MALAYSIA HCFC PHASE-OUT MANAGEMENT PLAN (HPMP STAGE-1) FOR COMPLIANCE WITH THE 2013 AND 2015 CONTROL TARGETS FOR ANNEX-C, GROUP-I SUBSTANCES

PREPARED JOINTLY BY:

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alaysia acceded to the Vienna Convention and ratified the Montreal Protocol on Substances that deplete the Ozone Layer in August 1989. As of October 2001, Malaysia has ratified all the amendments to the Montreal Protocol.

Malaysia was classified as a party operating under Paragraph-1, Article-5 of the Montreal Protocol and thus qualified for technical and financial assistance, including transfer of technology, through the financial mechanism of the Montreal Protocol.Malaysia's Country Programme incorporating the National Strategy and Action Plan for controlling the use of Ozone Depleting substances was approved 1992. Since then Malaysia has taken proactive measures such as phase-out project activities including technology transfer investments, technical assistance, training and capacity-building, information dissemination and awareness-raising and regulations. Malaysia has established a comprehensive regulatory framework for controlling ODS. As a result, Malaysia has consistently been in compliance with the provisions of the Montreal Protocol.

Hydrochlorofluorocarbons (HCFCs) are classified as controlled substances under Annex-C Group-I of the Montreal Protocol and are subject to the adjusted control schedule for Article-5 countries; to freeze the consumption at baseline levels from 2013 and reduction of 10% from baseline levels from 2015. HCFCs are used in Malaysia in various industry sectors, such as Air Conditioning, Refrigeration, Foams, Firefighting and Solvents. The predominant HCFC used is HCFC-22 mainly in the Refrigeration and Air Conditioning Sectors. HCFC consumption in Malaysia increased from 841 metric tonnes in 1996 to 7,700 metric tonnes in 2009, indicating an average annual growth rate of over 18%. In the past five years, HCFC consumption in Malaysia has grown at a relatively steadier rate of 8% annually. The main reasons for this growth are sustained economic development and resulting increase in demand for consumer, commercial and industrial products that use HCFCs.

In order to meet the 2013 freeze and 2015 reduction targets, the industry, consumers and government will need to make tremendous efforts. This will involve phasing out HCFC use in major manufacturing sectors and reducing dependence on HCFCs and controlling and reducing HCFC use wherever possible in the servicing sector. The main constraints for transitioning from HCFCs to alternative environment-friendly substitutes is the dependable and economic availability of benign and sustainable substitutes and the limited time available for implementing phase-out actions for compliance. Extraordinary efforts will be needed to curb the momentum of inevitable growth in HCFC consumption in sectors that are not addressed through this proposal.

To overcome these constraints, adequate technical and financial assistance would be one of the inputs needed to minimize the burden of transition on consumers and industry. Also, adequate institutional support will be needed to ensure that awareness of the impending consumption limits is duly disseminated and capacity-building and training programmes for stakeholders are carried out.



Malaysia PROJECT DOCUMENT

Project Title:	HCFC Phase-out Management Plan (HPMP) Stage-I for compliance with the 2013 and 2015 control targets for Annex-C, Group-I substances (HCFCs) in Malaysia (MLF Project Numbers: MAL/PHA/65/TAS/168, MAL/PHA/65/INV/169, MAL/PHA/65/TAS/170)
UNDAF Outcome(s):	N/A
Expected CP Outcome(s):	Improved environmental stewardship through sustainable energy development and environmental management (Outcome 3, Country Programme (CP) 2008-2012)
Expected Output(s):	Improved data management of greenhouse gas emissions and ozone depleting substances consumption (Output 3.4, CP 2008-2012)
Executing Agency:	Ministry of Natural Resources and Environment
Implementing Partner:	Department of Environment (DOE)
Responsible Parties:	DOE, UNDP

Project Summary

Malaysia's HCFC Phase -out Management Plan (HPMP Stage-I), for compliance with the 2013 and 2015 control targets for HCFC consumption according to the Montreal Protocol, comprises of a combination of interventions such as technology transfer investments, policies and regulations, technical assistance, training, awareness, communications and management, coordination and monitoring in various HCFC consuming sectors, to be implemented during 2012 to 2016, consistent with the provisions of the performance-based agreement between the Executive Committee of the Multilateral Fund and Malaysia.

Upon successful completion, the plan will result in net sustainable reductions of 77.36 ODP tonnes in the national HCFC consumption by 2016, contributing to Malaysia's compliance with the control targets for consumption of HCFCs. In addition, the project will result in net CO_2 -equivalent direct emission reductions of about 1.35 million tonnes annually from 2016.

Programme Period:	2012 - 2016	Total Resources Required:	US\$ 9,587,470
Key Result Area (Strategic Plan):		Total Resources Allocated	
Atlas Award ID:		Regular:	N/A
Start Date:	23 April 2012	Other:	N/A
End Date:	31 December 2016	MLF:	US\$ 9,587,470
PAC meeting date:		In-kind contributions:	N/A
Management Arrangements:	NIM		

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LIST OF ABBREVIATIONS

APR	Annual Progress Report
AP System	Application Import Permit System
AWP	Annual Work Plan
CDR	Combined Delivery Report
CETEC	Centre for Environment Technology
CFC	Chloro Fluoro Carbons
CO2	Carbon Dioxide
СР	Country Programme
CTC	Carbon Tetra Chloride
ExCom	Executive Committee of the Multilateral Fund
GMS	General Management Support
GWP	Global Warming Potential
HACT	Harmonized Approach to Cash Transfer
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
HPMP	HCFC Phase-out Management Plan
IA	Implementing Agency
ISS	Implementation Support Services
DOE	Department of Environment, Ministry of Natural Resources and Environment
MAC	Mobile Air Conditioning
MASHRAE	
MITI	Ministry of International Trade and Industry
MLF	Multilateral Fund for the Implementation of the Montreal Protocol
MNRE	Ministry of Natural Resource and Environment
MOP	Meeting of Parties to the Montreal Protocol
MP	Montreal Protocol
MT	Metric Tonnes
NSC	National Steering Committee
OAI	Office of Audit and Investigations
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
OPU	Ozone Protection Unit
PU	Polyurethane
R&R	Recovery and Recycling
SMEs	Small and Medium-sized Enterprises



INTRODUCTION







SOUTHEAST ASIA AND THE PACIFIC ISEAPI NETWORK MEETING OF OZONE DEPLETING SUBSTANCES IODSI OFFICERS Dust Thini Hotel, Makati City, Philippines * 26:29 April 2010

1.1 OBJECTIVES

The objectives of the overarching strategy of Malaysia's HCFC Phase-out Management Plan are as below:

- To facilitate Malaysia's compliance with the control targets for HCFC consumption with minimal impacts on the national economy, on environment and on occupational health
- To implement a combination of interventions such as technology transfer investments, policies and regulations, technical assistance, training and capacity-building, awareness and education and monitoring and management in the selected HCFC consuming sectors, contributing to achieve sustainable reductions and phase-out of HCFC consumption.

1.2 BACKGROUND

1.2.1 Country profile

Montreal Protocol

London Amendment

Montreal Amendment Beijing Amendment

Copenhagen Amendment

Malaysia is a tropical peninsular country in Southeast Asia, bordering Brunei, Malaysia, Thailand and Singapore, with a coastline of about 4,700 km. The total land area is about 329,000 sq. km and with a population of about 25.5 million (2009). The average population density is about 78 persons per sq km and urban population is about 70% of the total population. The per capita GDP was about US\$ 7,440 (2009), with agriculture accounting for 9.4%, industry about 40.9% and services about 49.7% of the GDP.

