-Article-5 countries from the above table, it is seen that the regulations on production/consumption of HCFCs in India (described in section 3.5.2) are progressive. The capacities for HCFC production levels have been effectively curtailed since 2000 and many controls on HCFC consumption are also in place. Thus, there appears to be limited scope of more stringent regulations governing HCFC use, which constitutes another challenge for meeting the 2016 freeze in consumption.

3.5.2 Availability and Prices of Substitutes

As noted in Section 3.3, most of the substitutes for HCFCs have been or are being developed recently

and in tandem with evolving regulations on HCFCs in non-Article-5 parties. In most Article-5 countries including India, the dissemination of these new technologies has been either non-existent or extremely limited.

The availability of substitutes for HCFCs discussed section 3.3 in India is limited or non-existent. Based on current publicly available information, the bulk international prices of most substitutes are in the region of US$ 9.00 - US$ 12.00 per kg or more.

Technologies needed for converting production facilities from HCFCs to substitutes are not widely available, although limited technical information on most substitutes is published by the manufacturers of these substitutes.

Thus, prices, availability, technology and information/awareness are factors which presently are unfavorable to wider adoption of substitute technologies. This constitutes another major challenge for reducing demand for HCFCs and thereby compliance with the 2016 freeze.

3.6 POTENTIAL ACTIONS FOR COMPLIANCE

The potential interventions that would assist in meeting with the next control milestone for HCFC use, i.e., the freeze in consumption at 2015 levels by 2016, are as below:

- ❏ Preparation at the earliest, of a strategy and action plan for compliance with the freeze in HCFC consumption from 2016 and progressive reductions thereafter. Such a strategy and action plan could include and prioritize:
    - Identification of sectors and applications where HCFC demand can be reduced on a priority basis, by implementing technology conversions, best practices, conservation, etc. For example in the Foams Sector in India, where HCFC-141b consumption would reach 6,416 metric tonnes by 2015, could be addressed for reducing HCFC-141b demand by adopting available promising and proven substitute technologies, such as HFC-245fa, Hydrocarbons, etc. Also in the Refrigeration and Air Conditioning Servicing Sector, existing infrastructures created for reducing CFC demand could be appropriately supplemented for reducing HCFC demand, through additional equipment inputs and investments, technical assistance, training, capacity-building, etc. In addition, drop-in substitutes could be employed to reduce HCFC demand at end-users installations.
    - Intensive awareness programmes incorporating compliance obligations, information dissemination on alternative technologies, networking and information exchange and technical assistance, would be needed to sensitize stakeholders on the importance of taking early actions that would ensure compliance
- ❏ In conjunction with the above, potential regulatory interventions, such as restriction on installation of new capacities or expansion of existing capacities for manufacturing of HCFC-based products, could be considered.

However, these interventions would need technical and financial assistance for meeting their incremental costs and the net costs to the economy. In addition, in line with the national priorities and guiding principles outlined in India's Country Programme and its update, such interventions need to be designed in such a way as to minimize industrial dislocation and obsolescence, maximize indigenization of technologies and minimize the economic impact to the consumers and industry.

3.7 SUMMARY AND CONCLUSIONS

HCFC-141b, HCFC-22 and HCFC-123 are the predominant HCFCs used in India, in the Aerosols, Foams, Refrigeration & Air Conditioning and Solvent Sectors.

HCFC-22 is produced in India, while other HCFCs are imported. The total capacity available for producing HCFC-22 from 2010 onwards would be about 42,000 metric tonnes.

In 2005, the consumption of HCFC-123, HCFC-141b and HCFC-22 was respectively 17 metric tonnes, 2,156 metric tonnes and 8,854 metric tonnes, amounting to a total of 11,027 metric tonnes.

Projected unconstrained demand by 2015 for HCFC-123, HCFC-141b and HCFC-22 is expected to reach 44 metric tonnes, 6,416 metric tonnes and 20,643 metric tonnes respectively, amounting to a total of 27,103 metric tonnes, potentially leading to notable environmental impacts on ozone depletion and global warming.

The numbers of enterprises currently consuming HCFCs in various HCFC-consuming sectors in India are tabulated below:

Sector	Sub-sector	Estimated number of enterprises
MANUFACTURING		
Aerosols	Industrial applications	10
Foams	Systems houses	10
	Rigid PU Foam	450
	Integral Skin PU Foam	40
Refrigeration and Air Conditioning	Domestic Refrigeration	2
	Residential/Commercial AC	500
	Industrial Air Conditioning	100
	Commercial Refrigeration	350
	Industrial Refrigeration	70
	Transport Ref & AC	120
Solvents	Metal/electronic cleaning	50
SERVICING		
Refrigeration and Air Conditioning	All	Over 20,000

Note: The numbers and data provided in the table are a result of a limited survey of various sectors related to HCFCs the primary aim of which was to generate information that would enable the ExCom to establish a permanent aggregate level of consumption against which future activities could be funded. The numbers and data in this table are therefore ***indicative only and not binding***. The numbers/ data may be revised in future as a result of more detailed sector-level information becoming available. The numbers/data may not be used without the prior consent of the Government.

The most significant opportunity for compliance with the 2016 freeze in consumption of HCFCs is the robust and forward looking regulatory framework on controlled substances instituted by Government of India. The most significant challenges for meeting the 2016 freeze include the comfortable availability of HCFCs, high cost and unpredictable availability of mature and proven substitutes, access to technology and funding for meeting the incremental costs of conversion and inadequate levels of awareness, capacity and training.

Potential actions for compliance include early interventions to reduce demand for HCFCs and to establish frameworks for sustaining these reductions.

ANNEXURE-III

REPORT OF THE

STAKEHOLDER CONSULTATION WORKSHOP ON INDIA'S HPMP

June 2008

INDIA - HPMP PREPARATION

HCFC STAKEHOLDER CONSULTATION WORKSHOP, JUNE 2008
Summary of Outcomes and Recommendations

1. Technology

- ❏ Alternatives to HCFCs need to account for their impact on climate
- ❏ Development of HCFC alternatives indigenously or in cooperation with other A5 countries needs to be promoted
- ❏ Need to consider alternative technology choices based on environmental considerations, but also from a trade perspective due to concurrent regulatory framework in other countries
- ❏ Awareness of HCFC alternatives, especially low GWP options, knowledge needs to be compiled and intensely disseminated
- ❏ Alternative technology choices need to be made early and considering overall sustainability
- ❏ Standards for alternatives to HCFCs, particularly the low or zero-GWP alternatives, need to be introduced
- ❏ Demonstration projects for HCFC alternatives are needed

2. Industry Baseline and Response

- ❏ The HCFC Survey (2005-2007) data needs to be updated through intensive data collection and analysis
- ❏ Identification of all HCFC uses needs to carried out (such as HCFC-123 in chillers, HCFC-22/142b for XPS/XPE in foams and in pharmaceutical process agent applications)
- ❏ Growth rates for HCFC-22 use in air conditioning appliance manufacturing, needs to be predicted more accurately until 2010/2013.
- ❏ Special needs/challenges of SMEs and unorganized enterprises to be taken into account
- ❏ About 90% of HCFC-based residential air conditioning appliances use (imported) rotary compressors, rest use indigenous reciprocating compressors
- ❏ Production Sector: HCFC production capacity has been frozen since 2000, further reductions are contingent upon adequate funding

3. Prioritization of Activities and HPMP

- ❏ Adapt existing structures and/or institute new structures for HPMP as needed, with flexibility

- ❏ Prioritization oof activities needed, which ensures compliance with 2013/2015 targets
- ❏ Sectoral prioritization is needed, because a single sector or sub-sector may not provide all the required reduction opportunities for compliance
- ❏ Industry needs to be proactive in identifying alternatives and taking actions for reducing HCFC use
- ❏ In the Servicing Sector, reduction of leakage/emissions and use of drop-in replacements for HCFCs to be promoted
- ❏ Determination of policy/capacity building and industry level interactions
- ❏ Intensive dissemination of information on recent MP adjustments due to low level of awareness
- ❏ Time available for actions for compliance is very limited, net 3-4 years, so early actions are called for
- ❏ Submission date for HPMP (2009) – whether July or November – needs to be determined
- ❏ Highlight linkages between production and consumption sectors
- ❏ Policy options for reducing demand/dependence on HCFCs need to be highlighted
- ❏ Undefined parameters, such as cut-off date for eligibility, second conversions, etc needed
- ❏ Clarity on submission of individual projects, sector plans needed
- ❏ Production Sector proposal to be separately submitted and negotiated

STAKEHOLDERS CONSULTATION WORKSHOP FOR INDIA'S HCFC PHASE-OUT MANAGEMENT PLAN

04 June 2008, 11.00 am to 5.30 pm at
Casuarina Hall, Convention Centre, India Habitat Centre
Lodhi Road, New Delhi 110003

