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

Tenth Meeting
Montreal, 28–30 June 1993

COUNTRY PROGRAMME: CAMEROON

This document consists of:

- (a) Country Programme Evaluation Sheet (prepared by the Fund Secretariat)
- (b) Country Programme Cover Sheet (prepared by the Fund Secretariat)
- (c) Transmittal Letter from Government of Cameroon
- (d) The Country Programme

CAMEROON COUNTRY PROGRAMME EVALUATION SHEET

The Cameroon Country Programme is submitted to the Tenth Meeting of the Executive Committee as document UNEP/OzL.Pro/ExCom/10/20. The document is consistent with the format provided in the "Procedures for Presentation of Country Programmes and Project Proposals to the Executive Committee (UNEP/OzL.Pro/ExCom/5/16).

It consists of:

- Letter of Transmittal
- Country Programme Cover Sheet (Prepared by the Secretariat)
- Executive Summary
- Introduction
- Current Situation, which includes the description of:
 - Current Consumption
 - Forecast consumption
 - Industry Structure
 - Institutional and Policy Framework
- Implementing Phase-Out, which includes the description of:
 - Strategy Statement by Government, action plan, planned government measures and a summary of projects for carrying out the action plan
- Annexes, which include the following:
 - FAEM Technology conversion project
 - Ozone Monitoring Commission project
 - Training in the refrigeration and air conditioning sector
 - Technical assistance in the Customs Department
 - Cost of Country Programme.

Cameroon imports all its requirements of ODS. The total consumption of ODS as reflected by the import figures for 1991 was 101.8 ODP tonnes. This was made up mainly of 20.8 ODP tonnes of CFC-11, 43.8 ODP tonnes of CFC-12, 21.1 ODP tonnes of methyl chloroform (1.1.1-trichloroethane) and 15 ODP tonnes of Halon (6 ODP tonnes Halon 1211 and 9 ODP tonnes Halon 1301). The main sources of ODS for Cameroon are countries of the European Community. The unconstrained demand in the year 2010 is expected to be 253 ODP tonnes.

The main user sector is domestic refrigeration which accounted for 42.8 ODP tonnes (about 41%) of the total consumption in 1991. On account of Government's rural electrification programme, accelerated increase in the demand for refrigerators and freezers and hence increase in the consumption of ODS in this sector is forecast. Cameroon has one major refrigeration manufacturing company which accounts for 60% of the market for refrigerators and freezers. The refrigerator and freezer market was 16,700 units in 1992 and was expected to rise to about 21,000 units in 1993. The refrigerator manufacturing company also exports to five neighbouring countries of the Central African Customs and Economic Union (UDEAC) with estimated combined demand of 100,000 units per year, 50% of which the company hopes to meet.

There is one major and three small foam factories which have progressively converted to methylene chloride as a substitute blowing agent.

The aerosol sector has also completely replaced CFC-12 by hydrocarbon as propellants.

The government's strategy for the phase-out of ODS envisages the use of market mechanism and control measures which involves introduction of appropriate licences, taxes and duties, incentives and penalties.

Four projects have been proposed to be undertaken from 1993-1996 to phase-out the ODS in Cameroon. These include one investment project in refrigeration manufacturing, two training and one institutional strengthening projects. These are described in the annexes attached to the Country Programme. US \$30,000 is requested for the development of the investment project in refrigeration. The implementing agency selected for the projects is UNEP.

Comments

Activities for which request is being made for funding approval are the following:

1. Project preparation assistance for conversion to non-ODS technology in the manufacture of domestic refrigerators and freezers at Household Appliances and Airconditioning Co (FAEM)	US \$30,000
2. Ozone Monitoring Commission (CNBO) project (Institutional strengthening)	201,300
3. Training in the refrigeration and air conditioning sector	138,500
4. Technical assistance to Customs Officers	20,200
	TOTAL 390,000

1. **Project preparation assistance for FAEM technology conversion project (US \$30,000)**

- Given that only one major project in one sector is envisaged, the amount requested for the project preparation assistance (US \$30,000) is high.
- The selection of UNEP as implementing agency for the investment project may conflict with UNEP's terms of reference under its agreement with the Executive Committee and the Terms of Reference of the Multilateral Fund.

2. **Ozone Monitoring Commission (CNBO) Project (institutional strengthening) (US \$201,300)**

- Taking account of the fact that the main activity of the Commission will be concentrated in one sector which involves one main and dominant private sector company, the amount of US \$201,300 requested is high.

- The budget estimates do not provide a breakdown to allow for evaluation. However, the number of staff (two professional and 4 supporting staff) listed is high considering the expected scope of work.

3. Training in the refrigeration sector (US \$138,500)

- Information provided does not facilitate the evaluation of the project costs.
- In view of the dominant role of FAEM in the refrigeration sector, the training activities should be related to the FAEM project to ensure co-ordination with the informal sector and cost-effectiveness.

4. Technical assistance in the Customs Department (US \$20,200)

- In view of Cameroon's position in the Central African Customs Union and the potential for non-intended use through reexport to neighbouring countries, such training could be considered as essential.

Recommendations

- To approve the Cameroon Country Programme. The approval does not denote approval of projects included within it and their corresponding funding levels.
- To request the Government of Cameroon to submit a detailed proposal for institutional strengthening to the next meeting of the Executive Committee.
- To approve the amount of US \$20,200 for the training of customs officers. The activity is to be included as amendment to UNEP's Work Programme.
- To draw the attention of the Government of Cameroon to the selection of UNEP as the implementing agency for the project preparation assistance and the subsequent investment project and the problems that this could pose to the implementation of the project.

COUNTRY PROGRAMME COVER SHEET

Country : Cameroon

Date Received : May 1993

Period Covered : 1993-1998

Lead National Agency : Ministry of Environment and Forests

Lead Implementing Agency : UNEP

1. Phase-out schedule

Substances	Current Consumption (Tonnes X ODP) in 1991	Planned Consumption till Phase-out Tonnes X ODP	Planned Year of Phase-out
CFC-11	20.8	331.0	1998
CFC-12	43.8		
CFC-115	1.9		
Halon-1211	6.0	72.0	1998
Halon-1301	9.0		
Carbon Tetrachloride	21.2	90.0	1998
Methyl Chloroform	1.1	4.0	1996
TOTAL	103.8	497.0	

2. Government Action Plan

The main elements of the Action Plan to be carried out between 1993 and 1996 are:

Creation of an Ozone Monitoring Commission
 Establishment of Montreal Protocol implementation network
 Dissemination of Information
 Enactment of regulations and legislation.