1.2.2 ODS phase-out activities in Malaysia

Ratification of Montreal Protocol and its amendments

Malaysia was one of the earliest among developing countries, to become a party to the Vienna Convention and the Montreal Protocol. Over the years, Malaysia has been playing a proactive role in the deliberations of the various Montreal Protocol bodies. The dates of ratification by Malaysia of the Montreal Protocol and its amendments were:

Agreement	Ratification
Vienna Convention	29 August 1989

29 August 1989

16 June 1993

05 August 1993 26 October 2001

26 October 2001

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

ODS Phase-out Activities

Malaysia took early actions towards controlling consumption of CFCs, Halons, CTC/TCA and Methyl Bromide.

Malaysia's Country Programme reflecting the national strategy and action plan for controlling the use of ozone depleting substances was approved at the 6th ExCom meeting in 1992. The Country Programme prioritized ODS phase-out activities in the main ODS consuming sectors, through technology transfer investments, technical assistance, capacity building, training and monitoring.

Malaysia's Country Programme Update was prepared in 1995. The Country Programme Update reassessed the ODS consuming sectors in Malaysia, reviewed the progress made in ODS phase-out and identified further activities needed for the future, thus renewing Malaysia's commitment for complying with the Montreal Protocol control targets and obligations.

A number of investment and non-investment activities were implemented by Malaysia, for complying with the Montreal Protocol targets during 1993 to 2001. These are depicted in Figure-1 below:



Figure-1: ODS Phase-out Activities in Malaysia (1993-2003)

Malaysia's National CFC Phase-out Plan for addressing the phase-out of all remaining consumption of Annex-A Group-I substances (CFCs) and also CTC/TCA by 2010, was approved at the 35th ExCom meeting December 2001. The National CFC Phase-out Plan was a performance-based multi-year agreement between Malaysia and the Executive Committee, which enabled Malaysia to comply with the 2005, 2007 and 2010 control milestones of the Montreal Protocol.

MLF assistance for investment projects for CFC phase-out

Malaysia's baseline for Annex-A Group-I substances (CFCs) for the purposes of Montreal Protocol was 3,271 ODP tonnes (average of calculated consumption from 1995 to 1997).

During 1992-2010, a total of 88 individual and group investment projects and one national phase-out plan were approved by MLF, to phase out CFCs in the Aerosols, Foams and Refrigeration sectors in Malaysia, with a total funding of US\$ 39.28 million at a cost-effectiveness of US\$ 7.65/kg, targeting to phase out a total of 5,133 ODP tonnes of CFCs. Table-2 below summarizes the approvals by sector.

Approval Period	Aerosols	Foams	Refrigeration	National Plan	Total
Until Dec 1997 (US\$)	2,658,832	11,023,386	8,215,370	0	21,897,588
Impact (ODP tonnes)	548	1,495	552	0	2,595
Cost-effectiveness (US\$/kg-y)	4.85	7.37	14.88	N/A	8.43
Jan 1998 to Dec 2009 (US\$)	0	2,766,773	3,098,884	11,517,005	17,382,662
Impact (ODP tonnes)	0	305	286	1,947	2,538
Cost-effectiveness (US\$/kg-y)	N/A	9.07	10.83	5.92	6.85
Cumulative funding until Dec 2009 (US\$)	2,658,832	13,760,159	11,314,254	11,517,005	39,280,250
Cumulative Impact (ODP tonnes)	548	1,800	838	1,947	5,133
Cumulative cost-effectiveness (US\$/kg-y)	4.85	7.64	13.50	5.92	7.65

Table-2: MLF assistance for CFC phase-out investment projects (1992 to 2010)

Source: MLF project inventory

Until December 1997, the total approvals for CFC phase-out investment projects amounted to about US\$ 21.9 million, to phase out 2,595 ODP tonnes at a cost-effectiveness of US\$ 8.43/kg, representing about 56% of the total funding and 51% of the total phase-out, noting that these approvals were primarily targeted to assist Malaysia to meet the 1999 freeze in CFC consumption at the baseline level.

1.2.3 Accelerated HCFC Phase-out

HCFCs, which have Ozone Depleting Potential (ODP) up to 15% of that of CFCs, are classified as controlled substances under Annex-C, Group-I of the Montreal Protocol. HCFCs therefore need to have use restrictions and would eventually have to be phased-out. Initially for developing countries, the scheduled phase-out date for HCFCs was 01 January 2040 with an interim control measure of freezing HCFC production and consumption at 2015 levels, from 01 January 2016.

HCFCs were also used historically as refrigerants in the refrigeration and air conditioning industry. Due to sustained economic growth experienced by developing countries during the 1980s and thereafter, the demand for consumer and industrial products using HCFCs increased rapidly. Further, due to the high global warming potential (GWP) of HCFCs, their increased use was also a threat to the global climate system.

During the implementation of the CFC phase-out under the Montreal Protocol, HCFCs were approved as interim substitutes for CFCs in many of the projects and activities supported by the Multilateral Fund.

Recognizing the environmental benefits of reducing HCFC production and consumption earlier than the previous control schedule, the XIXth Meeting of the Parties to the Montreal Protocol in September 2007, through its Decision XIX/6, accelerated the phase-out schedule for HCFCs by 10 years. The first control is the freeze on production and consumption of HCFCs from 01 January 2013, at the Baseline Level (average of 2009 and 2010 consumption levels). The second control step is the reduction of 10% from the Baseline Levels on January 1, 2015. Subsequent control steps are 35% reduction by 2020, 67.5% by 2025, 97.5% by 2030 and complete phase out from 01 January 2040. The decision confirmed stable and sufficient funding for Article-5 countries to meet these new obligations.

1.2.4 HCFC Survey in Malaysia (2005-2007)

The ExCom approved at its 45th Meeting in 2005, funding for UNDP to carry out HCFC surveys in 12 countries, to assess the HCFC consumption and growth trends in these countries. Malaysia was one of the countries which requested to be a part of this activity. The key expected result of this survey was establishing the HCFC consumption profiles and projected growth rates in HCFC consumption in various sectors in Malaysia until 2015. The survey was carried out during 2005 to 2007. The survey focused on data collection and analysis mainly from upstream suppliers of chemicals and equipment, as well as sampling of enterprise-level HCFC use patterns.

In this survey, it was noted that Malaysia's HCFC consumption increased from 1,456 metric tonnes in 1997 to 5,635 metric tonnes in 2005, signifying a compounded annual growth rate of about 18.43%. HCFC-22 and HCFC-141b were the two main HCFCs consumed. HCFC-141b is used as a blowing agent in foam production as a replacement for CFC-11. HCFC-22 is used as a refrigerant in air conditioning and refrigeration systems, especially in comfort air conditioning units, central air conditioning chillers and industrial refrigeration.

Based on projected annual growth rates in demand forecasted for HCFCs until 2015 in various sectors in this survey, it was estimated that unconstrained consumption of HCFCs in Malaysia would reach about 8,261 metric tonnes in 2015. This was expected to lead to additional environmental impacts on ozone depletion as well as on global warming due to the ozone depleting potential and high global warming potential of HCFCs.

The survey identified constraints and opportunities for long term management of HCFCs such as availability and costs of mature and environmentally friendly alternatives to HCFCs in various sectors, needs for training and capacity-building, technology transfer and adequate financial assistance for HCFC phase-out.

1.2.5 HCFC Phase-out Management Plans (HPMPs)

Decision XXI/6 of the Meeting of the Parties to the Montreal Protocol, referred above, also requested the Executive Committee of the Multilateral Fund to assist Article-5 Parties for preparing and implementing HCFC Phase-out Management Plans (HPMP), to facilitate their compliance with the accelerated control targets.

