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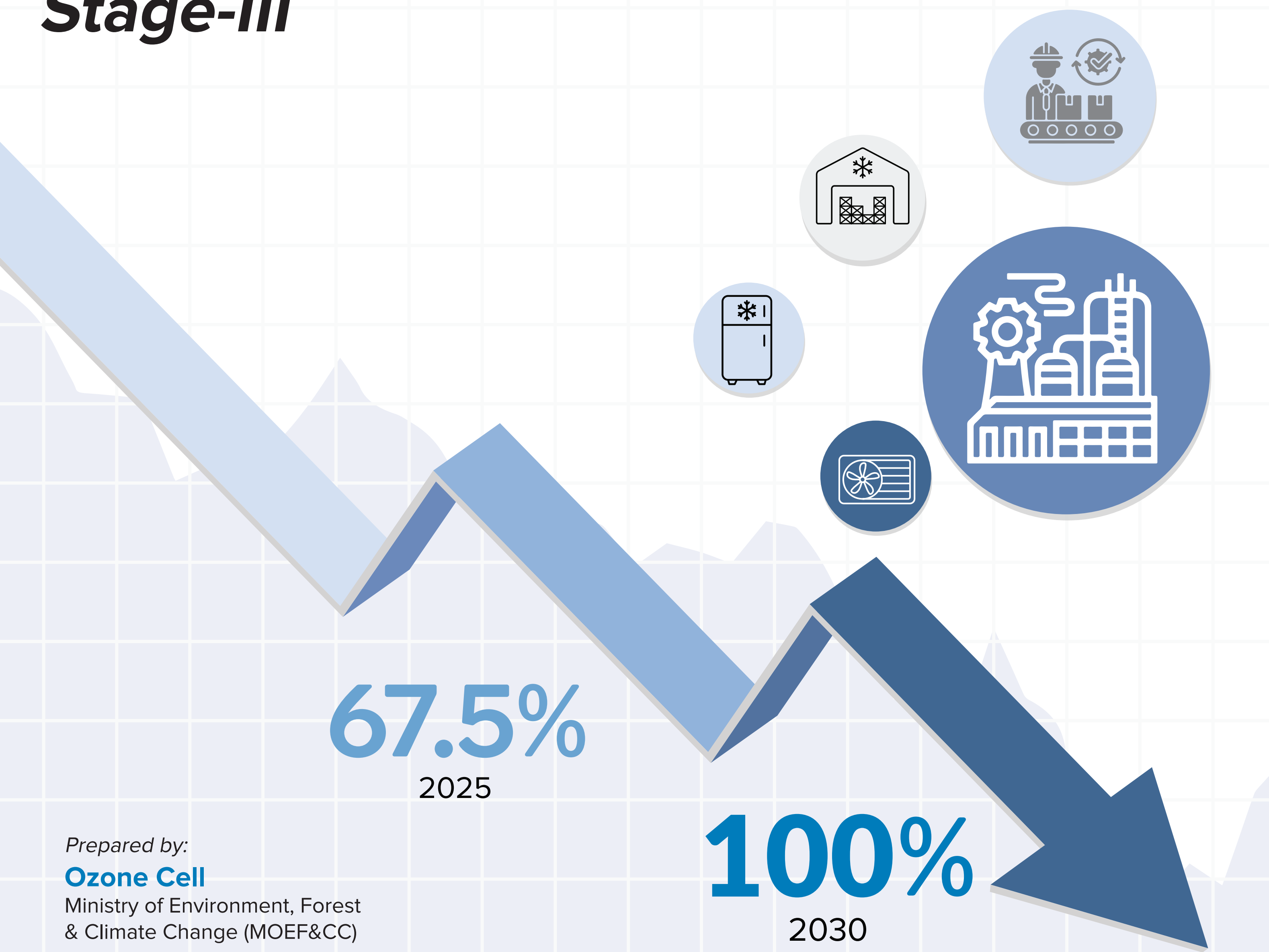
Ministry of Environment, Forest and Climate Change

HCFC PHASE-OUT MANAGEMENT PLAN (HPMP)

Stage-III



Prepared by:

Ozone Cell

Ministry of Environment, Forest & Climate Change (MOEF&CC)

HCFC PHASE-OUT MANAGEMENT PLAN (HPMP)

STAGE-III

मंत्री
पर्यावरण, वन एवं जलवायु परिवर्तन
और
श्रम एवं रोजगार
भारत सरकार

सत्यमेव जयते

MINISTER
ENVIRONMENT, FOREST AND CLIMATE CHANGE
AND
LABOUR & EMPLOYMENT
GOVERNMENT OF INDIA

स्वच्छ भारत
एक कदम स्वच्छता की ओर

भूपेन्द्र यादव
BHUPENDER YADAV

आज़ादी का अमृत महोत्सव

MESSAGE

The Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer, having universal ratification, are widely recognized as the most successful international environmental treaties. The extraordinary international cooperation of Parties to the Montreal Protocol has led to not only the phase-out of production and consumption of several Ozone Depleting Substances (ODSs) but also has contributed significantly towards protection of climate.

India, as a Party to the Montreal Protocol and all its amendments, has been successfully implementing through the setting up of the well-established regulatory and policy measures in the country. Accessing the Montreal Protocol's financial mechanism and following a structured and effective implementation framework, India has not only successfully fulfilled all its commitments to the Protocol, but also has been ahead of target of the Montreal Protocol.

The transition from Hydrochlorofluorocarbons (HCFCs) to non-HCFC and low global warming potential alternative technologies is a challenging task, particularly for a vast country like India which needs to achieve its development goals in an environmentally sustainable manner, especially considering the large number of micro, small and medium enterprises operating in the country and using HCFCs in their manufacturing operations.

The HCFC phase out Management Plan (HPMP) Stage-III would be the last of the HPMPs to be implemented from 2023-2030, during which use of HCFCs in manufacturing sectors need to be phased out by 31.12.2024 and the activities in the Refrigeration and Air-conditioning (RAC) servicing sector would continue till 2030.

The phase-out of HCFCs in the HPMP Stage-III will be addressed through technology conversions at several large, medium, small and micro enterprises in the RAC manufacturing sector and activities in the RAC servicing sector. In addition, targeted technical assistance and capacity building activities as part of enabling component of HPMP Stage-III will also be implemented to ensure timely and sustainable phase-out of HCFCs.

It gives me great pleasure to dedicate the HCFC Phase out Management Plan Stage-III to the global cause for reduction of ODS use and protecting the Earth from the harmful ultraviolet rays.

Date: 14**.09.2023**

(Bhupender Yadav)

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अश्विनी कुमार चौबे
Ashwini Kumar Choubey

सत्यमेव जयते
आहारशुद्धौ सत्त्वशुद्धिः
स्वच्छ भारत
एक कदम स्वच्छता की ओर

राज्य मंत्री
पर्यावरण, वन एवं जलवायु परिवर्तन
उपभोक्ता मामले, खाद्य और सार्वजनिक वितरण
भारत सरकार
MINISTER OF STATE
ENVIRONMENT, FOREST AND CLIMATE CHANGE
CONSUMER AFFAIRS, FOOD & PUBLIC DISTRIBUTION
GOVERNMENT OF INDIA

संदेश

वर्ष 1987 में लागू हुआ मॉन्ट्रियल प्रोटोकॉल सर्वाधिक सफल अन्तर्राष्ट्रीय संधि के रूप में जाना जाता है। यह विश्व के देशों के लिए ओजोन क्षयकारी पदार्थों के उत्पादन को वैज्ञानिक और तकनीकी रूप से समाप्त करने के लिए बाध्यकारी दायित्व निर्धारित करता है। इसका वित्तीय तंत्र का बहुपक्षीय कोष से अनुपूरित होना एक अद्वितीय विशेषता है।

भारत ने जून, 1992 में मॉन्ट्रियल प्रोटोकॉल का अनुमोदन करने के पश्चात अब तक इसके सभी दायित्वों को पूरा किया है। ओजोन क्षयकारी पदार्थों को चरणबद्ध तरीके से समाप्त करने संबंधी कार्यक्रम के कार्यान्वयन में भारत की सफलता का एक मुख्य कारण योजना और कार्यान्वयन दोनों ही स्तरों पर प्रमुख हितधारकों की भागीदारी का होना है। देश में मॉन्ट्रियल प्रोटोकॉल के तहत ओजोन क्षयकारी पदार्थों हाइड्रोक्लोरोफ्लोरोकार्बन (एचसीएफसी)) को चरणबद्ध तरीके से समाप्त करने संबंधी कार्यक्रमों में उद्योगों, अनुसंधान संस्थानों, संबंधित मंत्रालयों/विभागों, उपभोगकर्ता आदि अपना महत्वपूर्ण योगदान दे रहे हैं।

राष्ट्रीय नीतियों और विनियमों को बनाये जाने के साथ-साथ मॉन्ट्रियल प्रोटोकॉल के तहत ओजोन क्षयकारी पदार्थों को चरणबद्ध तरीके से समाप्त करने संबंधी कार्यक्रम के अनुसार अनुपालन लक्ष्यों को प्राप्त करने के लिए एचसीएफसी फेज आउट मैनेजमेंट प्लान (एचपीएमपी) चरण-III के कार्यान्वयन को एकीकृत और परिणाम-उन्मुख तरीके से करने की आवश्यकता है। जैसा कि हमारी सदियों की परंपरा रही है, इस प्रयास के लिए, सभी प्रमुख हितधारकों को सर्वसम्मत दृष्टिकोण का पालन करते हुए मिलजुल कर कार्य करने की आवश्यकता है।

मैं एचपीएमपी चरण-III के कार्यान्वयन की सफलता की कामना करता हूं।

(अश्विनी कुमार चौबे)

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लीना नन्दन
LEENA NANDAN

सत्यमेव जयते

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SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

MESSAGE

Hydrochlorofluorocarbons (HCFCs) were used as transitional substances to phase out Chlorofluorocarbons (CFCs). HCFCs have Ozone Depleting Potential (ODP) of less than 0.2. However, with the dramatic increase in the production and consumption of HCFCs, the threat to the ozone layer and climate change became more imminent, resulting in the accelerated phase out of HCFCs as per an agreed schedule by the Parties to the Montreal Protocol. The HCFC phase-out through the introduction of low Global Warming Potential (GWP) alternatives can make significant contributions to climate change mitigation.

The most widely used HCFCs include HCFC-22 (as a refrigerant), and HCFC-141b (as a foam-blowing agent). While India has completely phased out use of HCFC 141b as on 1.1.2020, the phase out of HCFC-22 in the Refrigeration and Air-conditioning (RAC) sector will be addressed through implementation of the HCFC phase-out Management Plan (HPMP) Stage-III.

Considering that the servicing sector is a major component of HPMP Stage III, action has been initiated for developing a unified certification and training system for the Refrigeration and Airconditioning (RAC) service technicians, strengthening training infrastructure at the Industrial Training Institutes (ITIs) and tools support for trained and certified technicians for adopting good service practices. Also, considering that a large number of medium and small enterprises (MSMEs) would be participating in HPMP Stage-III for phase out of HCFCs and carrying out technology conversion to non-HCFC and low GWP alternatives, a competency enhancement framework in association with an institute of National eminence will be put into place, to facilitate the MSMEs in technology conversion as well as in achieving the HCFC phase out schedule.

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The HPMP Stage-III aims to maximize the environmental benefits of HCFC phase-out by prioritizing safe and sustainable low-GWP alternative technologies, taking into account national circumstances and industry needs.

My best wishes to all the stakeholders for the successful implementation of HPMP Stage-III.

(Leena Nandan)

New Delhi,
September 12, 2023.

TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

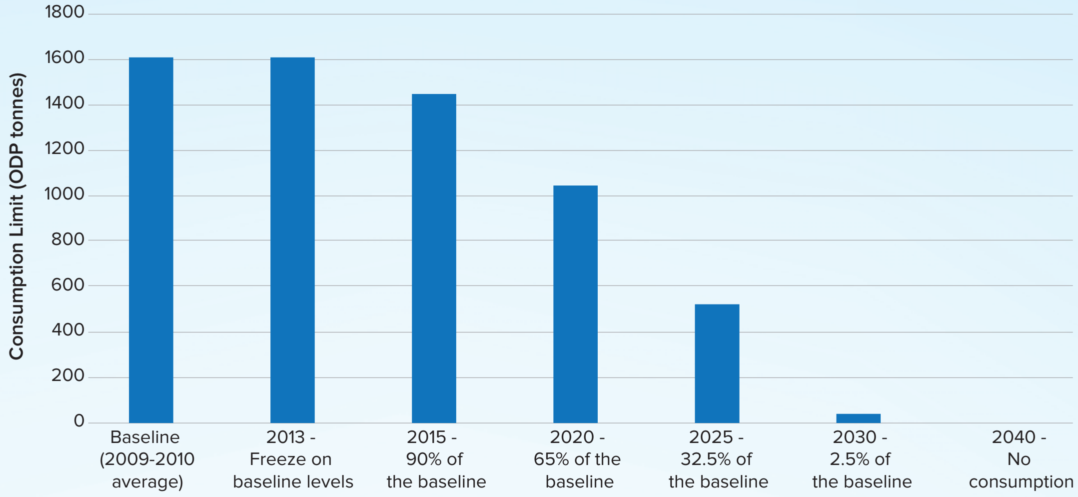
India acceded to the Vienna Convention for the Protection of the Ozone Layer in March 1991 and ratified the Montreal Protocol on Substances that Deplete the Ozone Layer in June 1992. India has also ratified all the amendments to the Montreal Protocol including the London Amendment in 1992, the Copenhagen Amendment, Montreal Amendment, and Beijing Amendment in 2003, and the Kigali Amendment in September 2021. As a party operating under Paragraph 1 Article-5 of the Montreal Protocol, India is committed to phasing out production and consumption of Ozone Depleting Substances (ODSs) including hydrochlorofluorocarbons (HCFCs) in accordance with the accelerated phase-out schedule of the Montreal Protocol. India has taken progressive measures to phase-out designated controlled substances and is in compliance with the Montreal Protocol control schedule. This has been successfully accomplished through the technical and financial assistance from the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol by undertaking technology conversions, technical assistance, training and capacity building, information dissemination and awareness-raising, and management and coordination.

India has established an effective policy and regulatory framework for ODSs. The regulatory framework for ODSs is set forth in the Ozone Depleting Substances (Regulation and Control) Rules, 2000, as amended from time to time. Amendment to ODS Rules has been done during the year 2014 to align with the accelerated phase-out schedule of HCFCs. The most recent amendment was done in the year 2019 to ban the import of HCFC-141b and to phase-out the use of HCFC-141b in the manufacturing of polyurethane foam from 1.1.2020, as per the ODS (Regulation and Control) Rules 2000, as amended in 2014.

India had earlier taken proactive steps for implementation of the accelerated phase-out schedule of HCFCs, in line with the decision XIX/6 of the 19th Meeting of Parties of the Montreal Protocol held in September 2007. To this end, India prepared a Roadmap in the year 2009 describing the long-term vision and action plan including the policy instruments for phase-out of production and consumption of HCFCs in the country, which considered the expected availability of technologies that are sustainable and cause minimum undue financial burden on industry and consumers.

India has successfully met the 2013, 2015 and 2020 phase-out targets of HCFCs (as given in Figure 1).

Figure 1: HCFC Phase-out Limits for India



Phase-out Targets

HPMP Stage-III will be the last of the HPMPs for India. It will assist the country in achieving compliance with the Montreal Protocol's 2025 and 2030 control targets for consumption of Annex C-Group I substances (HCFCs) with complete phase-out of HCFC-22 by 1.1.2025 in all manufacturing sectors as per the Ozone Depleting Substance (Regulation and Control) Rules 2000, as amended in 2014. In addition, HPMP Stage-III addresses phase-out of HCFC-22 in the RAC manufacturing sector, servicing sector, capacity building, project activities, policy and regulations, enforcement training, etc. for the successful and sustainable implementation of complete phase-out of HCFCs by 2030, with a service tail of 2.5 percent of the baseline of HCFCs.

Impact

Implementation of HPMP-Stage-III will result in sustainable reductions of 10678.87 MT or 579.99 ODP tonne of HCFCs consumption from the starting point, contributing to India's compliance with the 2025 and 2030 control targets for Annex C-Group I substances (HCFCs) under the Montreal Protocol. In addition, the project will result in net direct CO2-equivalent emission reductions of 19,239,929 tonnes CO2-eq. from 2030 onwards.

The project will result in net direct CO2-equivalent emission reductions of

19,239,929

tonnes CO2-eq. from 2030 onwards.

Implementing Agencies

United Nations Development Program (UNDP) is the lead implementing agency for HPMP Stage-III and the United Nations Environment Program (UNEP) and Deutsche Gesellschaft für Internationale Zusammenarbeit, (GIZ) Proklima, Government of Germany are the cooperating agencies.

All the activities relating HPMP Stage-III will be implemented under the supervision of Ozone Cell, Ministry of Environment, Forest and Climate Change (MoEF&CC) and in close cooperation with the concerned stakeholders.

INTRODUCTION

Objectives

The objectives of India's HPMP Stage-III are:

- To facilitate India's compliance with the Montreal Protocol's 2025 and 2030 control targets for consumption of Annex C - Group I substances (HCFCs) through complete phase-out of HCFCs by 1.1.2030, in line with the accelerated phase-out schedule of the Montreal Protocol.
- To sustain the phase-out of HCFCs through implementation of a combination of interventions for technology transfer, training and capacity-building, awareness, monitoring, and management in refrigeration and air-conditioning manufacturing sectors, and policy and regulatory actions.

India ratified the Vienna Convention for the Protection of Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer as early as in 1991 and 1992 respectively.

Background

Ozone-Depleting Substances (ODS) Phase-out Activities in India

India is the second largest producer and consumer of ODS after China amongst the Article-5 countries (developing countries). India ratified the Vienna Convention for the Protection of Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer as early as in 1991 and 1992, respectively. The dates of accession by India of the Montreal Protocol and its amendments are as follows:

Figure 2: Dates of Accession to Montreal Protocol and its Amendments by India

India's Country Programme for phase-out of ODSs under the Montreal Protocol was developed in August 1993 with the assistance of the United Nations Development Programme (UNDP) and other nodal line Ministries/Departments of the Government and concerned agencies including research and academic institutions.

India's Country Programme was approved at the 11th Meeting of the Executive Committee (Ex-Com) of the Multilateral Fund (MLF) for Implementation of the Montreal Protocol, held in November 1993. India's Country Programme implementation was contingent upon availability of adequate technical and financial assistance for mitigating the incremental costs of ODS phase-out.

The Country Programme forecasted an unconstrained demand for ODS of

96,000

metric tons by 2005, from a level of

10,370

metric tons in 1991, but successful implementation of the phase-out led to an actual demand of only about

9,000

metric tons in 2005.

India put in place policies and regulations, including banning the use of Chlorofluorocarbons (CFCs) in manufacturing of new equipment from 1st January 2003, that led to significant progress in controlling the production and consumption of ODS. The Country Programme forecasted an unconstrained demand for ODS of 96,000 metric tons by 2005, from a level of 10,370 metric tons in 1991, but successful implementation of the phase-out led to an actual demand of only about 9,000 metric tons in 2005. This was accomplished with proactive policy and regulatory actions by the Government of India and technical and financial assistance from the MLF along with the support from implementing and bilateral agencies. The ODSs phase-out activities in India from 1993 until December 2016 are summarized in Table 1.

