



United Nations Environment Programme

Distr.
LIMITED



UNEP/OzL.Pro/ExCom/13/20
27 June 1994

ORIGINAL: ENGLISH

Executive Committee of
the Multilateral Fund for the
Implementation of the Montreal Protocol

Thirteenth Meeting
Montreal, 25-27 July 1994

COUNTRY PROGRAMME: KENYA

This document consists of:

- Comments and recommendations of the Fund Secretariat
- Country Programme Evaluation Sheet (prepared by the Fund Secretariat)
- Transmittal Letter from the Government of Kenya
- Country Programme Cover Sheet
- Country Programme Executive Summary¹
- Institutional strengthening project proposal

¹ Complete Country Programme was sent only to members of the Executive Committee that requested full documentation.

COMMENTS AND RECOMMENDATIONS OF THE FUND SECRETARIAT

COMMENTS

1. The Country Programme conforms to the format of the approved guidelines. The Country Programme provides data on all substances controlled under the Montreal Protocol and all its amendments.
2. The Country Programme presents a situation where voluntary actions driven by the market have led to gradual phase-down of the use of CFCs where this has been found to be economically feasible and possibly commercially beneficial. This has been the case particularly in the aerosol, foam and the solvent sectors, where the use of ODS has either been completely phased out (aerosol, flexible foam) or considerably reduced (solvents). This trend is likely to continue even in the refrigeration manufacturing and assembly sector since the activity is dependent on standards of and supplies mother companies in non-Article 5 countries.
3. It is expected that market forces will continue to induce voluntary ODS reductions as well as introduction of substitutes or substitute technologies, following the phase-out in the non-Article 5 countries. In the refrigeration sector where unintended emissions during servicing range between 10 per cent and 300 per cent of the refrigerant charge, it is believed that, if supported, the conservation strategies adopted by the Government would also help reduce demand for CFCs for servicing existing equipment.
4. Due to the importance of methyl bromide to the country's economy, it is considered in the phase-out strategy in spite of the fact that it is not yet a controlled substance for Article 5 countries. Annexes provide a summary of causes of refrigerant losses in domestic refrigerators and how to remedy them and projections of CFC-12 demand in the refrigeration sector to the year 2005.
5. An elaborate institutional framework is provided for the implementation of the country programme and its monitoring.

RECOMMENDATIONS

The Fund Secretariat recommends as follows:

6. To approve the Kenya Country Programme. Approval of the Country Programme does not denote approval of the projects identified therein or their funding levels where they have not been previously approved.
7. In accordance with the Executive Committee decision on progress of implementation of country programme (UNEP/OzL.Pro/ExCom/10/40, para 135), to request the Government of Kenya to provide information on progress of implementation of the Kenya Country Programme within one year of its approval, i.e. on 31 July 1995 and annually on 31st day of July of each subsequent year.

KENYA COUNTRY PROGRAMME EVALUATION SHEET

National Implementing Agency: National Sub-Committee on Ozone Depleting Substances (NACODS)

Status of ratification of the Vienna Convention and the Montreal Protocol

	Signature	Ratification	Entry Force
Vienna Convention (1985)		09/Nov/88	07/Feb/89
Montreal Protocol (1987)	16/Sep/87	09/Nov/88	07/Feb/89
London Amendment (1990)			
Copenhagen Amendment (1992)			

Production of controlled substances: 0 metric tonnes (mt)

Consumption of controlled substances (0): 111.1 metric tonnes
(excluding methyl bromide) 129.5 weighted tonnes (ODP)

Substance (ton)	CFC						Halon			Solvents			M-Br
	11	12	113	114	115	Total	1211	1301	Total	CTC	MCF	Total	
ODS	6.0	41.0				47.0	3.5	0.6	4.1	60.0		60.0	330.0
ODP	6.0	41.0				47.0	10.5	6.0	16.5	66.0		66.0	231.0

Source: Country Programme (1994)

Distribution of ODP by substance:

CFC: 36.3% Halon: 12.7% CTC, MCF: 51.0%

Distribution of ODP by sector:

Sector:	Aerosol	Foam	Halon	Refrig.	Solvent
Consumption (tonnes):			15.5	47.0	66.0
Percent of total:			12.7%	36.3%	51.0%

Country Programme

Duration of country programme: 1994-2007

ODS phase-out target:

CTC phase out by 1996, halon phase out by 2000. Complete ODS phase out by 2007

Phase-out priority area:

Refrigeartion and halon sectors

Cost of activities in country programme: \$1,169,157

Strategy:

To phase-out ODS earlier than the Montreal Protocol requires. Will take advantage of market forces to accelerate phase-out in halon and refrigeration sectors. Reliance on refrigerant management and conservation through compressor protection and recovery recycling programmes using public awareness campaigns and mandatory certification of service technicians. Ban on the use of ODS in new equipment and strict customs enforcement. Economically and technically feasible reductions in methyl bromide use.

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES

Telegrams: 'ASILI', Nairobi
Telephone: Nairobi 229261

When replying please quote

Ref. No. NES/CONF/07/18/Vol I

Please address your reply to:
The Permanent Secretary for
Environment and Natural Resources



OFFICE OF THE PERMANENT SECRETARY
KENCOM HOUSE
MOI AVENUE
P.O. BOX 30126
NAIROBI
24 June, 1994

Dr Omar El-Arini
Chief Officer
Multilateral Fund for the
Implementation of the Montreal
Protocol Secretariat,
18000 McGill College Avenue, 27th Floor
Montreal, Quebec Canada.
H3A 3J6

Dear Sir,

RE: REQUEST FOR CONSIDERATION FOR FUNDING OF THE KENYA
COUNTRY PROGRAM TO PHASE OUT THE OZONE DEPLETING
SUBSTANCES UNDER THE MONTREAL PROTOCOL

On behalf of the Government of Kenya I wish to send to you the above document through you to the Executive Committee of the Multilateral Fund of the Montreal Protocol. The document was prepared after due consultations were made, between the Private Sector, Industry and Public Institutions in Kenya, where the Ozone Depleting Substances (ODS) are used.

Kenya has strongly supported efforts to protect the Global Environment in general and the Ozone Layer in particular, having ratified the Vienna Convention on the Protection of the Ozone Layer and its Montreal Protocol on the Substances that Deplete the Ozone Layer on 9th November, 1988. Thus the Government of Kenya is committed to following the provision of the Montreal Protocol:

The document covers the extent of use of ODS and actions to be taken by Kenya in the phaseout including policy and legislation measures that will be necessary to achieve this. Approval of the Program by the Executive Committee will therefore be a step towards mobilizing the financial and technological resources necessary for efficient phase out.

This Ministry is mandated to co-ordinate the efforts of phasing out the ODS. Consequently, within the Department of the National Environment Secretariat of this Ministry, there is already a project to start an Ozone Office to oversee and facilitate the implementation of the Program.

SENT BY:UNDEVPRO

120- 6-84 : 11:47 :

UNDP KENYA-

212 806 6847: # 2/ 2

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES

Telegrams: "ASILI", Nairobi
Telephones: Nairobi 219261

When replying please quote

Ref: NES/CONF/07/Vol

Ref. No.

Please address your reply to:
The Permanent Secretary for
Environment and Natural Resources
10th June, 1994



OFFICE OF THE PERMANENT SECRETARY
KENCOM HOUSE
MOI AVENUE
P.O. BOX 30126
NAIROBI

J.D. Whaley
Resident Representative
UNDP
NAIROBI

Dear

Ref. COUNTRY PROGRAM ON PHASEOUT OF OZONE DEPLETING SUBSTANCES.

Please refer to my letter of 27th January, 1994 on the above subject

The National Subcommittee on Ozone Depleting Substances (NACODS) in its meeting held on 31st March, 1994 discussed the draft program written with assistance from Dr Khalil who was the UNDP consultant and the amendments recommended by that committee have now been incorporated in the document.

I would therefore like to request you to forward the document to the Multilateral Ozone Fund Secretariat for approval and funding.

Yours

[Signature]
J.T.N. SABARI
PERMANENT SECRETARY

UNDP
NAIROBI
Date: 16 JUN 1994
File: 100/100/100
LMW 1316
LL

N.O.O

cc:

The Director, NES - your letter ref. No. NES/conf/07
NAIROBI /Vol 11/(33) of 8th June 1994
refers.

COUNTRY PROGRAMME COVER SHEET

Country:

KENYA

Lead National Agency:

National Environment Secretariat (NES)

Participating Implementing Agency:

UNDP

PHASE-OUT SCHEDULE

Substance	Current consumption (Tonnes x ODP) in 1993	Cumulative consumption until Phase-out (Tonnes ODP)		Proposed year for complete phase-out
		Article 5 Schedule (1)	Accelerated Schedule (2)	
ANNEX A GROUP I				
CFC-11	6.0x 1.0 = 6.0	103	24	2005
CFC-12	41.0x 1.0 =41.0	801	126	2005
CFC-113	0.0x 1.0 =0.0	-		
CFC-114	0.0x 1.0 =0.0	-		
CFC-115	0.0x 0.6 =0.0	-		
Subtotal				
ANNEX A GROUP II				
Halon 1211	3.5x 3.0 =10.5	193	47	1999
Halon 1301	0.5x 10.0 = 5.0	92	225	1999
Halon 2404	0.0 x 6.0 =0.0	-		
ANNEX B GROUP I				
CFC-13	0.0 x 1.0 = 0.0	-		
CFC-111	0.0 x 1.0 = 0.0	-		
CFC-112	0.0 x 1.0 = 0.0	-		

Subtotal				
ANNEX B GROUP II				
CTC (CCL ₄)	60.0 x 1.1 = 66	1138	291	1996
ANNEX B GROUP III				
TEE	0.0 x 0.1 = 0.0	-		
TOTAL	128.5	2327	666	2005

- (1) Forecast consumption until year 2010 in accordance with Montreal Protocol
 (2) ODS phase-out schedule based on the action plan by the Government, if faster than the Article 5 schedule.