The 54th Meeting of the Executive Committee in April 2008, through Decision 54/39, adopted guidelines for HPMPs, which provide an indicative outline and content of the HPMPs, with the following key elements:

- 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-1) would focus on compliance with the 2013 freeze and 2015 reduction targets. The subsequent stages would focus on HCFC phase-out in compliance with the future reduction control targets.
- b) Commitments to achieving the 2013 and 2015 control milestones through performance-based agreements

Further, through Decision 60/44, ExCom adopted funding guidelines for various components and types of HPMPs.

Malaysia's HPMP (Stage-I) complies with the provisions of all ExCom decisions relevant to HPMPs.



2. HPMP PREPARATION IN MALAYSIA



2.1 HPMP PREPARATION FUNDING

In order to assist Malaysia for the preparation of its HPMP (Stage-I) for compliance with the 2013/2015 targets, UNDP, on behalf of Malaysia, submitted a request for preparation funding to the 55th meeting of the Executive Committee which was held in July 2008 for the overarching HPMP strategy, which was approved at a level of US\$ 173,750. Further, in accordance with ExCom Decision 56/16, Malaysia was eligible for an additional funding of US\$ 250,000 for preparation of investment and associated activities in various sectors. This funding was approved in the 57th meeting of the ExCom in April 2009.

2.2 HPMP NATIONAL INCEPTION WORKSHOP

In December 2008, a HPMP national inception workshop for a wide spectrum of industry and government stakeholders was held in Subang Jaya, Malaysia. The workshop was jointly organized by DOE and UNDP. The objectives of the workshop were to raise awareness of Malaysia's new obligations under the Montreal Protocol arising from the accelerated phase-out schedule for HCFCs, to disseminate and exchange information on alternative technologies and to develop a consensual and stakeholder-driven plan of action for preparation of Malaysia's HPMP (Stage-1) for compliance with the 2013/2015 targets. The workshop was attended by about 400 participants including high-level decision-makers from industry, government and many international participants, making it one of the first and largest of its kind in the region. The stakeholders acknowledged key compliance challenges and opportunities in various sectors and agreed on broad plan, mechanism, milestones and timelines for actions for HPMP preparation. The key recommendations of this workshop were to affirm a proactive partnership between government and industry for HPMP preparation and implementation and to take swift and forward-looking actions to meet the 2013 and 2015 control targets for reductions in HCFC consumption.

2.3 GOVERNMENT-INDUSTRY PARTNERSHIP FOR HPMP PREPARATION

Throughout the HPMP preparation process, a core group of key industry representatives were in continuous consultation with CETEC, DOE and UNDP, ensuring proactive representation and participation of the industry in the HPMP preparation process.

2.4 HPMP PREPARATION PROCESS

The HPMP preparation process consisted of the following steps:

- Formation of the national team (assignment of stakeholder entities for carrying out the sector-level and national-level data collection and analysis work).
- Stakeholder consultations (regular periodic meetings for interactions with government and industry stakeholders)
- Information dissemination and industry interaction (sector-level workshops and events)
- Data collection at the sector-level (and reconciliation with the national-level)
- Data analysis at the sector-level (and reconciliation at the national-level)

- Preparation of draft sectoral strategies and national strategy
- Stakeholder interactions/consultations (national stakeholders workshop)
- Finalization of the HPMP (Stage-I) proposal

2.4.1 Formation of the national team

For the work of data collection, analysis and sector and national-level strategy preparation DOE and UNDP commissioned CETEC (Center for Environmental Technologies), a Malaysian think-tank and consulting organization. CETEC in turn, engaged experts from the chemical industry as well as Malaysian Society of Air-conditioning, Heating and Refrigeration Engineers (MASHRAE), to provide assistance for sector-level work.

2.4.2 Information dissemination and stakeholder interaction

In order to adequately inform the stakeholders, the challenges and opportunities in complying with the adjusted phase-out schedule for HCFCs, DOE, UNEP and CETEC conducted several stakeholder interaction meetings for each sector.

Technical experts from the industry, both from Malaysia and abroad, shared knowledge and experiences on alternative technologies. DOE representatives and environment departments of local administrations also participated and provided guidance on the international regulatory scenario. Information brochures on HCFC phase-out and HPMP preparation were prepared and distributed.

2.4.3 Data Collection

Appropriate questionnaires and formats for reporting information and data were developed with the assistance of UNDP. These questionnaires were sent to enterprises or distributed during sector-level interaction workshops.

Sector-level data was collected from upstream suppliers of chemicals and downstream enterprises through telephone, meetings and on-site visits. For manufacturing sectors, the coverage of enterprises was over 80% based on HCFC consumption.

At the national level, data reconciliation was carried out through interactions with Customs Department, Department of Statistics and Ministry of Trade and Industry.

Comparative analysis of different sets of data originating from downstream users, upstream suppliers and government departments such as customs and statistics, indicated that the variance between the overall data between survey figures and official statistics was less than 5% and thus, the final data and analysis is indicative of the real situation prevailing in Malaysia.

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2.4.4 Data Analysis

The data analysis at the sector level included classification based on historical and present HCFC consumption by sub-sector and application, establishing patterns of unconstrained growth in each sub-sector, analysis of the status of alternative technologies for each sub-sector and application and the prospects of phase-out of the use of HCFCs in each sub-sector based on the same. The required national-level phase-out for meeting the 2013 and 2015 control targets was then broadly established.

2.4.5 Draft sectoral strategies

Based on the data analysis as described above, the following approach for prioritizing subsectors/applications for HCFC phase-out was adopted:

- Segregation of eligible and ineligible enterprises (and consumption)
- Segregation of first and second conversions as applicable (and related consumption)
- Availability of zero-ODP and low-GWP mature alternative technology options for each sub-sector/application
- Implementability of the conversions within the available timeframe of about 3 years

Consistent with the guidance from ExCom, manufacturing was prioritized and high-ODP substances (HCFC-141b) were prioritized, within the context of the above.

The phase-out in the selected/prioritized sub-sectors/applications would be carried out in conjunction with targeted, effective and enforceable regulations, which would be supported by the industry. The sector-level strategies proposed a timeline for required regulations based on the above and also incorporated estimates of resources needed for carrying out conversions, technical assistance, awareness and other activities to support the change over.

2.4.6 Stakeholder Consultations and draft national strategy

Several consultation meetings for data reconciliation and strategy preparation were organized, ensuring a transparent and participatory approach for developing the sector strategies. The basic national strategy was developed based on the outputs of this bottoms-up approach with the involvement of all stakeholder representatives.

A national stakeholder consultation seminar was arranged in November 2010 with participation from key government stakeholders, national and international experts, and key representatives of the national scientific and technical institutions and over 250 industry representatives. The comments and recommendations of the stakeholders were collected, collated and incorporated in the national strategy.

Further sector-level consultations were held to refine the sectoral and national approaches and phase-out quantities, particularly in context of policies and regulations as well as implementability of conversions for achieving the phase-out targets.

2.4.7 Finalization of the HPMP (Stage-I) proposal

The draft national HCFC phase-out management plan was prepared focusing on compliance with the 2013 and 2015 targets, incorporating the draft sector and national strategies, with review and technical advice provided by UNDP and in close coordination with DOE.

The time available for Article-5 parties including Malaysia, for meeting the 2013/2015 control targets was considered to be quite limited. It was estimated that there would be maximum of about 3 years from 2011, to implement key activities leading to compliance with the 2013 and 2015 targets. It was therefore considered imperative that the preparation of Malaysia's HPMP and its submission to and approval by the Executive Committee was accomplished no later than 2011, so that adequate time as well as technical and financial assistance was available to implement actions for compliance.

Accordingly, upon government endorsement, the final HPMP (Stage-I) proposal for Malaysia was targeted for submission no later than the 65th ExCom meeting in November 2011.

2.5 HPMP Submission and Approval

The Malaysia HPMP Stage-1 was submitted for consideration at the 65th ExCom Meeting in November 2011, wherein it was approved.