Table 1: MLF-supported ODS Phase-out Activities in India until December 2022

Sector	Number of Projects	Funding (US$)	Phase-out (ODP tons)
Aerosols Sector (CFC)	38	13,705,006	1,702
Foams Sector (CFC)	163	37,880,185	5,074
Firefighting Sector (Halons)	21	5,176,701	2,719
Institutional Strengthening	8	2,738,166	31
Refrigeration & Air Conditioning Sector (CFC)	87	31,827,256	3,983
Solvents Sector (including CTC production)	41	61,358,042	12,966
Production Sector (CFC and Halons)	15	84,228,000	20,107
HPMP Stage-I Preparation	1	570,000	----
HPMP Stage-I (HCFC-141b and HCFC-22)	1	21,294,490	342
HPMP Stage-II Preparation	1	490,000	----

Sector	Number of Projects	Funding (US$)	Phase-out (ODP tons)
Demonstration Project in Foam Sector Preparation (HCFC-141b)	1	30,000	----
Survey on ODS Alternatives	1	180,000	----
HPMP Stage-II (HCFC-141b and HCFC-22)	1	44,911,459	769
HPMP Stage-III Preparation	1	450,000	----
Enabling Activities for HFC Phase down under the Kigali Amendment to the Montreal Protocol	1	250,000	----
HPMP Stage-III (HCFC-22, HCFC 142b, HCFC-123 and HCFC 124)	1	25,157,632	579.99
TOTAL	**385**	**330,066,937**	**48,241.99**

Source: MLF Secretariat – Inventory of approved projects.

All the projects and activities related to production and consumption of CFCs, CTC, halons and HCFC-141b have been successfully completed either on or ahead of schedule. The projects and activities related to the HCFC phase-out which have been recently approved are under implementation.

ACCLERATED PHASE-OUT OF HCFCs

The 54th Meeting of the Ex-Com of the MLF in April 2008, through Decision 54/39, adopted guidelines for preparation of HCFC Phase-out Management Plans (HPMPs), which provided an indicative outline and content of the HPMPs. The key elements of the guidelines were:

a) Adoption of a staged approach for HPMPs within the context of an overarching strategy for HCFC reductions and phase-out as per the adjusted schedule. The HPMP (stage I) focused on compliance with the 2013 freeze and 2015 reduction targets.

b) Prioritization of HCFCs for phase-out by ODP, like HCFC-141b, which has highest ODP among HCFCs is to be phased out first and subsequently other HCFCs with lower ODP.

c) Commitments to achieve the 2013, 2015, 2020, 2025 and 2030 control milestones through performance-based agreements.

HCFCs are used in the foam manufacturing, refrigeration and air conditioning industry. During the implementation of the CFC phase-out under the Montreal Protocol, HCFCs were introduced as transitional substitutes for ODSs wherever other non-ODS technologies were not available. Due to sustained economic growth experienced by developing countries, like India, the demand for consumer and industrial products using HCFCs increased rapidly.

Initially, for Article 5 Parties (developing countries), the scheduled phase-out date for HCFCs was 1st January 2040. The XIX Meeting of the Parties (MOP) to the Montreal Protocol held in September 2007, in its Decision XIX/6, accelerated the phase-out schedule for HCFCs by 10 years. The accelerated schedule for phase-out started with an interim control measure of freezing HCFC production and consumption at 2013 levels with the first reduction of 10% on 1st January 2015, against baseline years of 2009-2010 average consumption. Subsequent control steps are 35% reduction by 2020, 67.5% by 2025, 97.5% by 2030 and complete phase-out from 1st January 2030. A service tail of 2.5% of the baseline is allowed till 2040. The baseline for HCFC consumption was 1608.20 ODP tonnes (average consumption for 2009 and 2010).

India being the second largest producer and consumer of HCFCs, with accelerated reduction in consumption and production of HCFCs, will make a significant contribution towards protection of the Ozone Layer and the Climate System.

Considering the importance and challenges in implementation of the accelerated phase-out of HCFCs as per the Decision XIX/6 of accelerated phase-out of HCFCs, India initiated activities in 2009 with awareness programmes, collection and collation of data on consumption of HCFCs in various sectors, sectoral strategy especially for foam, Refrigeration and Air Conditioning (RAC), and development of Roadmap for phase-out of HCFCs, which was launched in 2009.

India being the second largest producer and consumer of HCFCs, with accelerated reduction in consumption and production of HCFCs will make significant contribution towards protection of the Ozone Layer and the Climate System.

Implementation of HPMP Stage-I

The HPMP Stage-I was submitted for the consideration of the Ex-Com of the MLF at its 66th meeting held in April 2012, during which the Ex-Com of the MLF approved the HPMP Stage-I for India with a total funding of US$21.3 million which included US$18.44 million for implementation by UNDP (Lead Implementing Agency), US$1.99 million for implementation by GIZ Proklima, Government of Germany, and US$0.86 million by United Nations Environment Programme (UNEP). The funding was approved for achieving a total phase-out of 341.77 Ozone Depleting Potential (ODP) tonnes from the starting point of 1,691.25 ODP tonnes. This starting point was arrived at by addition of 1,608.2 ODP tonnes of consumption baseline for India and import of 83.05 ODP tonnes of pre-blended polyol containing HCFC-141b in the baseline years, thus arriving at the starting point of 1,691.25 ODP tonnes for HPMPs.

The implementation of the Stage-I was completed by 31 December 2017 and project closure report submitted to the Ex-Com of the MLF. The highlights of the achievements of HPMP Stage-I include:

(a) **PU Foam Sector (UNDP):** 15 large-sized enterprises in the foam manufacturing sector were assisted to phase-out their use of HCFC-141b, including eight (8) domestic refrigeration manufacturing enterprises; two (2) continuous sandwich panel manufacturers; and five (5) enterprises in discontinuous (sandwich) panels. In addition, 15 system houses were also assisted in developing HCFC-free polyol formulations with low GWP blowing agents.

(b) **Refrigeration and Air-conditioning (RAC) Servicing Sector (GIZ):** The servicing sector has targeted technicians training and institutional strengthening activities, awareness, customs and policy training components.

(i) The training programs for the RAC technicians in room air conditioners up to 2 tonnes were conducted in the country, through two training modules: One module was for installers and the other module for service technicians.

(ii) The trainers were trained through Training of Trainers (ToT) programs by leading international faculty/consultants. Three ToTs were conducted under the project and 50 trainers were trained.

The module for servicing trained a total of

9,240

technicians through

332

training programs and the module for installers trained a total of

2,036

technicians through

76

training programs.

(iii) Training material was developed for the technicians and the trainers.

(iv) The project has trained total 11,276 technicians through 408 training programs. The module for servicing trained a total of 9,240 technicians through 332 training programs and the module for installers trained a total of 2,036 technicians through 76 training programs.

(c) **Enabling Activities under the AC-R Servicing Sector (UNEP):** In collaboration with the National Academy of Customs Indirect Taxes and Narcotics (NACIN), training materials were developed, including the Country Handbook on the National Regulations for Monitoring and Controlling Production and Use of Ozone-Depleting Substances in India, which was published in December 2016; two train-the-trainers workshops for customs officers with 48 participants were organized; and a workshop on zero- and low-global warming potential alternatives for the building sector was organized:

(i) 93 Trainers were trained;

(ii) 320 Supervisory Officers of Customs, Other enforcement agencies (DRI, BSF) and senior decision makers on ODS issues were trained;

(iii) Risk profiling workshop conducted with international resources in UNCC Bangkok with participation by NACIN, DRI and National Ozone Units of India, Maldives, Pakistan and Sri Lanka. The aim of the workshops was to assist customs of selected countries to integrate risk profiling techniques into ODS control enforcement.

(iv) Refrigerant identifiers were procured and supplied to the priority customs ports and border check points.

(v) AC-R service sector training videos were developed in 5 regional languages.

(vi) Newsletter and videos on RAC servicing best practice were developed and distributed.

(vii) Refrigeration and Air-conditioning Service Sector Society (RASSS) was supported.

Through its HPMP Stage-I, India has successfully met the 2013 target of a freeze of HCFC Production and Consumption and 10% phase-out targets of HCFCs in 2015, resulting in an environmental benefit with net direct emission reductions of 3,071,260.5 t.CO2-eq.

Implementation of HPMP Stage-II

The Stage-II of HPMP for India was approved at the 77th meeting of the Ex-Com of the MLF, for the period 2016 to 2023, to reduce HCFC consumption by 60 per cent of the baseline of 1608.20 ODP tonnes, for the total amount of US $ 48,315,261, consisting of: US $38,911,459, plus agency support costs of US $ 2,723,802 for UNDP, US $ 900,000, plus agency support costs of US $ 109,000 for UNEP, and US $ 5,100,000, plus agency support costs of US $ 571,000 for the Government of Germany. The highlights of the HPMP Stage-II include:

A total of 160 duly verified and deemed enterprises that were found eligible by a third party were participating in the HPMP stage-II.

a) **PU Foam Manufacturing Sector (UNDP):** Consistent with the Ex-Com guidelines and the Ozone Depleting Substances (Regulation and Control), 2000 as amended in 2014, the polyurethane foam sector has been prioritized for phase-out actions for complete phase-out of HCFC-141b by 1.1.2020. The blowing agents Cyclopentane (C5), Methyl Formate (Ecomate) water, and Hydrofluoroolefins (HFOs) have been selected for the conversions in the foam manufacturing sector.

(i) A total of 160 enterprises, duly verified and deemed eligible by third party, were participating in the HPMP stage-II. These enterprises accounted for 2,630.11 MT of consumption of HCFC-141b. The conversion activities in the enterprises had been operationalized through Memoranda of Agreement (MOA) signed between each participating enterprise and the Ozone Cell, MoEF&CC. The MOA contained the legal obligations as well as the schedule of milestones to be achieved. Technical Assistance activities involving hand-holding support and guidance of enterprises with respect to alternative technologies was required to operationalize the MOAs with enterprises.

(ii) A technical institute, Centre for Petrochemicals Engineering and Technology (CIPET) Government of India, having expertise in PU foam technologies, has been on-boarded to provide hand-holding technical support to the participating foam

Centre for Petrochemicals Engineering and Technology (CIPET) Government of India, having expertise in PU foam technologies has been on-boarded to provide hand-holding technical support to the participating foam manufacturing enterprises under HPMP Stage-II.

manufacturing enterprises under HPMP Stage-II. The technical institute along with Ozone Cell, MoEF&CC provided technical support to enterprises under a competency enhancement framework, which included training workshops, trials, on-site demonstrations and support, practical hands-on-training and product validation. The technical institute also provided the testing facilities for non-HCFC and low GWP formulations and foam products certification. It also addressed issues related to physical technology conversion of the enterprises. The technical assistance support of CIPET to the enterprises proved to be the key for successful sustainable implementation of complete phase-out of HCFC-141b in foam manufacturing sector.

(iii) M/s Mott MacDonald has been commissioned as an independent third party by UNDP for the on-site verification of the completion of deliverables/milestones as per the MOA by each participating enterprise. The UNDP, Ozone Cell and an expert technical institution, supported by international experts, provided assistance to the enterprises to move forward and complete the technology conversion activities.

(iv) M/s Mott MacDonald, after physical site verification, confirmed that the participating enterprises have phased out the use of HCFC 141b and no stocks of HCFC 141b are available at any of the manufacturing sites.

b) **Air Conditioning Manufacturing Sector (UNDP):** In the air-conditioning sector, India is phasing out 1,140 MT of HCFC-22 consumption in six (6) room air-conditioning manufacturing enterprises that volunteered to participate in the HPMP Stage-II activities by technology conversion to HFC-32.

c) **Servicing Sector (UNEP and Germany):** 1,250 MT of HCFC-22 is also being phased-out through activities in the servicing sector implemented by GIZ and UNEP: The activities include:

Sixty Trainers have been trained through Training of Trainers (TOT) Programmes, knowledge products were developed, printed and widely disseminated, including among the training partners across the country.

(i) Training of 17000 RAC service technicians has been completed. Sixty trainers have been trained through Training of Trainers (TOT) Programmes, knowledge products were developed, printed and widely disseminated, including among the training partners across the country. Syllabus for RAC service trade (ITIs) has been updated to include alternative refrigerants, including flammable refrigerants and good service practices.

(ii) Developed a concept note for the national implementation of a certification system and discussed in Stakeholder Consultation workshop. Proceedings of the workshop were prepared and widely disseminated. Further work on the recommendations of the workshop is in progress.

(iii) Training of trainers for ITI Instructors (TOT), one training program has been completed and the remaining two training programmes will be completed by December 2022,

(iv) Syllabus for RAC service trade (ITIs) has been updated to include alternative refrigerants including flammable refrigerants and good service practices.

(v) Discussions initiated with institutions like Central Public Works Department (CPWD) and Delhi Metro for conducting training on good servicing practices. Modalities including structure of training, are being worked out.

d) **Enabling Activities for Servicing Sector (UNEP)**

Ozone Cell, MoEF&CC, in association with the UN Environment (UNEP) has been implementing the enabling components of HPMP Stage-II. The following activities were undertaken:

(a) Under the Customs and Enforcement capacity building component, Memorandum of Agreement has been signed between Ozone Cell and National Academy of Customs, Indirect Taxes and Narcotics (NACIN) for undertaking activities under customs and enforcement capacity building. Workshops have been organized for the customs and enforcement personnel. In addition, the field customs establishments were also sensitized through the NACIN on the prohibition of HCFC-141b imports in the country.

A study report on sensitizing building construction community on passive cooling design, Non-ODS, Low-GWP and Energy-Efficient Technologies in association with M/s Construction Industry Development Council (CIDC) has been completed.

(b) To facilitate the smooth and sustainable phase-out of HCFCs, the following studies have been completed:

i. Application of non-ODS and low-GWP alternatives in Cold Chain Sector in India in association with M/s Pricewaterhouse Coopers Ltd. (PWC).

ii. Public Procurement Policies for RAC Equipment using Non-ODS based refrigerants in association with M/s The Energy and Resources Institute (TERI).

iii. Application of non-ODS and low-GWP alternatives in Building Sector in India in association with M/s Alliance for Energy Efficient Economy (AEEE).

iv. Assistance for the development of national standards to be framed by the Bureau of Indian Standards (BIS) for low-GWP Refrigerants in association with IIT, Delhi.

v. Study report on sensitizing building construction community on passive cooling design, Non-ODS, Low-GWP and Energy-Efficient Technologies in association with M/s Construction Industry Development Council (CIDC).

vi. Service sector enterprises/ technicians in RAC sector in association with M/s NTPC School of Business.

(c) The following studies have been commissioned:

(i) Study on Good Management Practices for energy efficient buildings by introducing Passive Cooling designs, to reduce operational costs, improve health and comfort and promote use of non-HCFC and low-GWP alternatives.

(ii) Study on Good Management Practices for Cold Storage (warehouse) infrastructure used in e-commerce business highlighting application of non-HCFC and low Global Warming Potential (GWP) refrigerant-based energy efficient cooling systems.

(iii) Study on Public Procurement policies for hiring trained and certified RAC service technicians an agreement.

(d) Information products regarding training and certification of refrigeration and air conditioning service technicians highlighting the benefits of training and certification were disseminated to service technicians across the country.

(e) Awareness material comprising 18,000 Posters on “Good Service Practices for Room Air-Conditioners” and “Copper Tube operations” as part of Good Service Practices, 30,000 flyers, 20,000 multi-color stickers on Good Service Practices for Room Air-

The Implementation of the HPMP-Stage-II will result in sustainable reductions of

8,190 MT

or

769.49 ODP

tonnes of HCFC consumption from the starting point of

1691.25 ODP

tonnes by 2023.

Conditioners, 700 copies of pocket handbook "Quick guide" on good servicing practices on handling flammable refrigerants and a booklet on Good Servicing Practices for energy efficient operation of Room Air-conditioners, highlighting the benefits of training and certification was disseminated to service technicians across the country.

(f) 10 awareness workshops for RAC dealer technicians have been conducted. Further, information products and outreach materials targeted towards the service sector, material for RAC technicians on Good Servicing practices in RAC equipment for the improvement of Energy Efficiency, has been developed and disseminated.

(g) The website is regularly updated. Separately, as part of awareness generation and information dissemination activates, the ozone cell has set up a YouTube channel, Facebook and Twitter pages.

The Implementation of the HPMP-Stage-II will result in sustainable reductions of 8,190 MT or 769.49 ODP tonnes of HCFC consumption from the starting point of 1691.25 ODP tonnes by 2023, contributing to India's compliance well in advance with the control targets for HCFCs under the Montreal Protocol. The ongoing implementation of Stage-II will result in net direct CO2-equivalent emission reductions of about 8,530,900 mt CO2 eq. per year from 2023 onwards.

INSTITUTIONAL AND REGULATORY FRAMEWORK

Institutional Framework

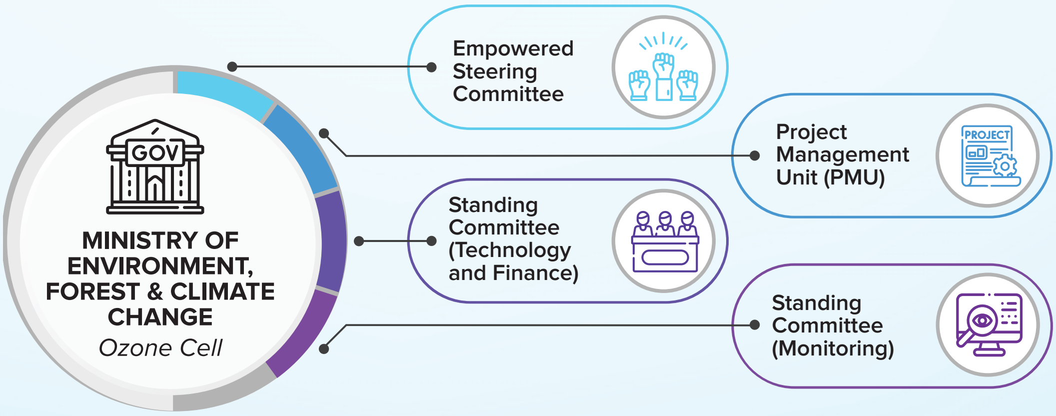
The Government of India has entrusted the work relating to the Protection of the Ozone Layer to the Ministry of Environment, Forest and Climate Change (MoEF&CC). The MoEF&CC established the Ozone Cell within the Ministry, which is dedicated to management and coordination of the implementation of the Montreal Protocol in India. The functions and responsibilities of the Ozone Cell include notification of regulations pertaining to the Montreal Protocol, 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 ESC is responsible for providing an overall policy direction for implementation of the Montreal Protocol, review of various policy and implementation options, project approvals and project monitoring.

The Government of India had also constituted an Empowered Steering Committee (ESC) with Secretary MoEF&CC as chairperson and comprising representatives of various line ministries and other national stakeholders. The ESC is supported by two Standing Committees, namely the Technology and Finance Standing Committee (TFSC) and Standing Committee on Monitoring. The ESC is responsible for providing an overall policy direction for implementation of the Montreal Protocol, review of various policy and implementation options, project approvals and project monitoring.

The institutional arrangements for implementation of the Montreal Protocol in India are depicted in Figure 3.

Figure 3: Institutional Framework



The Project Management Unit (PMU) in the Ozone Cell assists in the implementation of the activities relating to implementation of the Montreal Protocol, including ODS phase-out projects.