SUMMARY OF ACTIONS AND IMPLEMENTING BODIES

NUMBER	ACTION	STARTING DATE	IMPLEMENTING BODY
1	Publicity campaigns Full customs documentation	June 1994 to Dec. 1996	NES / ODS office Consumer Organizations Kenya Power and Lighting Co. Ltd.
2	Training for technicians in the refrigeration sector Registration and licensing of service agents and technicians Formulate codes of practice	January 1994 to December 1996	UNDP/Multilateral Fund Ministry of Research, Technical Training and Technology Tertiary Education Institutions
3	Installation of recovery and recycle equipment. Installation of appropriate charging systems	1994	Government of Kenya Assemblers, Retailers and Service Agents UNDP
4	Establishment of national bank for CFC-12 and HCFC-22	1994	Assemblers and Contractors Chemical Importers
5	Installation of compressor protection devices on domestic refrigerators (new and existing)	1995	General public Assemblers, Retailers and Service Agents Kenya Power and Lighting Company Limited
6	Legislation on the use of Methyl Bromide	1995	KARA Pesticides Control Board
7	Mandatory certification and registration of service technicians and agents	1995	Ministry of Research, Technical Training and Technology Directorate of Occupational Health and Safety Services
8	Full declaration of type, function, capacity, country of origin of refrigeration systems and chemicals Ban use of ODS in new equipment. Switch to HFC-134a for refrigeration Inspection of non-domestic refrigeration systems on CFC-12 and other coolants. Conversion of existing CFC-12 systems to non ODS, HCFC-22 or other products.	January 1996	Ministry of Commerce Ministry of Finance Customs Department
9	Ban use of CFC in new equipment in all sub-sectors	January 1996	Ministry of Commerce Ministry of Finance Customs Department, Refrigeration Assemblers and Contractors
10	Switch to alternatives of methyl bromide ‡ Please see note below	1996	Horticulturists

‡ Note. While plant materials leaving Kenya are inspected to meet the standards of the importing countries, it is equally important to protect the country from foreign pests. Inspection at all points of entry and exit and the enforcement of disaffection by the most effective fumigant will continue to be an effective means of protecting Kenya from injurious pests. While Phosphine and methyl bromide have been the main fumigants for agricultural produce, there is evidence that resistance to Phosphine may be increasing on the Mombassa island. The alternative methyl bromide, though an ODS, will continue to be Kenya's main fumigant for agricultural produce.

PROJECTS IN ORDER OF THEIR PRIORITY TO THE GOVERNMENT OF KENYA

DURATION	PROJECT	ESTIMATED COST IN US \$	IMPLEMENTING AGENCY	REMARKS
1994-1998	Institutional Strengthening for the Phase out of ODS	175,000	UNDP	Approved by Exec. Committee Mar 93 Project to start in July 1994
1995-96	Methyl Bromide Demonstration and Training Workshop	200,000	UNEP	Cost to Multilateral Fund to be cofunded by Government
1993	Demonstration and Training Unit for maintenance and recharge in the refrigeration sector	9,850	UNEP	Approved by Exec. Committee June 91 Demonstration Project Completed
1994-97	Running costs for Training Unit for maintenance, recovery recycling and recharge in the refrigeration sector	17,000	UNEP	Cost to Multilateral Fund
1994-97	CFC Phase out in Kenya for 3 companies	380,875	UNIDO	Approved by Exec. Committee Nov. 93 Awaiting letters of agreement
1993	Support to a National Workshop on Refrigeration	115,000	UNEP	Approved by Exec. Committee Mar. 93 Completed
1994	Halons Bank and Project Identification	30,000	UNDP	Project Preparation
1994-96	National Demonstration Center Programme (NRDC)	91,432	UNEP	May be cofinanced by Industry, Government of Kenya, Chemical Suppliers
1994-95	Solvents - Workshops, Hotels and Dry Cleaners	30,000	UNDP	Some phase out completed after ratification. Cost of project preparation, Incremental cost to be prorated for Multinational companies
1994-95	Cold storage rooms - Industry, Hotels and other units	30,000	UNDP	Some phase out completed after ratification. Cost of project preparation, Incremental cost to be prorated for Multinational companies
1994-95	Foams - Project identification	30,000	UNDP	Project Preparation
1995	National Workshop on Monitoring and Control of ODS Consumption	40,000	UNEP	Project Preparation
	TOTAL	1,169,157		

THE COST OF THE PRESENT PHASE OUT OF ODS IS ESTIMATED AT US \$ 1,169 M WITH A COST EFFECTIVENESS OF US \$ 900 / KG ODP



REPUBLIC OF KENYA

**MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES
NATIONAL ENVIRONMENT SECRETARIAT
NAIROBI, KENYA**

KENYA

**COUNTRY PROGRAMME FOR THE PHASE
OUT OF OZONE DEPLETING SUBSTANCES**

JUNE 1994

TABLE OF CONTENTS

ABBREVIATIONS	1
EXECUTIVE SUMMARY	2
S.1 INTRODUCTION.....	2
S.2 IMPORTATION OF ODS IN KENYA.....	2
S.3 USE OF ODS.....	2
S4. ACTION PLAN.....	4
S5. ROLES IN IMPLEMENTING THE STRATEGY	5
S6. ASSISTANCE RECEIVED.....	5
S.7. IMPLEMENTATION PROJECTS.....	5
S.8. CONCLUDING REMARKS	5
1. INTRODUCTION.....	7
1.1 PURPOSE.....	7
1.2 STATUS.....	7
1.3 ASSISTANCE RECEIVED.....	7
2. CURRENT SITUATION	8
2.1 GENERAL.....	8
2.2 CONSUMPTION OF ODS	8
2.3 INDUSTRY STRUCTURE	10
IMPORTS.....	10
REFRIGERATION	10
DOMESTIC REFRIGERATION	11
COMMERCIAL AND RETAIL REFRIGERATION	12
COLD STORAGE AND COLD ROOMS	12
AIR CONDITIONING	12
MOBILE REFRIGERATION	13
MOBILE AIR-CONDITIONING (CARS).....	13
INDUSTRIAL REFRIGERATION	13
REPLACING CFC-11 BLOWN POLYURETHANE.....	14
TECHNICAL IMPLICATIONS OF PHASE-OUT OF CFC-11 BLOWN POLYURETHANE.....	14
AEROSOLS.....	14
SOLVENTS	14
HALONS	15
METHYL BROMIDE.....	15
2.4 FORECAST DEMAND.....	16
3. INSTITUTIONAL FRAMEWORK	19
3.1 GOVERNMENT INSTITUTIONS:.....	19
• THE NATIONAL ENVIRONMENTAL SECRETARIAT (NES):	19
• MINISTRY OF FINANCE:	19
• MINISTRY OF AGRICULTURE:	19
• MINISTRY OF WORKS (MOW) :	19

• MINISTRY OF INFORMATION:	19
• MINISTRY OF RESEARCH, TECHNICAL TRAINING AND TECHNOLOGY:	19
• DIRECTORATE OF OCCUPATIONAL HEALTH AND SAFETY SERVICES:	20
• NATIONAL AGRICULTURAL RESEARCH LABORATORIES:	20
• OTHER INSTITUTIONS IMPORTANT TO ODS PHASE OUT.....	20
• KENYA ASSOCIATION OF MANUFACTURERS (KAM):.....	20
• KENYA NATIONAL CHAMBER OF COMMERCE AND INDUSTRY:	20
• INSTITUTION OF ENGINEERS OF KENYA (IEK) :.....	20
• SPECIAL INTEREST GROUPS	20
3.2 POLICY FRAMEWORK.....	20
3.3 GOVERNMENT AND INDUSTRY RESPONSE TO THE PROTOCOL.....	21
• GOVERNMENT RESPONSE	21
• INDUSTRY RESPONSE.....	21
 4. IMPLEMENTING PHASE OUT	22
4.1 STRATEGY STATEMENT BY THE GOVERNMENT.....	22
• PHASE OUT STRATEGY.....	22
• OBJECTIVES	22
• REFRIGERANT CHARGING	23
• DOMESTIC REFRIGERATION	23
• COMMERCIAL AND RETAIL REFRIGERATION.....	23
• COLD STORAGE AND COLD ROOMS	24
• TRANSPORT REFRIGERATION.....	24
• COMFORT AIR-CONDITIONING	24
4.2 ACTION PLAN.....	24
4.3 ROLES IN IMPLEMENTING THE STRATEGY	25
4.4 TIMETABLE AND CONSUMPTION IMPLICATIONS	26
4.5 BUDGET AND FINANCING PROGRAMME.....	26
4.6 MONITORING ARRANGEMENTS	30
4.7 PROJECTS.....	30
 ANNEX I.....	31
ANNEX II.....	36

ABBREVIATIONS

CFC	Chlorofluorocarbons
CTC	Carbon Tetrachloride
EC	European Community
HCFC	Hydrochlorofluorocarbon
IBRD	International Bank for Reconstruction and Development (World Bank)
IEK	Institution of Engineers of Kenya
KAM	Kenya Association of Manufacturers
KBC	Kenya Broadcasting Corporation
MB	Methyl Bromide
MC	Methylene Chloride
Montreal Protocol	Montreal Protocol on Substances that Deplete the Ozone Layer
MOW	Ministry of Works
Multilateral Fund	The Multilateral Fund for the Implementation of the Montreal Protocol
NES	National Environment Secretariat
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substance
Premier	Premier Refrigeration and Engineering Company
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization

EXECUTIVE SUMMARY

S.1 INTRODUCTION

Kenya ratified the Montreal Protocol on 09 Nov. 1988 thus became a party on 7 February 1999. In 1993 with a consumption of 68.5 ODP Tonnes of ODS and a population of 25 M, the consumption per capita was 0.00274 kg. Thus Kenya qualifies to operate under paragraph I of Article 5 of the Montreal Protocol.

S.2 IMPORTATION OF ODS IN KENYA

The importation of ODS into Kenya in 1993 is estimated as follows:

YEAR		1993	1993
ODS Annexes A and B substances	ODP	Tonnes	ODP Tonnes
CFC-11	1	6	6
CFC-12	1	41	41
Halon-1211	3	3.5	10.5
Halon-1301	10	0.5	5
CTC CCL ₄	1.1	60	66
TOTAL Annexes A and B substances		111	128.5

YEAR		1993	1993
ODS Annexes C and E substances	ODP	Tonnes	ODP Tonnes
HCFC-22	0.055	70	3.5
MB CH ₃ Br	0.7	330	231
TOTAL Annexes C and E substances		400	234.5

YEAR		1993	1993
ODS Annexes A, B, C and E substances	ODP	Tonnes	ODP Tonnes
TOTAL		511	363

S.3 USE OF ODS

CFC-11 was mainly used as a blowing agent for polyurethane foams. Polyurethane foam other than for use in the refrigeration sector is now blown using Methylene Chloride and water. Thus the consumption of CFC-11 has decreased from 21.7 ODP Tonnes in 1991 to 6 ODP Tonnes in 1993.

Since February 1993, most aerosol fillers are using butane as propellant which lead to an 80 % reduction in CFC-12. The remaining 41 Tonnes of CFC-12 imported in 1992 was mainly used by the refrigeration sector.

In 1993, 70 Tonnes (3.5 ODP Tonnes) of HCFC-22 were used as a substitute for CFC-12 in the cold storage sub-sector.