3. SITUATION ANALYSIS



3.1 HCFC SUPPLY SCENARIO

3.1.1 Production

There is no production of HCFCs in Malaysia.

3.1.2 Exports and feedstock uses

No exports or feedstock uses of HCFCs have been recorded in 2009.

3.1.3 Imports

The entire domestic demand is met through imports mainly from China, India, Republic of Korea, Singapore and USA. Import of HCFCs is regulated in Malaysia (see Section 3.4.2). HCFC-141b, HCFC-22 and HCFC-123 are the main HCFCs imported.

3.1.4 Distribution

HCFCs are sold by the importers to manufacturers or users directly or indirectly through secondary distributors or retailers. HCFCs are also supplied through service establishments and contractors. Larger manufacturers also import HCFCs directly.

3.2 HCFC CONSUMPTION

3.2.1 Historical HCFC consumption

The HCFC consumption in Malaysia increased from 841 metric tonnes in 1996 to 7,700 metric tonnes in 2009, indicating an average annual growth rate of over 18%.



Figure-2: Malaysia HCFC consumption in metric tonnes (1996-2009)

This steady increase in HCFC consumption was ascribed to sustained economic development resulting in increased demand for consumer, commercial and industrial products requiring HCFC use or operating on HCFCs, particularly in the foams, refrigeration and air conditioning sectors.

3.2.2 Recent HCFC Consumption

Based on data collected from the survey and compiled, collated and reconciled between data from Department of Customs, Department of Statistics, Ministry of Trade and Industry and data reporting from Ministry of Environment, the consumption of HCFCs in Malaysia during 2005 to 2009 was as below. The past five years data has considered for further analysis to account for potentially unrepresentative increases and decreases occurring over shorter periods:

Year	HCFC	-141b	HCF	C-22	HCFC	C -123	Otl	ner	Tot	tal
Substance	Metric	ODP	Metric	ODP	Metric	ODP	Metric	ODP	Metric	ODP
2005	899	98.9	4,553	250.4	60	1.2	155	8.7	5,667	359.2
2006	1,153	126.8	4,562	250.9	25	0.5	86	4.9	5,826	383.1
2007	1,280	140.8	4,911	270.1	54	1.1	40	1.5	6,285	413.5
2008	1,206	132.7	4,471	245.9	106	2.1	45	2.5	5,829	383.2
2009	1,335	146.9	6,255	344.1	68	1.4	42	1.8	7,700	494.2

Table-3: Malaysia HCFC Consumption (2005 to 2009)

Note: Metric tonnes rounded off to the nearest 1. ODP tonnes rounded off to the nearest decimal.

Other HCFCs include HCFC-225 and HCFC-142b used in solvent, refrigerant, propellant and blowing agent applications.

There was a dip in overall HCFC consumption between 2007 and 2008, as Malaysia was one of the first countries to experience the impact of the global economic downturn. However, as an average over a five-year period during 2005-2009, the HCFC consumption has grown at more realistic level at a compounded annual rate of 7.97% on a metric-tonne basis and 8.28% on ODP-tonne basis. These trends are considered realistic, based on the average growth rate in the overall GDP in Malaysia, which was 4.67% during 2005-2009.

Figure-3 below shows the 2009 HCFC consumption by substance (in metric tonnes).



Figure-3: Malaysia HCFC consumption by substance in metric tonnes (2009)

The breakdown of the HCFC consumption between manufacturing and servicing is shown below:



Figure-4: Malaysia HCFC consumption by Manufacturing and Servicing (2009)

The consumption in Servicing is mainly of HCFC-22 and HCFC-123 with trace quantities of HCFC-124.

3.3 INDUSTRY STRUCTURE

As mentioned in Section 1.2.1, the industry in Malaysia contributed about 41% to the GDP (2009) and is thus a critical element in the economy. Historically, Malaysia has had a robust industrial and manufacturing base in various sectors from petrochemicals to consumer goods. The main HCFC consuming sectors also are largely consistent with this trend and have a diverse manufacturing base in Malaysia.

3.3.1 Air Conditioning Sector

Manufacturing

This sector is classified into five sub-sectors tabulated below: air-cooled split and packaged units, water-cooled packaged units, heat pumps, direct-expansion chillers and flooded chillers (centrifugal chillers). The data on HCFC consumption in manufacturing this sector for 2009 is shown below:

Sub-sector	HCFC Consumption (metric tonnes)
Air-cooled split and packaged units	1,750
Water-cooled Packaged Units	21
Heat Pumps	4
Direct Expansion Chillers	92
Flooded Chillers	48
Total	1,915

Table-4: HCFC consumption in manufacturing in the Air Conditioning Sector (2009)

As seen above, the bulk of the HCFC consumption (~91%) in manufacturing in the Air Conditioning Sector originates from air-cooled split and packaged units. In 2009, 2,778,999 units were manufactured in Malaysia.

There are 8 major manufacturers and about 23 small and medium-sized manufacturers in this sector. The major manufacturers in the sector are well-organized and have a good technical and managerial capacity for engineering, manufacturing as well as environmental issues. Only three of these eight manufacturers have A5 ownership (ranging from 02% to 65%). The rest are multinationals with 100% non-A5 ownership. The small and medium-sized enterprises are locally owned. All of the current manufacturing capacity in this sector was established before September 2007.

Imports

The imports of air conditioning equipment in Malaysia is mainly of air-cooled split and packaged units, of which split room air-conditioners up to 2.5 HP rating constitute the bulk of the imports. There are about twenty importers, of which about ten are large-sized. In 2009, about 200,000 units were imported to Indonesia, mainly from China, Japan and US, predominantly HCFC-22 based. The imported air-conditioners are fully or partially charged with refrigerants. During installation of these split air-conditioners, additional top-up charge is needed and this was estimated to be 128 metric tonnes in 2009.

Exports

Malaysia is a significant export hub for air conditioning equipment in the region, particularly for air-cooled split and packaged air-conditioners. All major manufacturers recorded exports in 2009, amounting to a total of 1,857,697 air-cooled split and packaged units.

Servicing

The estimated population of HCFC-based equipment in the air conditioning sector in 2009 was \sim 7 million (air-cooled split and packaged units) and about 2,200 (direct-expansion and flooded chillers). HCFC-22 and HCFC-123 were the main substances used for servicing in this sector. The estimated HCFC consumption in servicing in this sector in 2009 was 4,004 metric tonnes.

The Sector has experienced a healthy growth in the past decade with progressive and substantial investments in manufacturing technology, capacity and capability. Due to the steady economic development, market penetration of air conditioning equipment has grown significantly in the past few years and is expected to continue to do for the next several years.

It was estimated that unconstrained consumption in the Sector is likely to reach about 5,000 metric tonnes by 2015. The main challenges for HCFC phase-out in the Sector were identified to be the absence of a mature and efficient alternative technology and the rapidly growing population of HCFC-based air conditioning equipment, enhancing the HCFC demand in manufacturing and servicing.

3.3.2 Refrigeration Sector

The Refrigeration Sector performs a critical function of serving the cold chain in Malaysia, where the service sector contributes 40% to the national economy. Due the expanding market for food service equipment, the quality and sophistication of the manufacturing technology has gradually improved over the years, resulting from investments made for catering to the long-term potential. The Sector also experiences competition from imported products and equipment, testifying to the significant market potential.

Manufacturing

Three sub-sectors and applications have been defined in the Refrigeration Sector, and their 2009 consumption is shown below:

Sub-sector	HCFC Consumption (metric tonnes)
Domestic refrigeration	0
Commercial refrigeration	80
Cold chain refrigeration	250
Total	330

Table-5: HCFC Consumption and Sub-sectors in the Refrigeration Sector (2009)

The Domestic Refrigeration sub-sector did not report any HCFC consumption in Malaysia in 2009. The polyurethane foam part converted to cyclopentane during CFC phase-out and the refrigerant technology was HFC-134a.