Policies and Regulations

The guiding principles for various policies and regulations assimilating the national priorities are detailed in the Country Programme. The important principles are as follows:

a) To strengthen national institutions for monitoring and managing ODS phase-out.
b) To assist indigenous industries for conversion to non-ODS technologies through the Montreal Protocol financial mechanism, while ensuring that the MSMEs and other unorganized tiny enterprises are fully compensated for conversions, including retraining.
c) 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.
d) To maximize indigenous production by encouraging technology transfer for local production of non-ODS substitutes.
e) To evaluate alternatives to ODS and the available substitute technologies on a continuing basis, so as to lead to wider adaptation and dissemination.
f) To promote recycling, reclamation, retrofitting and drop in substitutes to prolong economic life of existing equipment, until new replacement technologies become mature, cost-effective and available.
g) To institute decentralized management of ODS phase-out activities for smooth implementation.
h) To facilitate development of new standards and certification systems for products and processes, including those for safety.
i) To integrate the ODS phase-out activities closely with the growth in the various industrial sectors, economic reforms and policies, etc.

The Ozone-Depleting Substances Rules, 2000 have been amended eight times till 2019 to provide for the emerging needs and developments for successful implementation of the Montreal Protocol.

Ozone-Depleting Substances (Regulation and Control) Rules, 2000

Recognizing the importance of establishing an effective regulatory framework for the successful implementation of the ODS phase-out programme and meet the obligations of the Montreal Protocol, MoEF&CC initiated a forward-looking regulatory framework to support the various ODS phase-out measures.

In exercise of the powers under Sections 6, 8 and 29 of the Environment (Protection) Act, 1986, Government of India formulated the Ozone Depleting Substances Rules, 2000, which were published in the Gazette of India in July 2000. The above rule was finalized after detailed consultation with the public and stakeholders. These rules since then have been amended eight times (2001, 2003, 2004, 2005, 2006, 2007, 2014 and 2019) to provide for the emerging needs and developments for successful implementation of the Montreal Protocol. The salient features of the ODS Rules are summarized as below:

ODS Production

a) Prohibition in creating new capacity or expansion of capacity in non-feedstock use.
b) Restriction on production levels as per "base level" and specified time-bound reductions.
c) Allocation of annual production quota based on production share in baseline for each producing enterprise.
d) Mandatory registration with the Ozone Cell, Ministry of Environment, Forest and Climate Change.
e) Filing of returns to Ozone Cell at prescribed intervals.

ODS Consumption

a) Ban on new capacity or expansion of capacity for manufacturing products and equipment containing designated ODS.

b) Mandatory registration with designated authorities.

c) Declaration requirement in prescribed format at the time of procurement of ODS.

d) Restrictions on manufacturing of ODS-based products in various sectors.

e) Filing of returns to Ozone Cell at prescribed intervals.

ODS Trade

a) Mandatory registration for exporters & importers with designated authorities.

b) Licensing of import of ODS and ODS containing equipment.

c) Ban on trade with Non-Parties: export restricted to countries who are parties to the Montreal Protocol and amendments against quota.

Registration and Reporting

a) Mandatory registrations for reclamation and destruction of ODS.

b) Every entity that produces, uses, imports, sells, stocks, reclaims or destroys ODS has to maintain records and file reports as specified.

c) 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.

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.

Ozone Depleting Substances (Regulation and Control) Rules as amended in 2014.

The Ozone Depleting Substances (Regulation and Controls) Rules, 2000, have been amended in 2014 to align and cater to the needs of the accelerated phase-out of HCFCs. The Ozone-Depleting Substances (Regulation and Control) Amendment Rules, 2014 was published in the Gazette of India in April, 2014. The salient features of these Rules are as follows:

a) Control of production and consumption of HCFCs as per the accelerated phase-out schedule of HCFCs.

b) Licensing system for import of HCFCs.

c) Introduction of quota system for production and supply of HCFC to the domestic market for non-feedstock application for the domestic producers.

d) Prohibition on import of pre-blended polyols containing HCFCs.

e) Prohibition on import of blends containing ODSs, including HCFCs from 1st January 2013.

f) Prohibition on creation of new capacities to manufacture products with HCFCs from April 2014.

g) Prohibition in use of HCFCs in manufacturing of Domestic Refrigerators and Continuous Sandwich Panels after 1st January 2015.

h) Prohibition on import of HCFC based Air-conditioners from 1st July, 2015.

i) Prohibition on manufacturing of other Foam products using HCFCs from 1st January 2020.

j) Prohibition on manufacturing of Air-conditioners and RAC products with HCFCs from 1st January 2025 to meet the 2025 phase-out target of 67.5%.

Ozone Depleting Substances (Regulation and Control) Rules as amended in 2019.

The Ozone Depleting Substances (Regulation and Controls) Rules, 2000, have been amended in 2019 inter alia prohibiting issuance of import license form HCFC 141b from 1st January 2020.

Licensing System for Import/Exports

India introduced the licensing system for Ozone Depleting Substances in 1996 based on recommendation of the Meeting of the Parties (MOP) at Vienna in 1995. Trade in ODS with non-party countries has been banned. Harmonized classification of commodity codes, consistent with international system has been developed and put in place. HCFCs are covered by an import licensing system. The ODS Rules list 38 HCFCs for which an application for import is to be made. Import is permitted only against an import license. The import/export license is issued by the Directorate General of Foreign Trade (DGFT), Ministry of Commerce and Industry, Government of India, based upon the recommendations of the Ozone Cell, MoEF&CC.

Import and Export of HCFCs

The Ozone Cell monitors and regulates the use of HCFC as per Ozone Depleting Substances (Regulation and Control) Rules, 2014. The MoEF&CC issues quota order for production of HCFC-22 for controlled uses to meet the compliance targets as per the Montreal Protocol schedule.

Most notably, through regulatory and policy measures, India has successfully met the 2013, 2015 and 2020 compliance target of the accelerated phase-out schedule of the Montreal Protocol and achieved the phase-out targets in line with the approval of the Ex-Com of the MLF and the agreement between the Ex-Com of the MLF and the Government of India.

The Government of India provides for full exemption from Customs and Excise tariffs on capital goods required to implement ODS phase-out projects funded by the MLF.

Fiscal Measures

The Government of India provides for full exemption from Customs and Excise tariffs on capital goods required to implement ODS phase-out projects funded by the MLF. This exemption has been extended to ODS phase-out projects which were eligible for funding under the MLF, regardless of whether such enterprises actually sought assistance from the MLF. The provisions 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 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.

PREPARATION OF HPMP STAGE-III

To assist India for the preparation of its HPMP (Stage-III), UNDP, on behalf of the Government of India, submitted a request for preparation funding to the 87th Meeting of the Ex-Com for the development of an overarching HPMP strategy and preparation of Sector Plans for achieving the 2025 and 2030 compliance targets. The total funding approved was US$ 450,000. The funds approved for each agency in preparation the HPMP is shown below:

Table 2: HPMP Stage-III Preparation Funding

Agency	Sector	Funding approved (US $)
UNDP	Overarching	30,000
UNEP	Overarching	20,000
Germany	Overarching	40,000
UNDP	Refrigeration Manufacturing Sector	150,000
UNDP	Air-conditioning Manufacturing Sector	150,000
UNDP	Fire-fighting Manufacturing Sector	60,000
Total		**450,000**

The methodology for data collection was designed to allow for both top-down and bottom-up approaches, enabling the comparison of data from various sources to get a more accurate estimate of the current use of ODS and ODS alternatives by substance and sector.

Firstly, data were compiled through desk research, using information available from institutional sources, such as inter alia, HCFC Consumption Verification Reports, Country Programme and Article 7 Reports, and other important documents collected from Ozone Cell, data from importers, the Customs and Excise Office, and the Associations of Refrigeration and Air Conditioning, the Fire Department Service and Civil Defense. These sources constituted the top-down (qualitative/secondary) data sources.

After being appointed as a consultant by UNDP, Ernst and Young India LLP conducted a "bottom-up" survey to collect information on the air-conditioning manufacturing sector.

AC Manufacturing Sector

UNDP appointed M/s Ernst and Young LLP as the consultant (herein after called "Ernst and Young India LLP "). Ernst and Young India LLP conducted a "bottom-up" survey to collect information on the air-conditioning manufacturing sector, based on information from industrial databases, enterprises registered with Ozone Cell, MoEF&CC, enterprises registered with the Ministry of Micro, Small and Medium Enterprises (MSMEs), the Central and State Pollution Control Boards working under consent and the participants in the awareness workshops. As part of preparation of HPMP Stage-III, Ernst and Young India LLP organized six awareness and stakeholder consultation workshops across the country to create awareness on HPMP, the alternative technologies and the funding guidelines.

Through these efforts, a total of 30 enterprises were long listed in the air-conditioning sector. A survey questionnaire was developed for the purpose of obtaining information relating to the enterprise to assess the eligibility and was circulated to all the 30 identified enterprises. In total, 21 enterprises from the air-conditioning sector were responsive to the survey and submitted the filled information required to continue the eligibility assessment. The screening of information submitted by the company concludes the 18 companies were, in principle, found eligible to receive MLF assistance.

Ernst and Young India LLP proceed then to carry out physical site verification of all the 18 (in principle) eligible enterprises in the air-conditioning sector to confirm the eligibility through verification and obtain additional required information for project preparation comprising type and number of products manufactured, HCFC-22 consumption and baseline equipment. Geotagged photographs of the manufacturing facility, manufacturing process and baseline equipment were also taken as part of the verification exercise and included as part of the verification report.

In the physical site verification, it was established that 16 enterprises in this sector are eligible for inclusion in HPMP Stage-III, having a consumption of 222.92 MT (12.26 ODP tonnes).

Refrigeration Manufacturing Sector

Ernst and Young India LLP was also appointed by UNDP to conduct a survey to collect information on the refrigeration manufacturing sector, based on information from industrial databases, enterprises registered with Ozone Cell, MoEF&CC, enterprises registered with the Ministry of Micro, Small and Medium Enterprises (MSMEs), operating under the consent with the Central and State Pollution Control Boards and the participants in the awareness workshops.

As part of preparation of HPMP Stage-III, Ernst and Young India LLP organized six awareness and one national stakeholder consultation workshops across the country to create awareness on HPMP.

As part of preparation of HPMP Stage-III, Ernst and Young India LLP organized six awareness and one national stakeholder consultation workshops across the country to create awareness on HPMP, the alternative technologies, the funding guidelines, etc., to get all the eligible enterprises included in the HPMP Stage-III. Through these efforts, a total of 138 enterprises in the refrigeration sector were identified. A survey questionnaire was developed for the purpose of obtaining information relating to the enterprises to assess their eligibility and was circulated to all the 138 identified enterprises. In total, 93 enterprises from the refrigeration sector responded to the survey and submitted the filled-in questionnaires.

Physical Site verification was carried out for all the manufacturing process followed, HCFC-22 consumption and baseline equipment of 53 (in principle) eligible enterprises in the refrigeration sector to confirm their eligibility through verification of supporting documents in original and to get the required information for project preparation comprising type and number of products manufactured, including equipment. Geotagged photographs of the manufacturing facility, manufacturing process and baseline equipment were also taken as part of the verification exercise and included as part of the verification report.

Following the physical site verification, it was established that 48 enterprises in this sector are eligible for inclusion in HPMP Stage-III, having a consumption of 163.19 MT (8.98 ODP tonnes).

Fire-Fighting Sector

The preparation of HPMP Stage-III included six awareness cum stakeholder consultation workshops wherein enterprises from the firefighting sector were invited to participate and made aware of the funding and eligibility guidelines for the firefighting equipment manufacturing enterprises. The identified enterprises were deemed ineligible for participation in the HPMP Stage-III as they did not meet the MLF baseline criteria, such as establishment and use of HCFC-123 prior to 21.09.2007.

Stakeholders Engagement

Six stakeholders' consultation and engagement workshops were conducted across India, as given in the figure below.

Figure 4: Stakeholder Consultation Workshops Schedule

Across the 6 regional and national stakeholder consultation workshops,

500+

stakeholders participated from government departments or organisations.

A National Stakeholder Workshop was also organized on July 22, 2022 with stakeholders from the industry and regulatory authorities to deliberate on and discuss the draft HPMP Stage-III strategy for the refrigeration and air-conditioning manufacturing sectors, as well as, the strategy for the RAC servicing sector. The workshop was designed to gather feedback from stakeholders on multiple aspects including, the process of HPMP Stage-III development, availability and viability of technology alternatives for HCFC phase-out, recovery and recycling options, and training needs of various industry sub-sectors.

The main stakeholders consulted during the preparation and stakeholder consultation missions were listed in table 3. Across the 6 regional and the national stakeholder consultation workshop, 500+ stakeholders participated from government departments/ organisations such as DGFT, NACIN, DST, NCCD, Ministry of MSME, BIS, SPCBs, industry associations, manufacturing and servicing enterprises.

Table 3: Stakeholder Participation in Consultation Workshops

Type of Stakeholder	Particulars
State Pollution Control Boards (SPCBs)	• SPCBs of Chhattisgarh, Madhya Pradesh, Rajasthan, Goa, Karnataka, Kerala, Chandigarh, Haryana, Himachal Pradesh, Punjab, Andhra Pradesh, Tamil Nadu, Telangana, West Bengal, Uttar Pradesh, Uttarakhand, Maharashtra, Assam, Gujarat
Pollution Control Committees (PCCs)	• PCC of Delhi, Pondicherry, Andaman & Nicobar, Dadra & Nagar Haveli
Ministry of MSME	• Representative of concerned state of the Ministry of MSME
Industry Associations	• Refrigeration and Air-Conditioning Manufacturers Association (RAMA) • A webinar conducted with RAMA industry members to generate awareness on HPMP Stage-III and encourage participation • Refrigeration and Air-Conditioning Trades Association Ltd. (RATA) • Indian Society of Heating, Refrigeration and Air-Conditioning (ISHRAE) • Refrigeration and Air-Conditioning Servicing Sector Society (RASSS) • All India Air-conditioning & Refrigeration Association (AIACRA)
Manufacturing Enterprises	Manufacturing enterprises from following sectors: • Refrigeration Manufacturing • Air-Conditioning Manufacturing • Firefighting Equipment Manufacturing
RAC Servicing Sector	RAC servicing enterprises and servicing technicians

Gender

In response to the Decision 84/92, a gender sensitive survey was carried out to collect data and assess the gender-responsive baseline activities and data. For the manufacturing sector, additional survey to assess the number of employees by gender and the internal policies potentially applied by the companies were carried out. In addition, the MLF's Gender Mainstreaming Checklist developed by the Secretariat was applied during this project preparation.

Finalisation of HPMP Stage-III Proposal

The finalised HPMP Stage-III was submitted to the MLF Secretariat through UNDP, the lead implementing agency for HPMP Stage-III for consideration at the 91st meeting of the Ex-Com of the MLF held from 5-9 December 2022 at Montreal, Canada.

HCFCs PRODUCTION AND CONSUMPTION, PROFILE AND ALTERNATIVES

As per current regulations in India, setting up new facilities and expansion of production facilities for controlled uses of all ODSs, including HCFC-22 is prohibited.

India only produces HCFC-22. All other HCFCs are imported using due licensing system. HCFC-22 is produced for both controlled and feedstock uses. It may be mentioned that as per current regulations in India, setting up new facilities and expansion of production facilities for controlled uses of all ODSs, including HCFC-22 is prohibited. It is also noted that the production of HCFC-22 for controlled use has continued decrease due to regulations controlling HCFC supply to the market for controlled applications and the licensing and monitoring systems are in place. In addition, India is an exporter of HCFC-22. The annual exports of HCFC-22 and the annual imports of other HCFCs for controlled uses during 2016-2021 are presented below:

Table 4: India's Annual Production of HCFC-22, 2016-2021 (MT)

Substance/ Year	2016	2017	2018	2019	2020	2021
HCFC-22	31,036.636	32,949.48	34,690.354	35,146.854	24,633.337	21,346.036

Source - Article-7 data reporting

Table 5: India's Annual Exports of HCFCs - 2016-2021 (MT)

Substance/ Year	2016	2017	2018	2019	2020	2021
HCFC-22	19,397.342	23,159.093	24,753.596	25,158.408	19,229.147	17,067.043

Source - Article-7 data reporting

Table 6: India's Annual Imports of HCFCs: 2016-2021 (MT)

Substance/Year	2016	2017	2018	2019	2020	2021
HCFC-22	0	0	0	0	0	0
HCFC-123	373.532	253.468	82.381	77.48	12.993	47.188
HCFC-141b	3638.020	2,526.25	2,896.29	3,494.18	0	0
HCFC-142b	126.000	120.000	0	0	0	0

Source - Article-7 data reporting

Table 7: India's Calculated Annual Consumption and Sector Use of HCFCs, 2016-2021

Substance/ Year	2016	2017	2018	2019	2020	2021
HCFC-22 Total	10,884.294	9,376.95	9,326.13	9,988.446	5,404.19	4,278.993
Manufacturing	5115.624	4407.17	4383.28	4295.031	2323.802	386.105
						194.644
Servicing	5768.67	4969.78	4942.85	5693.415	3080.388	3,698.244
HCFC-141b Total	3,638.02	2,526.25	2,896.29	3,494.180	0	0
Manufacturing	3,638.02	2,526.25	2,896.29	3,494.180	0	0
Servicing					0	0
HCFC-142b Total	126	120	0	0	0	0
Manufacturing	29.37	27.60	0	0	0	0
Servicing	96.63	92.40	0	0	0	0
HCFC-123 Total	373.53	253.47	82.38	77.48	12.993	47.188
Manufacturing	67.23	45.62	14.83	27.118	4.547	24.000
Servicing	306.30	207.84	67.55	50.362	8.446	23.1883

HCFC-22 is exported to 19 countries, while an other HCFC (HCFC-123) is imported primarily from 3 countries and is used for servicing.

ODS Consumption Profile and ODS Alternatives Market

HCFC-22 is exported to 19 countries, while an other HCFC (HCFC-123) is imported primarily from 3 countries and is used for servicing.

In terms of alternative refrigerants to HCFCs used in India, the survey results revealed that in the room air-conditioning (RAC) sub-sector, R-410A and R-32 are the most used alternatives to HCFC-22, while local manufacturers, in the lines supported by the Stage-II of the HPMP, HFC-32 is used. One manufacturer is using R-290.

In the light commercial air-conditioning and chillers sub-sector, R-410A, HFC-134a and R-407C are mainly used as alternatives to HCFC-22. These chemicals are available in the market.

In the case of industrial air-conditioning equipment/process chillers, R-717 (wherever feasible), HFC-134a and R-404A are commonly used. These refrigerants are widely available in the market.

HPMP STAGE-III – OVERARCHING STRATEGY

The HPMP Stage-III will address the complete phase-out of HCFCs in all manufacturing sectors by December 2024.

The HPMP Stage-III would be the last of the HPMPs for India, to be implemented from 2023 to 2030, during which India will have to achieve the 2025 and 2030 compliance targets in the consumption sector as per the accelerated phase-out schedule of the Montreal Protocol for HCFCs.

As per the Ozone Depleting Substances (Regulation and Control) Rules 2000 as amended in 2014, the manufacturing of air-conditioners, manufacturing of other refrigeration and air-conditioning products (excluding compressors), manufacturing of fire extinguishers or fire extinguishing systems and manufacturing of all other equipment or products using HCFC is to be phased out by 1.1.2025. Accordingly, the HPMP Stage-III will address the complete phase-out of HCFCs in all the manufacturing sectors by 31.12.2024. In turn, the activities in the RAC servicing sector would continue until 2030.