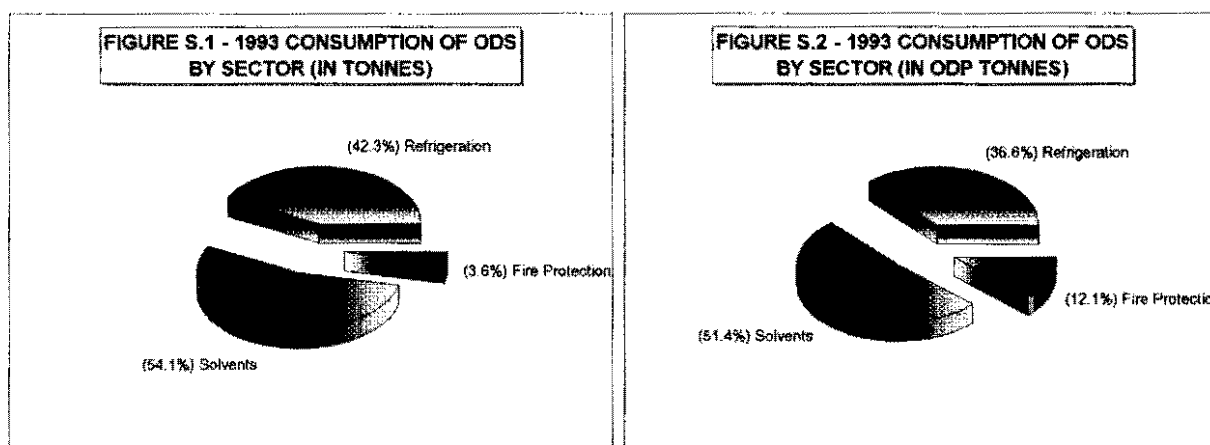
Carbon tetrachloride (CTC) is mainly used as a solvent. Its high cost has forced the decline in use indicating a drop to 66 ODP Tonnes from the 1990 consumption.

Methyl Bromide is used in the horticultural industry, soil fumigation, fumigation of cereals and grain in storage and for quarantine. The horticultural industry is a major growing exporting industry. In 1993, 330 Tonnes (231 ODP Tonnes) were imported. The absence of an acceptable substitute for Methyl bromide and at competitive cost is of major concern to Kenya due to the magnitude of the horticultural crops industry and the strict fumigation standards imposed by the importers of Kenyan fresh produce.

The importation of Halons for use as fire retardants has mainly been restricted to a few institutions. Substitutes will almost completely wipe out the importation of Halons.

Figures S.1 and S.2 show the percentage use of ODS by sector.

It was recognized that it is necessary to propose phase-out programmes for the refrigeration, Halons, solvents, foams and fumigation sectors for the consumption of ODS to be eliminated.



S4. ACTION PLAN

The proposed Action Plan aims at complete phase out of CTC by 1995. The plan includes short-term and long-term objectives for ODS phase-out and environmental awareness. The main objectives of the action plan are to reduce consumption to be developed through; ODS substitute projects, education of general public, training of technicians, and improving manufacturing / assembling standards. No new ODS operating equipment will no longer be allowed to enter the country. Existing hand held fire extinguishers will no longer be recharged after 1986.

SUMMARY OF ACTIONS AND IMPLEMENTING BODIES

NUMBER	ACTION	STARTING DATE	IMPLEMENTING BODY
1	Publicity campaigns Full customs documentation	June 1994 to Dec. 1996	NES / ODS office Consumer Organizations Kenya Power and Lighting Co. Ltd.
2	Training for technicians in the refrigeration sector Registration and licensing of service agents and technicians Formulate codes of practice	January 1994 to December 1996	UNDP/Multilateral Fund Ministry of Research, Technical Training and Technology Tertiary Education Institutions
3	Installation of recovery and recycle equipment. Installation of appropriate charging systems	1994	Government of Kenya Assemblers, Retailers and Service Agents UNDP
4	Establishment of national bank for CFC-12 and HCFC-22	1994	Assemblers and Contractors Chemical Importers
5	Installation of compressor protection devices on domestic refrigerators (new and existing)	1995	General public Assemblers, Retailers and Service Agents Kenya Power and Lighting Company Limited
6	Legislation on the use of Methyl Bromide	1995	KARA Pesticides Control Board
7	Mandatory certification and registration of service technicians and agents	1995	Ministry of Research, Technical Training and Technology Directorate of Occupational Health and Safety Services
8	Full declaration of type, function, capacity, country of origin of refrigeration systems and chemicals Ban use of ODS in new equipment. Switch to HFC-134a for refrigeration Inspection of non-domestic refrigeration systems on CFC-12 and other coolants. Conversion of existing CFC-12 systems to non ODS, HCFC-22 or other products.	January 1996	Ministry of Commerce Ministry of Finance Customs Department

CONT...

ACTION PLAN CONTINUED

NUMBER	ACTION	STARTING DATE	IMPLEMENTING BODY
9	Ban use of CFC in new equipment in all sub-sectors	January 1996	Ministry of Commerce Ministry of Finance Customs Department, Refrigeration Assemblers and Contractors
10	Switch to alternatives of methyl bromide	1996	Horticulturists

S5. ROLES IN IMPLEMENTING THE STRATEGY

The National Environmental Secretariat (NES), under the Ministry of the Environment, shall be the organization that shall implement the Country Programme to eliminate the consumption of ODS in Kenya.

A National Committee on ODS has been formed under NES. This committee advises NES and the Government on ODS related matters, policy requirements, legislation, projects in the Action Plan, research, institutional strengthening and awareness campaigns. The ODS office will be under NES.

S6. ASSISTANCE RECEIVED

The Government of Kenya received technical and financial assistance to complete the Country Programme from the Multilateral Fund through UNDP. It received other assistance from the Multilateral Fund through UNEP and UNIDO. Other assistance in country studies was by the US EPA.

S.7. IMPLEMENTATION PROJECTS

A summary of the proposed implementation projects in order of their priority to the Government of Kenya, the proposed implementing agency and the fund sourcing is given on the following page. The total estimated incremental costs of the projects and activities is 1,169 M US \$.

S.8. CONCLUDING REMARKS

The trends in the consumption of ODS in Kenya are quite encouraging even before the official phase-out programme is brought into action. The picture seen now is indeed much more encouraging than what was previously expected to occur as far as the availability of acceptable ODS alternatives was concerned, the financial implications of CFC phase-out and equipment retrofitting. A smooth phase-out programme is expected if major proposals regarding awareness campaigns, training, protection of refrigeration systems, etc. are put into action from mid 1994.

HFC-134a refrigerant is now commercially available and will be used in new refrigerators. Although HFC-134a is currently more expensive than CFC-12, it is most likely that this price will soon substantially drop while the price of CFC-12 is also expected to increase substantially in the coming months.

The success of the phase-out programme will mainly depend on the reaction of the end users, assemblers, refrigeration contractors and the Government policy as well as its enforcement.

PROJECTS IN ORDER OF THEIR PRIORITY TO THE GOVERNMENT OF KENYA

DURATION	PROJECT	ESTIMATED COST IN US \$	IMPLEMENTING AGENCY	REMARKS
1994-1998	Institutional Strengthening for the Phase out of ODS	175,000	UNDP	Approved by Exec. Committee Mar 93 Project to start in July 1994
1995-96	Methyl Bromide Demonstration and Training Workshop	200,000	UNEP	Cost to Multilateral Fund to be cofunded by Government
1993	Demonstration and Training Unit for maintenance and recharge in the refrigeration sector	9,850	UNEP	Approved by Exec. Committee June 91 Demonstration Project Completed
1994-97	Running costs for Training Unit for maintenance, recovery recycling and recharge in the refrigeration sector	17,000	UNEP	Cost to Multilateral Fund
1994-97	CFC Phase out in Kenya for 3 companies	380,875	UNIDO	Approved by Exec. Committee Nov. 93 Awaiting letters of agreement
1993	Support to a National Workshop on Refrigeration	115,000	UNEP	Approved by Exec. Committee Mar. 93 Completed
1994	Halons Bank and Project Identification	30,000	UNDP	Project Preparation
1994-96	National Demonstration Center Programme (NRDC)	91,432	UNEP	May be cofinanced by Industry, Government of Kenya, Chemical Suppliers
1994-95	Solvents - Workshops, Hotels and Dry Cleaners	30,000	UNDP	Some phase out completed after ratification. Cost of project preparation, Incremental cost to be prorated for Multinational companies
1994-95	Cold storage rooms - Industry, Hotels and other units	30,000	UNDP	Some phase out completed after ratification. Cost of project preparation, Incremental cost to be prorated for Multinational companies
1994-95	Foams - Project identification	30,000	UNDP	Project Preparation
1995	National Workshop on Monitoring and Control of ODS Consumption	40,000	UNEP	Project Preparation
	TOTAL	1,169,157		

1. INTRODUCTION

1.1 PURPOSE

The Government of Kenya reiterates its commitment to its obligations to the Vienna Convention and the Montreal Protocol. The present Country Programme confirms the Government of Kenya's obligations and aims at the analysis and evaluation of ODS consumption data, and the formulation of the Kenya Country Programme for the phase-out of ODS. This Country Programme looks at the consumption of all Controlled Substances under the Montreal Protocol and its amendments, including the consumption of Methyl Bromide, which is an important chemical to the Kenyan economy.

Kenya has already started to act on the rapid elimination of ODS. It has presented projects and received funds even before it has completed the Country Programme. The funds approved for Kenya by the Executive Committee of the Multilateral Fund have been for projects in all user sectors. They include institutional strengthening, training in refrigeration, demonstration, project preparation and phase out projects.

Kenya shall monitor the progress of its action plan for rapid phase out of ODS through the focal point identified in the Institutional Strengthening Project.

1.2 STATUS

- **THE NATIONAL ENVIRONMENT SECRETARIAT (NES)**

NES is the responsible body that has led the formulation of the Country Programme. Following meetings with all parties concerned, NES presented this document to the Minister of the Environment for his final approval.

- **PREVIOUS STUDIES**

The following are previous studies that have estimated the consumption of ODS in Kenya. Data contained in these reports were used as a basis to compile the present Country Programme.

- Ozone layer protection: Kenya case study on costs and strategies. UNEP, October 29, 1990.
- Final confidential report on techno economic assessment of the financial viability of the collection and safe disposal of refrigerant gases and related materials in Africa (Project No. US/RAF/90/173).
- Project of Kenya Country Study for UNIDO, Vienna, Austria UNIDO, August 1992.

1.3 ASSISTANCE RECEIVED

The Government of Kenya received technical and financial assistance to complete the Country Programme from the Multilateral Fund through UNDP. It received other assistance from the Multilateral Fund through UNEP and UNIDO. Other assistance in country studies was by the US EPA.

2. CURRENT SITUATION

2.1 GENERAL

Several studies have been conducted in Kenya to survey the current situation and evaluate the consumption. These studies including the present Country Programme have determined that the refrigerator sector was the largest consumer of ODS in the country.

2.2 CONSUMPTION OF ODS

The results of the studies undertaken give the following consumption figures. 1993 being the base year.