3. Project Summary

Year(s)	Type of Project	Project Description	Project Cost US\$	Incremental Cost US\$	Implementing Agency	Tonnes X ODP to be Phased Out
1993-1996	Institutional Strengthening	Ozone Monitoring Commission	201,300	201,300	UNEP	-
1993	Project Preparation	Elaboration and technical assistance to the Refrigeration Sector in the preparation of investment project	30,000	30,000	UNEP	-
1993-1996	Refrigeration	Technology conversion project	3,150,258	3,150,258	UNEP	8.5 CFC-12/yr 45.6 CFC-11/yr*
1993-1996	Refrigeration	Training of maintenance technicians	138,500	138,500	UNEP	-
1994	All	Training of maintenance technicians	20,200	20,200	UNEP	-

* Seems to be overestimated.

4.	Cost of Activities and Projects in Country Programme	US \$ 3,540,258
	Estimated cost of complete phase-out	3,540,258
	Estimated cost effectiveness	3,807 per tonne X ODP 3.8/kg

**Ministry of the Environment
and Forests**

**Republic of Cameroon
Peace-Labour-Homeland**

CAMEROON

**Country Programme for the Implementation
of the Montreal Protocol**

May 1993

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EXECUTIVE SUMMARY

INTRODUCTION

- ES.1 The Montreal Protocol is an agreement ratified by over 70 countries worldwide to reduce the emissions of Ozone Depleting Substances (ODSs) through regulation of consumption. Under the Montreal Protocol (MP), the participating developed countries have established the Interim Multilateral Fund, which has now become the Multilateral Fund. The Multilateral Fund is to help qualified developing countries with technical and financial assistance to meet their obligations under the MP agreement. At the request of the Government Cameroon, the United Nations Environment Programme, Industry and Environment Programme Activity Centre, (UNEP IE / PAC), assisted a team from Cameroon in the preparation of the Country Programme, a requisite document for assistance from the Multilateral Fund.
- ES.2 The Republic of Cameroon ratified the Vienna Convention and the Montreal Protocol. These instruments of ratification were received by the Montreal Protocol on 30 August 1989. Thus entry into force of the Convention and the Protocol was on 28 November 1989. The London Amendments were also ratified by the Republic of Cameroon. These were received on 8 June 1992. Entry into force of these amendments was on 6 September 1992.
- ES.3. The consumption of Ozone Depleting Substances (ODS) in 1991 is 103.8 ODP tonnes or 0.0087 kg per capita. The country thus qualifies under Paragraph 1. of Article 5 of the Protocol for a ten year delay in the phase-out of ODSs and qualifies for assistance from the Multilateral Fund in accomplishing the phase-out.

METHODOLOGY

- ES.4 The methodology for the preparation of the Country Programme for the Republic of Cameroon involved, in 1992, a data collection and analysis mission by a UNEP consultant to the country. During this mission, an inter ministerial team was formed. Presentations were made by the UNEP Consultant to the team and other interested parties explaining the role of the Ozone layer, what Ozone Depleting Substances (ODS) were, the chemical action of depletion of Ozone and how to develop a Country Programme, as required by the Multilateral Fund of the Montreal Protocol. Data on the supply and demand for ODSs was collected; the institutional and policy framework was researched with industry and government officials. ODS phase-out problems and plans were discussed with the members of the team; and the availability of ODS substitutes was investigated. A set of projects that may qualify for Multilateral Fund grants was discussed. Prefeasibility studies for these projects were left to the team to prepare and cost. A set of ODS phase out scenarios that spanned a full range of probable activities was also discussed. The optimum scenario was selected by the team before a second visit by the consultant. The information gathered was used as a foundation for a phase-out strategy for the Republic of Cameroon. An action plan to accomplish the strategy was also studied.

ODS CONSUMPTION IN THE REPUBLIC OF CAMEROON

- ES.5 The Republic of Cameroon does not produce ODS. The total ODS consumption is estimated to ODS in the country. The demand is in the industries that manufacture and service domestic refrigerators, the be 284.1 tonnes, equivalent to 103.8 ODP tonnes in 1991. However, there are numerous users of foam industry, and solvents. Some fire extinguishing equipment in the country uses ODSs.

CURRENT DEMAND OF ODS

- ES.6 The Government of the Republic of Cameroon uses the Brussels Harmonized Classification System for chemicals that are imported into the country. The Customs Department has difficulty in identifying the individual controlled chemicals as defined by the Montreal Protocol. Therefore, the team had to consult with the importers to build its data on consumption.
- ES.7 The Montreal Protocol defines Consumption of Controlled Substances as Production plus Imports minus Exports. The Montreal Protocol also defines "controlled substance" see UNEP/Ozl.Pro.1/5. In conformity with these definitions, in 1991, the ODS consumption in the Republic of Cameroon is 103.8 ODP tonnes. The consumption in 1991 is 0.0087 kg per capita.

FORECAST DEMAND FOR ODS BY SECTOR

- ES.8 The forecasts presented in this section are based on the assumption that the Montreal Protocol does not exist, that there are no supply constraints and therefore define demand with no substitution. They do not take into account any possible product development or other changes in manufacturing practices as a result of normal progress. These unconstrained demand projections are the starting point for determining the demand for substitutes.
- ES.9 The overall unconstrained ODS consumption is projected from 103.8 ODP tonnes in 1991 to 252 ODP tonnes in 2010.

UNDERLYING GROWTH ASSUMPTIONS

- ES.10 In making these projections, the following were taken into account:
- * The opinion of industry leaders about the growth of production and its forecast.
 - * Population: The 1989 census shows a population of 12 Million. The Government is forecasting this to grow at 3.5% per year to the year 2010.
 - * GDP is assumed to grow at an average rate of 0.5-1.0 % per year for the next 19 years.

REFRIGERATORS AND FOAM INDUSTRY

- ES.11 The largest use of ODSs in Cameroon is in the Refrigerator and Foam sectors. According to the refrigeration industry, production would grow at the rate of 25% in 1993, 20% in 1994, 15% in 1995, 10% in 1996 and at a rate of 3 % to the year 2010. This growth corresponds to the present rural electrification growth programme. SONEC, the national electricity utility, is presently in the midst of a major programme. It is estimated that many rural villages are waiting for electricity to be connected for them to purchase a refrigerator. The growth in foam production is estimated at 3.5% per year, which corresponds to the projected population growth.
- ES.12 There are about 300,000 refrigerators in use in 1991 in Cameroon. The average life of a refrigerator is 16 years. The average life of a freezer is 14 years. On the basis of the estimated population growth rate this will rise to 643,000 refrigerator and freezer units in the year 2000 and 865,000 in the year 2010. The average family size is 5 in Cameroon.