AGENDA

TIME		ACTIVITY/TOPIC	BY
From	**To**		
10.30 am	11.00 am	Registration	
Inaugural Session			
11.00 am	11.05 am	Welcome Address	Joint Secretary, MOEF
11.05 am	11.15 am	Introductory Remarks	Addl. Secretary, MOEF
Panel Discussion-I: Accelerated HCFC Phase-out (Moderated by Shri. Madhava Sarma, Participants: Implementing/Bilateral Agencies)			
11.15 am	11.30 am	*Recent MEETING OF THE PARTIES and ExCom Decisions related to HCFCs*	*Director, Ozone Cell*
11.30 am	11.45 pm	*Presentation on India's HCFC Survey*	*UNDP*
11.45 pm	12.10 pm	*Sectoral challenges (5 min for each agency)*	*Implementing/Bilateral Agencies*
12.10 pm	12.45 pm	*Discussion and Q&A*	*All Participants*
Panel Discussion – II; Industry Perspectives and Responses (Moderated by Prof. R. S. Agarwal, Participants: Industry Associations			
12.45 pm	1.10 pm	Remarks/presentations by representatives of Industry Associations	Industry associations (5 min each)
1.10 pm	1.30 pm	Discussions on industry challenges and Q&A	Participants
Lunch Break			
Panel Discussion-III: Approaches for Compliance with HCFC Control Targets (Moderated by: Shri. Madhava Sarma, Participants: Implementing Agencies, Industry Associations)			
2.30 pm	2.45 pm	HCFC phase-out targets by sector and prioritization proposals	Director, Ozone Cell
2.45 pm	3.00 pm	Approach for HPMPs (Institutional and other arrangements)	UNDP
3.45 pm	4.15 pm	Discussions and Q&A	Participants
Tea/Coffee Break			
4.45 pm	5.10 pm	Summary of outcomes of discussions and recommendations	Ozone Cell
5.10 pm	5.20 pm	Concluding remarks	Addl. Secretary, MOEF
5.20 pm	5.30 pm	Vote of thanks and closure of meeting	Director, Ozone Cell

INDIA - HPMP PREPARATION
STAKEHOLDER CONSULTATION WORKSHOP, JUNE 2008, NEW DELHI

INDIA'S HCFC REDUCTION CHALLENGES – INDUSTRY INPUTS
(For complying with 2013/2015 targets)

Industry Responses (General)

1. The HCFC survey (2005 base) data needs to be updated and may not have captured all sources of consumption.
2. All HCFCs (such as HCFC-123, HCFC-22/HCFC-142b for XPS and pharmaceutical process agent applications, etc) should be accounted for.
3. Imports of products/appliances containing HCFCs signify about 10-20% and will add a servicing sector consumption implication.
4. Information on the recent adjustments to the MP need to be disseminated, as awareness about those is very limited.

Industry Association: Production – Refrigeration and Air Conditioning Manufacturers Association (REGMA)

5. HCFC production capacity in India has been frozen as of 2000.
6. The new MP adjustments though agreed upon are subject to commensurate funding.
7. Strong recommendation to submit and negotiate any production sector funding proposal in context of HPMP, separately from any other proposal.

Industry Associations (Consumption)

Refrigeration and Air-Conditioning Manufacturers Association (RAMA)

8. The growth rates for HCFC-22 based appliances are expected to be much higher than those assumed in the survey (~ 20-25% annually).
9. Alternative HFC-based technologies are available, but high technology transfer cost is involved. Also increased costs for components, training, etc. are involved.
10. About 90% of HCFC-22-based residential air conditioning units use rotary compressors and rest use indigenous reciprocating compressors.

All India Air-conditioning & Refrigeration Association (AIACRA)

11. Commercial issues (prices of HCFCs, regulations on imports, etc)

Indian Polyurethane Association (IPUA)

12. The foam sector consumption figures appear to be realistic and alternatives are available.

Technical Issues

13. Absence of standards for non-GHG alternatives

14. Indigenous development of HCFC alternatives or development in cooperation with other A5 countries needs to be promoted.

15. Demonstration projects for non-HFC technologies needed

16. Awareness of non-HFC technology alternatives is very limited and knowledge on them needs to be compiled and disseminated

17. Sectoral prioritization is necessary, because any single sector/sub-sector or substance may not provide the necessary reduction opportunities to comply with the 2013/2015 targets.

INDIA - HPMP PREPARATION
STAKEHOLDERS CONSULTATION WORKSHOP, JUNE 2008

Outcomes of the Interagency Meeting held on 03 June 2008
(Preceding the India Stakeholders Consultation Meeting for HPMP Preparation)

1. On the HPMP preparation approach document by UNDP

- ❏ Propose a flexible institutional structure considering that three different "models" of operating project management units simultaneously exist in India
- ❏ Priority setting for various actions
- ❏ Determination of policy/capacity-building and industry-level interactions
- ❏ Share information on the climate agenda

2. On HPMP Preparation:

- ❏ Submission date of July 2009 is ambitious
- ❏ Use the preparation process to increase awareness
- ❏ Linkage between production and consumption should be highlighted
- ❏ Multinational companies with respect to prospective funding
- ❏ Prioritize activities for phase-out/compliance
- ❏ Policy options to be highlighted (to reduce demand/dependence and control growth)
- ❏ Undefined parameters such as cut-off date for eligibility, second conversions, etc. will affect preparation of HPMP
- ❏ Additional data collection needed to comply with levels of details/confidence on data demanded by 54/39
- ❏ Clarity on submission of individual projects, sub-sector/sector-wide/umbrella projects.
- ❏ Implications for the Production Sector – will need to reduce production for compliance

HCFC STAKEHOLDER CONSULTATION WORKSHOP IN INDIA

AGENDA FOR INTER-AGENCY MEETING ON 03 JUNE 2008

The Ozone Cell, Ministry of Environment and Forests has organized a stakeholder consultation meeting on 04 June 2008, for coordination and for developing an approach and roadmap for preparation and subsequent implementation of India's HPMP. To facilitate appropriate and coordinated inputs to Government of India, an inter-agency meeting has been arranged, back-to-back with this meeting.

Date: **Tuesday, 03 June 2008**

Time: 10.00 am to 5.30 pm

Venue: CDC Conference Room
Ozone Cell, 2nd Floor, Core-4B
India Habitat Centre
Lodhi Road
New Delhi 110003

Participants: Representatives of implementing/bilateral agencies (UNDP, UNEP, UNIDO, World Bank and Germany) from 10.00 am to 5.30 pm

Representatives of the following industry associations are invited to join the meeting from 3.00 pm until 5.30 pm:

- All India Air Conditioning & Refrigeration Association (AIACRA)
- Confederation of Indian Industry (CII)
- Indian Chemical Council (ICC)
- Indian Polyurethane Association (IPA)
- Indian Society for Heating, Refrigerating & Air Conditioning Engineers (ISHRAE)
- Refrigeration & Air Conditioning Manufacturers Association (RAMA)
- Refrigerant Gas Manufacturers Association (REGMA)

Agenda:

10.00 am	Introduction by (UNDP)
10.10 am	Proposed approach for HPMPs in India (UNDP presentation)
10.30 am	Compliance with 2013 and 2015 HCFC consumption/production limits
10.45 am	Modalities, priorities, proposed institutional arrangements and roles and responsibilities of stakeholders
12.45 pm	Agency recommendations for the Stakeholder Consultation Meeting
1.15 pm	Lunch break
3.00 pm	***Representatives of industry associations join the meeting to provide industry perspectives.***
	Introduction on compliance with 2013 and 2015 HCFC consumption/production limits
3.15 pm	Discussions
5.00 pm	Draft conclusions and recommendations on priorities, approach and roadmap for HPMP in India
5.30 pm	Closure of the meeting

INDIA

HCFC PHASE-OUT MANAGEMENT PLAN
(First Stage – For compliance with 2013 and 2015 targets)

CONCEPT NOTE ON THE PROPOSED APPROACH FOR PREPARATION

PREPARED BY

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

May 2008

HCFC PHASE-OUT MANAGEMENT PLAN FOR INDIA (FIRST STAGE)

CONCEPT NOTE ON THE PROPOSED APPROACH

1. INTRODUCTION

This document describes the proposed approach for preparation (and subsequent implementation) of the HPMP for India. Such an approach would need:

a) To reflect national context and priorities, national policies and country-drivenness and consequently would need the agreement of the MOEF to the proposals contained herein;

b) To facilitate seamless transition from preparation to the subsequent implementation stage of the HPMP, once it is approved;

c) To draw upon the lessons learnt from functioning of institutional arrangements and operational mechanisms employed for CFC phase-out plans and to the extent possible integrate existing infrastructures;

d) To be dynamic and evolving, and to be open for revisions and adaptation as necessary in response to evolving situations.

2. BACKGROUND

The Nineteenth Meeting of the Parties to the Montreal Protocol in September 2007, through its Decision XIX/6, adopted an accelerated phase-out schedule for HCFCs. The first control is the freeze on production and consumption of HCFCs would be from 01 January 2013, at the Baseline Levels (average of 2009 and 2010). The second control step is the reduction of 10% from the Baseline Levels. The decision also directed the Executive Committee of the Multilateral Fund to assist the Article-5 Parties in preparation of HPMPs.