**TABLE 2.1 - CONSUMPTION IN TONNES AND IN ODP TONNES OF ODS SUBSTANCES
UNDER ANNEX A CONSUMED IN KENYA**

YEAR		1989	1989	1990	1990	1991	1991
ODS	ODP	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes
CFC-11	1	30.0	30.0	30	30	21.7	21.7
CFC-12	1	200.0	200.0	200	200	83.0	83.0
Halon-1211	3	3.5	10.5	3.5	10.5	3.5	10.5
Halon-1301	10	0.5	5.0	0.5	5	0.4	4.0
CTC CCL ₄	1.1		0.0	120	132		
MC C ₂ H ₃ CL ₃	0.1	120.0	12.0	<5	5.5		
SUB-TOTAL		354.0	257.0	359	383.0	108.6	119.2

TABLE 2.1 CONTD.

YEAR		1992	1992	1993	1993
	ODP	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes
CFC-11	1	6.0	6.0	6	6
CFC-12	1	41.0	41.0	41	41
Halon-1211	3	3.5	10.5	3.5	10.5
Halon-1301	10	0.3	3.0	0.5	5
CTC CCL ₄	1.1	0.5	0.6	60	66
MC C ₂ H ₃ CL ₃	0.1	60.0	6.0		
SUB-TOTAL		111.3	67.1	111	128.5

TABLE 2.2 - OTHER ODS CONSUMED

YEAR		1989	1989	1990	1990	1991	1991
ODS	ODP	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes
HCFC-22	0.05	50.0	2.5	50	2.5		
MB CH ₃ Br	0.7	360.0	252.0	340	338	330.0	231.0
SUB-TOTAL		410.0	254.5	390	340.5	330.0	231.0

TABLE 2.2 CONTD.

YEAR		1992	1992	1993	1993
	ODP	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes
HCFC-22	0.05	70.0	3.5	70	3.5
MB CH ₃ Br	0.7	330.0	231.0	330	231
SUB-TOTAL		400.0	234.5	400	234.5

TABLE 2.3 - GRAND TOTAL CONSUMPTION INCLUDING HCFC-22 AND METHYL BROMIDE

YEAR	1989	1989	1990	1990	1991	1991	1992	1992	1993	1993
ALL ODS CONSUMED	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes	Tonnes	ODP Tonnes
GRAND TOTAL	764.0	512.0	749	723.5	438.7	351.2	511.5	303.6	511	363

The variations in yearly consumptions are due to the following:

- CFC-11 importation decline is due to switch over to alternatives.
- HCFC-22 consumption increase is due to several cold storage installations switching from CFC-12 to HCFC-22 and due to new installations using that chemical.
- CFC-12 consumption accounts for waste due to improper repair and maintenance practices.
- Methyl Chloroform reduction in consumption is due to its cost relative to alternatives.

2.3 INDUSTRY STRUCTURE

IMPORTS

The following table gives the ODS Import data and Cost in the European Community by Company

Table 2.4 Import Data

IMPORT IN TONNES							
ODS	TWIGA (FEB. 93)	HOECHST (FEB. 93)	EAO (FEB. 93)	TOTAL (FEB. 93)	1990	1992	Retail Price in US \$/kg (FEB. 93)
CFC-11	6	---	---	6	30	21.7	1.85
CFC-12	20	7	14	41	200	83	3.23
HCFC-22	20	10	40	70	50	---	4.46
Methyl chloroform	60	---	---	60	120	---	1.00
Carbon tetrachlorid e	---	---	---	---	<5	---	---
Methyl Bromide	---	---	---	330	---	---	---

REFRIGERATION

The following table gives the consumption for the refrigeration sector for the years 1990-1991.

TABLE 2.5 - CONSUMPTION IN THE REFRIGERATION SECTOR

SUB-SECTOR	1990			1991		
	CFC 11	CFC 12	HCFC 22	CFC 11	CFC 12	HCFC 22
Domestic refrigerators and freezers	1.5	4.0	-	10.5	20.7	-
Retail and commercial	1.5	5.0	-	}	51.7	-
Industrial refrigeration (cold storage)	-	28.0	12.0	}		
Air-conditioning domestic and commercial	-	<1.0	38.0	-	-	-
Mobile air-conditioning	-	4.0	-	-	6.5	-
Cleaning and flushing	10	-	-	-	-	-
Transport	-	<1.0	-	-	-	-
unlocated	-	8.0	-	-	-	-
<u>Sub-total</u>	13.0	51.0	50.0	16.5	78.9	-
Rigid insulation foam	17.5	-	-	-	-	-
<u>Total</u>	30.5	51.0	50.0	16.5	78.9	-

While for 1993 reliable data was unable to be found for CFC-11 and CFC-12, estimates give the consumption for these two substances at 47 Tonnes per year each. There is, over the years an increase in consumption of HCFC-22, this is caused by its increased use as refrigerant for cold rooms.

DOMESTIC REFRIGERATION

The consumption of CFC-12 by the domestic refrigeration sub- sector is for initial charge and for recharging of: upright refrigerators, upright combined refrigerator-freezer units and chest freezers which are used in residential premises.

Domestic refrigerators were introduced in Kenya in the mid- to late - 1960's and that the life span of a refrigerator is about 15 years. The most popular size of refrigerator is 6 cubic feet capacity. However, the range is from 3 cubic feet (office type) to 16 cubic feet (family size, two-door refrigerator-freezer type). The chest freezers range in size from 12 cubic feet to 60 cubic feet. The number of domestic freezers is small compared to the number of refrigerators.

In Kenya some refrigerators are assembled by a small number of small- sized production plants estimated to be about 10 in 1989/90. At present there are 4 major assemblers of refrigerators and freezers in Kenya whose productions in 1991 are as follows:

TABLE 2.6 - PRODUCTION OF REFRIGERATORS AND FREEZERS

Firm	Annual Production (1991) No. of Units
Premier	5,000
Nairobi Afrigas	6,000
Sanyo-Armco	4,200
Kamco	800
<u>Total</u>	16,000

The only information available is for Premier that has produced 6,000 units in 1992. It has produced and sold about 15,000 units in the years 1990-92. Is estimated that Premier has about 30%-40% of the Kenya market for domestic refrigerators. Estimates have indicated that there is a total refrigerator population of 150,000 units in 1990 and that the growth rate is estimated at about 5,000 units per year or 5-6% per annum.

About 4,000 fully assembled and charged refrigerators are also imported per annum. Thus the total estimated number of refrigerators and chest freezers in Kenya at the end of 1992 was 190,652 units.

According to interviews, from 1996, most imported and locally assembled domestic refrigerators will probably use non ODS refrigerants, most likely HFC-134a. It is necessary to also look at the possibility of retrofitting refrigerators using CFC-12 and use drop in substitutes. This possibility will depend on the suitability of, drop in substitutes, CFC-12 refrigerator components to accommodate the operating characteristics of these substitutes.

COMMERCIAL AND RETAIL REFRIGERATION

This sub-sector covers food display cabinets, display chest freezers, large bottle coolers, ice makers, etc. used in hotels, institutions, butcheries, department stores, etc. The units usually have 0.5 kW compressors and CFC-11 blown polyurethane foam insulation, and all use CFC-12 as refrigerant.

It is estimated that in 1993, the base year, there were about 22,000 units in Kenya. Whereas there are imported units coming into the country, about 2,500 units are assembled locally with Premier Refrigeration and Engineering Company having the major share of 40% - 50%.

COLD STORAGE AND COLD ROOMS

This sub-sector covers facilities used for cold storage and freezing in the following industries; fish, meat processing industry, fruit juice industry, hotels, horticultural crops industry, fisheries and Butcheries, and Milk.

In 1993, the base year, there were about 8,470 cold rooms of various physical and refrigerating capacities using CFC-12 refrigerant and some 1,500 using HCFC-22. The cold rooms operating at very low temperatures are very few. Approximately 2,000 of the units are 14 or more years old.

The rapid expansion of the tourism industry, horticultural crops industry and the liberalization of the milk, fish and meat industries has resulted in a high growth rate in refrigeration requirements of about 10% per annum from 1990 to 1996.

The major contracting companies engaged in insulation and equipment fabrication, installation and maintenance of cold rooms in Kenya are; Hall Equatorial, Daikin Kenya, Refrigeration Contractors, Remco Ltd., Refrigeration Centre and Kooltech

Most major and small companies are based in Nairobi. However, with the expected growth in the coastal region as well as in the lake region some companies operating in these regions.

From 1990 onwards the majority of the new cold storage installations will use HCFC-22.

AIR CONDITIONING

Central air-conditioning plants are used in many hotels (a total of about 30 units), in some high rise office buildings (about 20-30 units) and hospitals. Window-mounted units are used in offices, hotels, hospitals and split units are used in hospitals, hotels, office, some factories and residential buildings.

All window-mounted and split units use HCFC-22. Most central air-conditioning plants use HCFC-22.

There are a few air-conditioning plants that use CFC-12, the exact number could not be ascertained. The units are generally older than 14 years (1993) and will be written off in the period 1995-2000 to be replaced with ones using ozone friendly alternatives.

Information provided by contractors indicate that there are about 4 to 6 centrifugal chillers operating on CFC-12, each containing about 500 kg of CFC-12. These chillers were installed in the period 1975-1985 and will therefore require CFC-12 for servicing for the next 2 to 12 years. The growth rate for this sub-sector is estimated at 30%.

MOBILE REFRIGERATION

This sub-sector covers refrigerated trucks, railway wagons and sea freight containers.

Trucks: In Kenya road transport of perishable goods (horticultural crops, meat, fish, etc.) is by insulated but unrefrigerated trucks. The insulation is mostly CFC-11 blown polyurethane or polystyrene boards while the cooling is by dry ice or ice blocks made in industrial and commercial refrigeration units. It is estimated that there are about 60 refrigerated trucks in use in Kenya in 1993 and all these units operate on CFC-12. Charging is about 8 kg per unit, with 15% per annum. of the fleet requiring recharge, and about 30% per annum. of the fleet requires topping up to 35% of the initial charge. Presently charging requires 3 times the amount of refrigerant required.

Railway Wagons: Railway wagons are used for transportation of perishable goods. Refrigeration is also required in restaurant cars. There are 34 to 40 such wagons operating with CFC-12 with an average charge of 7 kg per unit.

Sea Freight Containers: There are about 50 such containers using CFC-12, with an average charge of 12 kg per unit.

Table A-4 in Annex II gives the projected demand for CFC-12 in this sub-sector

MOBILE AIR-CONDITIONING (CARS)

The MAC sub-sector covers the air conditioning of passenger vehicles and coaches. Before 1987, MAC was insignificant, since then it has started to grow.

There are three vehicle assembly plants; General Motors, Associated Vehicle Assemblers and Kenya Vehicle Assemblers. These firms assemble about 6 international makes of vehicles.