The overarching strategy of Stage-III of the HPMP was developed to follow the Montreal Protocol phase-out schedule and the provisions of the Ozone Depleting Substances (Regulation and Control) Rules as amended in 2014 and the principles enshrined in the Country Program of India for phase-out of Ozone Depleting Substances, comprising to have minimum economic dislocation and obsolescence cost and maximize indigenous production for twin environment and economic gains. In addition, the strategy is based on the following guiding principles:

a) It should reflect national context, priorities, national policies and be country-driven;

b) It should be based on developing and demonstrating a strengthened and proactive partnership between government and industry;

c) It should draw upon the lessons learnt from functioning of institutional arrangements and operational mechanisms in implementation of ODS phase-out in the past;

d) It should integrate and build upon existing infrastructures and introduce new mechanisms as needed; and

e) It should be dynamic and evolving and be open for revisions and adaptation as necessary in response to evolving situations.

The selection of non-ODS technology, especially by the MSMEs, is based on factors like economics and easiness of use. Towards competency enhancement of the MSMEs, training and awareness programmes on non-ODS and low GWP alternatives to HCFCs, including adoption of such alternatives, are planned associating government supported technical institution, as done for HPMP Stage-II in the foam manufacturing sector. MSMEs will also be facilitated for adequate tie-ups with laboratories for trials, in addition to organizing study tours, field visits, etc.

Implementation of HPMP Stage-III will result in sustainable reductions of 10678.87 MT or 579.99 ODP tonne of HCFCs consumption from the starting point, contributing to India's compliance with the 2025 and 2030 control targets for Annex-C, Group-I substances (HCFCs) under the Montreal Protocol. In addition, the project will result in net direct CO_2-equivalent emission reductions of 19,239,929 tonnes CO_2-eq. from 2030 onwards.

Regulatory Framework Interventions & Stakeholders Engagement

The Ozone Depleting Substances (Regulation and Control) Rules, 2000, and its amendments continue to be the overarching legal framework for the implementation of HPMP Stage-III. Additional measures will be considered, including inter alia development of framework for technician certification in the refrigeration and air-conditioning servicing sector along with implementation modalities, strengthening monitoring and reporting framework, including of illegal trade of ODS.

Regulatory actions will also be critical to support and sustain the phase-out of HCFCs, particularly in sub-sectors/companies not eligible to receive assistance from MLF. Through this, 194644 tonnes of HCFC-22 consumption in the RAC manufacturing sector will be phased-out.

Besides participating enterprises, the stakeholders comprise of the industry associations, nodal line Ministries, R&D and academic institutions, etc. Periodic stakeholder consultation will be carried out for effective implementation of the HPMP Stage-III. In addition to periodic consultations, review meetings with the participating enterprises will be taken to address issues of concern, which will facilitate timely and effective implementation of the project.

Regulatory actions will also be critical to support and sustain the phase-out of HCFCs, particularly in sub-sectors/ companies not eligible to receive assistance from MLF.

Sector Plans Interventions

The over-arching strategy to phase-out HCFCs in Stage III of the HPMP is founded in the implementation of five (5) Sector Plans:

(a) Air-conditioning - Room Air-Conditioner Manufacturing Sector Plan (UNDP): conversion of 13 companies to low-GWP alternative technologies (HFC-32).

(b) Refrigeration Manufacturing Sector Plan including Process Chillers (UNDP): In the refrigeration manufacturing sector 48 companies (mostly MSMEs) will receive funding and technical assistance for converting to low GWP alternatives (HC-290 and HFC-32) in the subsectors of commercial refrigeration and process chillers.

(c) Air-Conditioning - Light Commercial & Chiller Manufacturing Sector Plan (UNDP): conversion of 3 companies to low-GWP alternatives (HFC-32 in medium-to-large manufacturing enterprises.

(d) RAC Servicing Sector Plan (UNDP and GIZ): Activities to strengthen and considerably expand the reach of technicians training, improve training capacities of national training entities on installation commercial refrigeration units to uptake low GWP alternatives as well as streamline training curricula. In addition, targeted technical assistance activities, including equipment support to technicians and national training institutions will be undertaken.

(e) RAC Servicing Sector (Enabling Activities) Plan (UNEP): Expand activities related to awareness generation, stakeholders' interaction and technical assistance related to RAC targeted issues that may challenge, hinder or be a barrier to the full implementation of the Servicing Sector Plan.

Project Monitoring Unit (PMU)

Project implementation and Monitoring is a critical part of this over-arching strategy so to allow additional human capacities to be added to the Ozone Cell structure and allow the full realization of the proposed Action Plan, particularly given the national settings of India, a large country with large consumption spread out in sectors and companies located in diverse areas of country. The quantity of technicians, stakeholders and training institutions involved in the implementation of the Stage III will require a dedicated team to assure the project is timely implemented following the Rules and Regulations of the MLF and the Implementing Agencies, in addition to supporting reporting systems and facilitating independent verifications and audits.

The structure established for the PMU under the Stage II will be continued under the HPMP Stage III to retain expertise in technical and implementation areas, as well as to assure a smooth transition between projects. The PMU will continue to be facilitated by UNDP and be within the structure of MOEF&CC's Ozone Cell, reporting directly to the National Ozone Officer.

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The PMU will continue to ensure close coordination of activities between the IAs, Ozone Cell and MOEF&CC, assuring the proper reporting lines and deployment of joint activities.

The PMU will continue to ensure close coordination of activities between the IAs and the Ozone Cell, MOEF&CC, assuring the proper reporting lines and deployment of joint activities. The works undertaken by *inter alia* include:

(a) Third party verification of enterprises for eligibility through physical on-site visits

(b) Technical assistance to eligible enterprises.

(c) Third party verification of milestones through physical on-site visits

(d) Management in the implementation of investment projects.

(e) Organization of missions, meetings and technical visits to enterprises.

(f) Preparation of periodic reports and reporting to the Project Steering Committee.

(g) Preparation of technical documentation and organization of meetings for evaluating and making recommendation to the Ozone Cell/MoEF&CC regarding implementation, performance, achievement of milestones, field verification of enterprises and endorsement of disbursements.

(h) Day-to-day administration of the HPMP activities (managerial and operational).

(i) Budget and financial control of approved funds.

(j) Preparation of annual budget reviews pursuant to Implementing Agency's rules and regulations.

Implementation Arrangements

The HPMP Stage-III shall be implemented as per the procedures and guidelines laid down by the ExCom, with country specific project management arrangements between Implementing Agencies, Government, Implementing partner and the participating enterprises.

In, specific Financial, Procurement and Human Resources Rules and Regulations as well as Gender and Environmental and Social Screening Policies of the Implementing Agencies will be observed during implementation.

A competency enhancement arrangement with the MSMEs in the manufacturing sector will be deployed, with support from the PMU, for training and capacity building on non-ODS and low GWP alternatives to HCFCs including adoption of such alternatives to assure smooth introduction of alternatives and compliance with the HPMP requirements. MSMEs will also be facilitated for adequate tie-ups with laboratories for testing and product certification (particularly for energy efficiency), in addition to organizing cooperation activities and exchange of experiences to maintain market competitiveness after conversion.

AIR-CONDITIONING MANUFACTURING SECTOR

The air conditioning sector companies were forced to decrease their overall consumption of

98 TONNES

in 2019 to

~52 TONNES

in 2020 and

47 MT

in 2021 due as a result of the economic impacts of the pandemic.

Sector Analysis

The air conditioning sector in India has experienced a very high growth leading up to 2019, with pre-COVID-19 pandemic levels. The air conditioning companies suffered severely due to the slowdown of economic activity as a result of the pandemic as they were forced to decrease their overall consumption of 98 tonnes in 2019 to ~52 tonnes in 2020 and 47 MT in 2021. Thus, these companies are already contributing to the phase-out with a reduction of 44 tonnes of consumption under a business-as-usual (BAU) scenario.

It is to be noted that this sector is only starting to regain some level of manufacturing prior to COVID and it might expect a significant growth pressure during 2022. This situation will certainly impact the enterprise-wise consumption and will result in a more economical investment project to the MLF which is tied to the companies' ODS consumption in the year 2021. However, a larger co-financing will be required from the companies in order to comply with the conversion project as they return to their usual level of consumption.

This market situation is a reflection of the economic development, increase in purchasing power of the population, fast urbanization, and the harsh climatic conditions in most parts of India due to the recent increase in temperatures. Most of the air conditioning equipment in use today continues to have HCFC-22 as the refrigerant.

There are two air conditioning manufacturing subsectors that uses HCFC-22: (a) residential air conditioners: and (b) light commercial air conditioning systems (ducted package and floor mounted units) and chillers.

Some large residential air conditioning (RAC) manufacturing lines have successfully been converted from HCFC-22 to HFC-32 under the framework provided by Stage II of the HPMP.

In this regard, the remaining enterprises that continue to manufacture AC units based on HCFC-22 are being considered for assistance under Stage-III. The light commercial manufacturing lines using HCFC-22 are being considered for the first time for phase-out of HCFC-22 in this stage. As mentioned earlier, the Ozone Depleting Substances (Regulation and Control) 2000 and its 2014 Amendment prohibits the use HCFCs in the manufacture of any product and equipment containing HCFCs from 1 January 2025. Thus, all enterprises involved in the manufacturing of air conditioning equipment using HCFC-22 have been included in Stage-III despite several technical issues especially in equipments like light commercial air conditioning.

Historically, HCFC-22 has been used in all types of air conditioning equipment with small to large cooling capacities. In a BAU scenario, based purely on market demand, most of the air conditioning manufacturing facilities would be converted from HCFC-22 to high GWP alternative refrigerants like R-410A or R-407C due to their commercial availability, wide knowledge on use and the fact that they are non-flammable while some would potentially use low-GWP technologies like HFC-32. Therefore, MLF interventions will be critical to support major interventions to drive technological change towards the use of lower GWP alternatives in the sector.

MLF interventions will be critical to support major interventions to drive technology change towards lower GWP alternatives in this sector.

In the room/residential air conditioning (RAC) sub-sector, all the large manufacturing lines were included in the HPMP Stage-II to convert the manufacturing from HCFC-22 to HFC-32. The remaining enterprises in the residential air conditioning sub-sector are MSMEs. There are about 13 MSMEs covering 13 technology conversion projects in this sub-sector according to the survey conducted by Ernst and Young Ltd.

These enterprises are grouped into four categories based on their consumption and number of appliances manufactured annually: micro with an annual consumption of <1 MT; small with a consumption of <5 MT; medium with a consumption of < 20 MT; and large with a consumption of >20 MT.

Another sub-sector in air conditioning manufacturing is light commercial air-conditioner and chillers. There are three eligible enterprises covering three technology conversion projects in this sub-sector. The cooling capacity of light commercial air conditioning equipment manufactured by these enterprises varies from 3 TR to 60 TR.

Phase-out Strategy

In the Stage-III Air-Conditioning Manufacturing sector plan, the phase-out of HCFCs will be carried out through both investment activities for the conversion of manufacturing lines and non-investment activities including the enforcement of policies and regulations, awareness-raising activities, and TA activities. A total of 222.92 MT (12.26 ODP tonnes) of HCFCs will be phased-out through 16 conversion projects for enterprises.

The existing ODS (Regulation and Control) Rules, 2000 and its amendments will provide the policy and regulatory framework to ensure a smooth transition to non-HCFC and low GWP alternative technologies.

ODS Alternatives Assessment for Room Air Conditioners (RAC)

HCFC-22 has a long history of being used as a refrigerant in refrigeration and air conditioning sectors due to its favorable thermodynamic and physical properties, stable and inert nature, non-toxicity, and availability and accessibility at a reasonable price.

The technology has been selected after careful assessment of relative merits of different technology options, industry structure, and cost-effectiveness of such technologies. While there is no perfect alternative to HCFC-22 that meets all the above criteria, some of the zero-ODP potential alternative technical options to HCFC-22 for the air conditioning sector are listed in Table 8.

Table 8: Alternative Technical Options Considered for AC Manufacturing Sector

Substance	GWP	Application	Remark
Ammonia	0	Industrial refrigeration and process chillers	• Flammability, toxicity, material compatibility and regulatory issues.
R-290	3	Small-capacity unitary air conditioners domestic and commercial refrigeration equipment	• Flammability issues. Not widely used in large capacity air conditioning systems
R-32	675	Small and medium capacity commercial refrigeration and air conditioning applications	• Single component refrigerant. Mildly flammable. • Higher working pressures than HCFC-22. Main component of R-410A.
R-454B	466	Proposed as alternative to HCFC-22 and R-410A for air conditioning applications	• Blend of HFC and HFO. Mildly flammable and high temperature glide. The flammability and the high temperature glide are the concerns. Commercial availability and accessibility not yet there.
R-454C	148	Proposed as alternative to HCFC-22 and R-410A for air conditioning applications	• Blend of HFC and HFO. Mildly flammable and high temperature glide. The flammability and the high temperature glide are the concerns. Commercial availability and accessibility not yet there.
R-455A	148	Proposed as alternative to HCFC-22 and R-410A for air conditioning applications	• Blend of HFC and HFO. Mildly flammable and high temperature glide. The flammability and the high temperature glide are the concerns. Commercial availability and accessibility not yet there.
R-466A	733	Proposed as alternative to HCFC-22 and R-410A for air conditioning applications	• Blend of HFC and HFO. Non-flammable; A1 classification of ASHRAE. Commercial viability yet to be established.
R-407C	1774	Most air conditioning applications	• Properties closely match R22. • Temperature glide is slightly less efficient than R22. High GWP.
R-410A	2088	Most air conditioning applications	• Near azeotropic blend of R-32 and R-125. Higher pressures, better cooling capacity, low temperature glide, high GWP, synthetic lubricants needed.

Note: There are several other possible alternatives such as HFOs and their blends that could be considered as HCFC free technology options for this sector. At this stage, commercial availability of such alternatives is limited.

Proposed ODS alternative technologies for Room Air Conditioners (RAC) in Stage III

HFC-32 is a single component refrigerant with zero ODP, GWP 675 (a third of R-410A) and is the main component of R-410A. Its working pressure is higher than R-410A, with good heat transfer properties, volumetric refrigerating capacity, and theoretical energy efficiency. The charge amount of HFC-32 is about 60-80% of HCFC-22 for the same refrigerating capacity, depending on the application. HFC-32 is expected to achieve better overall performance than R-410A. It is commercially available and mature, with a favorable price as compared to the price of R-410A but that is slightly higher than that of HCFC-22. However, HFC-32 is mildly flammable, therefore, safety measures will need to be introduced in manufacturing, installation, and servicing. IEC 6035-2-40 defines the charge levels of HFC-32 for machine room and unitary air-conditioning units using HFC-32.

HFC-32 is expected to achieve better overall performance than R-410A and is commercially available and mature with a comparatively favorable price than R-410A.

HFC-32 has already been successfully adopted for residential air conditioners up to 3 TR cooling capacity in India. Most of the large AC manufacturers of small cooling capacity ACs in India have successfully converted the manufacturing facilities to HFC-32 under HPMP Stage-II and remaining residential AC manufacturers have also decided to use the same HFC-32 technology.

Proposed alternative technologies to HCFC-22 for Light Commercial Air Conditioners in Stage III

Technology choices for the light commercial air conditioning units are very limited since flammable refrigerants are not being recommended as the cooling coil within the conditioned space is a major safety concern. IEC 6035-2-40 does not recommend the use of any flammable refrigerants including A2L refrigerants beyond 4–4.5 TR units. The light commercial units manufactured range in cooling capacity from 3 to 60 TR.

Most of the large AC manufacturers of small cooling capacity ACs in India have successfully converted the manufacturing facilities to HFC-32 under HPMP Stage-II.

Currently, R-410A is being used globally in this sub-sector. Some efforts have been made to use HFC-32 in smaller cooling capacity units that fall within the charge quantities recommended by IEC 6035-2-40 for both A3 and A2L refrigerants. After long intensive discussions with the enterprises, it has been proposed to use HFC-32 for this sector.

Table 9 presents subsector-wise estimated environmental benefits by converting air conditioning manufacturing from HCFC-22 to HFC-32 technology.

Table 9: Estimated Environmental Benefits for AC Manufacturing Sub-sectors

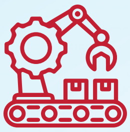
Sub-sector	Baseline			Alternative Technology			Reduction
	HCFC-22 (MT)	GWP	Tonnes CO2-eq Impact	Alternative Technology HFC-32 (MT*)	GWP	Tonnes CO2-eq Impact	Tonnes CO2-eq (baseline – alternative)
RAC	49.21	1,810	89,070.10	39.37	675	26,574.75	**62,495.35**
Light Com. AC and Chiller	173.71	1,810	314,415.10	138.97	675**	93,804.75	**220,610.35**
Total	**222.92**	-	**396,797.60**	**178.34**	-	**120,379.50**	**283,105.70**

**Takes into consideration 20% reduction, on average, due to reduction in charge size.*
*** HFC-32 or other lower-GWP (HFC, HFO blend).*

REFRIGERATION MANUFACTURING SECTOR

Sector Analysis

The refrigeration sector has been experiencing fast growth in India due to climatic conditions and the growing needs for a widespread food cold chain to preserve prepared food, raw vegetables and beverages, etc. Further, the growing urbanization in India significantly increased manufacturing base and use of refrigerated equipment as process units. There is a widespread use of horizontal and vertical medium temperature and low temperature display cabinets and freezers, in convenience shops, restaurants, hotels, etc.



The refrigeration sector also suffered economically as a result of the pandemic as these companies were forced to decrease their overall consumption of 181 MT in 2019 to 160 MT in 2021.

Similar to the AC sector, the refrigeration sector also suffered economically as a result of the COVID-19 pandemic as these companies were forced to decrease their overall consumption of 181 MT in 2019 to 160 MT in. Thus, these companies are already contributing to the phase-out with a reduction of 44 MT of consumption under a BAU scenario. However, these impacts were less compared to the AC sector. Due to the fact that the demand for such appliances has continued with some relative stability during the lockdown period to satisfy the demand for storage and transportation of vaccines all over the country. The use of refrigeration equipment is also linked with safety and health needs for food production, handling, storage and sales. There are large numbers of manufacturing enterprises of refrigeration appliances in the country.

Nevertheless, the decrease in HCFC-22 consumption in this sector has impacted the enterprise-wise consumption. However, this will require a larger co-financing from the companies in order to comply with the conversion project as they return to their usual level of consumption.

The financial contribution of the MLF will be critical to drive the technology change towards lower GWP alternatives while phasing-out the HCFC-22 in this sector.

The typical refrigeration equipment currently manufactured using HCFC-22 are: (a) standalone refrigeration equipment (plug-in units) which are typically low and medium temperature freezers and fresh food and frozen food display cabinets of various types and size; (b) small cooling capacity process chillers; and (c) customized appliances for convenient stores, including cold rooms.

In the past, most of the refrigeration equipment was manufactured based on either CFC-12 or HCFC-22. CFC-12 manufacturing base was mostly converted to HFC-134a. In a Business as Usual (BAU) scenario, and based on market demand, most of the manufacturing facilities would be expected to be converted from HCFC-22 to high GWP alternative refrigerants like HFC-134a, R-404A and R-507A due to ease of use, wide availability across the country at relatively reasonable price, as well as for the fact that these refrigerants are not flammable.