SUMMARY OF GROWTH AND OTHER ASSUMPTIONS

ES.13 The following table gives a summary of the assumptions used for calculating forecast values in the present document.

Household appliances sales growth rate	3 %	1992-2010
Population growth rate	3,5 %	1992-2010
GDP growth rate	0,5-1,0 %	1992-2010
Number of refrigerators in use in the Country	301,270	1992
Number of freezers functioning in the Country	271,000	1992
Refrigerator average life span	8	years
Freezers average life span:	6	years
Number of formal maintenance workshops	130	1992
Number of informal maintenance workshops	130	1992
Solvents consumption growth rate	3 5%	1993-2010
Halon consumption growth rate	3,5	1993-2010
CFC consumption for the repair of one unit	1 kg	CFC-12
SONEL clientele growth rate	25-10%	1993-1996%

NET INCREMENTAL COST TO CAMEROON ECONOMY AS A CONSEQUENCE OF MONTREAL PROTOCOL

ES.14 The net incremental economic cost to the Republic of Cameroon for forced phase-out of ODSs is approximately 13 Million US \$ (1991) using a 10 % discount rate.

ES.15 The primary conclusion drawn from this analysis is that a prompt ODS phase-out will be beneficial to the protection of the Ozone layer. The determination of reimbursement of costs for financing the projects proposed in this country programme is an issue for the Multilateral Fund Executive Committee to decide in accordance with the set criteria of the Montreal Protocol.

ES.16 In order of importance to the economy of Cameroon, the following conclusions were also reached:

- 1) The most significant net incremental costs to Cameroon are those associated with the potential forced early replacement of domestic refrigerators when virgin CFCs will no longer be available for recharge. It is to be noted that replacement costs only apply to those refrigerators that would not be able to find CFC-12 for recharge. An early transition to refrigerant HFC-134a for domestic refrigerators will reduce the population of CFC-12 refrigerators in 2010, and hence reduce early replacement costs. The average age of the CFC-12 refrigerator population in 2010

was also a factor. In the absence of recycling of CFC-12 refrigerant, the average age of CFC-12 refrigerators is substantially decreased.

2) The incorporation of recycle and recovery into any phase-out case will have the effect of directly reducing ODS consumption. Its primary benefit will be to assure local supplies of CFC-12 for recharging refrigerators. Additional savings (not included) should be expected from applying recycle/recovery technology to the conservation of HFC-134a.

3) Capital requirements shall be determined once the project preparation activities are completed. It is estimated however, that the total costs of investment projects for this country programme 3 150 258 US \$. Any delay in the timing of investments shall increase the economic cost to the country.

STRATEGY

ES.17 The optimum strategy for the Government of Cameroon is to adopt a set of policies and implement a series of projects that support a phase-out of ODSs consumption as soon as is technically feasible.

ES.18 This strategy will accomplish the complete phase-out of ODSs at the least economic cost to the country and provide the basis for an officially recognized National Ozone Policy to which industry and government leaders are committed for phasing out ODSs.

POLICIES

ES.19 The following are the main policies that are recommended to be included in the National Ozone Policy (NOP) for Cameroon:

- * Enhance public awareness of the "ozone issue" through media attention. The emphasis should at first be placed on the conservation aspects of ODS and subsequently on substitution;
- * Announce a proposed phase out schedule;
- * Establish ODS import monitoring policies and procedures which account for all ODS as required under the Montreal Protocol and from which progress in reducing ODS consumption is tracked to guide appropriate adjustments in programmes and policies;
- * Create an "Ozone Monitoring Office" within the Ministry of the Environment and Forests to act as the focal point that will provide guidance in the formulation and promulgation of specific policies consistent with NOP.

PROJECTS

ES.20 This Country Programme document contains projects presently presented to the Multilateral Fund for financing. These projects are described in the Annexes. The Projects and their associated costs are:

SUMMARY OF PROJECT AND THEIR COSTS

YEAR	PROJECT	SECTOR	EXPECTED OUTPUT	COST IN US \$
1993 - 96	OZONE MONITORING COMMISSION	ALL	COORDINATION OF ALL ACTIVITIES	201 300
1993 - 96	TRAINING MAINTENANCE TECHNICIANS	REFRIGERATION	TRAINED TECHNICIANS IN SUBSTITUTE TECHNOLOGIES	138 500
1994	TRAINING OF CUSTOMS OFFICERS	PUBLIC SECTOR CUSTOMS	INTRODUCTION OF CONTROL SYSTEM	20 200
1993 - 96	CONVERSION OF FAEM	REFRIGERATION	ELIMINATION PROGRAM FOR CFC USE	3 150 258
TOTAL PROGRAMME	BUDGET			3 510 258

COST OF ELIMINATION OF ODS 33.8 US \$ / KG ODP

ACTION PLAN

OBJECTIVES AND COORDINATION

ES.21 The objective of the Action Plan is to effectively, efficiently and as fairly as possible, phase-out the consumption of ODS in the Republic of Cameroon. This is in compliance with the Montreal Protocol, as ratified by the Government of the Republic of Cameroon in accordance with the proposed optimum strategy.

ES.22 The Action Plan comprises the investments, policies and implementation actions needed to ensure compliance. The principal agents are the Government (which is responsible for the specific policies, referred to here as "National Ozone Policy") and UNEP (as implementing agency). These two agencies must be synchronized to effect the purpose of the Action Plan, i.e., compliance with the terms of the Protocol.

ES.23 This action plan is consistent with the principles for evaluating and financing incremental costs for the ODS phase-out as detailed in the "Indicative List of Categories of Incremental Costs." In summary these are:

- * be cost-effective and attuned to the national industrial strategy;
- * include a careful review of cost items and avoid double counting;

* feature early adoption of ozone protecting technologies.

ES.24 The action plan proposed for the Republic of Cameroon is based on the optimum phase-out scenario. In this strategy, action is initiated in 1993. The phase-out is completed by 2005.

SUMMARY OF PROPOSED ACTIONS

ES.25 The followings are the outlines of Action Plan:

A. Technological conversion financing programme;

B. Public awareness programme; and

C. Creation of Ozone Monitoring Commission.

ES.26 The following table page gives the target reduction in consumption. These targets will be met by banning the entrance into the country of amounts of these substances in excess of the values indicated in the table.