The Commercial Refrigeration sub-sector comprises of vending machines, visi-coolers, bottle coolers, water-coolers, chest freezers, etc. used in restaurants and other food service establishments. There are about twenty manufacturers of commercial refrigeration equipment in Malaysia, but they predominantly use HFC-134a, R-404a, etc as refrigerants. Only a few use HCFC-22 as a refrigerant. In 2009, about 80 metric tonnes was consumed in manufacturing by this sub-sector.

The Cold Chain Refrigeration sub-sector comprises of supermarket refrigeration equipment (such as display cabinets, island freezers, walk-in coolers and freezers), cold storages and warehouses. R-404a and R-507 are mainly used in low-temperature applications. Ammonia is used in some applications and HCFC-22 is used in medium temperature applications. In 2009, about 250 metric tonnes of HCFC-22 was used in manufacturing in this sub-sector.

Servicing

The servicing demand for HCFC-22 is growing due the rapidly increasing population of commercial refrigeration equipment, due to retrofits carried out for R-502 based equipment to HCFC-22 during CFC phase-out and due to new demand for servicing of HCFC-22 based equipment. In 2009, the estimated HCFC-22 demand for servicing in this sector was estimated to be about 250 metric tonnes.

The Refrigeration Sector has been experiencing a steady growth in the past few years. The main challenges seen are for limiting the growth in population of HCFC-based equipment both domestically manufactured and imported, in absence of cost-effective and efficient retrofit alternatives as well as mature and cost-effective candidates for converting the manufacturing capacity, which are also environmentally acceptable.

3.3.3 Polyurethane Foams Sector

Polyurethane foams for various applications are manufactured in Malaysia. The sector has experienced steady growth in recent years, due to the economic development and increase in purchasing power of the population and resulting growth in demand mainly in the construction appliance and cold chain industry segments.

Based on the information from the survey and stakeholder consultations, HCFC-141b is the predominant blowing agent used in the sector. It is used either as pure HCFC-141b or pre-blended in polyols supplied by the polyurethane chemical suppliers. There is no local production of HCFC-141b and therefore the entire requirement is met through imports by chemical suppliers, systems houses or sometimes directly by the foam manufacturers. The sector is organized into four categories of stakeholder enterprises as below:

- ♦ HCFC importers
- Systems houses
- Processing equipment suppliers
- Foam manufacturers

There are about 15-20 chemical suppliers that import HCFCs, including a few which import polyols suited for HCFC-141b. There is a small quantity of imported HCFC-141b pre-blended polyols.

There are seven systems houses, namely, BASF, Colorex, Cosmo, Dow, Maskimi, PPT and Oriken, which have facilities for blending and customization of HCFC-141b polyols in Malaysia.

Polyurethane foam processing equipment is not manufactured locally. There are four main polyurethane foam processing equipment suppliers with a presence in Malaysia, namely, Cannon, OMS, RIM Polymers and SAIP. Other global suppliers are represented through their respective corporate representations.

There are an estimated 100 manufacturers of polyurethane foam in Malaysia. This comprises of about 13 large-sized and organized manufacturers, about 20 medium-sized manufacturers and the rest being small and tiny manufacturers. Rigid polyurethane foam is the predominant product, which uses HCFC-141b as a blowing agent.

The two main sub-sectors consuming HCFC-141b in this sector are the rigid foam subsector and integral skin foam sub-sector.

The 2009 estimated HCFC consumption by sub-sector is tabulated below:

Sub-Sector	Application (No. of enterprises)	2009 HCFC Consumption (metric tonnes)
	Discontinuous sandwich panels (30)	1,045
	Refrigeration equipment (10)	90
	Insulated boxes (1)	40
Rigid Foam	Pipe insulation (10)	40
	Spray insulation (10)	50
	Other (40)	60
	Total (Rigid Foam)	1,325
Intergral Skin	Furniture and automative (3)	10
Foam	Total (Integral Skin Foam)	10
Total		1,335

Table-6: HCFC Consumption and Sub-sectors in the Foams Sector (2009)

Almost 60-70% foam manufacturers are small and medium-sized, however, due to their small size and capacity, their contribution to the overall sector consumption is only about 20-30%. The larger and more organized enterprises are mainly engaged in manufacturing of sandwich panels, insulated boxes and refrigeration equipment. A significant number of enterprises (over 90%) have converted previously from CFCs to HCFCs through assistance from MLF.

Due to the consistent growth in demand for consumer and commercial goods and with the expansion in the construction industry, the Polyurethane Foams sector expects to experience an average annual growth of about 10-12% annually.

The key challenge identified for reducing demand for HCFCs, was the implementability of zero-ODP and low-GWP alternative blowing agents in small and medium-sized enterprises.

3.3.4 XPS Foams Sector

Based on the survey, there is currently only one enterprise manufacturing extruded polystyrene foam boards in Malaysia. While the HCFC consumption in this enterprise could not be confirmed, it is estimated based on import profile of substances in 2009, that less than 15 metric tonnes of HCFC-22 and HCFC-142b combined were consumed.

3.3.5 Firefighting Sector

HCFC-123 has been a preferred blend component in fire extinguishing systems because of its ability to counter combustion chemically, without use of water, foam or powder. Since HCFC-123 is inert and stable, it offers the possibility to have a long or unlimited shelf life. HCFC-123 also has perhaps the lowest ODP among HCFCs typically encountered.

There are two types of fire extinguishing systems manufactured in Malaysia with HCFC-123 as the key blend component: Portable Fire Extinguishers and Total Flooding Systems. There is only one manufacturer of HCFC-123 based fire extinguishing systems, which consumed 13 metric tonnes of HCFC-123 in 2009. The main challenges foreseen for introducing non-HCFC alternatives are obtaining certifications for performance, toxicity and other environmental impacts and resource constraints.

3.3.6 Solvents Sector

HCFC-based solvents are used in general and precision cleaning, drying and defluxing applications and in electronics cleaning such as audio and video-heads, reflector glasses for laser printers and lenses, which require optimal surface cleanliness. HCFC-225 has been used as a solvent for such applications, due to its similar physical properties and cleaning performance as CFC-113, its compatibility with most plastics, elastomers and metals, excellent permeability due to low surface tension, non-flammability and short drying time. HCFC-225 can also be used as a carrier for silicone and other lubricants and also as a coolant. In 2009, only about 0.67 metric tonnes of HCFC-225 has been reported in the Solvents Sector. Due to the small quantities of HCFC-225 used and its low ODP and GWP, it is not considered a priority for the compliance targets until 2015.

3.3.7 Summary

The 2009 HCFC consumption in Malaysia by substance and sector is tabulated below:

Sector / Substance	HCFC-22	HCFC-141b	Other	Total
Manufacturing				
Air Conditioning	1,915	-	21	1,936
Refrigeration	330	-	20	350
Firefighting	-	-	13	13
PU Foams	-	1,335	-	1,335
XPS Foams	6	-	4	10
Solvents	-	-	1	1
Servicing	4,004	-	41	4,055
Total	6,255	1,335	110	7,700

 Table-7: Malaysia HCFC Consumption by Sector and Substance (2009)

Note: All figures in metric tonnes, rounded off to the nearest 1.00.

In terms of substances in metric tonnes, HCFC-22 accounts for about 81.2% of the consumption and HCFC-141b accounts for about 17.3% of the total consumption. HCFC-123, HCFC-225 and other HCFCs account for the remaining consumption.

Within manufacturing, the sectoral contributions to HCFC consumption are Air Conditioning (53.1%), Refrigeration (9.6%) and PU Foams (36.6%). In metric tonnes, about 47.3% of the total HCFC consumption is in manufacturing and remaining in servicing.