TABLE 2.7 - PRESENT AND FORECAST NUMBER OF CARS IN KENYA

YEAR	NUMBER OF CARS	NUMBER WITH MAC
1986	100000	
1994	301672	16000
1995	325806	17200
1996	351870	18490
1997	380020	19877
1998	410422	21368
1999	443255	22970
2000	478716	24693
2005	703390	35450
2010	1033511	50893

All mobile air conditioners are use on CFC-12. The average charge is 1 kg per unit but due to poor charging systems, the actual quantity of CFC-12 used for recharge is about 2 kg per car. It is reported by the firms servicing mobile air conditioners that about 20% of air-conditioned cars are recharged per year.

An improvement in the charging systems will reduce the waste to about 10% from 1995. It is assumed that all major car manufacturers will stop using CFC-12 car air conditioners from 1996 onwards. The projected requirements to the year 2000 are about 37 Tonnes.

INDUSTRIAL REFRIGERATION

This sub-sector covers process industries such as breweries, beverages, plastics, etc. The total capacity is about 5,000 tones of refrigerants. These are HCFC-22 and ammonia. Leakage, compressor failure, etc. in the Industrial

The use of flammable cleaning agents such as alcohol, ketones and hydrocarbons will require investment in fire protection measures and solvent recovery and recycling equipment.

HALONS

Halon 1301 is still being used in fixed "total flooding systems". Halon 1211 is also still being used in portable rechargeable fire extinguishers, and in portable throw-away aerosol container types of extinguishers.

One method for phase-out of Halon 1301 is to freeze the number of installations at the present level. This requires publicity and education among potential users and designers not to specify Halon fire protection units.

Halon 1211 is mainly used in fire extinguishers for electrical equipment, oil industry and cars. Excessive availability of Halons is apparent in Kenya although substitutes are available. The Government shall discourage the use of Halon 1211 in new installations as there are more cost effective substitutes.

METHYL BROMIDE

AMIRAN KENYA LIMITED is the sole importer of methyl bromide. The quantities of methyl bromide imported into Kenya in relation to the accepted alternatives such as phosphine, basamid, furadan and nemacur are given below. The relatively large amounts of methyl bromide imported, because of its efficiency and relatively low cost, clearly demonstrates the role this chemical is playing in promoting agricultural growth in Kenya. This growth is estimated at 10-15 % per annum.

TABLE 2.8 - IMPORT OF METHYL BROMIDE AS COMPARED TO VIABLE ALTERNATIVES

YEAR	METHYL BROMIDE	PHOSPHINE	BASAMID	FURADAN	NEMACUR
1988	295	10.7	20.		10.
1989	360	6	104	55.0	0.
1990	340	11.6	107	7.0	5.7
1991	330	11.2	50.2	12.	0
1992	330	-	-	-	-
1993	330				-
TOTAL	1985	39.5	281.2	74	15.7

The main uses of methyl bromide is for soil fumigation for cut flowers where it is applied using the "hot dip method" that involves heating of the gas and injecting 96 gr. per square meter through drip irrigation tubing. After harvest 70 percent of the total cuttings produced are fumigated since phytosanitary certification for specific countries requires the treatment of the cuttings with methyl bromide prior to shipping.

All importation of agricultural produce destined for Kenya must be duly authorized by a plant inspector. When consignments arrive they must bear a phytosanitary certificate from the country of origin. Some ships are fumigated if they come from countries known to be infested with important pests.

The main consumption of methyl bromide has increased due to expansion of the horticultural industry.

2.4 FORECAST DEMAND

REFRIGERATION

The table below shows the projected consumption of CFC-11 and CFC-12 and the projected demand for these substances in Refrigeration and Air-conditioning

TABLE 2.9 - FORECAST CONSUMPTION OD ODS

ODS	1993		1994		1995		2005		2007	
CFC	11	12	11	12	11	12	11	12	11	12
TONNES	60	60	60	60	0.0	37	0.0	29.7	0.0	0.0

The projections are based on the following:

1. After 1990, refrigeration and air-conditioning sector will consume most of the CFC, with air-conditioning consuming most of HCFC-22 while refrigeration will consume most of the CFC-12.
2. Electrification of rural and urban areas will grow at the rate of 8-10% per annum, with demand as high as 15% per annum. This implies a refrigeration usage growth rate of 5% per annum.
3. Atmospheric emission of CFC and waste of as much as 3 times CFC as is charged into the units due to poor technical maintenance.
4. Many installations will be retrofitted using alternative substances.
5. About 40% of refrigerators are assembled locally.
6. Foreign companies whose refrigerators are marketed in Kenya have proper charging equipment available.
7. HFC-134a is presently available.
8. A properly used refrigerator has a life span of 15-20 years.
9. CFC-12 can be substituted with a drop in mixtures using most of existing equipment.
10. From 1995, only HFC-134a refrigerators and new compressors will be imported.
11. Most of the information and estimates is given by manufacturers, assemblers and retailers.

In 1993, it is assumed that 10% of all refrigerators will require recharging. Thereafter, the number of refrigerators requiring recharge will drop to 6% in 1995 and then to 5% from 1996.

In 1992-1995, 800 grams of CFC-12 will be used to charge a refrigerator. This rate will then drop as follows: 1996 - 225 grams, after 2000 - 200 grams. This reduction in the waste will be achieved by better management, training the refrigeration technicians and by publicity to the general public.

The number of CFC-12 domestic refrigerators in Kenya will increase at the rate of 5% per annum up to 1996. The number of CFC-12 refrigerators will then decline to 5% per annum due to obsolesce and replacement with non-CFC-12 refrigerators.

The data indicate that from 1997, most CFC-12 requirements for recharging domestic refrigerators may be available from CFC-12 recovered from old refrigerators provided that the cost of that substance rises substantially and regulations will be put in place so that imports or assembly of CFC-12 refrigerators will not be allowed from 1997 onwards.

Information available from many chemical manufacturers indicates that the availability of CFC-12 will decrease from 1994. It may therefore be necessary to stockpile to meet the needs of high cost refrigerants in Kenya.

Availability of CFC-12 for fresh charging and recharging from stocks existing in the country will become important from 1995. Consumption of CFC-12 in commercial and household refrigerators is assumed to be reduced by reducing the charging and recharging losses. This may be achieved by use of correctly sized fuses and voltage

stabilizers, trained personnel, proper charging equipment, availability of recovery, cleaning and recycling equipment etc. and ODS awareness. The total demand for CFC-12 will be the total for fresh charging and recharging.

About 4% of the units require total recharging every year due to compressor failure and/or leakage, while 25% of the existing units require topping up once or twice a year to the extent of 50% of the total charge, the total charge being about 250 gm. The total CFC-12 demand is 3.6 Tonnes in 1994.

The growth rate for the commercial and retail refrigeration is estimated to be about 20% per annum mainly due to the growth in the hotel and restaurant business, department stores, the horticultural industry, small scale producers of milk and milk products. Assuming the improvements in charging, protection of compressors, etc. will follow the same trend as for domestic refrigerator, the CFC-12 demand for the commercial and retail sector will be as shown on tables in Annex II.

Comparison of the total demand and the recoverable quantities of CFC-12 for the sub-sector indicates that the demand can be adequately met by the recoverable quantities from 1997 onwards. The safety margin will be provided by stocking CFC-12 in Kenya, the quantities involved being small. Recovery of CFC-12 from leaking units is obviously not possible.

For the cold storage facilities using CFC-12, the average charge is 6 kg per unit. However, the actual quantity used per charging or recharging operation is about 18 kg due to use of untrained technicians and improper charging systems. About 6% of the units require recharging every year. About 25% of all units require annual topping up to the tune of 35% of the initial charge.

In 1994 it is assumed that 70% of the 8,500 units will be operating on CFC-12, and that there will be no new CFC-12 installations from then, the demand quantities of CFC-12 are as shown in Table A-3 in Annex II.

The calculations for the CFC-12 demand from 1995 onwards and recovery from old plant indicates that the total demand is higher than the recovery for this sub-sector. The short-fall may be met from other sub-sectors with surplus CFC-12 or from stock-piled CFC-12. In the event of growth in CFC-12 plants falling below the 10% per annum, assumed for 1993 and 1994, there will still be a difference between the recovered amount and the demand in 1995 onwards and hence other sources of CFC-12 must be available for this sector.

In some countries the price of HFC-134a is even less than that of CFC-12. If the charge and recharge quantities are reduced from 1995 onwards regardless of the refrigerant used, the price of substituting CFC-12 by HFC-134a with changes in the system components and energy consumption may be less than that of retrofitting the CFC-12 to use HCFC-22. Substitution of a CFC-12 with one operating with HFC-134a maybe an economical solution to the phase-out problem for the Cold Storage Sub-sector.

Information obtained from major refrigeration contractors in Nairobi indicates that the majority of them are aware of the changes taking place in the refrigeration industry and they initiated familiarization and training, and cost implication analysis with their mother companies. This information will then be passed to the consumers.

The CFC-12 for centrifugal chillers is estimated to be 50 kg per unit per annum i.e. 300 kg. total per annum.

The annual requirement of CFC-12 for air-conditioning is very small compared to the servicing requirement of the other sub-sectors. Improved operating, servicing methods and training of technicians will substantially reduce this requirement.

In summary, the growth rate for the transport refrigeration sub-sector has been very low and is not expected to increase in the next 5 years. The number of refrigerated sea freight containers may increase but practically all the new units will be made outside Kenya and run on refrigerants other than CFC-12 (possibly HCFC-22 or HFC-134a).

It is assumed that all new transport refrigeration systems made in Kenya from 1993 onwards will operate on HCFC-22 or HFC-134a, and CFC-12 will only be required for servicing until the units are written off.

Improvement in charging systems and training of technicians will reduce the waste of CFC-12 from three times to 1.1 times the required amount of recharge from 1995.

All mobile air conditioners use CFC-12. The average charge is 1 kg per unit but due to poor charging systems, the actual quantity of CFC-12 used for recharge is about 2 kg per car. It is reported by the firms servicing mobile air conditioners that about 20% of air-conditioned cars are recharged per year.

An improvement in the charging systems will reduce the waste to about 10% from 1995. It is assumed that all major car manufacturers will stop using CFC-12 car air conditioners from 1996 onwards. The projected requirements to the year 2000 are about 37 Tonnes.

FOAMS

As at the date of the preparation of the present Country Programme, the following was observed. Findings from more detailed studies shall be reported.

CFC have been used as blowing agents for polystyrene, phenolic and polyurethane plastic foams.

POLYSTYRENE FOAM: By February 1993 most production of polystyrene foams using CFC was phased out.

POLYURETHANE FOAMS: Flexible Foams: As of 1991 major manufacturers of flexible foam switched to water and Methylene Chloride blowing. CFC-11 that was used for producing foams of densities about 10-15 kg/m³ was reduced.

- **DIRECTORATE OF OCCUPATIONAL HEALTH AND SAFETY SERVICES:**

It was created to take over the functions of the former Inspectorate of Factories. The Directorate is established under the Ministry of Labour by an Act of Parliament. The Directorate has offices in all provinces of Kenya and is manned by engineers, chemists, physicists, doctors, etc. The main functions are to implement and enforce the Factories Act, to inspect factories and other places of work to ensure the premises comply with the applicable laws and standards, to approve the design and installation of industrial projects, to advise the Government and industries on the best ways of storage and disposal of chemicals and safety of new technologies.