AMOUNTS OF ODS ALLOWED INTO CAMEROON IN ODP TONNES BY GROUP

YEAR	ANNEX A GROUP I	ANNEX A GROUP II	ANNEX B GROUP II	ANNEX B GROUP III	TOTAL
1991	68.4	15.0	1.1	21.2	105.7
1992	63.7	16.0	1.2	20.5	101.4
1993	50.9	12.8	1.1	16.4	81.2
1994	37.9	9.6	0.6	12.3	60.4
1995	31.6	8.0	0.0	10.3	49.8
1996	27.5	6.0		6.2	39.7
1997	12.7	4.0		4.1	20.8
1998	0	0		0	0

OTHER FACTORS OF SIGNIFICANT IMPACT ON THE PHASE-OUT PROGRAMME

ES.27 The following factors will have direct bearing on phase-out activities, timing and process:

- * The future supply and associated costs of alternate refrigerants, and fire extinguishers and their associated appliances are not known precisely, and the feasibility of some technologies remains to be confirmed. However, the cost of alternatives is expected to approach the cost of existing technologies at some point in the future. It is anticipated that the cost of the available ODS, after an initial period of oversupply, will eventually rise sharply as supplies become greatly diminished with limited production.
- * If phase-out is slow in a fast developing economy, the stock of existing ODS using plant equipment and products will continue to grow. The result of such build up will ultimately increase the overall cost of ODSs phase-out.
- * The make-up of the NOP will directly influence the cost of phase-out to participating industries. It should be recognized that the eligibility rules under the Multilateral Fund will also create strategic incentives. To the extent that incremental costs incurred by rapid phase-out are reimbursable under the Multilateral Fund's incremental cost rules, higher costs need not be a burden to the developing country. The best approach for formulating the NOP appears to be a combination of elements representing various approaches in a pragmatic way.

1.0 INTRODUCTION

GENERAL

1.1 Stratospheric ozone, acts as an efficient shield or filter that screens out almost all the harmful ultraviolet rays emanating from the sun. Relatively short-wave ultraviolet radiation, known as UV-C, is lethal to living things. These rays are almost totally screened out by the Ozone Layer. Longer wavelength ultraviolet UV-A, is relatively harmless and is almost entirely allowed through. In the middle lies UV-B, which is less lethal than the shorter wavelength radiation but is still very dangerous, is mostly absorbed by the Ozone Layer.

1.2 Chlorofluorocarbons (CFC), Halons and other Ozone Depleting Substances (ODS), which are manufactured by some countries to satisfy man's consumption needs, are released into the atmosphere either during the manufacturing processes or during servicing of equipment containing the substances. Once released, these chemicals rise into the atmosphere, and after some time, reach the stratosphere. In this layer, where Ozone is present, the chemicals react with the Ozone decomposing it into its constituent Oxygen. Thus, by man's consumption of these substances, the Ozone layer is being eroded leading to far-reaching-long-term consequences on the earth and mankind.

PURPOSE

1.3 In order to face this menace, the international community summoned up its forces in 1985 in Vienna (Austria) and in 1987 in Montreal (Canada) to adopt two important international legal instruments, the Vienna Convention and the Montreal Protocol.

1.4 Even though Cameroon is not a producer of Ozone Depleting Substances (ODS) some of its industries use ODSs, these substances are: CFC-11, 12, 115, HCFC-22, Halons 1211 and 1301, carbon tetrachloride (CTC), methyl chloroform (MC) and methyl bromide (MB). It is to be noted that HCFC-22, which is not covered by the Montreal Protocol nor its London Amendment, is mentioned in this report for information only.

STATUS

1.5 Consumption, as defined by the Montreal Protocol, is Production plus Import minus Export of Controlled substances (CS). Values of consumption being given in Ozone Depleting Potential (ODP) tonnes. According to this definition, in 1991, the consumption in Cameroon was 103.8 ODP tonnes.

1.6 With a population of 12 Million, the per capita consumption of controlled substances, as defined by the Montreal Protocol, is 0.0087 kg. Thus Cameroon satisfies the conditions of Paragraph 1 of Article 5 of the Montreal Protocol and is therefore eligible to receive technical and financial assistance from the Multilateral Fund.

1.7 The present Country Programme, which is based on some of the data contained in a country study, has been completed by a national team composed of an inter ministerial working group and a representative of a non-governmental organization (NGO). It was coordinated by the Ministry of Environment and Forests (MINEF). A list of team members is given in section 1.5 of this report.

1.8 Following the approval of the present document by the Minister of the Environment and Forests, the document was approved by the Prime Minister, who is also the Head of the Government.

1.9 The implementing organization for the present Country Programme shall be the Ministry of the Environment and Forests.

1.10 The commitment to the implementation of the Country Programme is expressed in the following translated statement by the Minister of the Environment and Forests. This statement is: "DANS CE PROGRAMME DE PAYS, LE GOUVERNEMENT CAMEROUNAIS S'ENGAGE A RESPECTER SCRUPULEUSEMENT LES STRATEGIES ET PLAN D'ACTION QUI Y SONT DECRTITES EN VUE DE L'APPLICATION DU PROTOCOL. IL S'ENGAGE AUSSI A PRENDRE DES MESURES SUPPLEMENTAIRES EN CAS D'ADOPTION PAR LES PAYS PARTIES AU PROTOCOL DES SUBSTANCES NOUVELLES APPAUVRISANT LA COUCHE D'OZONE (NOUVEAUX AMENDEMENTS AU PROTOCOL)."

ASSISTANCE RECEIVED

1.11 In order to fulfill its obligations as a Party to the Montreal Protocol, the Government of Cameroon requested financial and technical assistance from the Multilateral Fund and from UNEP IE/PAC, in order to prepare its Country Programme (CP). The government of Cameroon, through its Ministry of Environment and Forests (MINEF) signed a letter of agreement on 22 July 1992 with the Director of UNEP IE/PAC to receive assistance for the preparation of the Country Programme.

CAMEROON COUNTRY PROGRAMME

1.12 The objective of the Country Programme is, amongst other things, to confirm the government's commitment to its obligations as a Party to the Montreal Protocol.

1.13 This report constitutes the Country Programme that was completed by an inter ministerial working group and a representative of a non-governmental organization (NGO). It was coordinated by the Ministry of Environment and Forests (MINEF).