About 60-70% of the consumption in manufacturing originates from organized enterprises with good technical and managerial capability. The remaining consumption in manufacturing originates in small and medium-sized enterprises.

The main challenges for HCFC reductions identified were the current non-availability of cost-effective, environment-friendly, efficient and mature alternatives and also the implementability of conversions within the short time span available for meeting the 2013 and 2015 control targets for HCFC consumption.

3.4.1 Institutional Arrangements

Malaysia established the Ozone Protection Unit within the Department of Environment (DOE) to respond to mandates of the Montreal Protocol. The Ozone Protection Unit (OPU) within the Air Division of the Department of Environment, plays a lead role in the Government's sustained efforts to phase-out ODS in the country.

The OPU is also the Secretariat to the National Steering Committee (NSC) for the Protection of Ozone Layer that serves as an advisory body to the Government to provide strategic and policy guidance for implementation of the Montreal Protocol. The Chair of the NSC is the Secretary General of the Ministry of Natural Resources and Environment. There are various working groups for the implementation of Montreal Protocol in Malaysia and the OPU acts as their coordinating body.

The OPU is partially supported through the Institutional Strengthening Project with financial assistance from the Multilateral Fund and implemented by UNDP.

Malaysia has taken a proactive approach in phasing out controlled substances under the Montreal Protocol. It has formulated policies and legislations to restrict and limit the use of these controlled substances. These policies and strategies have provisions for the monitoring of the importation and consumption of controlled substances as well as for promoting the use of non-ODS substitutes and alternatives in existing industries and new investments.

3.4.2 Existing Policies and Regulations

Malaysia's environmental policy regime can be traced to as early as 1974 with introduction of the Environmental Quality Act, 1974. Amendments to the Act had been made to include provisions on the prohibition of the use of CFCs in the refrigeration, foam and fire-fighting sectors. The guidelines for the control measures for the protection of the ozone layer to facilitate the implementation of the phase-out programme were issued by the Department of Environment in 1994.

To provide regulatory and policy support for enabling the industry to eliminate ODS in line with the country's obligations under the Montreal Protocol, the Government of Malaysia has taken and continues to take the following key initiatives and actions:

- Environmental Quality (Prohibition on the Use of CFCs and Other Gases As Propellants and Blowing Agents) Order, 1993;
- Environmental Quality (Refrigerant Management) Regulations, 1999;
- Environmental quality (Halon Management) Regulations, 1999;
- Environmental Quality (Delegation of Powers) (Halon Management) Order, 2000;
- ♦ Hydrogen Cyanide (Fumigation) Act (1953), (revised 1981);
- Occupational Safety and Health Act (1974);
- Plant Quarantine Act (1976)
- Custom Act (1967); and
- Factories and Machinery Act (1967)

The above regulations provide for powers to control the import, installation, use and/or disposal of CFCs and other ODS substances which are prohibited under the Montreal Protocol.

One of the primary systems of controls on ODS is the Application Import Permit System (AP System), which is administered by the Ministry of International Trade and Industry (MITI).

Since its introduction in 1994 under the Prohibition of Import (Amendment No. 4) Order, 1994 of the Customs Act, 1967, all importers of the listed ODS, namely CFC-11, CFC-12, CFC-13, CFC-113, CFC-114, CFC-115, carbon tetrachloride (CTC) and1,1,1-trichloroethane (TCA) must obtain an import permit issued by MITI. The total quantity of any of these substances that can be imported in any year is set by MITI in consultation with DOE. The amount is reduced each year in line with the Montreal Protocol obligations.

Besides the above, the Government has also undertaken various educational and public awareness programmes on the need to protect the ozone layer. Various guidelines and documents have also been produced for industry and public information and include:

- Guidelines for prequalifying and selection criteria for acceptable alternatives of ODS (1995);
- Training Manual for mobile air conditioning and recycling/service workshop operators (1995); and
- Guidebook on on-ODS technology (1997)

Other initiatives implemented by the Government included the provision of incentives to investment in ozone friendly technologies by approving several fiscal measures such as duty exemptions on imports on non-ODS technology, duty exemption on imports of HFC-134a and also include:

- Promoting the decentralization of implementation and enforcement of policies and regulations by interacting with and strengthening local environment focal points
- Supporting public awareness initiatives and campaigns for promoting ozone layer protection at the consumer level
- Regular interaction with other ministries and departments, industry representatives and implementing agencies for information dissemination related to impact of policy measures
- Actively participating in international meetings to represent Malaysia's interests
- Promoting research and use of ozone-friendly technologies
- Providing incentives and rewards for development and use of ozone-friendly technologies

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3.5 TECHNOLOGY

The selection of alternative technologies to HCFCs is governed by the following:

Requirements for the alternative substance

The alternative substance whether used as a refrigerant, blowing agent or fire suppressant, should:

- + Have favorable physical and chemical properties for the concerned application
- Be inert and stable
- Be compatible with existing materials
- Preferably not be flammable
- Not be toxic
- Have zero ODP and low GWP
- Be easily available

Requirements for the technology

In addition to the substance, the phase-out of HCFCs requires plant and process conversions. Additional requirements that the overall conversion technology needs to fulfill are as below:

- Proven and reasonably mature technology
- End-product properties and performance should be maintained
- Cost-effective conversion with minimal disruption of current manufacturing operations
- Compliance with established local and international standards for health safety and environment
- ◆ Low overall direct and indirect CO₂-equivalent emissions
- Implementable in a relatively short time frame

Currently, alternative substances and technologies that fully meet the above requirements are not available, except for one or two applications.

Due to the environmental and occupational impact of technologies in the ODS consuming sectors, the past two decades have been marked by constant uncertainties and changes as well as several technological innovations and investments to overcome them.

As more scientific and technical information on alternative technologies and their environmental impacts, as well as information on research on new alternatives becomes available, it is clear that the eventual choice of alternative technology will need to carefully take into account environmental impacts and focus more on long-term environmental and occupational sustainability. This will need resources to be directed towards innovative products and processes that minimize ozone and climate impacts, while remaining efficient and affordable.



4. STRATEGY



4.1 **PRINCIPLES**

The overarching strategy underlying the HCFC Phase-out Management Plan (HPMP) for Malaysia is based on the following guiding principles:

- Reflect national context and priorities, national policies and country-drivenness;
- Develop and demonstrate a strengthened and proactive partnership between government and industry;
- Draw upon the lessons learnt from functioning of institutional arrangements and operational mechanisms, integrate and build upon existing infrastructures and introduce new mechanisms as needed;
- Be dynamic and evolving, and to be open for revisions and adaptation as necessary in response to evolving situations

4.2 APPROACH FOR COMPLIANCE

Malaysia will develop and implement a staged approach for complying with the adjusted control schedule for Annex-C Group-I substances (HCFCs) under the Montreal Protocol.

4.2.1 Stage-I (2012 to 2016)

Considering the profiles of the various HCFC consuming sectors and sub-sectors, their current and forecasted consumption, their future prospects considering the country's need for sustained and sustainable economic development, the burgeoning population of HCFC containing products and equipment and resulting ozone and climate impacts, requirements for effective and efficient management and coordination and to ensure a systematic transition with minimal disruption, the Stage-I period from 2012 to 2016 will focus on converting manufacturing facilities in HCFC consuming sectors where non-HCFC, zero-ODP and low-GWP technologies can be applied.

To ensure that these conversions and the associated reductions in HCFC consumption remain sustainable, targeted and specific regulations will be promulgated. To control the growth of HCFC consumption, recovery and reclaim programmes and capacity-building programmes (for technicians and enforcement officials) will be carried out in the Servicing Sector. To further support the sustainability of these reductions, appropriate technical assistance, training and awareness actions will be implemented.