- **NATIONAL AGRICULTURAL RESEARCH LABORATORIES:**

Most phytosanitary inspections are concentrated at the Jomo Kenyatta International Airport where horticultural produce are air freighted, the port of Mombassa mainly imports into the country and exports grain. Officers of the National Agricultural Laboratories carry out inspections in Nairobi. While Chief Grader and Inspectors office in Mombassa deal with commodities entering through Kilindini harbour.

- **OTHER INSTITUTIONS IMPORTANT TO ODS PHASE OUT**

These institutions shall play an important part in the implementation of the proposed short-term and long-term training programmes for the refrigeration and air-conditioning sector.

- **KENYA ASSOCIATION OF MANUFACTURERS (KAM):**

Whose membership embraces all sectors of manufacturing and all sizes of firms. The officials of KAM are elected from among candidates whose firms are members of KAM. KAM has a secretariat in Nairobi. It also a monthly journal that may be used for disseminating information on trends in the refrigeration and air-conditioning industry.

- **KENYA NATIONAL CHAMBER OF COMMERCE AND INDUSTRY:**

The National Chamber of Commerce and Industry looks after the welfare of all sectors of business and therefore embraces many firms that will be affected by the changes caused by phasing out ODS.

- **INSTITUTION OF ENGINEERS OF KENYA (IEK) :**

IEK embraces all the engineering disciplines in Kenya. The major functions of IEK are the dissemination of information on projects, products, technical knowledge, training and professional standards, certification/Registration of professional engineers

- **SPECIAL INTEREST GROUPS**

These are major users of ODS who are: Fresh Horticultural Produce Exporters Association of Kenya, Kenya Association of Hotel Keepers and Caterers, Kenya Consumers Organization, Kenya Association for Refrigeration and Air-conditioning.

3.2 POLICY FRAMEWORK

Existing legislation related to licensing, control and standards for importation, local manufacture and use of chemicals and equipment must be modified in some cases for implementation of the phasing out of ODS. The relevant sections of legislation and their applications are as follows:

- (a) Customs and Excise Act shall be used to:
 - Restrict importation of ODS and equipment using ODS (restricted substances)
 - Keep proper records of chemical and/or trade names of ODS and other chemicals.

- Raise tariffs on ODS and ODS-use equipment as a disincentive for their importation.
 - Exempt from duty refrigerant recovery, recycle and charging equipment and voltage stabilizers.
- (b) The Kenya Bureau of Standards Act shall be used to:
- Improve quality control of imported and locally assembled refrigerators and refrigeration systems.
 - Restrict use of ODS in equipment.
- (c) The Occupational Health and Safety Act shall be used to:
- Regulate the quality of refrigeration installations by approval of design and regular inspection.
 - Licensing refrigeration inspectors as is done with boiler, compressed air, etc. inspectors.
 - Regulate use of fire fighting equipment and degreasing systems based on ODS.
 - Formulate codes of practice for industries using ODS.
- (d) The Ministry of Commerce and Industry in conjunction with other Government Ministries shall contribute to ODS phase-out by:
- Restricting the licensing of refrigeration contractors and service agents to trained and registered technicians.
 - Restrict the retail of ODS to registered suppliers and contractors and service agents only.

Apart from the above legislative acts, the Government of Kenya has already established in NES (and the ODS Committee) the Institutional Framework and the ODS office that will, with the NACODS, coordinate the above.

The various personnel, materials policies and modalities for the implementation of the phase-out programme and long term regulation of use of chemicals and equipment already exist and only need to be put into practice.

3.3 GOVERNMENT AND INDUSTRY RESPONSE TO THE PROTOCOL

• GOVERNMENT RESPONSE

The Government of Kenya, at the highest political level, has responded to the Montreal Protocol by being a signatory to the Protocol and ratifying it in 1988, and by participating in the deliberations at the various meetings. The Government has also contributed to two reports on the use and phase-out of ODS, the Regional Workshop for Africa held in December 1992 and the workshop on Refrigeration held in Nairobi in November 1993. It has undertaken to implement the recommendations on the phase-out programme via the NES and the ODS Committee that brings together representatives of various Government Departments and other interested parties. It is also going to impact legislation and regulations in support of the Action Plan presented in this document.

• INDUSTRY RESPONSE

Many of the retailers and users of domestic refrigerators and freezers and commercial and retail refrigerators maybe unaware of the Montreal Protocol and its implications enough to act. Although the large refrigeration and air-conditioning contractors are aware of the implications of the Montreal Protocol where they have already started to use HCFC-22 refrigerant and compressors as advised by their mother companies mostly multinational.

Refrigeration retailers and contractors are of the view that they will implement any recommendations as long as this does not adversely affect their share of business. Legislation is essential. The Government will enact legislation/regulations in support of the Action Plan given in this document..

Aerosol fillers have switched to the use of stench free hydrocarbon propellants.

Most foam blowing companies have converted to the use of non ODS substances in their operations for blowing polyurethane foam for insulation.

4. IMPLEMENTING PHASE OUT

4.1 STRATEGY STATEMENT BY THE GOVERNMENT

The Government strategy will generally be driven by the guidance contained in the 1993/1994 Seventh National Development Plan to use domestic resources as much as possible to meet its international obligations in the area of global environment protection. This will further be strengthened by the positive actions expected to be in the ongoing National Environmental Action Plan.

As far as ODS are concerned the Government will, if possible, avoid taking full advantage of the phase out grace period under the Montreal Protocol unless absolutely necessary as it is desirable to adopt ozone friendly technologies at this stage of Kenya's development. However, Kenya will also make use of financial and technological facilities under the Montreal Protocol in the phase out where alternative substitutes have been developed.

It has been noted that industry's reactions have been encouraging. Further encouragement will be given calling for prudence in certain areas where the use of ODS is necessary.

The strategy will be as following:

- Encourage industries to adopt technologies that require lowest net capital cost to them.
- Consider the life span of existing technologies in certain key sectors such as refrigeration and agriculture.
- Take appropriate fiscal and regulatory measures in meeting the phase out objectives.

In specific sectors, the Government shall do the following:

- Advise its departments to act on the phase out strategy while setting a Government National Ozone Coordinating Unit under the Institutional Strengthening Project.
- Immediately, all new installations must use alternative fire protection systems.
- In the short term, all present users and potential users of Halons shall be advised of the non production of Halons. Suggestion of retrofitting with alternatives whenever possible after consulting with essential uses boards.
- The use of alternatives for methyl bromide shall have to be very carefully evaluated. This is especially true because of its efficiency, price and the requirements countries importing horticultural products. However, the Government shall introduce methods of using methyl bromide in combination with other chemicals and encourage methods to reduce its emissions.

• PHASE OUT STRATEGY

The ODS phase-out strategy will take into consideration the adjustments to the Montreal Protocol, and shall phase out according to programmes that are technically and economically viable.

The Government shall do the following:

- Soonest, all new installations must use alternative fire protection systems
- In the short term, all existing users be advised on the unavailability of Halon from 1994. Use international Halon banks for essential recharge in the future.
- In the long term, all existing users be advised on the unavailability of Halon. Suggest retrofitting with alternative fire protection system whenever possible after consulting with essential uses boards.

• OBJECTIVES

The ODS phase-out action plan involves the following:

1. Update of ODS consumption in Kenya
2. Update of industrial set-up in Kenya
3. Identification of major areas of waste and remedial actions

4. Propose phase-out strategies, action plan and financial implications
5. Identification Country Programme Projects, Participants and their Roles
6. Propose funding arrangement
7. Provide background information for use in the implementation of the phase-out programme.

The phase-out strategy in refrigeration and air conditioning shall have the following refrigerant conservation aims:

1. Phase out ODS as soon as technically and economically possible
2. Reduce waste of refrigerants during charging
3. Protect existing CFC-12 systems from failure and/or leakage
4. Institute CFC-12 recovery and recycle programme
5. Create lasting improvement in manufacture, assembly, servicing and use of refrigeration equipment
6. Organize government and industry bodies to regulate activities in the refrigeration industry
7. Increase public awareness in environmental matters, the use of refrigeration systems etc.
8. Introduce acceptable substitutes for each sector

The approach shall take into consideration the prevailing state of the national economy. The phase out strategy should therefore start with remedies requiring the least financial implications while having a big impact on the use of CFC. In the long term, the phase out strategy shall introduce a refrigerant conservation programme.

The phase out strategy for methyl bromide will have a strategy that will start with remedies requiring the least financial implications while having a big impact on the use of that substance.

- **REFRIGERANT CHARGING**

The proper charging of refrigeration system will mean that existing systems will function properly with minimum leakage and at the optimum power consumption for a long time.

- **DOMESTIC REFRIGERATION**

Publicity campaigns and installation of proper protection of domestic refrigerator compressors should be the first priority action. Assuming that these remedial measures could reduce the number of refrigerators recharged per year from 8% to 2%, this could result in a decline of CFC-12 demand for recharge from 5.5 metric Tonnes (1992) to about 1.4 metric Tonnes per annum even with the existing recharge waste level of 3 times the optimum amount of CFC-12 required per charge. Improvement of charging techniques could reduce the waste to about 10%, thus reducing the demand for CFC-12 for recharge to about 0.55 metric Tonnes. The reduction of waste could also reduce the demand for CFC-12 for new charges from 3.6 metric Tonnes predicted for 1994 at current waste rate, to about 1.30 metric Tonnes. The total demand for CFC-12 for the sub-sector in 1995 could then be about 1.85 metric Tonnes.

New domestic appliances will be charged with HFC-134a. The small numbers of users who do not heed the call to install voltage fluctuation stabilizers, correctly sized fuses, eliminate vibration and correctly use refrigerators could be made to pay the higher price of recharging with either CFC-12 (recycled).

Gradual reduction of imports of CFC-12 and equipment using CFC may be extremely difficult to control. The other major reason for the early ban on CFC-12 imports is that the manufacturers of CFC-12 in Europe and North America, who are the traditional suppliers of CFC-12 to Kenya, have brought forward their national phase-out schedules and therefore the price of CFC-12, which will in the future be produced in very small quantities; may approach the price of HFC-134a, in which case market forces will force CFC-12 out of use in new and old refrigeration systems.

- **COMMERCIAL AND RETAIL REFRIGERATION**

The CFC-12 refrigerant conservation measures for domestic refrigeration will be applicable to the commercial and retail refrigeration sub-sector. Due to the poor training of operators, it is likely that about 4% of the units will require a full recharge per annum. However, the charging process can be improved to reduce waste to 10%. The total demand for CFC-12 would then be about 1.70 metric Tonnes for 1994.