THE TEAM

1.14 The following were the members of the working group:

- Mr. Roger TONLEU, Director of the Environment (Team Leader)
- Mr. Patrick A. MBAKO, IGR, Deputy Head of the Department, Treatment and Conservation of Agricultural and Food Products, MINAGRI
- Mr. Samba DIEUDONNE, Deputy Director of Technical Activities, Industrial Pollution, Ministry of Mines
- Mr. Michel Claude LOKOLO, ENVIRO-PROTECT
- Mrs. Irene VOUNDI, Chief, Studies Unit, Department of Industry, Ministry of Industrial and Commercial Affairs (Industrial Directorate)
- Dr. Robert Martin NEMBA, C.E.A. 2 / Ministry of Scientific Research, Dr. SC.
- Mr. Joseph ELANG, Deputy Director of Agriculture, Ministry of Agriculture
- M. Victor NGWESSITCHEN, Cameroon Representative to the International Association of Refrigeration

METHODOLOGY

1.15 In summary, the Country Programme was carried out in two phases:

Phase I:

Data collection from the public service (Customs), from the General Surveillance Company (SGS) and private enterprises that use or sell ODS.

Phase II:

Analysis of the data and information obtained during Phase I. As well as a study of the following:

Implementation of phase-out;
Governments strategy; and
Action plan and projects.

OUTLINE OF METHODOLOGY

1.16 The methodology involved, in 1992, a data collection and analysis mission by a UNEP consultant to the country. During this mission, an inter ministerial team was formed. Presentations were made by the UNEP Consultant to the team and other interested parties explaining the role of the Ozone layer, what Ozone Depleting Substances (ODS) were, the chemical action of depletion of Ozone and how to develop a Country Programme, as required by the Multilateral Fund of the Montreal Protocol. Data on the supply and demand for ODSs was collected; the institutional and policy framework was researched with industry and government officials. ODS phase-out problems and plans were discussed with the members of the team; and the availability of ODS substitutes was investigated. A set of projects that may qualify for Multilateral Fund grants was discussed. Prefeasibility studies for these projects was left to the team to prepare and cost. A set of ODS phase out scenarios that spanned a full range of probable activities were also discussed. The optimum scenario was selected by the team before a second visit by the consultant. The information gathered was used as a basis for a phase-out strategy for the Republic of Cameroon. An action plan to accomplish the strategy was also studied.

SOURCES OF DATA

1.17 The data collection exercise and the survey that were used as the basis for the present document were mainly carried out from 22/10/1992 to 10/11/1992. These were as the result of the combined initiatives and effort of MINEF and UNEP IE/PAC. This combined collaboration led to the present Country Programme for Cameroon.

1.18 The statistics obtained from SONEL, Cameroon's Electrical Utility, were used to estimate the number of households connected to its grid. The figure obtained from this source gives an estimate of the number of refrigerators in use; This survey also led to an estimate of the amount of CFC-12 used during the repair and servicing of the domestic refrigerators.

1.19 The information that is presented in this document was also partly obtained from the Customs Directorate, the SGS (a subsidiary of the multinational SGS group) and from the companies which import and sell ODSs on the local market.

PROPOSED PHASE OUT SCENARIO

The table on the following page shows the the proposed phase out scenario od ODS in Cameroon.

2.0 CURRENT SITUATION

CURRENT AND FORECAST CONSUMPTION OF ODS

CURRENT CONSUMPTION OF ODS

2.1 The following table gives the estimate of consumption of controlled substances in the Republic of Cameroon for 1991.

Table 1. 1991 Consumption of ODS in Cameroon

	IMPORTED TONNES	ODP	CONSUMPTION ODP TONNES
GROUP I ANNEX A			
CFC-11	20.8	1.0	20.8
CFC-12	43.8	1.0	43.8
CFC-115	3.2	0.6	1.92
Sub-total	67.8		66.52
GROUP II ANNEX A			
Halon 1211	2.0	3.0	6.0
Halon 1301	0.9	10.0	9.0
Sub-total	2.9		15.0
GROUP I ANNEX B			
Sub-total			
GROUP II ANNEX B			
CTC	1.0	1.1	1.1
GROUP III ANNEX B			
1, 1, 1-trichloroethane	212.4	0.1	21.2
TOTAL	284.1		103.8

2.2 Tables 2,3 and 4 on the following pages give a breakdown by importer of the ODS imported in Cameroon in 1991. These comprise: CFC 11, 12 and 115; Halons 1211 and 1301, CTC and MC. Also included for information only are: Methyl Bromide (MB), which is a pesticide used in agriculture and the refrigerant HCFC-22, which is exclusively used in air conditioning units. The import statistics for HCFC-22, as declared by Hoechst and Saticam for the 1986-1992 period are given for information purposes only in Table 4.

2.3 The two main importers of CFCs and Halons in Cameroon are: SATICAM (subsidiary of the French group Air Liquide) and HOECHST-Cameroon (a subsidiary of the German multinational Hoechst). These two companies have 39.1 and 52.4% respectively of the CFC and Halons market in Cameroon. About 8.4% of the total CFCs and Halons are imported by an informal sector that is made up of about 130 workshops located mainly in the urban centers.

2.4 All of the ODS consumed in Cameroon were exclusively imported from countries of the European Community (EC). In 1991, Cameroon imported 284.1 tonnes of Ozone Depleting Substances (ODS) equivalent to 103.8 ODP tonnes. The EC supplied 279.4 tonnes of these. This is equivalent to 95.5 % of the total amount of imports into the country. Approximately 4.5 % or 4.7 tonnes of imported CFC come from neighboring countries.

2.5 Table 5. gives, for 1991, the distribution of ODS imported by product and the country of origin of the product. Table 6. gives the breakdown of ODS imports by chemical for 1991. Tables 7 and 8 and the corresponding figures that follow give the ODS consumption by year and by chemical.

Table 5. Distribution of imports by product and source country for 1991.

Product	Country of origin	Quantity imported (tonnes)
CFC 11	France	16.8
	Germany	4.0
CFC-12	France	17.1
	Germany	22.0
CFC 115	Germany	3.2
Halon-1211	Germany	1.0
	France	1.0
Halon-1301	Germany	0.9
CTC	France	1.0
MC	Germany	151.6
	Belgium	20.9
	France	19.8
	United Kingdom	20.1

Table 6. breakdown of ODS imports by chemical for 1991.