The 54th Meeting of the Executive Committee in April 2008, through Decision 54/39, adopted guidelines for preparation of HPMPs. These guidelines provide indicative outline and contents of the HPMPs, which are essentially based on earlier guidelines developed and followed for CFC phase-out plans (RMPs/TPMPs/SPPs/NPPs). The decision has the following key elements:

a) Adoption of a staged approach to implementation of the HPMPs within the context of an overall national strategy. The first stage would focus on compliance with the 2013 freeze and 2015 reduction targets. The second stage would focus on HCFC phase-out in compliance with the future reduction control targets.

b) Commitments to achieving the 2013 and 2015 control milestones through performance-based agreements

c) In countries where there are multiple implementing agencies, a lead agency should be designated to coordinate the overall development of the HCFC phase-out management plans

3. ROLES AND RESPONSIBILITIES OF STAKEHOLDERS

This section outlines the roles and responsibilities of respective stakeholders in the activities involved in the preparation of the HPMP.

3.1 Ministry of Environment & Forests

The Ministry of Environment & Forests is the nodal agency in the administrative structure of Government of India, for planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. The Ministry carries out its tasks through a number of Divisions, Directorates, Boards, Subordinate offices, Autonomous institutions and Public Sector undertakings.

The functions and responsibilities of the Ministry of Environment & Forests as the designated national authority for the Montreal Protocol, include notification of regulations pertaining to the Montreal Protocol, issues related to international cooperation, maintaining and managing data on production, imports, exports and consumption of ODS, monitoring of implementation of Montreal Protocol activities, interacting with other line ministries on technical and financial matters pertaining to implementation of activities, liaising with scientific, technical and other public institutions for technical matters, representing India at various multilateral meetings and discussions, etc.

The Ministry has established a special Empowered Steering Committee, chaired by the Secretary, MOEF, for coordination at the national level for meeting India's obligations under the Montreal Protocol. The Empowered Steering Committee comprises of representatives of several other ministries supported by three standing committees:

- ❏ Technology and Finance Standing Committee: For providing policy and technical guidance, direction and oversight to the overall Montreal Protocol programme.
- ❏ Standing Committee for Monitoring: Entrusted with the task of advising on and monitoring of implementation.

3.2 Ozone Cell

The Ministry of Environment & Forests has established a special directorate (Ozone Cell) within the Ministry, dedicated to managing and coordinating the implementation of Montreal Protocol activities in India. The Ozone Cell functions as the focal point for day-to-day management of ODS phase-out projects and activities. The Ozone Cell is supported in its work through three project management units, one for coordination of activities related to the phase-out of CFC production, one for the phase-out of CTC and the third for the phase-out of CFCs in the main ODS consuming sectors (the Sector Phase-out Plan Unit or SPPU).

3.3 Lead Implementing Agency and Cooperating Agencies for HPMP

The allocation of sectors/activities covered by the HPMP among various implementing and bilateral agencies has been approved at the 34th Meeting of the Empowered Steering Committee of MOEF in March 2008, as below:

UNDP:	Lead Agency, overall coordination and all consumption sectors (Aerosols, Foams and Refrigeration & Air Conditioning, Solvents, Firefighting, etc), except transport refrigeration and air conditioning sub-sector
UNEP:	Non-investment components (export-import policy assistance, awareness, communications and outreach, customs and enforcement training)
UNIDO:	Transport refrigeration and air conditioning sub-sector
Germany:	Refrigeration & Air Conditioning Servicing Sector
World Bank:	Production Sector

Each implementing/bilateral agency will be responsible for specific sector(s)/component(s) of the HPMP as above. The strategies for individual components/sectors will then be integrated to form the overall HPMP draft for final review and endorsement by MOEF. The HPMP will be prepared following the guidelines approved by Executive Committee through Decision 54/39. The final draft HPMP will be an output of the combined efforts of these agencies in close collaboration with MOEF. The Lead Agency (UNDP) will submit the HPMP document to Executive Committee upon endorsement of the final draft HPMP by MOEF. The roles and responsibilities of the various implementing/bilateral agencies during the preparation of HPMP (Stage-I) would be as below:

Lead Implementing Agency (UNDP)

With respect to Ozone Cell/MOEF

- ❏ Support Ozone Cell/MOEF in ensuring an effective and smooth process in preparation of the strategies for sectors/components and the integrated HPMP;
- ❏ Support Ozone Cell/MOEF in review of the draft strategies for the components/sectors and integrated HPMP, for timely finalization and submission to the Executive Committee;
- ❏ Act in close collaboration with Ozone Cell/MOEF to follow-up the activities of the cooperating agencies to ensure timely initiation and completion of the strategies for individual sectors/components;
- ❏ Work in close cooperation and coordination with Ozone Cell/MOEF on integration of the strategies for sectors/components and finalization of the integrated HPMP;
- ❏ Provide assistance with policy, management and technical support to Ozone Cell/MOEF as and when required

With respect to Cooperating Agencies

- ❏ Provide overall coordination between the Cooperating Agencies and Ozone Cell/MOEF to ensure effective cooperation and consistent actions in the HPMP process;
- ❏ Coordinate and generate synergy on the overall technical, policy, regulatory and administrative

actions proposed in the strategies for individual strategies/components to ensure consistent and uniform application throughout the integrated HPMP;

- ❏ In consultation with Ozone Cell/MOEF, coordinate the activities of cooperating agencies

With respect to Industries

- ❏ Assist Ozone Cell/MOEF in the process of consultations with industries on the technical and logistical aspects of the preparation of the HPMP;

- ❏ In close coordination with the cooperating agencies, assist Ozone Cell/MOEF, in discussions with industries on identification and selection of alternative technologies and on technology transfer issues.

With respect to MLF Secretariat and Executive Committee

- ❏ Undertake consultations and clarifications with MLF Secretariat on HPMP guidelines and HPMP preparation process to facilitate effective preparation;

- ❏ Assist Ozone Cell/MOEF, in close coordination with the cooperating agencies, in responding to comments on HPMP from MLF/Executive Committee

Cooperating Agencies

- ❏ Prepare the strategies for the designated individual sectors/components with appropriate advice on technical, policy, regulatory and administrative actions relevant to these sectors/components, that need to be incorporated in the HPMP;

- ❏ Coordinate with Ozone Cell/MOEF and UNDP to ensure adequate information sharing and consistent application of technology choices and policy actions during the HPMP process

- ❏ Attend and participate in coordination meetings as required during the HPMP process and provide comments on draft integrated HPMP as per the agreed timeframes

4. HPMP PREPARATION PROCESS

The preparation of the national HCFC phase-out management plan would involve the following broad activities:

- ❏ Initial consultation meetings for stakeholders
- ❏ Constituting the national team
- ❏ Information dissemination and industry interaction
- ❏ Data Collection
- ❏ Data Analysis
- ❏ Draft document preparation
- ❏ Stakeholder interactions/consultations
- ❏ Finalization of the HPMP (Stage-I) proposal

4.1 Initiation Meetings of/for Stakeholders

The initial meeting(s) of/for stakeholder consultation would mark the commencement of activities involved in the preparation of the HPMP. The expected outcomes of these meetings would be to finalize the roles and responsibilities of the various stakeholders, development and finalization of the terms of reference for activities and personnel, finalization of work plans for various activities and development of formats and templates for data collection and reporting.

4.2 Constituting the National Team

This would include assignment of national and international personnel and experts for fulfilling various positions as envisaged in the proposed institutional framework.

4.3 Information Dissemination and Industry Interaction

The following sub-activities are envisaged:

- ❏ Preparation of information materials on HCFC phase-out
- ❏ Industry interaction workshops for various sectors (preferably by region to improve reach)
- ❏ Preparation of documentation/reports on findings

4.4 Data Collection

Notwithstanding the HCFC survey carried out in India during 2005-2007, Decision 54/39 of the Executive Committee introduces levels of details/confidence on the data as well as additional tasks, requiring an exhaustive data collection exercise for HCFCs. Data collection on industry profiles, baselines, consumption, etc. will be carried out for various HCFC-consuming sectors, through national experts and/or specialized survey agencies, to the level of detail mandated by Decision 54/39. This would include the development of appropriate questionnaires and formats for reporting the information and data collected. The data collected would be cross-checked and verified by Ozone Cell/MOEF in terms of legal eligibility as per local regulations. A database management tool would also need to be created as recommended in Decision 54/39.

4.5 Data Analysis

Data analysis would include but not necessarily be limited to classification of data based on present and historical HCFC consumption by enterprise, sector, sub-sector and application, list of HCFC users segregated by sector/sub-sector, data on first and second conversions by sector/sub-sector, historical production, consumption and export data by sector/sub-sector, projected growth trends until 2009/10 and required reductions in HCFC consumption for meeting the 2013 freeze and 2015 reductions, by sector/sub-sector.

4.6 Preparation of draft proposal

Based on the data collected, sector-wise draft strategy proposals for would be prepared by the responsible implementing agency in collaboration with the Ozone Cell/MOEF. The Lead

Implementing Agency will collate and integrate these sector-wise strategies into an overall draft national HPMP (First Stage) proposal. The draft HPMP (First Stage) proposal will be prepared focusing on compliance with the 2013 freeze and 2015 reductions with respect to the baseline (average of 2009 and 2010) levels.