- **COLD STORAGE AND COLD ROOMS**

The refrigeration equipment involved is stationary and can therefore benefit from the remedial measures applied to domestic and commercial sub-sectors. A reduction in the necessity for recharge and topping up and an improvement of the waste factor from 3 to 1.1 from 1994 would make a big difference because of the CFC-12 charging rate (about 6 kg per unit). The annual demand for CFC-12 for this sub-sector is 2.7 metric Tonnes in 1995, assuming a waste factor 1.1 and only 5% of the units requiring recharge.

This sub-sector has the highest demand for CFC-12 due to the large charging capacity required per unit. A major campaign to effect good house-keeping, better charging rates etc. will therefore reduce the national demand for CFC-12 by a big margin.

The demand for CFC-12 for this sub-sector will also be reduced through retrofitting and use of ODS substitutes.

- **TRANSPORT REFRIGERATION**

The waste of CFC in this sub-sector will be reduced once technicians are trained. ODS alternatives as well as retrofitting will be used.

- **COMFORT AIR-CONDITIONING**

Regardless of the refrigerant used this sub-sector will benefit from reduced waste of refrigerant during initial and subsequent charging operations.

4.2 ACTION PLAN

The action plan will follow the steps and strategy described in this document. The table below gives a summary of that Plan. The general policy adopted is based on the activities requiring low funding should be implemented first.

TABLE 4.1 - SUMMARY OF ACTIONS AND IMPLEMENTING BODIES

NUMBER	ACTION	STARTING DATE	IMPLEMENTING BODY
1	Publicity campaigns Full customs documentation	June 1994 to Dec. 1996	NES / ODS office Consumer Organizations Kenya Power and Lighting Co. Ltd.
2	Training for technicians in the refrigeration sector Registration and licensing of service agents and technicians Formulate codes of practice	January 1994 to December 1996	UNDP/Multilateral Fund Ministry of Research, Technical Training and Technology Tertiary Education Institutions
3	Installation of recovery and recycle equipment. Installation of appropriate charging systems	1994	Government of Kenya Assemblers, Retailers and Service Agents UNDP
4	Establishment of national bank for CFC- 12 and HCFC-22	1994	Assemblers and Contractors Chemical Importers

contd.

TABLE 4.1 CONTD. - SUMMARY OF ACTIONS AND IMPLEMENTING BODIES

NUMBER	ACTION	STARTING DATE	IMPLEMENTING BODY
5	Installation of compressor protection devices on domestic refrigerators (new and existing)	1995	General public Assemblers, Retailers and Service Agents Kenya Power and Lighting Company Limited
6	Legislation on the use of Methyl Bromide	1995	KARA Pesticides Control Board
7	Mandatory certification and registration of service technicians and agents	1995	Ministry of Research, Technical Training and Technology Directorate of Occupational Health and Safety Services
8	Full declaration of type, function, capacity, country of origin of refrigeration systems and chemicals Ban use of ODS in new equipment. Switch to HFC-134a for refrigeration Inspection of non-domestic refrigeration systems on CFC-12 and other coolants. Conversion of existing CFC-12 systems to non ODS, HCFC-22 or other products.	January 1996	Ministry of Commerce Ministry of Finance Customs Department
9	Ban use of CFC in new equipment in all sub-sectors	January 1996	Ministry of Commerce Ministry of Finance Customs Department, Refrigeration Assemblers and Contractors
10	Switch to alternatives of methyl bromide ‡ Please see note below	1996	Horticulturists

‡ Note. While plant materials leaving Kenya are inspected to meet the standards of the importing countries, it is equally important to protect the country from foreign pests. Inspection at all points of entry and exit and the enforcement of disaffectation by the most effective fumigant will continue to be an effective means of protecting Kenya from injurious pests. While Phosphine and methyl bromide have been the main fumigants for agricultural produce, there is evidence that resistance to Phosphine may be increasing on the Mombassa island. The alternative methyl bromide, though an ODS, will continue to be Kenya's main fumigant for agricultural produce.

The Government of Kenya understands that the question of funding for Methyl Bromide is under discussion by the Parties, however it will welcome technology for better management of this substance and its alternatives.

4.3 ROLES IN IMPLEMENTING THE STRATEGY

The National Environmental Secretariat (NES), under the Ministry of the Environment, shall be the organization that shall implement the Country Programme to Eliminate the consumption of ODS in Kenya.

A National Committee on ODS has been formed under NES. This committee serves to advise NES and the Government on ODS related matters, advise the Government on policy requirements, legislation, programmes of action, research, institutional strengthening and awareness campaigns. The ODS office will be under NES. The table on the following page outlines the Action Plan and the implementing bodies.

4.4 TIMETABLE AND CONSUMPTION IMPLICATIONS

The total CFC-12 consumption and projection are shown in Annex II

The data in the present Country Programme leads to the following major implications:

- It will be necessary for Kenya to stockpile CFC-12 if the world-wide phase-out of production is brought forward to 1995.
- The annual total recoverable CFC-12 cannot on its own justify the cost of installing and operating a recovery and recycle programme. The justification must therefore be due to environmental considerations, management and technology transfer for recovery and recycle of other refrigerants.

4.5 BUDGET AND FINANCING PROGRAMME

The following is the budget and financing programme required for phasing out ODS in Kenya. The table includes the proposed projects that are part of the Action Plan.

TECHNICAL ASSISTANCE AND TECHNOLOGY TRANSFER

The components of technical assistance and technology transfer are identified as:

- Recovery, Recycle and Charge Equipment
- Training
- Codes of Practice

INCREMENTAL COSTS

Incremental costs may be incurred by:

- Government of Kenya
- Refrigerator Assemblers and Servicing Agents
- Refrigeration Contractors
- Users (consumers)

a) Government of Kenya Costs

The incremental costs incurred by the Government Departments include:

- Specific Customs declaration forms and inspection to Monitor Imports/Exports of ODS as pure chemicals and as mixtures
- Certification and Registration
- Institutional strengthening (NES, Directorate of Occupational Health and Safety, etc.)
- Training
- Directly as a consumer

b) Refrigerator Assemblers and Servicing Agents Costs

The additional costs incurred are by way of:

- Assembly plant modifications
- Charge, Recovery and Recycle Equipment
- Certification and Registration
- Training
- Operation costs: raw materials, energy, housekeeping etc.

Cost of charge and recovery and recycle equipment may be financed through soft loans and from the Multilateral Fund.

The cost of certification and registration is very small.

The cost of training is funded through the Multilateral Fund.

c) Refrigeration Contractors Costs

The additional costs are of the same type and magnitude of those of Refrigerator Assemblers and Service Agents. The major refrigeration contractors were aware of the implications of the Montreal Protocol and have already taken steps in association with their mother companies to change to the new refrigerants.

d) Methyl Bromide

Although Methyl Bromide is not currently a controlled substance, the Government includes this section as farmers assert that the level of control of pests by the best alternatives such as Dazomet is unacceptable both in terms of disease control and if forced to switch to alternatives there would be direct losses in production plus the incremental costs will be:-

- Initial investment in new equipment especially for steam,
- purchase of taps
- Additional fuel costs
- maintenance costs of the steam generators

In the absence of a world standard for treatment of cuttings there will have to be thorough exchange of information between importers for alternatives and emission mitigation measures

e) Halons

Since the cost for recharging Halon equipment in the future will be higher, the earlier the new installations are stopped the following actions will be taken:-

- Stop new fixed Halon 1301 installations as soon as possible
- Encourage use of CO₂ or powder extinguishers instead of Halon 1211 rechargeable units
- Cease the production and importation of aerosol extinguishers containing Halon 1211.

f) Summary

In summary it has been proposed that for a policy that recognizes that it is not possible to monitor widespread minor uses countrywide, for Halon, CFC-12 and 11, methyl chloroform, carbon tetrachloride and methyl bromide, it is not realistic to have significant reductions in 1994 and early 1995. It is expected that after all programs are in place legally expected changes will occur in 1996.

Accordingly the amounts reduced until phase out in the year 2007 for these compounds are as given in the table below.

TABLE 4.2 - REDUCTION SCHEDULE FOR HALONS , METHYL BROMIDE AND CARBON TETRACHLORIDE.

Year	Halons	Methyl Bromide	Carbon Tetrachloride
1994	4.0	330	60
1995	4.0	330	30
1996	3.0	330	-
1997	3.0	250	
1998	2.0	250	
1999	2.0	200	
2000	-	200	
2001		150	
2002		150	
2003		150	
2004		80	

f) Consumer Costs

The costs incurred directly by the final consumer are:

- forced early retirement of refrigerators
- protection of compressors against voltage fluctuations.
- extra price of buying CFC-free refrigerators
- higher energy consumption

The costs incurred indirectly by the final user result from higher prices of consumer goods, hospital fees, school fees etc.

The modalities of compensating the consumer for the incremental costs would be too complex to implement.

However, it is considered that the consumer benefits from the CFC phase-out programme as a result of:

- improvement of the global environment
- improvement in quality of refrigerators, servicing etc.
- reduced frequency of refrigerator breakdown and cost of repairs/replacement
- consumer education
- consumer protection

It is proposed that the implementation budget and funding be distributed as shown below. This distribution takes into consideration the following factors:

- Ability of an organization to implement/execute a recommendation.
- Ability of an organization to fund a recommendation.
- Necessity of sharing responsibilities between the Government of Kenya, International Organizations, other Governments, Industry and end-users.
- Transfer of management skills and technology and global concern for the environment.

A summary of the proposed projects in order of their priority to the Government of Kenya and the desired implementing agency and funding source is provided below. It may be noted that for some projects only project preparation costs are indicated. The cost of implementation of these projects would be known only after completion of project preparation. Hence the cost of implementing the activities listed could exceed the amount of US \$ 1,169,157 indicated in the following table.