4.2.2 Stage-II (2016 to 2020)

In the Stage-II period from 2016 to 2020, three focal areas for action are identified as below:

Phase-out of the HCFC consumption in the remaining manufacturing sectors, which could not be addressed in Stage-I, through investments, regulations and technical assistance.

- Reduction of HCFC consumption in the Servicing Sector, for which necessary supporting actions in terms of investments, policy, regulations, technical assistance, training, capacity-building and awareness will be implemented
- Sustained monitoring and enforcement of regulations

4.2.3 Subsequent Stages (beyond 2020)

The focus of actions for subsequent stages will be on further reductions in HCFC demand for servicing in line with the subsequent control targets for HCFC consumption. This will involve sustaining and strengthening infrastructures for effective and efficient management of HCFCs, introducing and strengthening decentralized enforcement mechanisms and further mainstreaming the implementation of the Montreal Protocol in national and local institutions.

4.2.4 Strategic Issues

Malaysia expects to encounter tremendous challenges for meeting the control targets for HCFC consumption in accordance with the adjusted phase-out schedule. Two key strategic issues are identified as below:

- The time available to implement actions for achieving the objectives of Stage-I (2012 to 2016), Stage-II (2016 to 2020) and subsequent stages, is extremely limited and will introduce extraordinary management and coordination challenges for government and industry. While in the midst of implementing Stage-I, preparation for Stage-II will need to be initiated, well in advance of 2016, so that implementation of Stage-II can commence smoothly, using the momentum gained in the implementation of Stage-I. To address this constraint, the management and coordination of actions will need to be forward-looking, systematic, effective and efficient and both government and industry will need to dedicate strong focus and adequate resources to ensure that implementation is approached consistently and in a result-oriented and unified manner.
- Malaysia will give serious and special attention to maximizing the environmental benefits of HCFC phase-out by prioritizing safe and sustainable low-GWP alternative technologies in accordance with the guidance provided by MOP Decision XIX/6. Malaysia has also set voluntary national targets for CO₂-equivalent emission reductions (please refer to Section 4.10 for more details). In view of this, Malaysia considers it of utmost importance that adequate resources need to be targeted towards introducing benign alternative technologies and curtailing the population of products and equipment containing HCFCs or other high-GWP substances.

4.3 PRIORITIZATION FOR STAGE-I

As described in Section 4.2.1, Malaysia will focus on manufacturing sectors for converting to alternative technologies for compliance with the 2013 and 2015 targets. The prioritizing of enterprises, applications, sub-sectors and sectors will be based on the following criteria:

- Applications and sub-sectors where mature and benign alternatives are available
- Enterprises with sound financial standing and market reputation, with larger HCFC consumption and with good technical and managerial capacity, to ensure cost-effective conversions with maximum impact and implementability within the short timeframe
- Endeavoring to achieve phase-out on application-level or sub-sector level to facilitate easier regulation and enforcement and to maintain a level playing field for all stakeholders without market distortion

4.4 ANALYSIS OF REDUCTIONS REQUIRED FOR STAGE-I (2012 TO 2016)

4.4.1 **Baseline and Targets**

As described in Sections 3.2.1 and 3.2.2, the HCFC consumption in Malaysia has been experiencing steady growth. In order to ensure that compliance with the 2013 and 2015 targets is achieved, while ensuring also that legitimate needs of consumers and industry are met, the government and stakeholders carried out detailed analyses for projecting scenarios in order to establish the level of reductions needed to be achieved and available in various subsectors and applications for complying with the 2013 and 2015 targets, taking into account the prioritization principles described in Section 4.3. The following methodology was used:

- Establish the national HCFC consumption Baseline (average of 2009 and 2010 levels in ODP tonnes) based on the reported HCFC consumption for 2010
- Establish the allowable growth until 2013 for national-level HCFC consumption, to ensure adequate availability of HCFCs for legitimate needs of various sectors
- Apply the prioritization principles described in Section 4.3 and establish and segregate the level of HCFC consumption available in each sub-sector or application that could accomplish phase-out no later than 2015

The HCFC Consumption Baseline for Malaysia (average of 2009 and 2010 consumption levels) is shown below:

Substance	Consumpt	tion (ODP tonnes)	
Substance	2009*	2010*	Baseline
Annex-C Group-I substances (HCFCs)	494.2	537.5	515.8

Table-8: Malaysia HCFC Consumption Baseline

*A7 data reporting

Based on the above, the targets for compliance with the 2013 and 2015 controls are as below:

Table-9: Stage-I Targets

Target	Maximum Consumption Level (ODP tonnes)
From 01 January 2013	515.8
From 01 January 2015	464.2

4.4.2 Reductions for Stage-I Compliance

As enumerated in Section 3.2.2, the average compounded growth in consumption in Malaysia over a five-year period during 2005-2009, was 8.28% annually on ODP-tonne basis. During the same period, the average compounded growth in GDP was about 4.67% annually.

Malaysia will limit the growth of HCFC consumption during 2011 and 2012 at about 2.75% annually, through introduction of a quota system for HCFC imports, thus controlling the HCFC consumption by 2013, to no more than 567.38 ODP tonnes. Thus the reductions required for achieving the 2013 compliance target would work out to about 51.6 ODP tonnes. An additional 51.5 ODP tonnes would be needed to be reduced between 2013 and 2015, to achieve the 2015 compliance target. Thus, the total reductions needed for achieving both the 2013 and 2015 through the HPMP Stage-I work out to about 103.16 ODP tonnes.

Based on the prioritization criteria described in Section 4.3, Malaysia has decided to achieve reductions in HCFC consumption in various sectors as below:

Sector	Reductions for 2013 and 2015 targets (ODP tonnes)			
Sector	Manufacturing	Servicing	Total	
Air Conditioning	0	6.20	6.20	
Refrigeration	0	2.36	2.36	
Firefighting	0	0	0	
Foams	94.60	0	94.60	
Solvents	0	0	0	
Total	94.60	8.56	103.16	

Table-10: Reductions for Stage-I Compliance

4.5 RATIONALE AND PHASE-OUT STRATEGY

The following rationale and strategic considerations are involved in designing this phase-out strategy for compliance with the 2013 and 2015 compliance targets:

- Manufacturing, high ODP HCFCs (HCFC-141b) and the PU Foams Sector have been prioritized
- Applications and sub-sectors where mature and relatively benign technologies are available are prioritized
- Financially sound and viable enterprises with good technical and managerial capacity and large consumption have been prioritized, to ensure implementability and maximum impact
- Modest interventions in the Servicing Sector are proposed, to adapt and build on the servicing sector infrastructure, to contribute to the 2013 and 2015 targets, as well as to effectively control the growth in the servicing sector consumption.

Based on the above, the PU Foams Sector, which has predominantly HCFC-141b consumption and where low-GWP technologies can be applied to a relatively small number of well-organized enterprises, will be prioritized. The PU Foams Sector will achieve reductions of 94.6 ODP tonnes (Annex-II, PU Foams Sector Plan).

In order to control growth of HCFC consumption in servicing through containment, recovery and reclamations, as well as to ensure capacity-building of technicians and enforcement officials, modest interventions in the Servicing Sector are proposed (Annex-III, Servicing Sector Plan).

A key strategic consideration is the approach to deal with the HCFC consumption in manufacturing that would be unaddressed, either due to non-availability of mature and viable alternatives, or due to unimplementability in small and medium-sized enterprises within the available timeframe. The major unaddressed consumption would be in the Air Conditioning, Refrigeration and Servicing Sectors. Through carefully designed policies and targeted regulations, Malaysia will control the growth in HCFC consumption in sectors unaddressed for phase-out in Stage-I. For effective implementation, adequate resources will need to be accordingly allocated (Annex-I, Project Management, Policies and Regulations).