4.7 Stakeholder Consultations

The draft HPMP (First Stage) document will be circulated by Ozone Cell/MOEF among the various national stakeholders for comments, represented by the Empowered Steering Committee and its associated standing committees. In addition, one or more national stakeholder consultation workshops will be arranged with participation from key national stakeholders, implementing agencies, national and international experts, key representatives of the national scientific and technical institutions and industry representatives. The comments and recommendations of the stakeholders shall be collected and collated by Ozone Cell/MOEF with the assistance of the Lead Agency.

4.8 Finalization of the HPMP Proposal (First Stage)

The Lead Implementing Agency will finalize the HPMP (First Stage) proposal in consultation with the partner implementing agencies and Ozone Cell/MOEF, after incorporating comments and recommendations of the national stakeholders. The finalized proposal will be sent to government for endorsement and thereafter submitted to MLF.

5. TIME FRAME & MONITORING MILESTONES FOR HPMP PREPARATION

The HPMP will be targeted for submission during 2010. This allows for a net period of about 9 months for completing the activities needed for preparation of the HPMP, after taking into consideration the lead time of submission of 14 weeks prior to the ExCom:

MILESTONE/TIME FRAME (In months)	M1	M2	M3	M4	M5	M6	M7	M8	M9
Start-up of project activities									
Initiation meetings of/for stakeholders									
Constituting the national team									
Information dissemination/industry interaction									
Data collection									
Data analysis									
Preparation of draft proposal									
Stakeholder consultations									
Finalization and submission									

ANNEXURE-IV

REPORT OF THE HPMP SECTORAL WORKING GROUPS MEETING (SEPTEMBER 2009)

HPMP SECTORAL WORKING GROUPS MEETING

24-25 SEPTEMBER, 2009
VIGYAN BHAWAN, MAULANA AZAD ROAD, NEW DELHI

AGENDA

DAY 1: THURSDAY, 24 SEPTEMBER 2009 **VENUE : HALL NO. 4, VIGYAN BHAWAN**

Registration		
0900 – 0945	Registration of Participants	
0945 - 1020	**Inaugural Session**	
0945 – 0950	Welcome Address	Dr. B. P. Nilaratna, Joint Secretary, Ministry of Environment and Forests (MoEF)
0950 – 0955	Introduction to the Sectoral Working Groups Meeting	Dr. A. Duraisamy, Director, Ozone Cell, MoEF
0955 – 1005	Keynote Address	Mr. K. Madhava Sarma, Former Executive Secretary, Ozone Secretariat, UNEP
1005 – 1015	Inaugural Address	Mr. J. M. Mauskar, Additional Secretary, MoEF
1015 – 1020	Vote of Thanks	Dr. A. Duraisamy, Director, Ozone Cell, MoEF
1020 - 1100	**Coffee Break**	
Plenary Session - I: HCFC Scenario in India		**Chairman: Prof. R. S. Agarwal Member, Refrigerant Technical Options Committee (TEAP)**
1100 – 1120	Roadmap for Implementation of HCFC phase-out in India	Dr. A. Duraisamy, Dir., Ozone Cell
1120 – 1140	Overview of HCFC production sector in India	Mr. W. J. Samuel, Refrigerant Gas Manufacturers Association (REGMA)
1140 – 1200	Refrigeration and Air-Conditioning (RAC) Industry structure and current & future use of HCFCs in India	Mr. P. K. Mahindra, Refrigeration and Air-Conditioning Manufacturers Association (RAMA)
1200 – 1220	Foam manufacturing industry structure and current & future use of HCFCs in India	Mr. Mukesh Bhuta, Vice Chairman, Indian Polyurethane Association
1220 – 1240	Profile of Servicing sector & HCFC use in India	Mr. R. S. Iyer, Representative from Servicing Industry
1240 – 1300	Discussion	
1300 – 1400	**Lunch**	
Plenary Session - II: Policies, Regulations, Enforcement and Outreach		**Chairman: Mr. K. Madhava Sarma Former Executive Secretary, Ozone Secretariat**
1400 – 1420	ODS regulations in India	Mr. R. Srinivas, PMU, Ozone Cell
1420 – 1440	Policies, Regulations, Enforcement and Outreach	UNEP
1440 – 1500	MLF Guidelines for HCFC Phase-out in Article 5 Countries	UNDP

1500 – 1530	Discussion	
1530 – 1600	**Coffee Break**	
Plenary Session - III: HPMP Preparation in India		**Chairman: Dr. A. Duraisamy Director, Ozone Cell**
1600 – 1615	Overall HPMP preparation process	UNDP
1615 – 1705	Agency perspectives on sectoral strategies	UNDP, UNEP, UNIDO, GTZ, World Bank (10 min each)
1705 – 1745	Discussion and Formation of sectoral breakaway groups	Ozone Cell
1745	**Closure of Day 1**	
DAY 2: FRIDAY, 25 SEPTEMBER 2009		**VENUE : HALL NO. 4, VIGYAN BHAWAN**
Sectoral Parallel Sessions A : RAC Sector ; B : Foam Sector ; C : RAC Servicing Sector		
RAC Sector Convener: TBD by Sectoral Stake Holders		
Sectoral Session – A I : Technology Scenario		
0930 – 1000	Technology Trends	Refrigeration Industry Expert
1000 – 1100	Discussions on approaches for technology availability and selection considering environmental and occupational impacts	All Participants
1100 – 1130	**Coffee Break**	
Sectoral Session – A II : Phase-out Approaches and Costs		
1130 – 1215	Phase-out approaches (prioritization of sub-sectors based on technology maturity, ease of conversion, etc)	All Participants
1215 – 1300	Review of cost scenarios	
1300 – 1400	**Lunch**	
Sectoral Session – A III : Policy, Enforcement and Awareness Needs (including Sectoral Action Plan)		
1400 – 1500	Discussions on needs for designing appropriate and forward-looking sector-specific policies/regulations and awareness/communication actions	All Participants
1500 – 1515	Sectoral Action Plan and Milestones	All Participants
1515 – 1530	**Coffee Break**	
		Venue : Hall No. 4, Vigyan Bhawan
Plenary Session – IV : Conclusions and Action Plans		**Chairman : Mr. J. M. Mauskar Additional Secretary, MoEF**
1530 – 1610	Sectoral Group reports including future plans (10 min each)	Sectoral Conveners

1610 – 1630	Discussions/Suggestions on Sectoral Group reports	All Participants
1630 – 1650	National Action Plan and Milestones	Ozone Cell/UNDP
1650 – 1700	Concluding Remarks by the Chairman	
1700	**Closure**	
DAY 2: FRIDAY, 25 SEPTEMBER 2009		**VENUE : HALL NO. 3, VIGYAN BHAWAN**
Sectoral Parallel Sessions A : RAC Sector ; B : Foam Sector ; C : RAC Servicing Sector		
Foam Sector Convener: TBD by Sectoral Stake Holders		
Sectoral Session – B I : Technology Scenario		
0930 – 1000	Technology Trends	Foam Industry Expert
1000 – 1100	Discussions on approaches for technology availability and selection considering environmental and occupational impacts	All Participants
1100 – 1130	**Coffee Break**	
Sectoral Session – B II : Phase-out Approaches and Costs		
1130 – 1215	Phase-out approaches (prioritization of sub-sectors based on technology maturity, ease of conversion, etc)	All Participants
1215 – 1300	Review of cost scenarios	
1300 – 1400	**Lunch**	
Sectoral Session – B III : Policy, Enforcement and Awareness Needs (including Sectoral Action Plan)		
1400 – 1500	Discussions on needs for designing appropriate and forward-looking sector-specific policies/regulations and awareness/communication actions	All Participants
1500 – 1515	Sectoral Action Plan and Milestones	All Participants
1515 – 1530	**Coffee Break**	
		Venue : Hall No. 4, Vigyan Bhawan
Plenary Session – IV : Conclusions and Action Plans		**Chairman : Mr. J. M. Mauskar Additional Secretary, MoEF**
1530 – 1610	Sectoral Group reports including future plans (10 min each)	Sectoral Conveners
1610 – 1630	Discussions/Suggestions on Sectoral Group reports	All Participants
1630 – 1650	National Action Plan and Milestones	Ozone Cell/UNDP

1650 – 1700	Concluding Remarks by the Chairman	
1700	**Closure**	
DAY 2: FRIDAY, 25 SEPTEMBER 2009		**VENUE : CONFERENCE ROOM NO. A, VIGYAN BHAWAN ANNEXE**
Sectoral Parallel Sessions A : RAC Sector ; B : Foam Sector ; C : RAC Servicing Sector		
RAC Servicing Sector Convener: TBD by Sectoral Stake Holders		
Sectoral Session – C I : Technology Scenario		
0930 – 1015	Lessons learnt and sharing experiences during CFC phase-out	All Participants
1015 – 1100	Discussions on specific challenges in the HCFC servicing sector	All Participants
1100 – 1130	**Coffee Break**	
Sectoral Session – C II : Phase-out Approaches and Costs		
1130 – 1230	Discussions on approaches to address the Servicing sector and achieve reductions	All Participants
1230 – 1300	Review of cost scenarios	All Participants
1300 – 1400	**Lunch**	
Sectoral Session – C III : Policy, Enforcement and Awareness Needs (including Sectoral Action Plan)		
1400 – 1500	Discussions on needs for designing appropriate and forward-looking sector-specific policies/regulations and awareness/communication actions	All Participants
1500 – 1515	Sectoral Action Plan and Milestones	All Participants
1515 – 1530	**Coffee Break**	
		Venue : Hall No. 4, Vigyan Bhawan
Plenary Session – IV : Conclusions and Action Plans		**Chairman : Mr. J. M. Mauskar Additional Secretary, MoEF**
1530 – 1610	Sectoral Group reports including future plans (10 min each)	Sectoral Conveners
1610 – 1630	Discussions/Suggestions on Sectoral Group reports	All Participants
1630 – 1650	National Action Plan and Milestones	Ozone Cell/UNDP
1650 – 1700	Concluding Remarks by the Chairman	
1700	**Closure**	