Therefore, the financial contribution of the MLF will be critical to drive the technology change towards lower GWP alternatives while phasing-out HCFC-22 in this sector. Stage III will target conversion of the customized manufacturing of refrigeration equipments for retail outlets, restaurants, grocery, mortuaries, etc., which is mainly catered by a network of small manufacturers. There are about 47 micro, small and medium and 1 large technology conversion projects eligible for funding across 47 enterprises according to the survey conducted by Ernst and Young Ltd. This sector also includes companies that produce chillers for process industries, therefore, they are included as part of the refrigeration process and not as air conditioning/thermal comfort.

These companies can be grouped into three categories based on their consumption and number of appliances manufactured annually: (a) micro with an annual consumption of <1 tonne; (b) small with a consumption of <5 tonne; and (c) medium with a consumption of <20 MT; (d) the large one has a consumption of >20 MT.

Phase-out Strategy

In Stage-III of the HPMP for Refrigeration Manufacturing sector plan, the phase-out of HCFCs will be carried out through both investment activities for the conversion of manufacturing lines and non-investment activities including the enforcement of policies and regulations, awareness-raising activities and TA activities. A total of 163.19 MT (8.97 ODP tonnes) of HCFCs will be phased-out through the conversion of 48 technology conversion projects in enterprises.

The existing ODS (Regulation and Control) Rules, 2000 and its amendments will provide the policy and regulatory framework to ensure a smooth transition to non-HCFC and low GWP alternative technologies.

The review and update of technical options for HCFC replacement is being carried out periodically and is being reported in UNEP Technical Options Committee reports.

Assessment of Alternatives Technologies to HCFC-22 for Commercial Refrigeration Units and Process Chillers

HCFC-22 has a long history of being used as a refrigerant in refrigeration equipment, mainly due to its favorable thermodynamic and thermo-physical properties, non-flammable, non-toxic, stable and inert nature, and viable commercial availability. The factors listed in Table 10 need to be considered for selection of the alternative technology.

The review and update of technical options for HCFC replacement is being carried out periodically and is being reported in UNEP Technical Options Committee reports, viz., Refrigeration and Heat Pumps Technical Options Committee (RTOC) for refrigerants and the summary updates annually in the Technology and Economic Assessment Panel (TEAP) reports. The traditional HCFC-22 replacements for this sector and sub sectors cited are HFCs, blends of HFCs and hydrocarbons. However, recognizing the increasing concerns of climate impact of HFCs under the Montreal Protocol, the focus has been shifted towards low-GWP alternatives.

Table 10: Factors to be Considered in Selection of Refrigerant

Factors	Considerations
Technical Factors	• Thermo physical characteristics • Functionality in end product • Proven and mature technology • Energy efficiency
Commercial Factors	• Cost-effectiveness • Reliable availability and accessibility
Health and Safety Factors	• Low risk for occupational health • Low risk for physical safety (flammability, toxicity, etc.)
Environmental Factors	• Zero ozone impact • Low direct and indirect climate impacts

Specifically, the technology choice is undertaken after careful assessment of relative merits of different technology options, industry structure, applicability and cost-effectiveness of such technologies. While there is no perfect alternative to HCFC-22 that meets all the above criteria, some of the zero-ODP potential alternative technical options to HCFC-22 for the refrigeration sector are listed in Table 11.

Table 11: Technical Options Considered for Refrigeration Applications

Substance	Flammability Toxicity	GWP	Application	Remarks
CO2	A1	1	Supermarkets under cold /moderate climates in a trans critical cycle. Also used in a secondary loop as heat transfer fluid.	• Major redesign of system components needed. Investment costs are prohibitive. Handling of high-pressure refrigerant during operation and servicing.
Hydrocarbons R-600a & R-290	A3	3	Small-capacity domestic and standalone commercial refrigeration units equipment.	• Flammability issues. Not yet widely used in medium and large capacity refrigeration systems.
R-515 B	A1	293	Refrigeration including low temperature applications.	• Blends of HFOs. Commercial viability and accessibility yet to be established.
R-448A	A1	1300	Refrigeration including low temperature applications.	• Blend of HFCs and HFO, similar to R-404A. Moderate GWP. Commercial availability may take some time.
R-449A	A1	1300	Refrigeration including low temperature applications.	• Blend of HFCs and HFO, similar to R-404A. Moderate GWP. Commercial availability may take some time.
R-457A	A2L	140	Low Temperature applications.	• Blend of HFCs and HFO proposed as alternative to R-404A. Low-GWP, mildly flammable, high temperature glide. Commercial availability may take some time.
R-513A	A2L	632	Refrigerated transport application	• Blend of HFO and HFC-134a. Mildly flammable. Commercial availability is limited and cost of refrigerant likely to be significantly higher.

Substance	Flammability Toxicity	GWP	Application	Remarks
R-454C	A2L	150	Low temperature applications	• Blend of HFCs and HFO proposed as alternative to R-404A. Low-GWP, mildly flammable, high temperature glide. Commercial availability may take some time.
R-455A	A2L	150	Low temperature applications	• Blend of HFCs and HFO proposed as alternative to R-404A. Low-GWP, mildly flammable, high temperature glide. Commercial availability may take some time.
R-404A	A1	3922	Widely used for refrigeration applications including low temperature applications	• Widely adopted for refrigeration applications including supermarkets very high GWP.

Proposed Alternative Technologies to HCFC-22 for Commercial Refrigeration and Process Chillers in Stage III

Recently, several blends of HFCs and HFOs have been proposed as alternatives to HCFC-22/R-404A.

Hydrocarbon refrigerants are the only component natural refrigerants with ultra-low GWP. However, these refrigerants are highly flammable with A3 classification as per ASHRAE standard 34. R-600a has successfully been used in the domestic refrigeration sector since early 1990s and today about, 75% of domestic refrigeration manufacturing globally is with R-600a.

As it can be seen from the Table 11, there are no single refrigerants which can meet the requirements to replace HCFC-22. This has made the phase-out of HCFC-22 in this sector very challenging. Recognizing the ground reality, several refrigeration appliance manufacturers have already converted the manufacturing facilities with their own resources to R-404A and R-507A. However, this technology pathway is now not applicable due to adverse climate impact.

The blends of HFCs and HFOs like R-448A and R-449A (non-flammable or A1 category) with a GWP of 1300 are the better technical options and suitable to make a transition from HCFC-22 including low-temperature refrigeration for large units requiring larger charges in chillers used in specific conditions in which flammability is an issue.

Recently, several blends of HFCs and HFOs have been proposed as alternatives to HCFC-22/R-404A. It could be seen that the blends with low GWP are flammable (A2L category), except R-515B. Therefore, newly developed mildly flammable blends like R-454A, R-454C, R-455A and R-457A, which are still under testing, have not been considered due to their flammability and commercial unavailability.

Recognizing that there are very limited commercially viable low-GWP alternative refrigerants for this sector, it has been proposed to convert the (commercial) refrigeration manufacturing sector (mostly involving low refrigeration capacity units) from HCFC-22 to R-290 and process chillers to HFC-32.

TECHNICAL ASSISTANCE

HPMP Stage-III involves many micro, small and medium enterprises (MSMEs) of refrigeration and air conditioning manufacturing sectors. The annual consumption of these enterprises ranges from <1 MT to 20 MT and they are adopting A3 and A2L class of refrigerants. These enterprises do not have technical expertise within the manufacturing facilities and have been manufacturing RAC equipment with the traditional non-flammable refrigerant, HCFC-22, for the past several years. Most of these enterprises have learnt manufacturing processes from fellow manufactures or local technical consultant(s). To adopt flammable alternatives, the companies require strong (and independent purview) technical assistance support and handholding to assure proper product design, efficiency, long-term use and compliance with international standards and national laws and requirements in their facilities. UNDP is required to apply its Social and Environmental Safeguards (SES) in all projects and the Government of India is committed to avoid dislocation, undue financial burden or economic impacts to the industries, especially to MSMEs, to avoid or reduce risks to their employees and to the products, end-users.

Competency enhancement of the MSMEs, capacity building for manufacturing, handling, and training and awareness and adoption of non-ODS and low GWP alternatives to HCFCs including are required to be associated with government supported technical institutions, as done for HPMP Stage-II in the foam manufacturing sector. MSMEs will also be facilitated for adequate tie-ups with laboratories for trials, in addition to organizing study tours, field visits, and exchange of experiences, etc., to maintain market competitiveness after conversion and reduce any risks due to the new flammable alternatives. The proposed technical activities include, but are not limited to:

MSMEs will also be facilitated for adequate tie-ups with laboratories for trials, in addition to organizing study tours, field visits, and exchange of experiences, etc.

- Independent technical consultancy services to review project proposals, support development and re-design of products and production process, as well as conduct monitoring of conversion.
- Deliver technical workshops and seminars to disseminate information on the development of alternative technologies, ongoing research, and prospects for different alternatives. Independent international expert-consultant will provide advice to assist in technology conversion activities. 10 workshops will be planned for 2023 and 2024.
- Training and awareness-raising activities will be organized to inform participating enterprises about the project implementation procedures (for example, comply with rules and regulations on procurement, financial management and environmental impact assessment and evaluation, as well as other environmental and social safeguards due to project conversion and proper environmental disposal of equipment/waste); support companies to keep abreast of their implementation schedule; independently oversee commissioning and support companies in their reporting requirements to MLF, UNDP, MOEF&CC and Pollution Boards.
- Support gathering of experiences and project-level data, disseminate information on experience gained and sharing of international experiences, besides promoting alternative technologies and products.

SERVICING SECTOR PLAN

Background of Servicing Sector

Room air conditioners are widely used in residential and small commercial establishments. Indian room air conditioner market would register substantial growth in the coming years on account of strengthening residential sector, growing retail and hospitality sectors, rising construction activities across new housing societies along with the establishment of Small and Medium Enterprises (SMEs) and commercial hubs. Additionally, growth in the number of construction projects across all metro and Tier-2 cities, along with increasing government spending towards public infrastructures, would further increase the demand for room air conditioners in the country in the coming years.

Indian room air conditioner market would register substantial growth in the coming years on account of growing residential, retail and hospitality sectors.

It is to be noted that a significant percentage of the installed stock of room air conditioners contain HCFC-22 which is an Ozone Depleting Substance (ODS) and, as a controlled substance under the Montreal Protocol, needs to be phased out as per the accelerated phase-out schedule of the Montreal Protocol. Part of the room air conditioners stock also contains other commercially available alternate refrigerants such as R-32 and R-410A which have high global warning potential. Although R-290 is neither an ODS nor does it have a high global warming potential, it poses acute safety concerns.

The efficient performance of room air conditioners and prevention of emissions of refrigerants used in the room air conditioners depends on good service practices of service technicians, which include proper installation, preventive maintenance and servicing of the equipment. Servicing sector is an integral part of the air conditioning industry and consumes a large proportion of refrigerants used in the country. The sector accounts for more than 50% of the refrigerants used annually in the country and is increasingly recognized as an important sector for reducing refrigerant consumption and direct emissions of refrigerants to the environment and for ensuring efficient operation of air conditioners to reduce indirect emissions during their working life.

Servicing Sector in India

The servicing sector in India is made up of a diverse range of establishments that provide maintenance services for all types of refrigeration and air conditioning systems. The sector is estimated to employ approximately 350,000 technicians in formal and informal enterprises. Service workshops are considered formal when they are registered with relevant government authorities and have a minimum workforce employed (for example, the manufacturers' service centers and larger authorized service workshops). Most service workshops in India operate in the informal sector and are on a small scale, sometimes comprising only 1 to 2 multi skilled technicians.

Broadly speaking, there are three channels through which room air conditioners servicing is offered in the country:

(a) The first consists of manufacturing companies (OEMs) servicing network/authorized shops. The manufacturing companies have a formal servicing setup and a pool of trained service personnel. These companies largely operate through franchised service network, i.e., third-party sales and service dealers or authorized service providers, though they may have a few engineers/technicians on payroll at supervisory/managerial levels. The company routes the service calls/requests for both installation and repairs to these franchises. Actual service delivery is completed by these franchises using their service technicians.

(b) The second channel consists of independent third-party servicing companies. These could be either formally registered or unregistered but they do not have any franchisee relationship with the original equipment manufacturers (OEM).

(c) The third channel is that of the freelance servicing technicians available in the country. Servicing air-conditioners is a growing opportunity, especially in urban India. Technicians who already have a know-how of servicing air-conditioning systems hire people interested in the trade and train them on the job.

Servicing Sector and HCFC Phase-out Management Plans (HPMPs)

In HPMP Stage-I and II, there is a focus on training on good service practices towards achieving the objective of prevention of refrigerant leakage and improved performance of air conditioners.

Noting that proper installation and servicing of air conditioning equipment not only improves the performance of the air conditioners but also prevents the emission of refrigerants used in the servicing sector has been addressed in the HPMP Stage-I and HPMP Stage-II, with a focus on training on good service practices towards achieving the objective of prevention of refrigerant leakage and improved performance of air conditioners. The servicing sector component of HPMP is implemented by GIZ, Government of Germany, in close cooperation with the Ozone Cell, MoEF&CC.

Under HPMP Stage-I, training programmes for service technicians in room air-conditioners (up to 2 tonne refrigeration capacity) were conducted with two modules—one module for installers and the other module for service technicians. The trainings were organized through the network of training partners established earlier and a team of trainers trained by international and national experts; and a total of 11,276 service technicians were trained. In addition, some training programmes were also organized for institutional users such as railways and defense, which have a substantial inventory of HCFC-based equipment. Under HPMP Stage-II, 17,000 service technicians will be trained by the end of 2022, out of which 11,500 have been trained till date. HPMP Stage-II also addressed the model certification system on which discussions were held in a stakeholder consultation workshop. The syllabus of the refrigeration and air-conditioning trade in the Industrial Technical Institutes (ITI) was also updated to include not only HCFCs but also other commercially available alternate refrigerants such as R-32, R-410A and R-290 used in room air-conditioners.

Other Training Channels for Service Technicians

Besides the trainings imparted through the HPMPs, currently, there are various other channels for training of technicians. Broadly speaking, trainings are available for beginners as well as short-duration refresher courses/recognition of prior learning programmes for people who have been working in the sector for some time. Many institutes offer courses for both these categories of people. The training channels open to technicians are:

(a) AC manufacturing companies that train their technicians,

(b) Industry and associations (ISHRAE and RASSS),

(c) Ministry of Skill Development and Entrepreneurship (ITIs, Polytechnics, National Skill Development Corporation – Electronic Sector Skill Council of India).

The Ozone Cell, MoEF&CC, through a project funded by the Ministry of Skill Development and Entrepreneurship (MSDE), has already trained and certified about 39,000 air conditioning service technicians in collaboration with the Electronics Sector Skill Council of India (ESSCI) under the National Skill Qualification Framework (NSQF), and Pradhan Mantri Kaushal Vikas Yojana (PMKVY).

The current estimated overall number of RAC technicians in the country is 350,000. Penetration of RAC equipment is much higher in urban areas and still low in rural areas. Depending on the economic situation of (potential) customers, the growth of RAC market is estimated to be quick with urbanization and climate change (for example, due to heat waves) being the main drivers.

There could potentially be significant savings in refrigerant use if proper recovery and good service practices are implemented.

The refrigerant consumption in the servicing sector depends not only on the quality of the product but also on the quality of service provided during the product life cycle. Regarding the service quality, there is a wide variation in failure rates depending on knowledge and skill levels of technicians, most of whom are primarily from the unorganized sector without formal access to technology and training. Further, the age of the equipment has a direct impact on the HCFC consumption. During servicing, recovery of the refrigerant is not a common practice due to the nature of equipment and since servicing usually takes place at the site. The remaining refrigerant in the unit, if any, is usually vented out and after repair the equipment is completely recharged. Alternatively, the system may also just be topped up with refrigerant by the experienced technicians without exactly knowing how much refrigerant is missing. There could be potentially significant savings in refrigerant use if proper recovery and good service practices were implemented. Appropriate equipment, tools and skill levels are needed for the servicing of smaller, larger, and more complex systems when providing new alternative refrigerants.

Challenges for the Service Sector

The key challenges for the service sector comprise the following:

(a) Limited knowledge of technicians in handling multiple and flammable refrigerants.

(b) Limited training infrastructure at various training centres including the ITIs.

(c) Lack of tools and basic service equipment for the service technicians.

(d) Limited knowledge of technicians on new product with various technologies and good service practices.

(e) Lack of recognition of trained technicians. Need to promote measures to inculcate confidence amongst customers and job satisfaction amongst service technicians.

(f) Lack of coordinated effort amongst various training agencies in the country. Trainings mostly carried out by the training providers in isolation.

(g) Lack of standard training module amongst various training agencies.

Servicing Sector and HPMP Stage-III

HPMP Stage-III would be the last phase of the HPMP to be implemented from 2023 to 2030, during which time India will have to achieve the 2025 and 2030 compliance targets in the consumption sector as per the accelerated phase-out schedule of the Montreal Protocol for HCFCs. While the phase-out of HCFCs in all manufacturing sectors should be completed by 31 December 2024, the activities in the servicing sector will continue till 2030.

Servicing sector will account for a large consumption of HCFCs during HPMP Stage-III as there is large inventory of room air-conditioners using HCFC-22 and hence, servicing sector is likely to be the largest component. It is therefore necessary to have an effective strategy to address this sector while taking into account the lessons learnt from HPMP Stage-I and HPMP Stage-II.

The strategy for the servicing sector under HPMP Stage-III should propose broad modality for sustainability of the servicing sector by 2030.

Servicing Sector Activities Under HPMP Stage-III

Based on the present status of the servicing sector and from the lessons learnt from HPMP Stage I and II, components and the activities therein that require to be addressed were drawn. The activities planned will support phase-out of HCFC-22 in the servicing sector and develop a sustainable infrastructure that would benefit the servicing tail post 2030. The activities proposed to be implemented as part of HPMP Stage-III include the following:

It is necessary to have an effective strategy to address the servicing sector in HPMP Stage-III as there is still a large inventory of room air conditioners using HCFC-22.

Capacity Building

RAC Technicians Training: RAC technicians training will be conducted for technicians servicing and installing room ACs and for commercial and centralized systems technicians. Trainings for AC technicians will including training them about good service practice (GSP), handling of flammable refrigerants and safety, in addition to topics on recovery, recycling, and reclamation of refrigerants (for bigger charge size) with an emphasis on energy efficiency related to design and maintenance. Measures intended are for preventive maintenance, leakage management, optimization through training commercial and centralized systems technicians.

The setup for training will be chalked out to ensure sustainability and training a higher number of technicians.

a) **Develop Synergy Among Trainings Conducted in the Country:** In the country, there are government and private institutes, appliance manufacturing companies, and others conducting training for students aspiring to take up RAC trade as their career and for technicians who are already in the trade. Each has their own set of course contents/modules, duration and selection criteria. As part of the HPMP Stage-III, initiatives to establish synergies among these trainings will be undertaken, so that the training landscape can be used for a long-time and is sustainable. Harmonizing the trainings will upscale the opportunities for the technicians to get qualified for availing certification. Outreach and information and awareness raising needs to be done among the technicians about the various trainings.

   A core committee headed by the Joint Secretary, Ozone Cell, MoEF&CC and representatives of GIZ, UNDP, UNEP and representatives from other channels providing training and experts, as needed, is proposed to be formed.