IMPORTER	ODS	TONNES	ODP	ODP TONNES
HOECHST	CFC-11	4.0	1.0	4.00
	CFC-12	22.0	1.0	22.00
	CFC-115	2.3	0.6	1.38
	HALON-1211	-	6.0	-
	HALON-1301	0.9	10.0	9.0
Sub-total		29.2		36.38
SATICAM	CFC-11	1.8	1.0	1.80
	CFC-12	17.1	1.0	17.10
	CFC-115	0.9	0.6	0.54
	HALON-1211	2.0	3.0	6.00
	HALON-1301	-	10.0	-
Sub-total		21.8		25.44
SAPCAM	MC	1.0	0.1	0.10
SONOPOL	MC	79.4	0.1	7.94
	MC	132.0	0.1	13.20
SABC	CTC	1.0	1.1	1.10
Informal sector	CFC-12	4.7	1.0	4.70
SCIMPOS (Foams)	CFC-11	15.0	1.0	15.00
Grand Total		284.1		103.80

Table 7. ODS Consumption in Tonnes in Cameroon 1986-1992

Year	1986	1987	1988	1989	1990	1991	1992
CFC-11	30.5	29.5	28.5	24.0	22.0	20.8	17.7
CFC-12	83.5	73.1	60.9	53.0	52.4	43.8	43.5
CFC-115	7.5	6.4	4.5	3.5	5.5	3.2	4.1
Halon-1211	3.3	4.0	3.3	2.8	4.5	2.0	2.0
Halon-1301	1.0	0.0	0.0	0.0	0.8	0.9	1.0
Carbon tetrachloride	0.0	0.0	0.5	1.0	1.0	1.0	1.0
Methyl chloroform	225.0	230.0	240.0	225.0	228.0	212.4	205.0
Total	350.8	343.0	337.7	309.3	314.2	284.1	274.3

Table 8. ODS Consumption in ODP Tonnes in Cameroon 1986-1992

Year	1986	1987	1988	1989	1990	1991	1992
CFC-11	30.5	29.5	28.5	24.0	22.0	20.8	17.7
CFC-12	83.5	73.1	60.9	53.0	52.4	43.8	43.5
CFC-115	4.5	3.8	2.7	2.1	3.3	1.9	2.5
Halon-1211	9.9	12.0	9.9	8.4	13.5	6.0	6.0
Halon-1301	10.0	0.0	0.0	0.0	8.0	9.0	10.0
Carbon tetrachloride	0.0	0.0	0.6	1.1	1.1	1.1	1.1
Methyl chloroform	22.5	23.0	24.0	22.5	22.8	21.2	20.5
Total	160.9	141.4	126.6	111.1	123.1	103.9	101.3

2.7 The industry in the Cameroon uses ODSs as part of the production processes in the following sectors:

- 1) - Refrigeration and air conditioning
- 2) - Production of rigid foam
- 3) - Fire extinguishing
- 4) - Paints and varnishes
- 5) - Pharmaceutical industry
- 6) - Tobacco and cigarette manufacture
- 7) - Food industry

2.8 ODS users according to available records was established in October-November 1992. It is summarized in Table 8. below.

Table 8. ODS users in Cameroon established in October-November of 1992

ODS	USAGE	USER
CFC-11	Flexible and Rigid Foams	SONOPOL, FAEM, SCIMPOS
CFC-12	Manufacture of Refrigerators Freezers	FAEM
CFC-12	Recharging in refrigeration sector	FAEM, SICAMEC, U.C.E., A.R.S.M, A.R.S.I
CFC-12	Cigarettes	SITABAC
Halons 1211	Extinguishers	SCDP, SONARA, SIEMI, SHO, SICLI
Halon 1301	Extinguishers	SCDP, SONARA, SIEMI, SHO, SICLI
CTC	Industrial Solvents	SABC
MC	Industrial Solvents	PLANTECAM

2.8 Table 9. on the following page, gives the distribution of consumption of ODS per user sector. The figures on the following pages (Figures 9a to 9f) give, for 1991, the ODS consumption in the country by chemical and by user sector.

Table 9. 1991 Consumption of ODS by Sector

Sector	Consumption	Consumption
	Tonnes	ODP Tonnes
Foams	15.0	15.0
Refrigeration	52.8	51.6
Fire Fighting	2.9	15.0
Solvents	212.4	21.2
Tobacco	1.0	1.0
TOTAL	284.1	103.8

Table 10. 1991 Consumption of ODS by product and industry in each sector

Sector	Product	ODS	Consumption in ODP Tonnes
Refrigeration and Conditioning	Insulation foam	CFC-11	5.8
	Mobile refrigeration	CFC-115	1.92
	Refrigerators and freezers	CFC-12	42.8
Foam Industry	Rigid foams	CFC-11	15.0
Fire fighting	Portable fixed	Halons	15.0
Tobacco and Cigarette	Tobacco and cigarette filters	CFC-12	1.0
Paints and varnishes	Paints and varnishes	MC	8.02
Pharmaceutical	Natural Substances	MC	13.18
Food industry	Industrial Cleaning	CTC	1.1
Total Consumption			103.8