SUMMARY REPORT OF THE SECTORAL WORKING GROUP FOR

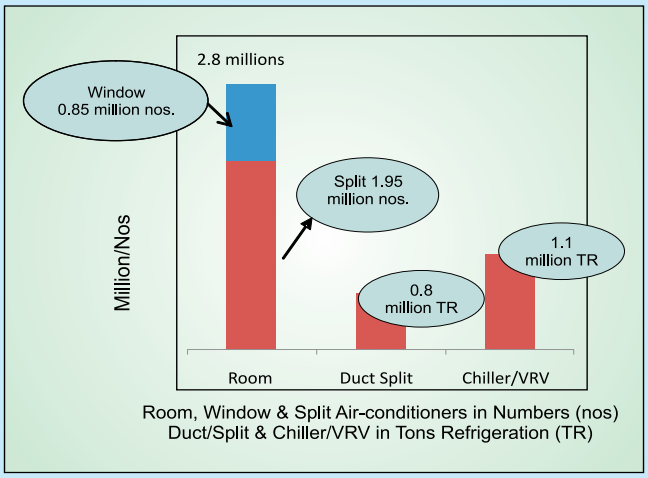
REFRIGERATION & AIR CONDITIONING (MANFUACTURING) SECTOR

RAC (MANUFACTURING) SECTOR WORKING GROUP MEETING

		AGENDA
SESSION 1	9:30 – 11:00 HRS	1. Convener to be decided by sectoral stakeholders 2. Constitute the national team 3. Presentation of technology trends- Refrigeration Industry Expert 4. Discussion on approaches for technology, availability keeping in mind environment and occupational impacts 5. Deliberation on need of survey of HCFC user industry and total country consumption of HCFC in various RAC manufacturing industry during the period 2008 -2012 6. Level of involvement of RAMA to establish effective partnership between RAMA and Ozone Cell, MoEF through out implementation programme 7. Any other points/issues for discussion
		11:00 – 11:30 HRS – TEA BREAK
SESSION 2	11:30 – 13:00 HRS	1. Recommended approach for strategy building up 2. Need for initial awareness activities 3. Suggestion for industry wise effective phase out programme with prioritization 4. Listing of activity which involves initial expenses 5. Review of cost scenarios
		13:00 – 14:00 HRS – LUNCH BREAK
SESSION 3	14:00 – 15:15 HRS	1. Review of present ODS policies/regulations 2. Regulations affecting import & export of ODS 3. Discussion on need of designing policies or regulation suitable for RAC manufacturing sector for HCFC phase out 4. Awareness and communication actions 5. Sectoral action plan 6. Complete the question related to communication Preparation of RAC manufacturing sector group report including future plans
		15:15 – 15:30 HRS – COFFEE BREAK

AT THE END OF SECTORAL SESSION RAC MANUFACTURING SECTOR GROUP PRESENTED A REPORT BY THE CONVENER AT PLENARY SESSION

RAC (MANUFACTURING) SECTOR WORKING GROUP MEETING

REPORT AND OUTCOMES			
No	**Topic**		**Outcomes/conclusions/recommendations**
1.	Convener and Joint-Conveners for the Session		Mr. B. J. Wadia Mr. P. K. Mahindra Mr. R. K. Mehta
2.	RAC Sector Working Group		The group composed of 1-2 representatives from each of the following stakeholders: ❏ Room Air-conditioners ❏ Commercial Refrigeration ❏ Central Air-conditioning ❏ Ducted/Packaged systems ❏ VRF systems ❏ Precision/Telecom sector ❏ Transport Refrigeration and Air-conditioning
3.	RAC sector growth rates		
		During last 5 years	Air-conditioning systems : Over 20% Commercial Refrigeration Sector : About 10%
		Expected growth rate during medium term (3-5 years)	Air-conditioning systems : 15 to 20% Segment-wise growth rate trend: ❏ Room air-conditioners : 20% ❏ VRF systems : 40% ❏ Chillers : 10% ❏ Ducted/package : 10% Others (precision/telecom) : 25-30% Commercial Refrigeration Sector : 10 to 12 % Segment-wise growth rate trend: ❏ Water Dispensers : 20% ❏ Storage Water Coolers : 05% ❏ Display/storage equipment : 15%

<table>
<tr><td>4.</td><td>Survey</td><td colspan="4">❑ There is a need for an additional survey to update the list of stakeholders in various RAC sectors and sub-sectors, to determine the consumption level of HCFC in manufacturing of RAC appliances and estimate growth trends till 2015.

❑ Data will be gathered through Refrigeration and Air-conditioners Manufacturers Association (RAMA)/third Party (Consultant) survey and Ozone Cell will be supporting the exercise.</td></tr>
<tr><td rowspan="9">5.</td><td rowspan="9">Technology Trends and availability of alternatives</td><td>Application</td><td>Present</td><td>Options</td><td>Issues</td></tr>
<tr><td>Room Air-Conditioner</td><td>100% HCFC22</td><td>R-410A/R-407C HC's* (R-290)</td><td rowspan="8">1 High critical pressure need to select appropriate components to meet Energy efficiency

2 Local availability

3 Cost of components

4 Development costs</td></tr>
<tr><td>Ducted</td><td>HCFC22</td><td>R-407C/R-410A</td></tr>
<tr><td>Commercial Refrigeration</td><td>HCFC22</td><td>R404A/R-134a</td></tr>
<tr><td>Chillers</td><td>HCFC22
HCFC123</td><td>R-134a
R-407C/R-410ª/R-404A/
HC-600a*</td></tr>
<tr><td>Telecom/ Precision</td><td>HCFC22</td><td>R-404C/R-407C/ R-410A</td></tr>
<tr><td>Transport Refrigeration and Air-conditioning</td><td>HCFC22</td><td>R-134a
R-404A/R-407C/ R-410A</td></tr>
<tr><td>Ice Candy Machines</td><td>HCFC22</td><td>R-404A/R-507A</td></tr>
<tr><td colspan="4">* HCs are in research stage and not yet commercialized</td></tr>
<tr><td>6.</td><td>Level of involvement of RAMA</td><td colspan="4">There is willingness on part of RAMA to participate in and support the HCFC phase-out program in India. The level of involvement would be confirmed after discussion within the RAMA executive committee.</td></tr>
<tr><td>7.</td><td>Recommended approach</td><td colspan="4">The prioritization of sub-sectors will be based on consumption level and availability of technically proven and economically viable options for various applications both for refrigeration and air-conditioning sub-sectors. The sub-sectors are presented in order to consumption of HCFCs:
1. RAC
2. DUCT/Package
3. Commercial Refrigeration
4. Small capacity chillers
5. Telecom /precision
6. Transport
7. Industrial /applications</td></tr>
</table>

		❑ After gathering the sector wise data, the prioritizations can be changed. ❑ The prioritization should be based on product life cycle. ❑ Ease on switch over & alternate availability of refrigerants ❑ Considering energy consumption of the equipments
8.	Need for Initial awareness and industry interaction	Regular meetings and 5 to 6 workshops across various sub-sectors and regions are suggested. To facilitate this, Ozone Cell, with the assistance of UNDP, to create a pool of experts who can conduct these workshops.
9.	Activities for initial financing	The survey update and awareness workshops would require initial financing. The estimates of this will be submitted to the Ozone Cell and UNDP in due course.
10.	Review of conversion costs scenarios	The group would interact with the relevant stakeholders to gather the cost data at each stage (Technology transfer/Technology development / Testing facility / Production facility /Incremental cost on components/ Training / Equipment for servicing). Costs for SME need to be evaluated separately.
11.	Policies and regulations	❑ The customs and excise duty exemption on import and local purchase of components, raw materials, consumables for non-ODS products be extended similar to on capital goods for setting up non-ODS production capacity. This will encourage conversion from ODS to non-ODS. ❑ Test facilities, calibration and other technology evaluating equipments for the testing of products /components need to be established. ❑ Income tax exemption similar to the product units sets up in backward areas should be permitted to units manufacturing products with non-ODS ❑ Govt. must promote the investments in the non-ODS component industry to make the non-ODS products competitive so that the projected growth should not be affected. ❑ There should be protection on non-ODS Products/raw materials/ components against anti dumping/safe guard duty. ❑ Govt. must promote the investments in the non-ODS component industry to make the non-ODS products competitive so that the projected growth should not be affected. ❑ There should be protection on non-ODS Products/raw materials/ components against anti dumping/safe guard duty.
12.	Communication and outreach needs	❑ Awareness programs organized by the organizations need to be identified and extend support. ❑ Government should take initiatives to educate and create awareness amongst end users on the safe usage of non-ODS substances.
13.	Broad milestones and timeframes	Survey : By February 2010 Awareness Workshops : By March /April 2010 Draft Sectoral Strategy : By May 2010