Institutional Strengthening:

In the long run, for the sustainable and continued activities in RAC trade with minimal or without external support, strengthening institutions and institutionalizing activities like Qualification Certification Registration and Licensing will benefit the trade and technicians and support the servicing tail.

b) **Qualification, Certification & Registration (QCR) Programs to be Established based on National Schemes and International Standards and Harmonize the QCR processes in the Country:** A concept for qualification, certification, and registration (QCR) system for national implementation was developed followed by a stakeholder consultation under HPMP Stage II. The roadmap proposed to develop a) a national qualification network facilitating country wide training of conformity requirements with good servicing practices (GSP) in the RAC sector; b) national certification network facilitating country-wide examination and certification of the conformity of RAC sector institutions, personnel and products; and c) a governance structure facilitating a country-wide process for compliance with the sector targets of the Indian government.

HPMP Stage-III implementation is proposed to follow a consecutive process, where the initial focus will be on complementing and upscaling qualification opportunities for service technicians/personnel. In parallel to this activity, relevant existing certification processes and products will need to be harmonized and the gaps need to be filled. A centralized system/database for the certified technicians to register requires to be developed.

A web-based application shall be developed through which the technicians to be trained under HPMP by GIZ or any of the channel partners shall directly register.

A web-based application shall be developed through which the technicians to be trained under HPMP by GIZ or any of the channel partners shall directly register. After completion of training and successful assessment, a database of all such trained and certified technicians will be generated. Such a database will be open for review by customers to ensure whether the technician visiting their home is certified or not.

c) **Develop/Introduce a Licensing System:** Licensing is the process through which authorizations and permits are granted to allow the specific services or individuals to carry out their operations, in particular when handling/purchasing regulated refrigerants. Most of the times, it may be tied up to a certification process, which entitles the company or the individual to obtain a license based on their capacities to perform a specific task and attain standards and liabilities related to it. Licensing system well integrates with the certification and registration that the project proposes to introduce under HPMP Stage-III.

HPMP Stage-III will facilitate implementation of a licensing system. This will be done through stakeholder consultation and a dialogue with the Government/NOU in the country. Existing examples from EU and Australia will be studied and adapted considering the absorption capacity of the Indian system.

d) **Industrial Training Institutes (ITIs):** In the country, there are government institutes conducting training for students aspiring to take up the RAC trade as their career and ITI is one of the government-run institute have their own set of syllabuses. Supporting the students through the project by revising the syllabus and training the instructors will harmonize the course contents with the training being imparted by private institutes, OEM and others. One way to ensure and maintain a well-structured national qualification, certification, and registration (QCR) system is through this network of existing training institutes (ITIs).

e) **Training for Technical Staff of Institutional Users:** HPMP Stage-III will continue training the technical staff of institutions on GSP, new refrigerants, safety and reclamation. The are many such institutions in the country, and under HPMP Stage-III, new institutions with a high stock of appliances with HCFC–22 will also be identified for training their technicians.

Technical Assistance

With time, eliminating HCFC consumption by adopting new technologies, techniques and practices is necessary. Along side imparting training to the technicians, technical assistance to the assemblers in the commercial refrigeration sector to make more efficient and environmentally sustainable appliances is also required.

f) **Commercial Refrigeration Sector-Designing, Assembling, and Servicing:** This component contains different elements and is applicable to all kinds of commercial refrigeration cabinets, stand-alone/island cases, multi-decks, chest freezers, display cabinets, etc.

The important aspect is that kits have been developed for all the refrigeration components in order to easily build the cabinets. This allows the beneficiary to readily build the cabinets and securely achieve the goal of converting to a HCFC and HFC free solution. HPMP Stage-III is about 20 nos. of commercial refrigeration companies in the country can be supported with the designing assembling and servicing of the commercial refrigeration equipment. The companies can be supported with kits that have been developed for this purpose. Additionally, capacity building concepts and materials for replication will be developed.

During HPMP Stage-III, a systematic plan will be drawn for raising awareness around issues relating to gender and working towards women empowerment.

g) **Reclamation Centre:** There is a need to introduce reclamation centres by preparing a business model with some provisional and realistic assumptions. Feasibility and sustainability of the reclamation centres will have to be assessed. The business model will have to be developed and assessed as well. Economic viability is closely linked to the introduction of refillable cylinders (and the ban of non-refillable cylinders), the close link between refrigerant distribution and reclamation as well as the licensing of authorized technicians to purchase refrigerants.

Assistance will only then make an impact on the improved performance of centres. An economically viable business model will facilitate the servicing tail post 2030. A concept for a viable business model for reclamation centre will be developed through a stakeholder consultation and experiences from other countries. Again, the EU and Australia will serve as suitable case studies.

Promoting Awareness on New Products and Good Service Practices

Awareness-raising material on new products, including new alternative refrigerants, shall be developed and widely disseminated amongst the technicians.

Gender Equality/Mainstreaming

During HPMP Stage-III, efforts will be initiated for the application of a gender-sensitive approach. The project will assess entry points for promoting gender-sensitive approaches and women's empowerment. A systematic plan will be drawn for raising awareness around relating to gender issue and working towards women empowerment. The plan will list criteria/indicators to assess progress on the key areas and provide quantitative feedback on specific cases.

ENABLING ACTIVITIES

Component 1: Policy/Regulations and Enforcement Capacity Building

Objectives: The objectives of this component are to strengthen the capacity of local agencies/authorities for enforcing ODS trade controls (licensing) and national ODS regulations.

Activity 1.1: Pollution Control Board (PCB) Capacity Building

The Central Pollution Control Board (CPCB) provides a good entry point for strengthening the capacity of the

28 STATE

Pollution Control Boards.

(a) **Lessons Learnt:** New activity that has not been covered under HPMP Stages I/II.

(b) **Rationale and Timing:** The Central Pollution Control Board is under the Ministry of Environment, Forest and Climate Change. They can provide a good entry point for strengthening the capacity of the 28 State Pollution Control Boards for ODS regulations enforcement, including inspecting the converted projects. Materials developed will be used as part of an annual training program geared specifically towards enforcement/inspection officers on the applicable ODS regulations. The biannual workshops will be designed as standalone or add-on meetings to roll-out the manual/guide.

(c) **Targets:** 1 manual/guide; 1 updated manual/guide; and 7 workshops

- Development of PCB training manual/guide: Manual/Guide on how to conduct inspections/enforcement of ODS regulations. The manual/guide will be reviewed and updated after 4 to 5 years. Includes stakeholder consultations.
- CPCB Capacity Building Workshops: Targeted workshops for local PCBs through the Central Pollution Control Board will be held to raise awareness of Montreal Protocol issues and relevant country regulations to enhance enforcement capabilities.

Activity 1.2: Customs Authority Capacity Building

Activity 1.2.1: Risk Profiling

(a) **Lessons Learnt:** New activity that has not been covered under HPMP Stages I/II.

(b) **Rationale and Timing:** As the HCFC phase-out reaches 100% reduction from baseline, it is increasingly important to provide proper training for customs officers who conduct risk profiling analysis and monitoring to understand the potential risk of illegal trade of ODS in order to spot anomalies in ODS trade data into their routing operation. The annual training will be designed as standalone or add-on meetings using the risk profiling module.

(c) **Targets:** 1 new module; 1 updated module; and 5 trainings

- Training Module on Risk Profiling: Development of a training module on risk profiling for targeted customs officials. The training module will be used to integrate risk profiling techniques into the ODS trade, such as operationalizing ODS trade risk management into routine customs exercise and developing risk profiling indicators to guide on-site inspection of ODS-related shipments. The module will be reviewed and updated after 4 to 5 years through the stakeholder consultation process.

- Risk Profiling Training Workshop: Targeted workshops for specific customs officials will be held to assist in the risk profiling analysis for HCFC trade and to enhance enforcement capabilities.

Activity 1.2.2: Customs Officers Capacity Building

(a) **Lessons Learnt:** Periodic revision necessary with respect to the added list of chemicals to keep the module up to date. Add training videos as a teaching medium to enhance trainings.

(b) **Rationale and Timing:** National Academy of Customs, Indirect Taxes & Narcotics (NACIN) is the premier training institute of the Government of India. It plays a vital role in the capacity building of customs officers in many areas, including environment protection. The annual training of trainers and biannual training of customs officers will be designed as standalone meetings using the customs officer's training module and videos. The procurement will support import/export control and help trainers and officers at customs ports identify various refrigerants.

National Academy of Customs, Indirect Taxes & Narcotics (NACIN) plays a vital role in the capacity building of customs officers in many areas, including environment protection.

(c) **Targets:** 1 updated module; at least 10 videos; 4 tot trainings; 10 customs trainings (400-500 officers trained); 25 units of advanced refrigerant identifiers; and 2 Border Dialogue meetings.

- Customs Officer's Training Module: In cooperation with the NACIN, review and update the existing New Customs Officer's Training Module, including stakeholder consultations. This activity is designed to ensure the module is current and relevant. The last update to the module occurred in 2020 - under HPMP Stage-II.

- Customs Officer's Training Videos: Create a series of training videos on various relevant topics (for example, case study videos for seizures and what to do with seized refrigerants, using examples of global cases of illegal smuggling, etc.).

- Training of Trainers: In cooperation with the NACIN, continue training program for trainers on HCFC trade control. Ensure that trainers have access to the most up-to-date information and are trained to use equipment properly.

- Customs Officer's Trainings: In cooperation with the NACIN, continue training program to train 2000 new/existing customs officers on HCFC trade control.

- Procurement of Advanced Refrigerant Identifiers: Through UNDP, procure 25 advanced refrigerant identifiers for NACIN training centres and customs ports. Under HPMP Stage-I, the NACIN has distributed 25 portable refrigerant identifiers to priority checkpoints and training centres.

- Border Dialogue with Neighbouring Countries: Organization of regional/cross-border enforcement cooperation meetings.

Activity 1.3: Capacity Building on Combating Illegal Trade

(a) **Lessons Learnt:** Enforcement Officers need standardized procedures on how to handle various issues they might encounter during the enforcement process. Targeted stakeholders were not accurately filling out data. Border dialogues facilitate communication.

(b) **Rationale and Timing:** SOPs are necessary for consistent enforcement protocols. Annual workshop to train importers, exporters and customs brokers in filling out data forms and keep records. Border dialogues will help to facilitate communications and joint actions between countries every 3 to 4 years.

(c) **Targets:** 4 new SOPs developed; +4 SOPs updated and 5 workshops.

- **SOPs on Enforcement Process:** Develop Standard Operating Procedures (SOPs) for enforcement officers which may include procedures for application of license/quota, reporting of import/export, declaration checking, inspection of shipments, handling seizures, penalties/fines, etc, including case reporting and recordkeeping. The SOPs will be reviewed and updated after 4 to 5 years. Includes stakeholder consultations.
- **Data Reporting and Recordkeeping Workshop:** Capacity building for importers/exporters (including producers) and middlemen (customs brokers) to accurately fill out data.

Capacity building to combat illegal trade also includes developing Standard Operating Procedures for enforcement officers.

Activity 1.4: Occupational Safety for RAC Servicing Workshops

(a) **Lessons Learnt:** New activity that has not been covered under HPMP Stages I/II.

(b) **Rationale and Timing:** Increasing awareness of occupational safety is needed as more low-GWP alternatives are introduced to the market that are flammable, toxic, and/or with higher working pressures. Materials will be used as part of an annual training program geared specifically towards occupational safety officers.

(c) **Targets:** 1 information factsheet; + 1 updated information factsheet; and 20 workshops

- Development of occupational safety materials: this is for the occupational safety enforcement staff on what to pay attention to when inspecting factories/workshops/buildings that use low GWP alternatives (with regard to the flammability/toxicity). The factsheet will be reviewed and updated after 4 to 5 years. Includes stakeholder consultations.
- Occupational Safety Workshop: Annual targeted workshop for Occupational Safety enforcement authorities' supervisors/managers in five cities.

Component 2: Sector Based ODS Policy Development Including Servicing Sector

Objectives: Strengthening the management of RAC servicing sector including sector-based ODS policy development.

Activity 2.1: Regulatory and Policy Framework to Ensure Sustainable Phaseout in the Servicing Sector

(a) **Lessons Learnt:** New activity that has not been covered under HPMP Stages I/II.

(b) **Rationale and Timing:** Review of current policies to enhance the regulatory framework.

(c) **Targets:** 1 compendium; 1 policy study; 1 code of good practices translated into 8 languages; and + 1 periodic update of code of good practices. .

- ODS Phase-out Legislation/Policies Compendium: On relevant legislation/policies for the ODS phase-out including the RAC servicing sector, cold chain, space cooling including Energy Conservation Building Code (ECBC), etc. Make recommendations based on the findings to enhance the regulatory framework, including stakeholder consultations.

- Policy Study on Women in Cooling Sector: On how current policies can better incorporate/advantage women in the cooling sector in cooperation with the Ministry of Women and Child Development, including stakeholder consultations.
- Code of Good Service Practices for RAC Technicians: Developed and translated in 8 languages, including English and Hindi. The code will be reviewed and updated after 4 to 5 years. Under Stage-II, Energy Efficiency Services Limited (EESL) developed a guidebook on GSP in consultation with Ozone Cell.

Code of Good Service Practices for RAC Technicians has been developed and translated in 8 languages and will be reviewed and updated regularly after 4-5 years.

Activity 2.2: Space Cooling

(a) **Lessons Learnt:** More targeted information is needed for subsector stakeholders.

(b) **Rationale and Timing:** As comfort cooling needs are expanding, explorations into space cooling is needed to understand the particular needs of this subsector in cooperation with the Ministry of Education, the Ministry of Power, the Bureau of Energy Efficiency (BEE), Ministry of Housing and Urban Affairs, etc. Workshops would occur during a two-year campaign.

(c) **Targets:** 3 Guidance products; 1 University Course Module; 1 Updated Module; and 6 Targeted Workshops.

- Green Buildings Product: In cooperation with the Construction Council of India, development of joint product on Green Buildings based on prior study (Dec 2021), including stakeholder consultations.
- Practical Guidance for Cooling Equipment in IT Data Centers: Development and dissemination of practical guidance, including best practices for operation and maintenance of cooling equipment, including stakeholder consultations.
- Study on district/passive cooling and its application in India to reduce refrigerant needs for urban development plans.
- Practical Guidance for Chillers: Development and dissemination of practical guidance, including best practices for installation and maintenance, including stakeholder consultations.
- University Course Module: Development and dissemination of course module for architects/building designers/mechanical and civil engineering and 1 review and update, including stakeholder consultations.
- Targeted Awareness Workshops: Develop materials (factsheets/guidelines) specifically targeted for Building Developers (commercial and residential), architects, manager of malls, retail stores, etc. including stakeholder consultations to raise awareness about available low-GWP and energy-efficient equipment and to facilitate discussions on making more ozone and climate friendly choices. Continuation of activities from Stage-II of a study on good management practices to sensitize both the construction community as well as the users towards the benefits of energy-efficient buildings by introducing passive cooling designs, to reduce operational costs, improve health and comfort and promote use of non-HCFC and low-GWP alternatives along with three consultation workshops.

Activity 2.3: Cold Chain Sector

(a) **Lessons Learnt:** More targeted information is needed for subsector stakeholders and it should be based on recommendations from the Cold Chain Sector Report (2021).

(b) **Rationale and Timing:** As refrigeration needs are expanding, explorations into the cold chain sector are needed to understand the particular needs of this subsector. Workshops would occur during a two-year campaign.

(c) **Targets:** 1 guidance product; 3 studies; and 4 targeted workshops.

- Practical Guidance on Ammonia/Low-GWP Alternatives: Development and dissemination of practical guidance on installation and maintenance of ammonia/low-GWP alternatives for system operators, designers, supervisors and managers for ammonia based cold storage/facilities.
- Study on Transportation Sector Refrigeration Development: Study to better understand how the sector can sustain the HCFC phase-out and how the sector will be transformed by the alternatives, including in the use of railways for refrigerated transport and integrated cold chain logistics.
- Study on Convenience Stores: Study to better understand how best to help small format convenience stores and what their needs are, including awareness for transitioning out of HCFC products, best practices for equipment maintenance as well as future technology choices.
- Study on handling ODS-based and non-efficient systems: Study to look at the current state of the existing cold-chain infrastructure, especially the cold storages providing an opportunity to improve energy efficiency, use of low GWP and non-ODS refrigerant based systems and reduce refrigerant demand and cooling load through judicious design practices.
- Targeted Awareness Workshops: Develop materials (for example, factsheets/guidelines) specifically targeted for farmers, food processing facilities, food storage warehouses, retail warehouses, refrigerated transport, food retailers, restaurants, convenience stores, fisheries, supermarkets including development of targeted materials and consultations to raise awareness about available low-GWP technologies and to facilitate discussions on making more ozone- and climate-friendly choices. Enhance skills through capacity building for system operators, engineers, technicians, consultants and policy makers to promote sustainable cold chain.

As refrigeration needs are expanding, explorations into the cold chain sector are needed to understand the particular needs of this subsector.

Activity 2.4: Promotion of Low-GWP RAC Technologies through Public/Private Partnerships

(a) **Lessons Learnt:** New activity that has not been covered under HPMP Stages I/II. Should be based on recommendations from the Cold Chain Sector Report (2021).

(b) **Rationale and Timing:** To promote low-GWP alternatives including those powered by renewable energy through public/private partnerships; business model in the cold chain sector.

(c) **Targets:** 2 studies; and 1 voluntary program.

- Study on indigenous/not-in-kind Indian RAC technology and its promotion, renewable energy-powered systems, cooperation through public/private partnerships, including stakeholder consultations.
- Study on Standards and Labelling programme with BEE for selected RAC products/equipment to explore practical areas and optimize labelling needs.
- Targeted Refrigerant Management Voluntary Program and Awareness Campaign: Explore ways to engage private companies to develop public/private partnerships to reduce HCFC consumption, including through corporate social responsibility and explore opportunities for a selected sector campaign such as a voluntary leak reduction program for convenience stores/supermarkets. The activity will be complementary to activities in Stage-II on e-commerce in food storage warehouses, including stakeholder consultations.

Targeted Refrigerant Management Voluntary Program and Awareness Campaign will explore ways to engage private companies to develop public/private partnerships to reduce HCFC consumption.

Activity 2.5: Sector Level Standards for the Mid-and Long-Term (2nd and 3rd Tranches)

(a) **Lessons Learnt:** More targeted national/group standards and/or codes are needed for subsector stakeholders.

(b) **Rationale and Timing:** As refrigeration and air conditioning needs are expanding, this activity will explore which sectors/subsectors will need to develop national standards and/or codes. The activity is reserved for the second and third tranches of the Stage III HPMP.

(c) **Targets:** 6 standards/codes developed.

- Development of National Standards/Codes: For building, cold chain, transportation sub sector and/or specific applications on the installation, operation, maintaining, servicing, and disposal, etc. in cooperation with industry associations, standards authority, government departments, etc., including stakeholder consultations. BIS is under the final stage of development of standards for flammable refrigerants.

Activity 2.6: Handling Unused/Unwanted ODS from Maintenance or Retired ODS Based Equipment

(a) **Lessons Learnt:** The issue was discussed during stakeholder meetings. Stakeholders referred to the lack of viable SOPs on the handling of unused/unwanted ODS from maintenance or retired ODS-based equipment.

(b) **Rationale and Timing:** To respond to stakeholders and to better understand the situation in India.

(c) **Targets:** 1 desk study.

- Research/Desk Study: To understand the situation in India, regulations, current practices, current and future needs for handing unused/retired ODS equipment and how to recover ODS.