4.6 STRATEGY COMPONENTS

The strategy for compliance with the Stage-I targets for compliance with the 2013 and 2015 milestones is comprised of the following components:

4.6.1 Policies, Regulations, Project Management and Coordination

Policies and Regulations

Policies and targeted regulations that are enforceable without distorting the markets will be instrumental in controlling the consumption of HCFCs, for meeting the 2013 and 2015 targets. Some of the key planned regulations planned are described below:

Table-11: Key	Planned Regulatory Actions
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Year	Planned Regulatory Actions
2012	Establishment of Application Permit (AP) import quota system based on HCFC Baseline (average national consumption for 2009/2010)
2012	Amend existing regulations for controlling use, imports, manufacturing, assembly and installation of products containing HCFCs
	Licensing re-export of HCFCs
	Enforcement of Application Permit (AP) quota system
2013	Prohibition of establishment and expansion of new HCFC-based manufacturing capacities
	Establish incentive system for promoting use of alternatives to HCFCs
	Certification of technicians for handling HCFCs
2015	Prohibition of manufacturing, assembly and import of HCFC-based air conditioners (2.5 HP and lower) for use in Malaysia
2015	Prohibit imports of polyols pre-blended with HCFCs
	Include HCFCs in the list of restricted gases
	Prohibit the manufacture, assembly and import of all products and equipment using HCFCs
2020	(except for essential uses)
2020	Prohibit the use of HCFC 141b as blowing agent
	Prohibit the use of HCFC in the manufacturing and installation of new fire suppression systems
2025	No more new installation of products and equipment using HCFC
2030	AP limited to 2.5% of baseline and for servicing use only
2040	Total ban on the import and use of HCFCs

Management, Coordination and Monitoring

The earliest date by which actual field activities can commence, is estimated to be early-2012. This is to allow time for putting in place the necessary project initiation procedures, agreements, etc. This means that stringent timelines will be encountered for implementing actions for Stage-I compliance. This will make the task of management and coordination of activities very challenging. Adequate resources would need to be allocated, to support the additional costs of management, coordination and monitoring.

Awareness and Communications

It is considered extremely important to engage and enlist the support of all stakeholders in the implementation of the HPMP (Stage-I). To accomplish this, targeted awareness and communication actions will need to be carried out, and aligned with the implementation of the HPMP Stage-I. Accordingly resources would need to be allocated to cover the costs of awareness and communications actions.

More details on this component are provided in Annex-I.

4.6.2 Polyurethane Foam Sector Plan

The Polyurethane Foams Sector Plan will aim to phase out HCFC consumption in selected foam manufacturing enterprises by 2015. The successful implementation of this plan will contribute 91.7% to the phase-out target.

More details are provided in Annex-II.

4.6.3 Technical Assistance for the Servicing Sector

Since a large proportion of the unaddressed consumption in 2015 would be in the Servicing Sector, actions would need to be initiated at the outset, to curb the growth of HCFC-based equipment population during the first 3-4 critical years during which phase-out actions are being implemented. Specific policy and technical assistance interventions will be needed to control the growth in HCFC consumption in servicing until 2015 to acceptable levels.

Further, Malaysia is one of the manufacturing hubs in Southeast Asia, for air conditioning and refrigeration equipment. These two sectors are not prioritized for phase-out actions to meet the Stage-I compliance targets. Cost-effective low-GWP alternatives in these two sectors are still not mature. To adequately prepare the locally-owned enterprises in these two sectors for conversion n Stage-II, it is considered important to ensure the engagement of these enterprise in the phase-out efforts, for the industry to keep abreast of the latest technological developments and to ensure that best practice technical information on selection of emerging low-GWP technologies is disseminated. This is expected to enable the locally-owned manufacturers of air conditioning and refrigeration equipment, to be prepared for cost-effective conversion to such technologies in the HPMP Stage-II.

4.7 SUMMARY OF COSTS AND FUNDING

The total costs, requested funding and counterpart funding are summarized below. The breakdown of details of costs and funding for sector level activities are provided in the relevant annexes.

	-	
Strategy Component	Phase-out (ODP tonnes)	Funding (US\$)
Management, Coordination and Monitoring	0	600,000
Polyurethane Foams Sector Plan	94.60	8,297,470
Technical assistance for Servicing Sector	8.42	690,000
Total	103.02	9,587,470

Table-12: Total MLF funding

Note: All amounts rounded off to the nearest US\$ 1.00 and do not include agency support costs

4.8 MANAGEMENT ARRANGEMENTS

The implementation of the HPMP (Stage-I) will need to be closely aligned and coordinated with the various policy, regulatory, fiscal, awareness and capacity-building actions the Government of Malaysia is taking and will need to take in future, ensuring consistency with national priorities.

The implementation of the HPMP (Stage-I) will be carried out using the national execution modality (except for individual projects). The following framework that was successfully used during the preparation stage will be primarily used for supervision and management of implementation, with changes as needed to respond to evolving needs.



Figure 5 : Management of Implementations

The National Ozone Unit/DOE will have the overall coordination role. UNDP is the designated implementing agency for Malaysia's HPMP. Considering the challenges for implementing phase-out activities and related supporting activities in a short span of time to meet the 2013 and 2015 targets and considering that Malaysia will implement HPMP Stage-I through a performance-based agreement, the overall HPMP will be implemented through a performance-based mechanism between UNDP and DOE.

A project management unit with dedicated project staff will need to be formed, to undertake day-to-day implementation supervision and project management. The NOU/DOE will be supported by national and international technical experts as needed. The detailed roles and responsibilities of the stakeholders will be defined at the time of initiation of project implementation in more detail.

4.9 MONITORING MILESTONES

A		2012			2013			2014			2015				2016			
Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Investment Components																		
Project initiation documentation																		
Establish project management unit			-															
Stakeholder consultations																		
Enterprise-level agreements				-														
Technology conversions					-		-	-										
Commissioning and trials																		
Non-investment Components																		
Policy and Regulations																		
Technical Support																		
Technical Assistance for Servicing																		
Awareness and Capacity-building																		
Verification																		
Verification of phase-out																		

Table-13 : Monitoring Milestones

4.10 Environmental Impact

4.10.1 Ozone Layer Protection

Successful implementation of the HPMP (Stage-I) in Malaysia will result in a phase-out of 103.16 ODP tonnes of HCFCs. After accounting for the controlled growth in consumption of HCFCs, the net impact would be minimum 51.6 ODP tonnes of sustained reductions in Malaysia's national HCFC consumption baseline from 2015.

4.10.2 Global Warming

Direct GHG emissions

Due to the relatively high global warming potential of HCFCs, their phase-out will result in reduced direct GHG emissions. The net impact would be the difference in the direct emissions between HCFCs and the alternatives introduced to replace them as below:

Sector/Substance	HCFC-22	HCFC-141b			
Foams (metric tonnes)	0	860			
Servicing	155	0			
Total (metric tonnes)	155	860			
GWP ¹	1,810	725			
Impact (CO ₂ -eq tonnes)	280,550	623,500			
Total Impact (CO ₂ -eq tonnes)/y	904,050				

Table 14 : Direct GHG emissions Before Conversion

Table 15 : Direct GHG emissions After Conversion

Sector/Substance	R-410A	НС			
Foams (metric tonnes)	0	688			
Servicing	0	0			
Total (metric tonnes)	0	688			
GWP ¹	2,088	11			
Impact (CO ₂ -eq tonnes)	0	7,568			
Total Impact (CO ₂ -eq tonnes)/y	7,568				

The net direct emission reductions are thus 896,482 CO₂-eq tonnes annually.

Indirect GHG emissions

Energy efficiency improvements are not the primary objective of this plan therefore the impact of indirect GHG emissions cannot be accurately estimated at this time.

4.10.3 Health and Safety

The HPMP (Stage-I) will be implemented taking into account all considerations for safeguarding health and safety in line with local and international regulations and guidelines.