SUMMARY REPORT OF THE SECTORAL WORKING GROUP FOR

FOAM SECTOR

FOAM SECTOR WORKING GROUP MEETING

		AGENDA
SESSION 1	9:30 – 11:00 HRS	1. Convener to be decided by sectoral stakeholders 2. Constitute the national team 3. Presentation of technology trends- Foam Industry Expert 4. Discussion on approaches for technology, availability by industry wise keeping in mind environment & occupational impacts 5. Deliberation on need of survey of HCFC user industry and total country consumption of HCFC in various foam processing industry for the year 2008 till 2012 6. Level of involvement of IPUA to establish effective partnership between IPUA & Government through out implementation programme 7. Any other points/issues for discussion
		11:00 – 11:30 HRS – TEA BREAK
SESSION 2	11:30 – 13:00 HRS	1. Recommended approach for strategy building up 2. Need for initial awareness activities 3. Suggestion for industry wise effective phase out programme with prioritization 4. Listing of activity which involves initial expenses 5. Review of cost scenarios
		13:00 – 14:00 HRS – LUNCH BREAK
SESSION 3	14:00 – 15:15 HRS	1. Review of present ODS policies/regulations 2. Regulations affecting import & export of ODS 3. Discussion on need of designing policies or regulation suitable for RAC manufacturing sector for HCFC phase out 4. Awareness and communication actions 5. Sectoral action plan 6. Complete the question related to communication Preparation of RAC manufacturing sector group report including future plans
		15:15 – 15:30 HRS – COFFEE BREAK

AT THE END OF SECTORAL SESSION RAC MANUFACTURING SECTOR GROUP PRESENTED A REPORT BY THE CONVENER AT PLENARY SESSION

REPORT AND OUTCOMES		
No.	**Topic**	**Outcomes/conclusions/recommendations**
1.	Convener for the Session Joint Convener for the Session	Mr. Mukesh Bhuta Mr. Nandan Chirmulay (only for facilitation for this particular meeting)
2.	Foam Sector Working Group	The group composed of 1-2 representatives from each of the following stakeholders: ❏ Systems Houses ❏ Domestic Refrigeration ❏ Commercial Refrigeration ❏ Sandwich Panels ❏ Integral Skin Foam ❏ Thermoware ❏ Equipment Suppliers ❏ Chemical Suppliers ❏ Ozone Cell
3.	Technology trends and availability of alternatives	**Appliance/Domestic Refrigeration** Hydrocarbons HFC-245fa **Commercial Refrigeration** Water Hydrocarbons HFC-245fa HFC-365mfc HFC-134a Methyl Formate **Continuous Sandwich Panels** Hydrocarbons **Discontinuous Sandwich Panels** Hydrocarbons HFC-134a HFC-245fa HFC-365mfc Methyl Formate Methylal Formic Acid **Thermoware** Water Reduced HCFCs Water + HFCs Hydrocarbons + HFCs

		General Insulation HFC-245fa Methyl Formate Formic Acid Integral Skin Foam Water n-pentane **Futuristic Blowing Agents** Low GWP and other Options ***Note: More emphasis should be given to long-term substitute blowing agents, which have zero ODP and low GWP such as hydrocarbons, etc. Currently there is no perfect substitute.***
4.	Survey	There is a need for an additional survey to update the list of stakeholders in various foam sectors and sub-sectors, to determine updated consumption levels of HCFCs and estimate growth trends until 2015.
5.	Level of involvement of Indian Polyurethane Foam Association (IPUA)	There is willingness on part of IPUA to participate in and support the HCFC phase-out programme in India. The level of involvement would be confirmed after discussion within the IPUA executive committee.
6.	Recommended approach for HCFC phase-out	The recommended approach for phase out of HCFCs from the Foam Sector in India would be as under: ❑ For large enterprises in the sub-sectors such as domestic refrigeration and continuous sandwich panels, complete phase-out of HCFCs to long term alternative blowing agents. ❑ Partial conversion to alternative blowing agents where HCFCs can be reduced stepwise over a period of time, in sub-sectors such as large manufacturers in commercial refrigeration and discontinuous sandwich panels. ❑ Use reduced-HCFC based formulations or formulations with mixtures of HCFCs and other zero-ODP/low-GWP alternative blowing agents, which can allow phased reductions in HCFC consumption. This approach at this time would be suited for SMEs ❑ Explore possibilities of using next generation blowing agents that may enter the market in the near term. ❑ Demonstration projects involving optimum alternative blowing agents are recommended
7.	Need for initial awareness and industry interaction	Five to six workshops across various sub-sectors and regions are suggested. To facilitate this, Ozone Cell, with the assistance of UNDP, to create a pool of experts who can conduct these workshops.
8.	Effective phase-out programme	For an effective phase-out programme, prioritization of sub-sectors and applications, would be determined and finalized after consulting relevant stakeholders.

9.	Activities for initial financing	The survey update and awareness workshops would require financing. The estimates of this will be submitted to Ozone Cell and UNDP in due course.
10.	Review of conversion costs scenarios	The group would interact with the relevant stakeholders particularly from large manufacturers of sandwich panels and appliances and collect information on estimates of conversion costs.
11.	Policies and regulations	❑ Presently HCFCs are a controlled substance and are regulated under Ozone Rules; however polyols containing HCFCs are not regulated at present and can be imported without license. These should be regulated. ❑ Explore possibility to simplify the advance license procedure for export of polyols containing HCFCs ❑ Policy to discourage setting up of new production capacities for HCFC-based products ❑ Standards for various products/applications need to be updated, particularly from energy-efficiency considerations
12.	Communications and outreach needs	These have been discussed with the national partner of UNEP and the related questionnaire has been submitted. In general, the industry interaction workshops planned until March/April 2010, would serve to collect data as well as for dissemination of knowledge on HCFC phase-out, alternatives and related information.
13.	Broad milestones and timeframes	Survey: By February 2010 Awareness Workshops: By March/April 2010 Draft Sectoral Strategy: By May 2010

SUMMARY REPORT OF THE SECTORAL WORKING GROUP FOR

REFRIGERATION & AIR CONDITIONING (SERVICING) SECTOR

RAC SERVICING SECTOR WORKING GROUP MEETING

		AGENDA
SESSION 1	9:30 – 11:00 HRS	1. Convener to be decided by sectoral stakeholders 2. Constitute the national team 3. Discussion on lessons learnt and sharing experiences during CFC phase-out 4. Discussion on specific challenges in the servicing sector 5. Deliberation on need of survey of HCFC user servicing enterprises & technicians and consumption of HCFC in various servicing industry during the period 2008 - 2012 6. Any other points/issues for discussion
		11:00 – 11:30 HRS – TEA BREAK
SESSION 2	11:30 – 13:00 HRS	1. Recommended approach for strategy building up 2. Need for initial awareness activities 3. Discussions on approaches to address achieve HCFC consumption reduction 4. Listing of activity which involves initial expenses 5. Review of cost scenarios
		13:00 – 14:00 HRS – LUNCH BREAK
SESSION 3	14:00 – 15:15 HRS	1. Review of present ODS policies/regulations 2. Discussion on need of designing policies or regulation suitable for RAC servicing sector for HCFC phase out 3. Awareness and communication actions 4. Sectoral action plan 5. Complete the question related to communication Preparation of RAC Servicing sector group report including future plans
		15:15 – 15:30 HRS – COFFEE BREAK