Figure 9a. 1991 ODS consumption in Cameroon in Tonnes

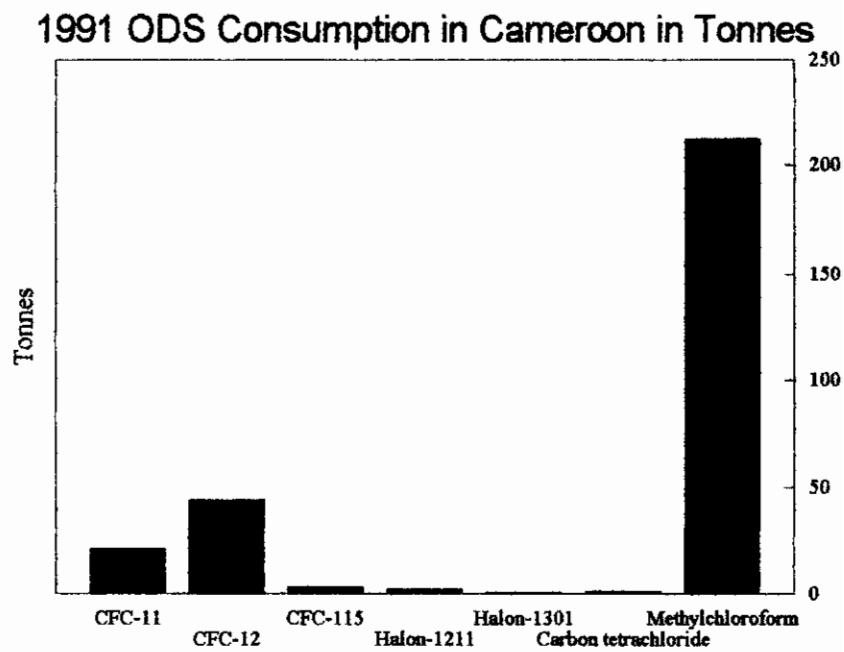


Figure 9b. 1991 ODS Consumption in Cameroon in ODP Tonnes

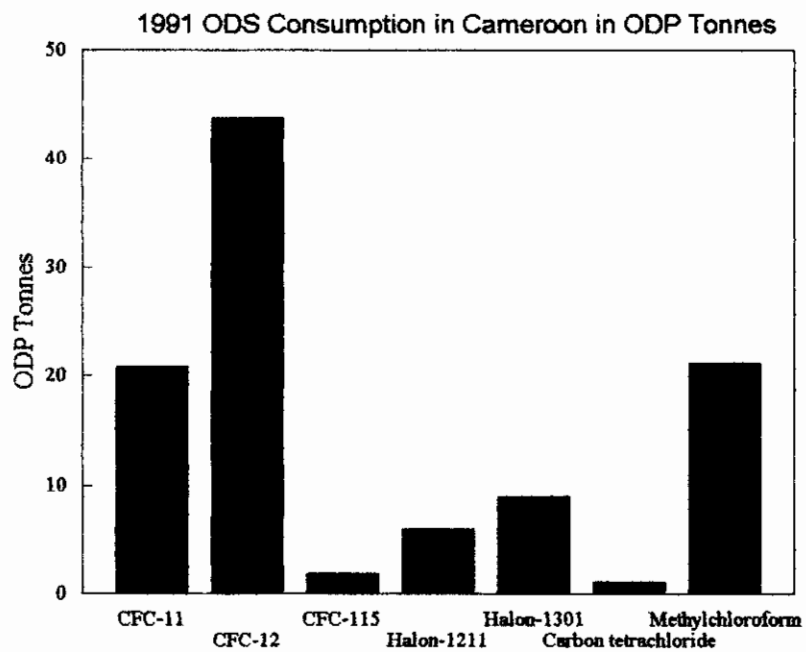


Figure 9c. 1991 Consumption by Sector in Tonnes

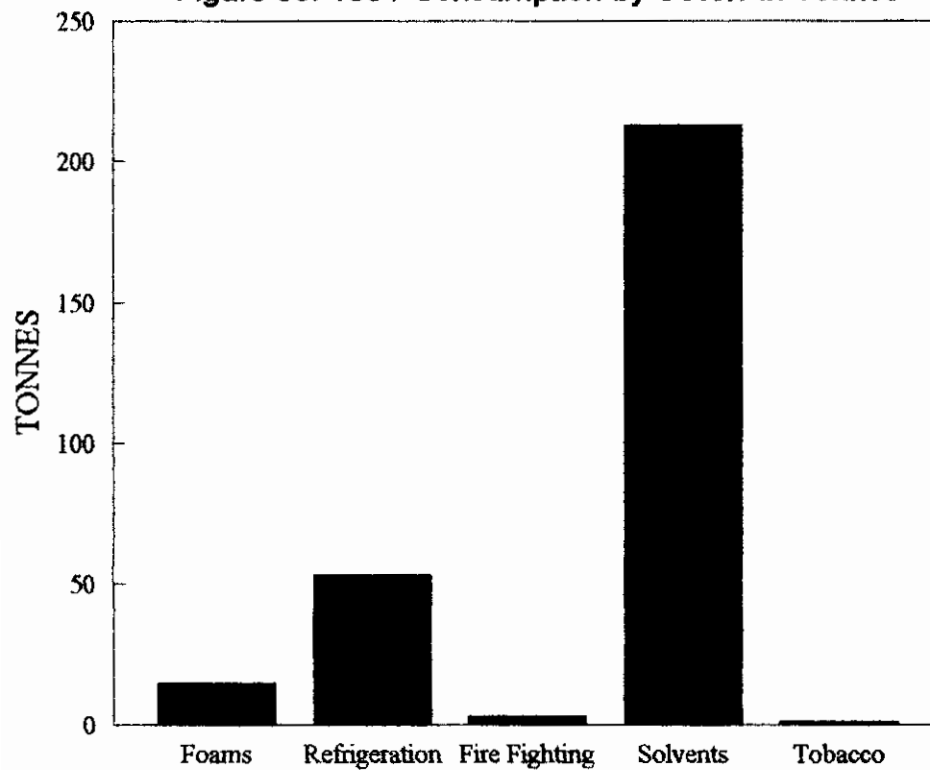


Figure 9d. 1991 Consumption by Sector in ODP Tonnes

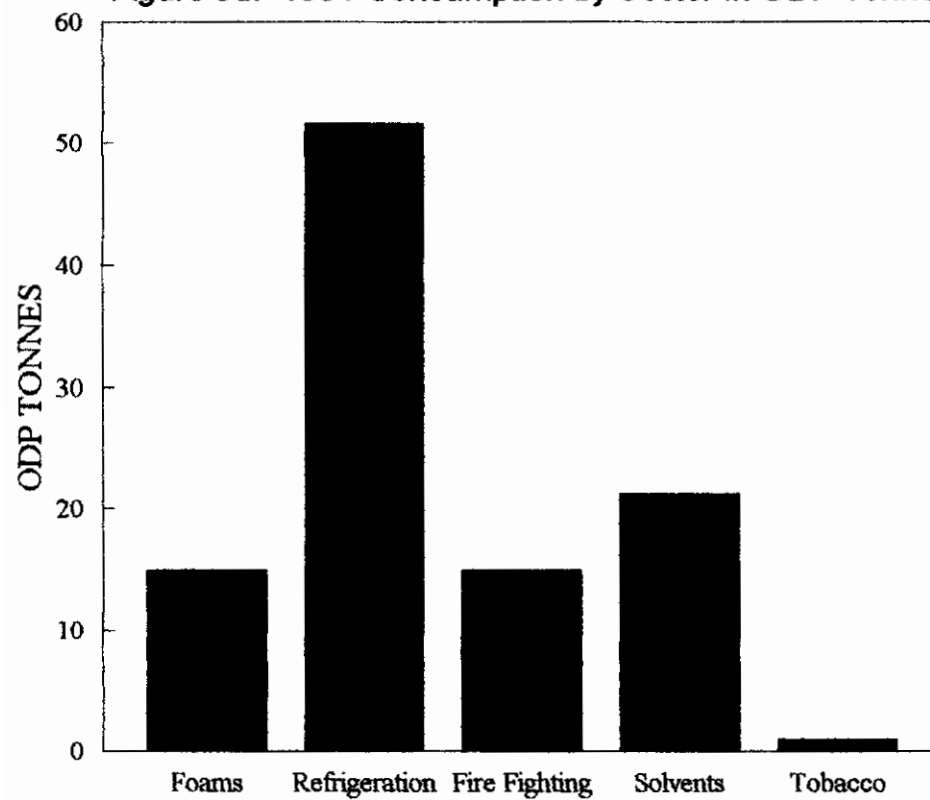


Figure 9e. 1991 Consumption by Sector in Tonnes

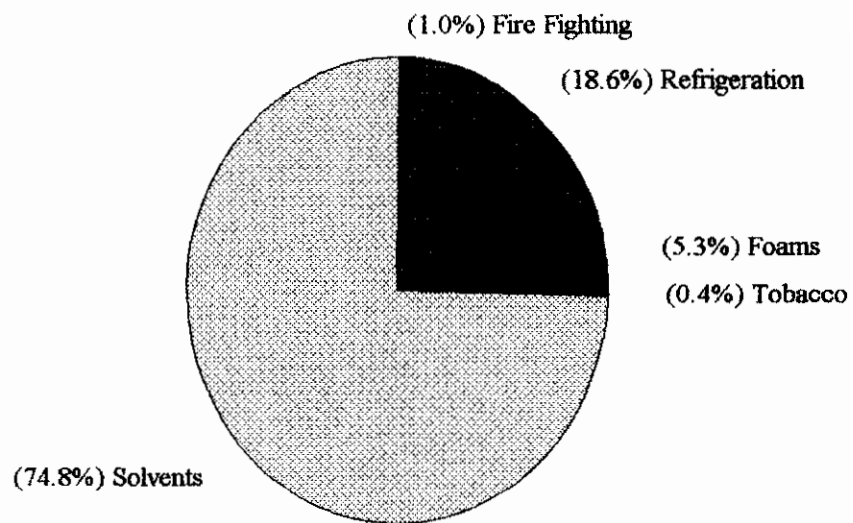
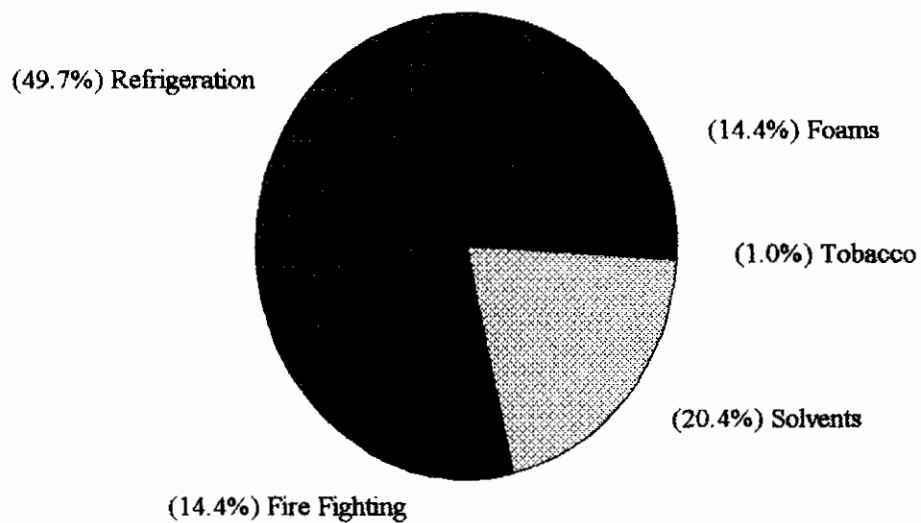


Figure 9f. Consumption by Sector in ODP Tonnes



OVERVIEW OF ODS CONSUMPTION

2.9 Cameroon's consumption of the controlled ODS (CFC-11, 12,115, Halons 1211 and 1301, MC and CTC) has gone from 350.8 tonnes or 160.9 ODP tonnes in 1986 to 284,1 tonnes or 103.9 ODP tonnes in 1991. The 1992 consumption was 274,3 tonnes or 101,3 ODP tonnes as shown in Tables 7 and 8. These tables and accompanying figures summarize the consumption.

CONSUMPTION OF ODS IN THE INFORMAL WORKSHOP SECTOR

2.10 In Cameroon there are about 130 workshops to repair household appliances in the informal sector. These are mostly located in the urban centers, mainly in the two largest towns of the country; Douala (1,400,000 inhabitants) and Yaoundé (700,000 inhabitants). It is estimated that these two cities have about 60 and 30 workshops respectively. The remaining 40 are throughout the territory in about 10 urban centers (50,000 to 200,000 inhabitants). In these non professionally managed "informal" workshops there is a lack of adequate equipment. Technicians obtain the CFC-12 from "informal" importers from neighboring countries. CFC losses during maintenance are very large. It is estimated that the consumption per unit of CFC-12 during a repair operation is in the order of 1 Kg. On the average it is estimated that each workshop repairs about 3-4 units per month. Thus the annual usage of CFC-12 within this sector would be about 6.6 tonnes.