TABLE 4.3 - IMPLEMENTATION PROJECTS IN ORDER OF THEIR PRIORITY TO THE GOVERNMENT OF KENYA

DURATION	PROJECT	ESTIMATED COST IN US \$	IMPLEMENTING AGENCY	REMARKS
1994-1998	Institutional Strengthening for the Phase out of ODS	175,000	UNDP	Approved by Exec. Committee Mar 93 Project to start in July 1994
1995-96	Methyl Bromide Demonstration and Training Workshop	200,000	UNEP	Cost to Multilateral Fund to be cofunded by Government
1993	Demonstration and Training Unit for maintenance and recharge in the refrigeration sector	9,850	UNEP	Approved by Exec. Committee June 91 Demonstration Project Completed
1994-97	Running costs for Training Unit for maintenance, recovery recycling and recharge in the refrigeration sector	17,000	UNEP	Cost to Multilateral Fund
1994-97	CFC Phase out in Kenya for 3 companies	380,875	UNIDO	Approved by Exec. Committee Nov. 93 Awaiting letters of agreement
1993	Support to a National Workshop on Refrigeration	115,000	UNEP	Approved by Exec. Committee Mar. 93 Completed
1994	Halons Bank and Project Identification	30,000	UNDP	Project Preparation
1994-96	National Demonstration Center Programme (NRDC)	91,432	UNEP	May be cofinanced by Industry, Government of Kenya, Chemical Suppliers
1994-95	Solvents - Workshops, Hotels and Dry Cleaners	30,000	UNDP	Some phase out completed after ratification. Cost of project preparation, Incremental cost to be prorated for Multinational companies
1994-95	Cold storage rooms - Industry, Hotels and other units	30,000	UNDP	Some phase out completed after ratification. Cost of project preparation, Incremental cost to be prorated for Multinational companies
1994-95	Foams - Project identification	30,000	UNDP	Project Preparation
1995	National Workshop on Monitoring and Control of ODS Consumption	40,000	UNEP	Project Preparation
	TOTAL	1,169,157		

4.6 MONITORING ARRANGEMENTS

The ODS Committee serviced under the ODS Office under NES will be the lead agencies in implementing and monitoring the various regulatory measures. NES will be giving recommendations to the following Ministries and Government bodies:

- Ministry of Finance (Customs and Excise Department)
- Ministry of Labour (Directorate of Occupational Health and Safety Services)
- Ministry of Agriculture
- Ministry of Works
- Ministry of Commerce and Industry (Kenya Bureau of Standards, Trade Licensing Department)
- Ministry of Technical Training and Applied Technology
- Ministry of Foreign Affairs and International Cooperation

The resource requirements for monitoring activities are covered by the cost of institutional strengthening. For some of the Government bodies and the other relevant organizations, there will be no need for extra resources, except the technical assistance required for publicity campaigns. These costs will be met under the ODS office.

The ODS office under NES will also coordinate the monitoring activities, and regularly report to the Montreal Protocol Secretariat.

4.7 PROJECTS

The list of proposed projects is given above. These are presented in their order of priority to the Government. Details are included in Annex I:

1. Institutional Strengthening for the Phase out of ODS
2. Substitution of Methyl Bromide Training Workshop
3. Demonstration and Training Unit for maintenance and recharge in the refrigeration sector
4. Running costs for Training Unit for maintenance, recovery recycling and recharge in the refrigeration sector
5. CFC Phase out in Kenya for 3 companies
6. Support to a National Workshop on Refrigeration
7. Halons Bank and Project Identification
8. Refrigeration, Demonstration Conservation Center Programme (NRDC)
9. Solvents - Workshops, Hotels and Dry Cleaners: Cost or a % of cost if Multinational Organizations
10. Cold storage rooms - Industry, Hotels and other units :Costs or % of Costs if Multinational
11. Foams - Project preparation
12. National Workshop on Monitoring and Control of ODS Consumption

ANNEX I

PROJECTS

PROJECT PROPOSAL:**PROJECT TITLE:****SECTOR COVERED:****ODS CONSUMPTION IN SECTOR:****PROJECT DURATION: 3 Years****PROJECT IMPACT :****TOTAL INCREMENTAL COST (US \$) :****IMPLEMENTING AGENCY:****NATIONAL IMPLEMENTING AGENCY:****PROJECT NUMBER : I****Institutional Strengthening for the Phase out of Ozone
Depleting Substances under the Montreal Protocol****Environment: Policies, Planning and Legislation****TONNES****ODP TONNES****ODS PHASE-OUT/YEAR****OTHERS****175,000****UNDP****National Environment Secretariat**

PROJECT DESCRIPTION:

Due to the lack of an institutional mechanism to respond to the amended Montreal Protocol, an Ozone Office has been established by the Government of Kenya in December 1992. Additionally, a National subcommittee on Ozone Depleting Substances (NACODS), has been established. This is a technical inter ministerial sub-committee whose function is to formulate strategies and prepare and evaluate periodic action programmes for phasing out ODS. The Ozone Office together with NACODS will enhance the capabilities of the Government of Kenya to industrially implement the provisions of the Montreal Protocol in Kenya.

Sector Data: The 1993 import of Ozone Depleting Substances is as following:

Substance	Tonnes	ODP Tonnes
CFC-11	6	6
CFC-12	41	41
Halon-1211	3.5	10.5
Halon-1301	0.5	5
CTC (CCl ₄)	60	66
HCFC-22	70	3.5
MB (CH ₃ Br)	330	231
TOTAL	511	363

Project description:

The National Environment Secretariat (NES) is the Government body responsible for liaising with national and international bodies on environmental matters. The establishment of the National Committee on ODS and the Ozone Office will provide a dedicated institutional infrastructure for carrying out these roles and ensuring informed and effective implementation of actions to phase out the ODS in Kenya.

The functions of NACODS will include the formulation of action programmes for the phase out of the ODS, review progress of their implementation and advise the Government through NES.

The functions of the ODS Office include the following:

- to act as secretariat for the National Sub-Committee on ODS;
- to coordinate and facilitate activities related to the phase out of the ODS;
- to monitor activities related to ODS use in Kenya and advise on Kenya's compliance with the Montreal Protocol;
- to collect, collate, analyze and disseminate information on the Ozone problem and related issues;
- to facilitate exchange of information with other Parties and organs established by the Montreal Protocol;
- to facilitate access of local entrepreneurs to relevant information, particularly the OzoneAction computerized information system, to relevant experts, specialists and technology transfer, and
- to participate in relevant meetings on the Ozone issue.

Project time frame:

The start-up date is expected to be July 1994 and will be completed by July 1997.

Impacts:

Although the project does not lead to direct elimination of ODS, it will provide the means for achieving an expeditious ODS phase out process in Kenya.

Total incremental cost:

All project costs are incremental costs to be provided by the Multilateral Fund. The cost elements are presented below.

One-time set-up costs in US \$

Equipment: 15,000

-microcomputer

-accessories

-printer

-modem

-software

-Voltage stabilizer (UPS)

-Telephone

-Photocopier

-Fax machine.

	1994 US\$	1995 US\$	1996 US\$	1997 US\$	total for 3 years
Staff requirement					
One coordinator	6,000	12,000	12,000	6,000	36,000
One professional Staff	4,245	8,490	8,490	4,245	25,470
Operational Costs (Including Clearinghouse functions, organization of NACODS, task groups, Public awareness programmes, etc.)	13,755	27,510	27,510	13,755	82,530
TOTAL	24,000	48,000	48,000	24,000	144,000
Contingency	2,667	5,333	5,333	2,667	16,000
Total Estimate	34,167	53,333	53,333	34,167	175,000

ANNEX II

Table A-1 Summary of Problems, Remedies and Target Groups for Improvement of Use of Domestic Refrigerators

Problem	Remedy	Target Group(s)	Implementation Period
Compressor failure due to voltage fluctuations	a. Correctly sized fuses b. Voltage stabilizers	a. Users and general public b. Consumer organizations and Special interest groups. c. Retailers d. Servicing agents and technicians	Immediately (1994) continuous
Punctured evaporators and other mishandling	a. Publicity and education b. Training of technicians c. Strict standards by Industry and Government control	a. Users and general public b. Consumer organizations c. Government Boards e.g. KBC d. Retailers e. Assemblers	Immediately (1994) Continuous
Repair by unqualified technicians	a. Training technicians b. Registration and certification c. Formation of Association for Refrigeration d. Legislation e. Publicity and education	a. Users and general public b. Government Registration Board	Immediately (1993) Continuous
Malfunctioning and sub-standard components Vibration-induced failure	a. Strict standards by Industry and Government control b. Quality control c. Training	a. Assemblers b. Servicing agents and technicians c. Retailers d. Kenya Bureau of Standards	Immediately (1994) Continuous

Table A-2 Projection for Demand for CFC-12 Refrigerators and Refrigerants

Year	No. of CFC-12 Refrigerators	CFC-12 in Refrigerators Tonnes	CFC-12 for New Charge Tonnes per year.	CFC-12 for Recharge Tonnes per year.	CFC-12 Annual Demand Tonnes per year.
1992	190,652	22.9	5.8	5.5	11.3
1993	200,185	24.1	3.4	5.8	9.2
1994	210,194	25.3	1.8	0.76	2.56
1995	220,704	26.5	1.35	0.59	1.94
1996	231,739	27.8	1.5	0.60	2.10
1997	220,152	26.4	---	0.58	0.58
1998	209,144	25.1	---	0.55	0.55
1999	198,687	23.8	---	0.53	0.53
2000	188,753	22.7	---	0.50	0.50
2002	170,349	20.5	---	0.45	0.45
2005	146,052	17.5	---	0.39	0.39

Table A-3 Projections for CFC-12 demand for the Cold Storage and Cold rooms

Year	No. of CFC-12 Cold Rooms	CFC-12 in Operating Systems Tonnes	CFC-12 for New Charge Tonnes per year.	CFC-12 For Recharging & Topping-up Tonnes per year.	CFC-12 Total Demand Tonnes per year.
1992	7,000	42.0	11.7	19.8	31.5
1993	7,700	46.2	12.6	21.8	34.4
1994	8,470	50.8	13.9	24.0	37.9
1995	8,047	48.3	---	2.7	2.7
1996	7,644	45.9	---	2.5	2.5
1997	7,262	43.6	---	2.4	2.4
1998	6,899	41.4	---	2.3	2.3
1999	6,554	39.3	---	2.2	2.2
2000	6,226	37.4	---	2.1	2.1
2001	5,915	35.5	---	2.0	2.0
2002	5,619	33.7	---	1.9	1.9
2003	5,338	32.0	---	1.8	1.8
2004	5,071	30.4	---	1.7	1.7
2005	4,818	28.9	---	1.6	1.6

- From 1995, all new cold rooms will use HCFC-22 or HFC-134a.
- From 1995, 5% per annum of all CFC-12 cold room refrigeration systems will be written off as obsolete and the cold rooms retrofitted with complete systems will operate with HCFC-22 or HFC-134a.
- Better management, charging and recharging facilities and technicians will reduce waste so that the quantity of CFC-12 required per charge or recharge or topping up operation is reduced.
- It is assumed that only 5% of all CFC-12 systems will require recharge or topping up from 1996.

Table A-4 Projected CFC-12 Demand in Transport Refrigeration

Year	CFC-12 in Operating Systems Tonnes	CFC-12 for New Charge Tonnes per year.	CFC-12 Recharge Tonnes per year.	CFC-12 Total Demand Tonnes per year.
1992	1.24	---	0.95	0.95
1993	1.24	---	0.95	0.95
1994	1.24	---	0.95	0.95
1995	1.18	---	0.35	0.35
1996	1.12	---	0.35	0.35
1997	1.06	---	0.35	0.35
1998	1.01	---	0.35	0.35
1999	0.96	---	0.35	0.35
2000	0.91	---	0.35	0.35
2001	0.87	---	0.35	0.35
2002	0.82	---	0.35	0.35
2003	0.78	---	0.35	0.35
2004	0.74	---	0.35	0.35
2005	0.71	---	0.35	0.35