AT THE END OF SECTORAL SESSION RAC MANUFACTURING SECTOR GROUP PRESENTED A REPORT BY THE CONVENER AT PLENARY SESSION

REFRIGERATION & AIR CONDITIONING (SERVICING) SECTOR

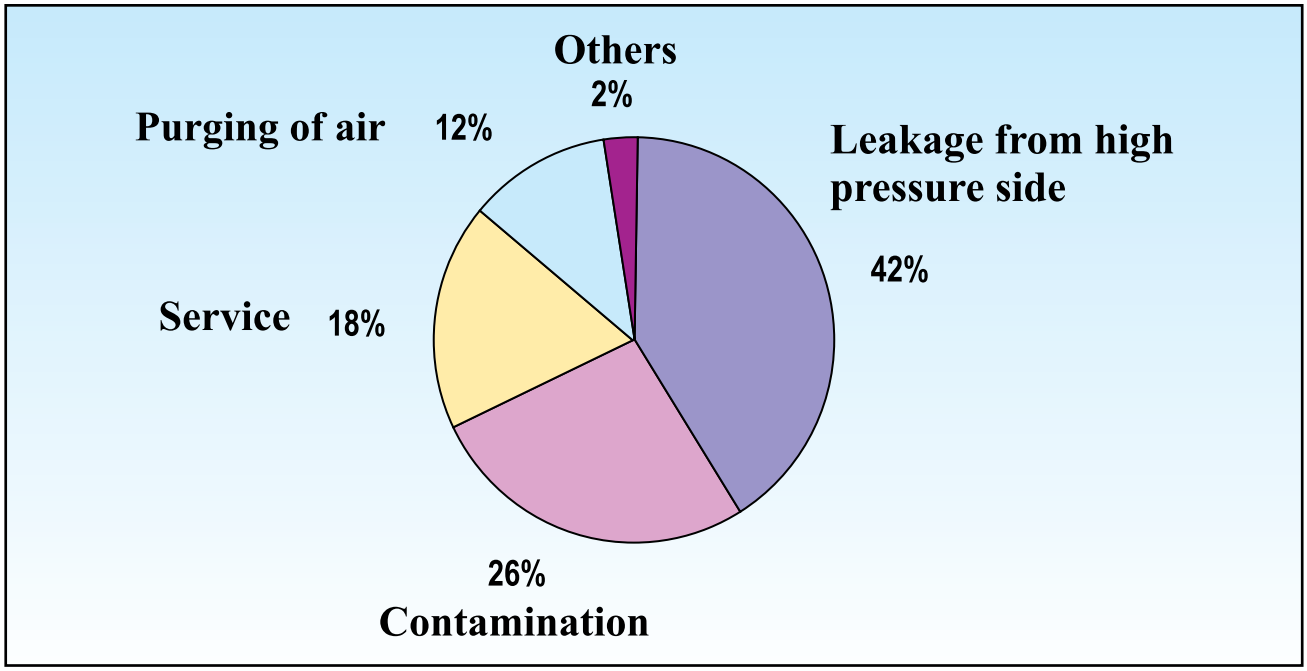
1. Relevance of Service Sector for HCFC Phase-out

- Significant share of total HCFC-22 consumption (~ 33%)
- More than 20,000 enterprises involved with more than 70,000 service technicians
- Wide variety of applications
- Most appliances serviced by technicians from informal sector after warranty period
- Informal sector not covered by Original Equipment Manufacturers (OEMs) training infrastructure
- Growth in the population of HCFC-based equipment
- Sustainable HCFC phase-out requires strategy and actions in the Servicing Sector due to risk of reverse conversions

2. Overview of Sub-sectors and Applications

- Domestic and commercial AC applications like Small ACs < 3TR, Packaged ACs ≥ 5TR, Chillers-reciprocating/scroll/screw.
- Refrigeration applications like Supermarkets, Cold Storages, Ice Cream & Ice Candy, Liquid/Water Coolers, and Process Chillers etc.
- Transport AC and refrigeration
- Variable Refrigerant Volume Systems (VRV)
- Telecommunication & Data Centers
- Centrifugal chillers

3. Refrigerant Emissions through poor servicing practices



4. Consumption Profile in the Servicing Sector

Air-Conditioning						
Application	**< 3TR Room AC**	**2 - 5TR Commercial AC**	**≥ 5 TR Commercial AC**	**VRF**	**Reciproc ./Scroll chiller**	**Screw chiller**
Population ('000)	Split: 20% (trend up) Window: 80% (trend down) To be checked with ORG, RAMA, NSSO Approx 9 Million	To be collected from RAMA	To be collected from RAMA	Blue Star will provide further details	Blue Star will provide further details	Blue Star will provide further details
Charge weight per TR	*900 g*	*900 g*	*900 g*			
Refrigerant stock in metric tonnes	*8100 tonnes*					
Failure rate (annually)	Split: 33% Windows:15% (verify with manufacturers)	Less as compared to RAC 3%	Less as compared to RAC 3%			
Topping up (per TR during lifetime)	Split: 900g (for 10% of the population) Windows: --	900 g for 25% of the population	900 g for 25% of the population			
Service emission factor	1.1 for OEM 1.2 for others (to be verified through sample)	1.1 for OEM 1.2 for others (to be verified through sample)	1.1 for OEM 1.2 for others (to be verified through sample)			
Addition during installation (is part of initial charge)	2-5% (only on split)	10%	10%			
Life in years	8 years	10-12 years	10-12 years	?	15-20 years	20-25 years
Growth rate p.a. (on sales)	2010-2015: 20%	10%	10%			
Retrofit options available	Yes	Yes	Yes	No	?	?
If yes, substitute?	HC 290? R407C, R417A, R424A, R422D	R407C, R417A, R424A, R422D	R407C, R417A, R424A, R422D			
Skill level required (low, medium, high)	medium	high	high	high	high	high
Potential for emission reduction through good service practices (relative improvement)	high	medium	medium	medium	low	low

Note: *Further information/inputs from the industry/stakeholders will be collected by end-October 2009.*

Consumption Profile in the Servicing Sector (cont'd)

Refrigeration						
Refrigeration	**< 3TR Room AC**	**2 - 5TR Commercial AC**	**≥ 5 TR Commercial AC**	**VRF**	**Reciproc ./Scroll chiller**	**Screw chiller**
Population ('000)	Blue Star & Voltas	Amoking, Freezeking, Bhavnagar	Blue Star & Voltas	Blue Star & Voltas, *Alfa Laval*	*Blue Star & Voltas, imported*	*Blue Star & Voltas*
Charge weight per TR						
Refrigerant stock in metric tonnes						
Failure rate						
Service emission factor						
Life in years	10 years	15-20 years	10 years	10-15 years	5-7 years	10-15 years
Growth rate						
Retrofit options available	Yes	Yes	Yes	Yes	Yes	Yes
If yes, substitute?	R-290, R407C, R417A, R424A, R422D	R404A, R407C, R417A, R424A, R422D	R-290, R407C, R417A, R424A, R422D	R-290?, R407C, R417A, R424A, R422D	R-290?, R404A, R407C, R417A, R424A, R422D	R-290?, R404A, R407C, R417A, R424A, R422D
Skill level required (low, medium, high)	medium	medium	medium			
Potential for emission reduction through good service practices						
Number of technicians	Overlap with RAC	Overlap with RAC	Overlap with RAC	2,000-3,000	5,000 – 7,000	

Note: *Further information/inputs from the industry/stakeholders will be collected by end-October 2009.*

5. Understanding HCFC Substitutes

- ❏ Zero ODP & Lo.w GWP e.g. Natural Refrigerants
- ❏ HFCs may also have to be phased out soon
- ❏ Drop-ins/Retrofits
- ❏ Evaluation of all options required:
  - Technical analysis
  - Availability of Refrigerant & Components
  - Economic Feasibility
  - Environmental, Health and Safety aspects

- Skills and Training requirements
- Trials and Demonstrations, Field Experience

6. Comparison with CFC Phase-out

CFC phase-out:

- ❑ Dominated by domestic refrigerators, freezers and other small appliances.
- ❑ Training emphasis on Good Servicing Practices, HC retrofits and R134a substitution. No HFC retrofits.

HCFC phase-out:

- ❑ May need training on a larger variety of substitutes depending on application.
- ❑ Need for retrofit training for HFCs which has to be disciplined, ensuring removal of mineral oil lubricants.

7. Lessons learnt & Experiences from CFC Phase-out

- ❑ Equipment support should be back-to-back with the training
- ❑ After sales service for equipment has to be ensured in support scheme
- ❑ ECO-COOL is the only communication to informal RAC technicians and should continue on quarterly basis
- ❑ Sealed components are not readily available for retrofit (OEM support required)
- ❑ EHS component should be included in the training
- ❑ Awareness & education for spare part dealers should on priority basis as they have great influence on the technicians
- ❑ Training partners could be upgraded as nodal centers for accessing the informal sector & SMEs (also for providing information on technology)
- ❑ PPP cooperation with ITIs
- ❑ Posters were good information tools
- ❑ NCCOPP certification for technicians is recognized in the sector

8. Challenges in Servicing Sector

- ❑ Post-warranty appliances and equipment usually serviced by technicians from informal sector with only limited support from OEMs.
- ❑ Technicians from informal sector may not follow Good Servicing Practices due to various reasons resulting in poor performance of equipment.
- ❑ Appliances manufactured by SMEs are also serviced by technicians from informal sector.
- ❑ Need to train and upgrade such technicians in HCFC substitution
- ❑ Difficult to reach out to the informal sector
- ❑ Difficult to specify and verify concrete phase-out targets

9. Building Experience

- ❑ Experience/Expertise to be developed in India on substitutes like R290, R417A, 427A, 407C, 422D etc.
- ❑ OEMs to be involved, e.g. for retrofits
- ❑ Establish support centers for trials and demonstrations etc.
- ❑ Training curricula and materials to be developed
- ❑ Hands on training for service technicians

10. Role of OEMs

- ❑ In CFC phase-out, OEMs played an active role in preparing training material for service, conducting training for trainers and technicians.
- ❑ Role of OEMs in servicing sector training to be strengthened under HCFC phase-out.
- ❑ OEM policies on substitutes in servicing required (e.g. for retrofitting).
- ❑ Cooperation with informal service sector will also benefit OEMs and their products.