Component 3: Outreach and Awareness

Activity 3.1: Targeted Awareness Campaigns/Knowledge Products

Certain underserved groups such as technicians whose main language is not English or Hindi, as well as technicians in rural areas, would benefit from translated materials and targeted campaigns.

(a) **Lessons Learnt:** Based on feedback from the stakeholder meetings, increased awareness, particularly for underserved populations, is needed.

(b) **Rationale and Timing:** Certain underserved groups such as technicians whose main language is not English or Hindi, as well as technicians in rural areas, would benefit from translated materials and targeted campaigns. Other targeted campaigns include gender mainstreaming, technicians that work on specific sub sectors (i.e. specific types of appliances) and end-users. Includes relevant updates to websites.

(c) **Targets:** 32 newsletters; 5 videos; 8 awareness campaigns; 8 years of updates; 7 gender mainstreaming activities; and 7 workshops for women in RAC.

- Quarterly E-Newsletters (NEWSTRAC) for servicing technicians: continuation of project and dedicated app preparation of infographics to be included in publications; includes translation in 8 languages, including English & Hindi. Ongoing activity under Stage-I and II.
- Educational videos presenting the recognition of service technicians by Ozone Cell as environment champions to promote adoption of good management practices, non-ODS/low-GWP refrigerants.
- Targeted awareness campaign for rural areas. Designing skits for television and radio on energy efficient cooling, highly flammable refrigerant handling, good service management practices (in 8 languages) for technicians in remote rural areas.
- Awareness campaigns on HCFC ban/phase-out by 2025 (manufacturers of air conditioners, other refrigeration and air-conditioning, fire extinguisher or fire extinguishing systems, all other equipment or products) to sustain the Cooling Sector (campaign in 2024, 2025, 2029 and 2030).
- End-User Awareness Campaign: Household/school children/retail refrigeration/air conditioning appliance choices translated in 8 languages.
- Website updates: Dissemination of information and materials through social media and web updates.
- Targeted Materials/Activity to actively promote gender mainstreaming (for example, training, awareness campaign, etc.)
- Capacity Building Workshop: Targeted workshops for women in RAC.

Activity 3.2: Ozone2Climate

(a) **Lessons Learnt:** Successful campaign in other countries. Creating a regular environment to share information.

(b) **Rationale and Timing:** Ozone2Climate Roundtable and Technology Roadshow aims to provide a platform to showcase and highlight available alternatives to HCFCs and promote low-GWP alternatives. This activity could occur annually or every two years and would be attached to an annual RAC expo.

(c) **Targets:** 4 events.

- Roadshow and roundtable (biennial activity).

Component 4: TA, Gender Mainstreaming and Impact Monitoring for UNEP

(a) **Lessons Learnt:** Staff who work on UNEP components that are integrated into the Ozone Cell are key to ensuring successful delivery of projects. Includes overhead and administrative costs.

(b) **Rationale and Timing:** As this HPMP will tackle the final steps of the HCFC phase-out, ensuring a sustainable phase-out will be paramount to the success of the HPMP. In the coming years, as bans go into effect and the market is moving towards alternatives, a dedicated staff is needed to ensure delivery of the activities.

(c) **Targets:** 1 staff over 8 years.

- **Staffing:** To implement these activities, one full time project manager is needed to ensure the successful and timely delivery of activities, work products, publications, contracts, progress reports and expenditure tracking, and other various administrative work.

PARTICIPATING ENTERPRISES AND PROJECT COSTS

Participating Enterprises

Table 12: Summary of Participating Enterprises in HPMP Stage-III

Sector	Sub-Sector and Activity	No of Participating Enterprises	Technology Option
Refrigeration Manufacturing	Technology Conversion in Commercial Refrigeration	Micro 24 Small 8 Medium 9	R-290
	Technology Conversion in Process Chiller	Micro 2 Small 3 Medium 1 Large 1	HFC-32
Air Conditioning Manufacturing	Technology Conversion in Room AC	Micro 6 Small 4 Medium 3	HFC-32
	Technology Conversion in Light Commercial AC	Small 1 Large 2	HFC-32
Total		**64**	

Project Costs:

Table 13 presents the summary of the total project costs and phase-out of HCFCs to be achieved.

Table 13: Summary of HCFC Phase-out and Funding for HPMP Stage-III

Component	Agency	Phase-out of HCFCs (Metric Tonne)	Phase-out of HCFCs (ODP Tonne)	Approved Funding (USD)
Project Management	UNDP	NA	NA	1,645,826
Refrigeration Manufacturing Sector	UNDP	163.19	8.98	2,634,117
Air-Conditioning Manufacturing Sector	UNDP	222.92	12.26	2,514,814
Technical Assistance Activities	UNDP	NA	NA	500,000
RAC Servicing Sector UNDP		3721.43	209.41	7,663,875
RAC Servicing Sector	GIZ			6,829,000
Enabling Activities	UNEP			3,370,000
Additional reductions to be achieved due to complete phase-out as on 1.1.2030 as per accelerated phase-out schedule for HCFCs		6571.33	349.34	-
Total		**10228.87**	**579.99**	**25,157,632**

LIST OF ANNEXURES

ANNEXURE-I

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

The Parties agree to accelerate the phase-out of production and consumption of hydrochlorofluorocarbons (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 during 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 Multilateral Fund for the 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 Multilateral Fund to 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 ozone-depleting potential, taking into account national circumstances;

(b) Substitutes and alternatives that minimize other impacts on the environment, including on the climate, taking into account global-warming potential, 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 totake every practicable step consistent with Multilateral Fund 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 favourable conditions;

(Decision XIX/6)

ANNEXURE-II

Funding Guidelines for HCFC Consumption Sector for HPMP Stage-II

Executive Committee decided, in determining criteria for funding HCFC phase-out in the consumption sector for stage II of the HCFC phase-out management plans (HPMPs) in Article 5 countries:

Cut-off Date

(a) Not to consider any projects to convert HCFC-based manufacturing capacity installed after 21st. September 2007;

Second-stage Conversion

(b) To apply the following principles in respect of second-stage conversion projects:

(i) Full funding of eligible incremental costs of second-stage conversion projects would be considered in those cases where an Article 5 Party clearly demonstrated in its HPMP that such projects:

a. Were necessary to comply with the Montreal Protocol HCFC targets up to and including the 35 per cent reduction step by 1 January 2020; and/or

b. Were the most cost-effective projects measured in ODP tons that the Party concerned could undertake in the manufacturing sector in order to comply with those targets; and/or

c. Would make the transition to low global-warming potential (GWP) alternatives;

(ii) Funding for all other second-stage conversion projects not covered under sub-paragraph (i) above would be limited to funding for installation, trials, and training associated with those projects;

Eligible Incremental Costs of HCFC Phase-out Projects

(c) To apply the following principles in respect of eligible incremental costs of HCFC phase-out projects for stage II of HPMPs, subject to a review in 2020:

(i) The current cost-effectiveness threshold values used for CFC phase-out projects in paragraph 32 of the final report of the 16th meeting of the Executive Committee (document UNEP/OzL. Pro/ExCom/16/20), to be measured in metric kilograms, and a cost-effectiveness threshold of US $7.83/metric kilogram for rigid insulation refrigeration foam, should be used as guidelines during the development and implementation of the second and subsequent stages of HPMPs;

(ii) Article 5 countries would have the flexibility to allocate the approved funding from incremental operating costs to incremental capital costs and to allocate up to 20 per cent of the approved funding for incremental capital costs to incremental operating costs, as long as the use of the flexibility did not change the intent of the project. Any reallocation should be reported to the Executive Committee;

(iii) Funding of up to a maximum of 25 per cent above the cost-effectiveness threshold would be provided for projects when needed for the introduction of low-GWP alternatives; however, for small and medium-sized enterprises (SMEs) in the foam sector with consumption of less than 20 metric tons, the maximum would be up to 40 per cent above the cost-effectiveness threshold;

HCFC Phase-out in the Foam Sector

(iv) Incremental operating costs for projects in the polyurethane foam sector would be considered at US $1.60/metric kilogram for HCFC-141b; however, for projects that make the transition to low-GWP alternatives, incremental operating costs would be considered at up to US $5.00/metric kilogram;

(v) Incremental operating costs for projects in the extruded polystyrene foam sector would be considered at US $1.40/metric kilogram for HCFC-142b, HCFC-142b/HCFC-22, or HCFC-22 consumption to be phased out at the manufacturing enterprise;

(vi) For group projects linked to systems houses, incremental operating costs would be calculated on the basis of the total HCFC consumption to be phased out for all downstream foam enterprises;

(vii) When it was clearly demonstrated that low-GWP alternatives with incremental operating costs as indicated in sub-paragraph (c) (iv) above were not feasible, the Executive Committee would fund higher levels of incremental operating costs when needed for the introduction of low-GWP alternatives by SMEs;

HCFC Phase-out in the Refrigeration and Air-conditioning Manufacturing Sector

(viii) Incremental operating costs for projects in the air conditioning sub-sector would be considered at US $6.30/metric kilogram of HCFC consumption to be phased out at the manufacturing enterprise;

(ix) Incremental operating costs for projects in the commercial refrigeration subsector would be considered at US $3.80/metric kilogram of HCFC consumption to be phased out at the manufacturing enterprise;

(x) Consistent with decision 31/45 of the Executive Committee, incremental operating costs would not be considered for enterprises in the refrigeration equipment assembly, installation and charging subsector category;

HCFC phase-out in the refrigeration servicing sector, including servicing for all the relevant refrigeration and air-conditioning subsectors

(xi) Article 5 countries with total HCFC consumption of up to 360 metric tons, and former low-volume-consuming (LVC) Article 5 countries with HCFC consumption in the refrigeration servicing sector only above 360 metric tons, must include in their HPMPs, as a minimum:

a. A commitment to meeting, without further requests for funding at least the 35 per cent reduction step in 2020, and, if the country so decided, the 67.5 per cent reduction step in 2025 or the complete phase-out of HCFCs in line or ahead of the Montreal Protocol schedule. This should include a commitment by the country to restrict imports of HCFC- based equipment if necessary to achieve compliance with the reduction steps and to support relevant phase-out activities;

b. Mandatory reporting, by the time funding tranches for the HPMP were requested, on the implementation of activities undertaken in the refrigeration servicing sector and in the manufacturing sector when applicable, in the previous year, as well as a thorough and comprehensive annual work plan for the implementation of the activities associated with the next tranche;

c. A description of the roles and responsibilities of major stakeholders, as well as the lead implementing agency and the cooperating agencies, where applicable;

(xii) Article 5 countries with total HCFC consumption of up to 360 metric tons would be provided with funding consistent with the level of consumption in the refrigeration servicing sector, as shown in the table below, on the understanding that project proposals would still need to demonstrate that the funding level was necessary to achieve the 2020 and 2025 phase-out targets, or if the country so decided, later reduction targets:

Consumption (mt)*	Funding (US $) (**)		
	Up to 2020	Up to 2025	Total phase-out
>0 <15	205,625	396,500	587,500
15 <40	262,500	506,250	750,000
40 <80	280,000	540,000	800,000
80 <120	315,000	607,500	900,000
120 <160	332,500	641,250	950,000
160 <200	350,000	675,000	1,000,000
200 <320	560,000	1,080,000	1,600,000
320 <360	630,000	1,215,000	1,800,000

(*) Level of HCFC baseline consumption in the refrigeration servicing sector
(**) This represents the maximum funding eligible, including funding already provided

(xiii) Article 5 countries with HCFC consumption in the refrigeration servicing sector only above 360 metric tons would be provided with funding for phase-out activities at US $4.80/metric kilogram;

(xiv) Article 5 countries with total HCFC consumption in the servicing sector only of up to 360 metric tons would have flexibility in utilizing the resources available to address specific needs that might arise during project implementation to facilitate the smoothest possible phase-out of HCFCs, consistent with Executive Committee decisions;

(xv) Article 5 countries with total HCFC consumption of up to 360 metric tons, used in both the manufacturing and refrigeration servicing sectors, could submit HCFC phase-out investment projects in accordance with the policies and decisions of the Executive Committee, in addition to funding for addressing HCFC consumption in the servicing sector;

(xvi) Article 5 countries with total HCFC consumption above 360 metric tons used in both the manufacturing and refrigeration servicing sectors should prioritize consumption in the manufacturing sector to meet the reduction steps in 2020, where possible. Activities in the refrigeration servicing sector for such countries would be calculated at US $4.8/ metric kilogram, to be deducted from their starting point for aggregate reductions in HCFC consumption;

HCFC phase-out in the Aerosol, Fire Extinguisher and Solvent Sectors

(xvii) The eligibility of incremental capital and operating costs for HCFC phase-out projects in the aerosol, fire extinguisher, and solvent sectors would be considered on a case-by-case basis; and

The Executive Committee would be open to considering projects to promote transition to not-in-kind technologies in relevant sectors.

ANNEXURE-III

Executive Committee Decision Approving India's HPMP Stage-3

The Executive Committee Decided:

(a) To approve, in principle, stage III of the HCFC phase-out management plan (HPMP) for India for the period from 2022 to 2030 for the complete phase-out of HCFC consumption, in the amount of US $27,351,569, consisting of US $14,835,060, plus agency support costs of US $1,038,454, for UNDP, US $3,370,000, plus agency support costs of US $380,700, for UNEP and US $6,952,572, plus agency support costs of US $774,783, for the Government of Germany, on the understanding that no more funding from the Multilateral Fund would be provided for the phase-out of HCFCs;

(b) To note the commitment of the Government of India to phase out HCFCs completely by 1 January 2030, and that HCFCs would not be imported after that date, except for those allowed for a servicing tail between 2030 and 2040, where required, consistent with the provisions of the Montreal Protocol;

(c) To deduct 574.45 ODP tonnes of HCFCs from the remaining HCFC consumption eligible for funding;

(d) To deduct an additional 5.54 ODP tonnes of HCFCs from the remaining HCFC consumption eligible for funding, in line with decision 91/53;

(e) To approve the Agreement between the Government of India and the Executive Committee for the reduction in consumption of HCFCs, in accordance with stage III of the HPMP, contained in Annex XXI to the present document;

(f) That, to allow for consideration of the final tranche of its HPMP, the Government of India should submit:

  (i) A detailed description of the regulatory and policy framework in place to implement measures to ensure that HCFC consumption was in compliance with paragraph 8 ter(e)(i) of Article 5 of the Montreal Protocol for the period 2030–2040;

  (ii) If India were intending to have consumption during the period 2030–2040, in line with paragraph 8 ter(e)(i) of Article 5 of the Montreal Protocol, proposed modifications to the targets specified in row 1.2 of its Agreement with the Executive Committee covering the period beyond 2030; and

(g) To approve the first tranche of stage III of the HPMP for India, and the corresponding tranche implementation plan, in the amount of US $9,232,016, consisting of US $6,166,500, plus agency support costs of US $431,655, for UNDP, US $668,215, plus agency support costs of US $75,486, for UNEP and US $1,700,643, plus agency support costs of US $189,517, for the Government of Germany.

(Decision 91/45)

ANNEXURE-IV

Agreement Between the Government of India and the Executive Committee of the Multilateral Fund for the Reduction in Consumption of Hydrochlorofluorocarbons in Accordance with Stage III of the HCFC Phase-out Management Plan

Purpose

1. This Agreement represents the understanding of the Government of India (the "Country") and the Executive Committee with respect to the reduction of controlled use of the ozone-depleting substances (ODS) set out in Appendix 1-A ("The Substances") to a sustained level of zero ODP tonnes by 1 January 2030 in compliance with Montreal Protocol schedule.

2. The Country agrees to meet the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A ("The Targets, and Funding") in this Agreement as well as in the Montreal Protocol reduction schedule for all Substances mentioned in Appendix 1-A. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to any consumption of the Substances that exceeds the level defined in row 1.2 of Appendix 2-A as the final reduction step under this Agreement for all of the Substances specified in Appendix 1-A, and in respect to any consumption of each of the Substances that exceeds the level defined in rows 4.1.3, 4.2.3, 4.3.3, 4.4.3, 4.5.3 and 4.6.3 (remaining consumption eligible for funding).

3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees, in principle, to provide the funding set out in row 3.1 of Appendix 2-A to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A ("Funding Approval Schedule").

4. The Country agrees to implement this Agreement in accordance with stage III of the HCFC phase-out management plan (HPMP) approved ("the Plan"). In accordance with sub-paragraph 5(b) of this Agreement, the Country will accept independent verification of the achievement of the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A of this Agreement. The aforementioned verification will be commissioned by the relevant bilateral or implementing agency.

Conditions for Funding Release

5. The Executive Committee will only provide the Funding in accordance with the Funding Approval Schedule when the Country satisfies the following conditions at least eight weeks in advance of the applicable Executive Committee meeting set out in the Funding Approval Schedule:

    (a) That the Country has met the Targets set out in row 1.2 of Appendix 2-A for all relevant years. Relevant years are all years since the year in which this Agreement was approved. Years for which there are no due country programme implementation reports at the date of the Executive Committee meeting at which the funding request is being presented are exempted;

    (b) That the meeting of these Targets has been independently verified for all relevant years, unless the Executive Committee decided that such verification would not be required;

(c) That the Country had submitted a Tranche Implementation Report in the form of Appendix 4-A ("Format of Tranche Implementation Reports and Plans") covering each previous calendar year; that it had achieved a significant level of implementation of activities initiated with previously approved tranches; and that the rate of disbursement of funding available from the previously approved tranche was more than 20 per cent; and

(d) That the Country has submitted a Tranche Implementation Plan in the form of Appendix 4-A covering each calendar year until and including the year for which the funding schedule foresees the submission of the next tranche or, in case of the final tranche, until completion of all activities foreseen.

Monitoring

6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement. The institutions set out in Appendix 5-A ("Monitoring Institutions and Roles") will monitor and report on implementation of the activities in the previous Tranche Implementation Plans in accordance with their roles and responsibilities set out in the same appendix.

Flexibility in the reallocation of funds

7. The Executive Committee agrees that the Country may have the flexibility to reallocate part or all of the approved funds, according to the evolving circumstances to achieve the smoothest reduction of consumption and phase-out of the Substances specified in Appendix 1-A:

(a) Reallocations categorized as major changes must be documented in advance either in a Tranche Implementation Plan as foreseen in sub-paragraph 5(d) above, or as a revision to an existing Tranche Implementation Plan to be submitted eight weeks prior to any meeting of the Executive Committee, for its approval. Major changes would relate to:

(i) Issues potentially concerning the rules and policies of the Multilateral Fund;

(ii) Changes which would modify any clause of this Agreement;

(iii) Changes in the annual levels of funding allocated to individual bilateral or implementing agencies for the different tranches;

(iv) Provision of funding for activities not included in the current endorsed Tranche Implementation Plan, or removal of an activity in the Tranche Implementation Plan, with a cost greater than 30 per cent of the total cost of the last approved tranche; and

(v) Changes in alternative technologies, on the understanding that any submission for such a request would identify the associated incremental costs, the potential impact to the climate, and any differences in ODP tonnes to be phased out if applicable, as well as confirm that the Country agrees that potential savings related to the change of technology would decrease the overall funding level under this Agreement accordingly;

(b) Reallocations not categorized as major changes may be incorporated in the approved Tranche Implementation Plan, under implementation at the time, and reported to the Executive Committee in the subsequent Tranche Implementation Report;

(c) Any enterprise to be converted to non-HCFC technology included in the Plan and that would be found to be ineligible under the policies of the Multilateral Fund (i.e., due to foreign ownership or establishment post the 21 September 2007 cut-off date), would not receive financial assistance. This information would be reported as part of the Tranche Implementation Plan;

(d) The Country commits to examining the possibility of using pre-blended systems with low-global warming potential blowing agents instead of blending them in-house, for those foam enterprises covered under the Plan, should this be technically viable, economically feasible and acceptable to the enterprises;

(e) The Country agrees, in cases where HFC technologies have been chosen as an alternative to HCFCs, and taking into account national circumstances related to health and safety: to monitor the availability of substitutes and alternatives that further minimize impacts on the climate; to consider, in the review of regulations standards and incentives adequate provisions that encourage introduction of such alternatives; and to consider the potential for adoption of cost-effective alternatives that minimize the climate impact in the implementation of the HPMP, as appropriate, and inform the Executive Committee on the progress accordingly in tranche implementation reports; and

(f) Any remaining funds held by the bilateral or implementing agencies or the Country under the Plan will be returned to the Multilateral Fund upon completion of the last tranche foreseen under this Agreement.