11. Elements of OEM Support

- ❑ Data inputs for HPMP
- ❑ Involvement in developing training material
- ❑ Active support of retrofit (specifications in installation & service manual, laboratory tests, complete procedure for retrofitting etc.)
- ❑ Integrating informal service technicians in OEM training programs (funding required for the necessary infrastructure)

12. Capacity Building in the Servicing Sector

- ❑ Awareness strategy to be developed
- ❑ Training and equipment needs of technicians to be identified
- ❑ Building on NCCOPP experience and infrastructure but target groups different
- ❑ Support structure for training to be sustained and upgraded
- ❑ Close co-operation with OEMs crucial for implementation

13. Innovative Methodologies

- ❑ Integrate informal technicians in OEM training
- ❑ Online training material (but limitation that it has no practical component)
- ❑ Training video on good servicing practices (DVD widely available nowadays)
- ❑ Pocket handbook with tips on installation and gas charging
- ❑ Updating the existing Industrial Training Institutes (ITIs) and Diploma curricula (to include HCFC alternatives)

- ❏ Awards to technicians adopting good servicing practices

14. Needs for Policies and Regulations

- ❏ Licensing of service enterprises from an independent body in a phased manner (initial phase on a voluntary base parallel with awareness program), subsidies required for equipment (barriers for the target group should not be too high)
- ❏ Reduction of import duties for imported alternative refrigerants and equipments required for retrofits (in particular for smaller imports)
- ❏ Revision of standards for some of the alternatives (cylinders, gas storage, transport etc.)
- ❏ Permissions to transport small quantities of refrigerant in public transport
- ❏ Immediate ban on import of HCFC-401A as alternative for CFC-12

15. Communication Needs

- ❏ Key stakeholders: Customers, Associations, Large users, Servicing enterprises, OEM service centers, spare part dealers, refrigerant dealers, ITIs, Diploma institutes,
- ❏ More information on the relationship between good servicing practices and emission reductions in general awareness activities
- ❏ Piggybacking with Bureau of Energy Efficiency (BEE) awareness campaign on energy efficiency labeling (with support from OEMs)
- ❏ Capacity development for the support platform has to be done first before mass communication campaign can be effective
- ❏ ECO-COOL should continue without interruption (OEMs could place advertisements for co-financing)
- ❏ Engineering institutions should be made aware of the HCFC phase-out immediately
- ❏ Disseminate ozone education pack and raising more awareness by conducting the ozone day painting competition country wide with the help of National CFC Consumption Phase-out Plan (NCCoPP) training partners

16. Steps for Developing the Servicing Sector Strategy

- ❏ Develop a comprehensive service sector profile (e.g. number of service enterprises and concentration, HCFC consumption per sub-sector, skill levels, servicing practices)
- ❏ Prioritization of sub-sectors (low hanging fruits & high impact)
- ❏ Identifying all requirements for phase-out of HCFC in the servicing sector (awareness, training, equipment support)
- ❏ Assess scope for regulation and policy measures
- ❏ Layout of support structure (building on NCCOPP)
- ❏ Estimation of funding requirements for implementation
- ❏ Impact of the planned phase-out activities in ODP tonnes

- Develop monitoring and verification methodology

17. Monitoring & Verification Methodology, Feasible Phase-out Targets

- Retrofit of room air-conditioners in private & public sector and Government departments (monitored through inventories)
- OEM will offer retrofit in case of repair (logging each case in a database)
- Monitoring use volume of refrigerants only used by service sector (retrofit use only)
- Retrofit of large installations in cases where energy efficiency gains will accrue (individual monitoring required)
- Recovery & recycling and reuse the refrigerant to reduce emissions (may increase when the price of HCFC goes up; quality issues involved due to contamination)
- Scope for achieving huge measurable reductions in HPMP Stage-I may be limited but servicing sector has to be addressed early, otherwise the momentum gained under CFC phase-out will be lost and post-warranty retrofits and servicing of new equipments need to be dealt with on priority

18. Action Plan and Milestones

- Approach OEMs and trade bodies/associations for more data (to be completed by end of October)
- Sample studies on servicing practices (mid of November, format to be prepared till 9th October)
- Regular meetings with the sector group (every 4-6 weeks, next meeting on 6th Nov) to update and review the data collected
- Sector Profile 2nd week of December (with meeting of the sector group to prioritize the sub-sectors)
- First draft of strategy by end of January 2010

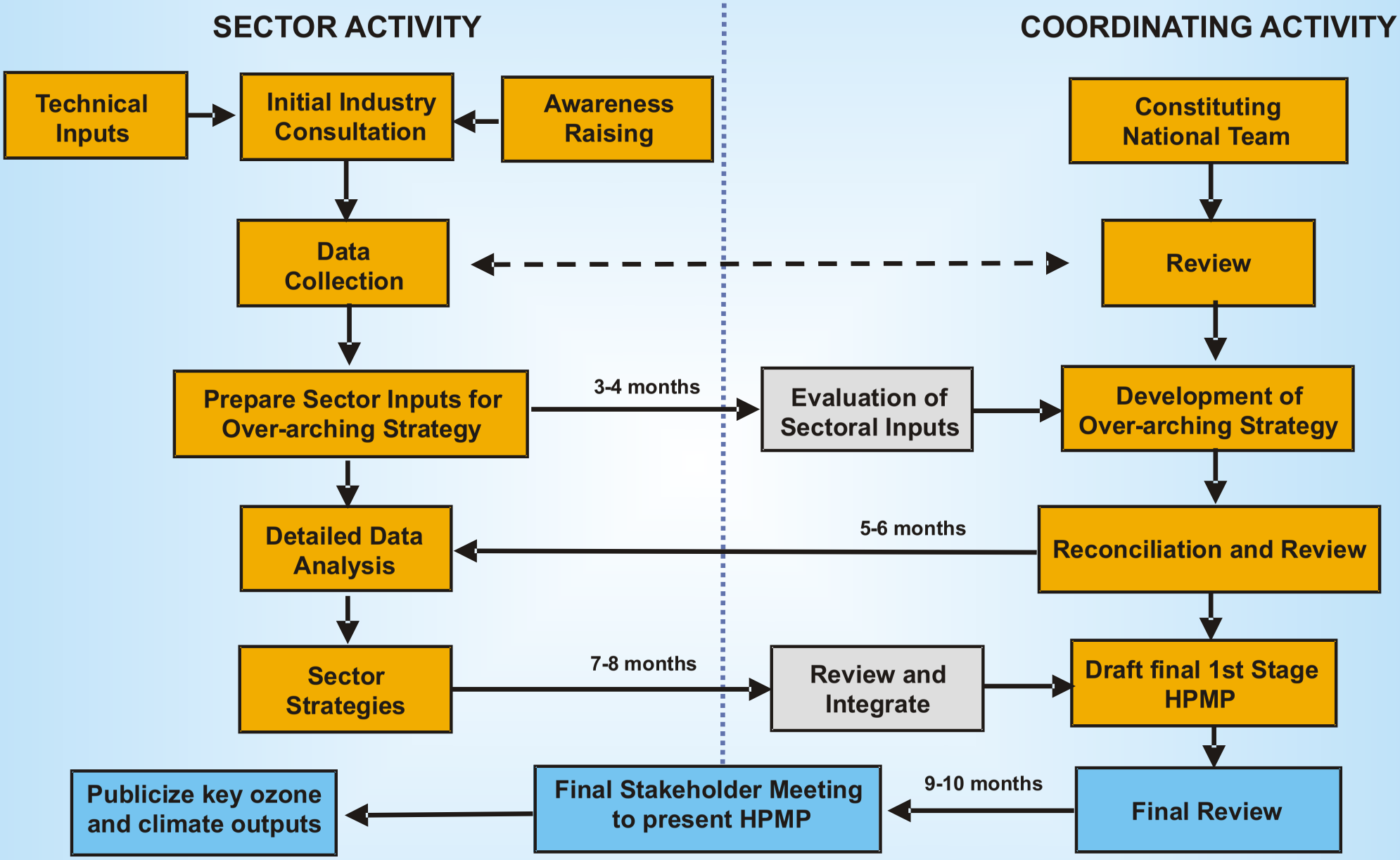
SUMMARY OF KEY ACTIONS AND TIMELINE FOR DEVELOPMENT OF HPMP

After extensive consultations on 24-25 September 2009, the Sectoral Working Groups prepared the following key actions for development of HPMP.

- Update sector/sub-sector level data of supply and demand of HCFCs
  - Collect current sectoral and sub-sectoral data
  - Integrate sectoral/sub-sectoral (or regional) workshops and events with data collection efforts
- Review status of alternative technologies to phase-out HCFCs
- Prioritize sub-sectors for phase-out of HCFCs
- Formulate policies/regulatory framework for HCFC phase-out, monitoring and control
- Establish communication needs for implementation of HCFC phase-out
- Estimate costs for HCFC phase-out in individual sub-sectors / applications
- Prepare draft sectoral strategies for HCFC phase-out
- Integrated HPMP based on the above

The proposed time-line for development of HPMP is given below:

Initial Stakeholder Consultation	by June 2009
Constituting National Team	by September 2009
Stakeholder interactions	by October / November 2009
Data collection	by March 2010
Data Analysis	by April 2010
Sectoral Strategies	by May 2010
Draft HPMP Stage-1	by June 2010
Stakeholder consultations	by July 2010
Submission to MLF	by August 2010



HPMP PREPARATION PROCESS

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