Considerations for the refrigeration servicing sector

8. Specific attention will be paid to the execution of the activities in the refrigeration servicing sector included in the Plan, in particular:

(a) The Country would use the flexibility available under this Agreement to address specific needs that might arise during project implementation; and

(b) The Country and relevant bilateral and/or implementing agencies would take into consideration relevant decisions on the refrigeration servicing sector during the implementation of the Plan.

Bilateral and implementing agencies

9. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfil the obligations under this Agreement. UNDP has agreed to be the lead implementing agency (the "Lead IA") and UNEP and the Government of Germany have agreed to be the cooperating implementing agencies (the "Cooperating IAs") under the lead of the Lead IA in respect of the Country's activities under this Agreement. The Country agrees to evaluations, which might be carried out under the monitoring and evaluation work programmes of the Multilateral Fund or under the evaluation programme of the Lead IA and/or Cooperating IAs taking part in this Agreement.

10. The Lead IA will be responsible for ensuring co-ordinated planning, implementation and reporting of all activities under this Agreement, including but not limited to independent verification as per sub-paragraph 5(b). The Cooperating IAs will support the Lead IA by implementing the Plan under the overall co-ordination of the Lead IA. The roles of the Lead IA and Cooperating IAs are contained in Appendix 6-A and Appendix 6-B, respectively. The Executive Committee agrees, in principle, to provide the Lead IA and the Cooperating IAs with the fees set out in rows 2.2, 2.4 and 2.6 of Appendix 2-A.

Non-compliance with the Agreement

11. Should the Country, for any reason, not meet the Targets for the elimination of the Substances set out in row 1.2 of Appendix 2-A or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Approval Schedule. At the discretion of the Executive Committee, funding will be reinstated according to a revised Funding Approval Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next tranche of funding

under the Funding Approval Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amount set out in Appendix 7-A ("Reductions in Funding for Failure to Comply") in respect of each ODP kg of reductions in consumption not achieved in any one year. The Executive Committee will discuss each specific case in which the Country did not comply with this Agreement, and take related decisions. Once decisions are taken, the specific case of non-compliance with this Agreement will not be an impediment for the provision of funding for future tranches as per paragraph 5 above.

12. The Funding of this Agreement will not be modified on the basis of any future Executive Committee decisions that may affect the funding of any other consumption sector projects or any other related activities in the Country.

13. The Country will comply with any reasonable request of the Executive Committee, the Lead IA and the Cooperating IAs to facilitate implementation of this Agreement. In particular, it will provide the Lead IA and the Cooperating IAs with access to the information necessary to verify compliance with this Agreement.

Date of completion

14. The completion of the Plan and the associated Agreement will take place at the end of the year following the last year for which a maximum allowable total consumption level has been specified in Appendix 2-A. Should at that time there still be activities that are outstanding, and which were foreseen in the last Tranche Implementation Plan and its subsequent revisions as per sub-paragraph 5(d) and paragraph 7, the completion of the Plan will be delayed until the end of the year following the implementation of the remaining activities. The reporting requirements as per sub-paragraphs 1(a), 1(b), 1(d), and 1(e) of Appendix 4-A will continue until the time of the completion of the Plan unless otherwise specified by the Executive Committee.

Validity

15. All of the conditions set out in this Agreement are undertaken solely within the context of the Montreal Protocol and as specified in this Agreement. All terms used in this Agreement have the meaning ascribed to them in the Montreal Protocol unless otherwise defined herein.

16. This Agreement may be modified or terminated only by mutual written agreement of the Country and the Executive Committee of the Multilateral Fund.

APPENDICES

Appendix 1-A: The Substances

Substance	Annex	Group	Starting point for aggregate reductions in consumption (ODP tonnes)
HCFC-123	C	I	3.50
HCFC-124	C	I	13.50
HCFC-141b	C	I	865.50
HCFC-142b	C	I	123.70
HCFC-22	C	I	602.00
Sub-total			1,608.20
HCFC-141b contained in imported pre-blended polyols	C	I	83.05
Total			1,691.25

Appendix 2-A: The Targets, and Funding

Row	Particulars	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	1,045.33	1,045.33	1,045.33	522.67	522.67	522.67	522.67	522.67	0.00	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	698.82	643.28	643.28	75.85	75.85	75.85	75.85	75.85	0.00	n/a
2.1	Lead IA (UNDP) agreed funding (US $)	6,166,500	0	5,495,933	0	2,663,295	0	0	509,332	0	14,835,060
2.2	Support costs for Lead IA (US $)	431,655	0	384,715	0	186,431	0	0	35,653	0	1,038,454
2.3	Cooperating IA (UNEP) agreed funding (US $)	668,215	0	1,011,000	0	1,168,825	0	0	521,960	0	3,370,000
2.4	Support costs for Cooperating IA (US $)	75,486	0	114,210	0	132,039	0	0	58,965	0	380,700
2.5	Cooperating IA (Germany) agreed funding (US $)	1,700,643	0	2,140,772	0	2,396,887	0	0	714,270	0	6,952,572
2.6	Support costs for Cooperating IA (US $)	189,517	0	238,564	0	267,105	0	0	79,597	0	774,783

Row	Particulars	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
3.1	Total agreed funding (US $)	8,535,358	0	8,647,705	0	6,229,007	0	0	1,745,562	0	25,157,632
3.2	Total support costs (US $)	696,658	0	737,489	0	585,575	0	0	174,215	0	2,193,937
3.3	Total agreed costs (US $)	9,232,016	0	9,385,194	0	6,814,582	0	0	1,919,777	0	27,351,569
4.1.1	Total phase-out of HCFC-123 agreed to be achieved under this Agreement (ODP tonnes)										3.50
4.1.2	Phase-out of HCFC-123 to be achieved in previously approved projects (ODP tonnes)										0.00
4.1.3	Remaining eligible consumption for HCFC-123 (ODP tonnes)										0.00
4.2.1	Total phase-out of HCFC-124 agreed to be achieved under this Agreement (ODP tonnes)										13.50
4.2.2	Phase-out of HCFC-124 to be achieved in previously approved projects(ODP tonnes)										0.00
4.2.3	Remaining eligible consumption for HCFC-124 (ODP tonnes)										0.00
4.3.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)										0.00
4.3.2	Phase-out of HCFC-141b to be achieved in previously approved projects(ODP tonnes)										865.50
4.3.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)										0.00
4.4.1	Total phase-out of HCFC-142b agreed to be achieved under this Agreement (ODP tonnes)										123.70
4.4.2	Phase-out of HCFC-142b to be achieved in previously approved projects (ODP tonnes)										0.00
4.4.3	Remaining eligible consumption for HCFC-142b (ODP tonnes)										0.00
4.5.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)										439.29
4.5.2	Phase-out of HCFC-22 to be achieved in previously approved projects (ODP tonnes)										162.71

Row	Particulars	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
4.5.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)										0.00
4.6.1	Total phase-out of HCFC-141b contained in imported pre-blended polyols agreed to be achieved under this Agreement (ODP tonnes)										0.00
4.6.2	Phase-out of HCFC-141b contained in imported pre-blended polyols to be achieved in previously approved projects (ODP tonnes)										83.05
4.6.3	Remaining eligible consumption for HCFC-141b contained in imported pre-blended polyols (ODP tonnes)										0.00

**Date of completion of stage II as per stage II Agreement: 31 December 2024*

Appendix 3-A: Funding Approval Schedule

1. Funding for the future tranches will be considered for approval at the second meeting of the year specified in Appendix 2-A.

Appendix 4-A: Format of Tranche Implementation Reports and Plans

1. The submission of the Tranche Implementation Report and Plans for each tranche request will consist of five parts:

    (a) A narrative report, with data provided by tranche, describing the progress achieved since the previous report, reflecting the situation of the Country in regard to phase out of the Substances, how the different activities contribute to it, and how they relate to each other. The report should include the amount of ODS phased out as a direct result from the implementation of activities, by substance, and the alternative technology used and the related phase-in of alternatives, to allow the Secretariat to provide to the Executive Committee information about the resulting change in climate relevant emissions. The report should further highlight successes, experiences, and challenges related to the different activities included in the Plan, reflecting any changes in the circumstances in the Country, and providing other relevant information. The report should also include information on and justification for any changes vis-à-vis the previously submitted Tranche Implementation Plan(s), such as delays, uses of the flexibility for reallocation of funds during implementation of a tranche, as provided for in paragraph 7 of this Agreement, or other changes;

    (b) An independent verification report of the Plan results and the consumption of the Substances, as per sub-paragraph 5(b) of the Agreement. If not decided otherwise by the Executive Committee, such a verification has to be provided together with each tranche request and will have to provide verification of the consumption for all relevant years as specified in sub-paragraph 5(a) of the Agreement for which a verification report has not yet been acknowledged by the Committee;

    (c) A written description of the activities to be undertaken during the period covered by the requested tranche, highlighting implementation milestones, the time of completion and the interdependence of the activities, and taking into account experiences made and progress achieved in the implementation of earlier tranches; the data in the plan will be provided by calendar year. The description should also include a reference to the overall Plan and progress achieved, as well as any possible changes to the overall Plan that are foreseen. The description should also specify and explain in detail such changes to the overall plan. This description of future activities can be submitted as a part of the same document as the narrative report under sub-paragraph (b) above;

(d) A set of quantitative information for all Tranche Implementation Reports and Plans, submitted through an online database; and An Executive Summary of about five paragraphs, summarizing the information of the above sub-paragraphs 1(a) to 1(d).

2. In the event that in a particular year two stages of the HPMP are being implemented in parallel, the following considerations should be taken in preparing the Tranche Implementation Reports and Plans:

(a) The Tranche Implementation Reports and Plans referred to as part of this Agreement, will exclusively refer to activities and funds covered by this Agreement; and

(b) If the stages under implementation have different HCFC consumption targets under Appendix 2-A of each Agreement in a particular year, the lower HCFC consumption target will be used as reference for compliance with these Agreements and will be the basis for the independent verification.

Appendix 5-A: Monitoring Institutions and Roles

1. The monitoring process will be managed by Ozone Cell, Ministry of Environment, Forest and Climate Change, with the assistance of the Lead IA.

2. The consumption will be monitored and determined based on official import and export data for the substances recorded by relevant government departments.

3. The Ozone Cell, Ministry of Environment, Forest and Climate Change, shall compile and report the following data and information on an annual basis on or before the relevant due dates:

(a) Annual reports on consumption of the substances to be submitted to the Ozone Secretariat; and

(b) Annual reports on progress of implementation of the Plan to be submitted to the Executive Committee of the Multilateral Fund.

4. The consumption will be monitored annually throughout the implementation of the Plan and accordingly reflected in the progress report on the implementation of the Plan.

5. The Ozone Cell, Ministry of Environment, Forest and Climate Change shall endorse the final report and the Lead IA shall submit the same to the relevant meeting of the Executive Committee along with the annual implementation plan and reports.

Appendix 6-A: Role of the Lead Implementing Agency

1. The Lead IA will be responsible for a range of activities, including at least the following:

(a) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's HPMP;

(b) Assisting the Country in preparation of the Tranche Implementation Reports and Plans as per Appendix 4-A;

(c) Providing independent verification to the Executive Committee that the Targets have been met and associated tranche activities have been completed as indicated in the Tranche Implementation Plan consistent with Appendix 4-A;

(d) Ensuring that the experiences and progress is reflected in updates of the overall plan and in future Tranche Implementation Plans consistent with sub-paragraphs 1(c) and 1(d) of Appendix 4-A;

(e) Fulfilling the reporting requirements for the Tranche Implementation Reports and Plans and the overall plan as specified in Appendix 4-A for submission to the Executive Committee, and should include the activities implemented by the Cooperating IAs;

(f) In the event that the last funding tranche is requested one or more years prior to the last year for which a consumption target had been established, annual tranche implementation reports and, where applicable, verification reports on the current stage of the Plan should be submitted until all activities foreseen had been completed and HCFC consumption targets had been met;

(g) Ensuring that appropriate independent technical experts carry out the technical reviews;

(h) Carrying out required supervision missions;

(i) Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Tranche Implementation Plan and accurate data reporting;

(j) Co-ordinating the activities of the Cooperating IAs, and ensuring appropriate sequence of activities;

(k) In case of reductions in funding for failure to comply in accordance with paragraph 11 of the Agreement, to determine, in consultation with the Country and the Cooperating IAs, the allocation of the reductions to the different budget items and to the funding of the Lead IA and each Cooperating IA;

(l) Ensuring that disbursements made to the Country are based on the use of the indicators;

(m) Providing assistance with policy, management and technical support when required;

(n) Reaching consensus with the Cooperating IAs on any planning, co-ordination and reporting arrangements required to facilitate the implementation of the Plan; and

(o) Timely releasing funds to the Country/participating enterprises for completing the activities related to the project.

2. After consultation with the Country and taking into account any views expressed, the Lead IA will select and mandate an independent entity to carry out the verification of the HPMP results and the consumption of the Substances mentioned in Appendix 1-A, as per sub-paragraph 5(b) of the Agreement and sub-paragraph 1(b) of Appendix 4-A.

Appendix 6-B: Role of the Cooperating Implementing Agencies

1. The Cooperating IAs will be responsible for a range of activities. These activities are specified in the Plan, including at least the following:

(a) Providing assistance for policy development when required;

(b) Assisting the Country in the implementation and assessment of the activities funded by the Cooperating IAs, and refer to the Lead IA to ensure a co-ordinated sequence in the activities;

(c) Providing reports to the Lead IA on these activities, for inclusion in the consolidated reports as per Appendix 4-A; and

(d) Reaching consensus with the Lead IA on any planning, co-ordination and reporting arrangements required to facilitate the implementation of the Plan.

Appendix 7-A: Reductions in Funding for Failure to Comply

1. In accordance with paragraph 11 of the Agreement, the amount of funding provided may be reduced by US $86.75 per ODP kg of consumption beyond the level defined in row 1.2 of Appendix 2-A for each year in which the target specified in row 1.2 of Appendix 2-A has not been met, on the understanding that the maximum funding reduction would not exceed the funding level of the tranche being requested. Additional measures might be considered in cases where non-compliance extends for two consecutive years.

2. In the event that the penalty needs to be applied for a year in which there are two Agreements in force (two stages of the HPMP being implemented in parallel) with different penalty levels, the application of the penalty will be determined on a case-by-case basis taking into consideration the specific sectors that lead to the non-compliance. If it is not possible to determine a sector, or both stages are addressing the same sector, the penalty level to be applied would be the largest.

ANNEXURE-V

Enterprises to be Assisted in the Refrigeration Sector in HPMP Stage-III

S. No.	Name of Enterprise	Consumption of HCFC-22 (kg)
Refrigeration Manufacturing: Commercial Refrigeration Sub-Sector		
1	Global Polyurethanes LLP	8375.00
2	Kool King Industries	13920.00
3	Birla Aircon	13200.00
4	Maharaja Polyurethane	15300.00
5	Mongia and Co.	11105.00
6	Benson Refrigeration & Air Conditioning Systems	16024.00
7	Shreeji Seating System	9940.00
8	Expo Refrigeration Company	20.00
9	Pritam Refrigeration and Engineering	48.35
10	Mangaldeep Engineering Company	67.55
11	Daffoo Engineering Enterprises	69.00
12	Coolkit Care Engineering Company	70.50
13	Synergy Agro-Tech Pvt. Ltd.	78.00
14	J.K. Industries	99.10
15	Glacier Air Conditioning	108.10
16	National Refrigeration Engg	109.80
17	Vijay Refrigeration	111.20
18	Shankar Refrigeration and Engineering	155.00
19	Kartar Refrigeration	194.85
20	GS Enterprises	166.00
21	Meta Fabs	224.60
22	Windsor Engineers	279.00
23	New Anucool Engineers	230.00
24	M/s Tempcon	367.45
25	Vishwakarma Engineering Works	412.55

S. No.	Name of Enterprise	Consumption of HCFC-22 (kg)
26	Phoenix Refrigeration	400.00
27	Ladhar AC and Ref. Sales	200.00
28	Mellcon Engineers	612.50
29	Avon Refrigeration	654.00
30	Neelam Engineering Company	139.05
31	Eakcon Systems Pvt. Ltd.	838.74
32	Kay Ess Industries	1139.10
33	Coments Industry	1099.20
34	Airtech Cooling Process Pvt Ltd	1155.00
35	Kohinoor Industry	1500.00
36	Kelvin (India)	1501.05
37	Ambica Engineers	1535.00
38	Raja Cool Home	1940.00
39	J.S. Refrigeration	2257.60
40	Ami Cooling	6101.00
41	Blue Star Ltd. (Wada Unit)	3861.00

S. No.	Name of Enterprise	Consumption of HCFC-22 (kg)
Refrigeration Manufacturing: Process Chiller Sub-Sector		
42	Unique Airtech	563.50
43	Bristal India Steel Industries	762.80
44	Sea Bird Refrigeration Private Limited (Ghaziabad Unit)	1404.70
45	Sea Bird Refrigeration Private Limited (New Delhi Unit)	2629.20
46	Shreeji Seating System	20900.00
47	Ice Make Refrigeration Ltd.	2754.35
48	Voltas Ltd.	12246.30
Total Conversion Projects in Refrigeration Manufacturing		**48**

Enterprises to be Assisted in the Air-Conditioning Sector in HPMP Stage-III

S. No.	Name of Enterprise	Consumption of HCFC-22
Air-Conditioner Manufacturing: Room Air-Conditioners		
1	Esquire Services	5965.00
2	Subros Limited	18293.65
3	Enjoy Refrigeration	3769.00
4	Ice Make Refrigeration Ltd.	3906.70
5	Birla Aircon	1500.00
6	Mongia and Co.	9306.75
7	Benson Refrigeration & Air Conditioning Systems	4530.00
8	GS Enterprises	42.00
9	New Anucool Engineers	82.50
10	Phoenix Refrigeration	25.00
11	Ladhar AC and Ref. Sales	238.50
12	Neelam Engineering Company	698.20
13	Kay Ess Industries	849.15
Air-Conditioner Manufacturing: Light Commercial AC & Chiller Sub-Sector		
14	Blue Star Ltd. (Dadra Unit)	140415.00
15	Voltas Ltd.	29432.98
16	Blue Star Ltd. (Wada Unit)	3861.00
Total Conversion Projects in Air-Conditioner Manufacturing		**16**

SEPTEMBER 2023

WHOM TO CONTACT TO LEARN MORE ABOUT OZONE

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