FORECAST CONSUMPTION OF ODS IN CAMEROON

STRUCTURE OF DOMESTIC APPLIANCES MARKET

2.11 Sales of domestic appliances for the 1986-1992 period show that the demand for refrigerators, freezers and air conditioning units is 88902, 82340 and 38507 units respectively. The share of imports fluctuates and averages out to about 4300 units per year, or 15 % of the annual sales, while sale of local production covers about 85 % of the demand. Distribution of annual sales per type of equipment for 1986-1992 is shown in Tables 11 and 12.

2.12 It should be noted that during the 1986-1992 period, the market suffered a recession and the decrease in sales for this period was of about 11% per year. In order for the country to overcome this situation, an increase in sales of domestic appliances is only possible if the following conditions are met:

- implementation of the structural adjustment program ,
- implementation of a sustained electrification policy for rural areas, and
- increase of the income of households.

SONEL'S CLIENTELE STRUCTURE

2.13 The number of households connected to the national electricity grid is proportional to the number of refrigerators in the country. In Cameroon, there are also a number of households that are not connected to the national electricity grid but can afford purchasing refrigerator units. In order to estimate the present and future number of refrigerators in the country, reference was made to the statistics available in SONEL, the national electric utility.

2.14 Table 13 gives the number of households connected to the national grid for the years 1986 to 1992. Due to SONEL's Rural Electrification Programme, which is presently under way, it is expected that the number of households to be connected to the national grid would be as shown in Table 14. Through interviews, it was established that most of the households would purchase a refrigerator unit when electricity would reach them.

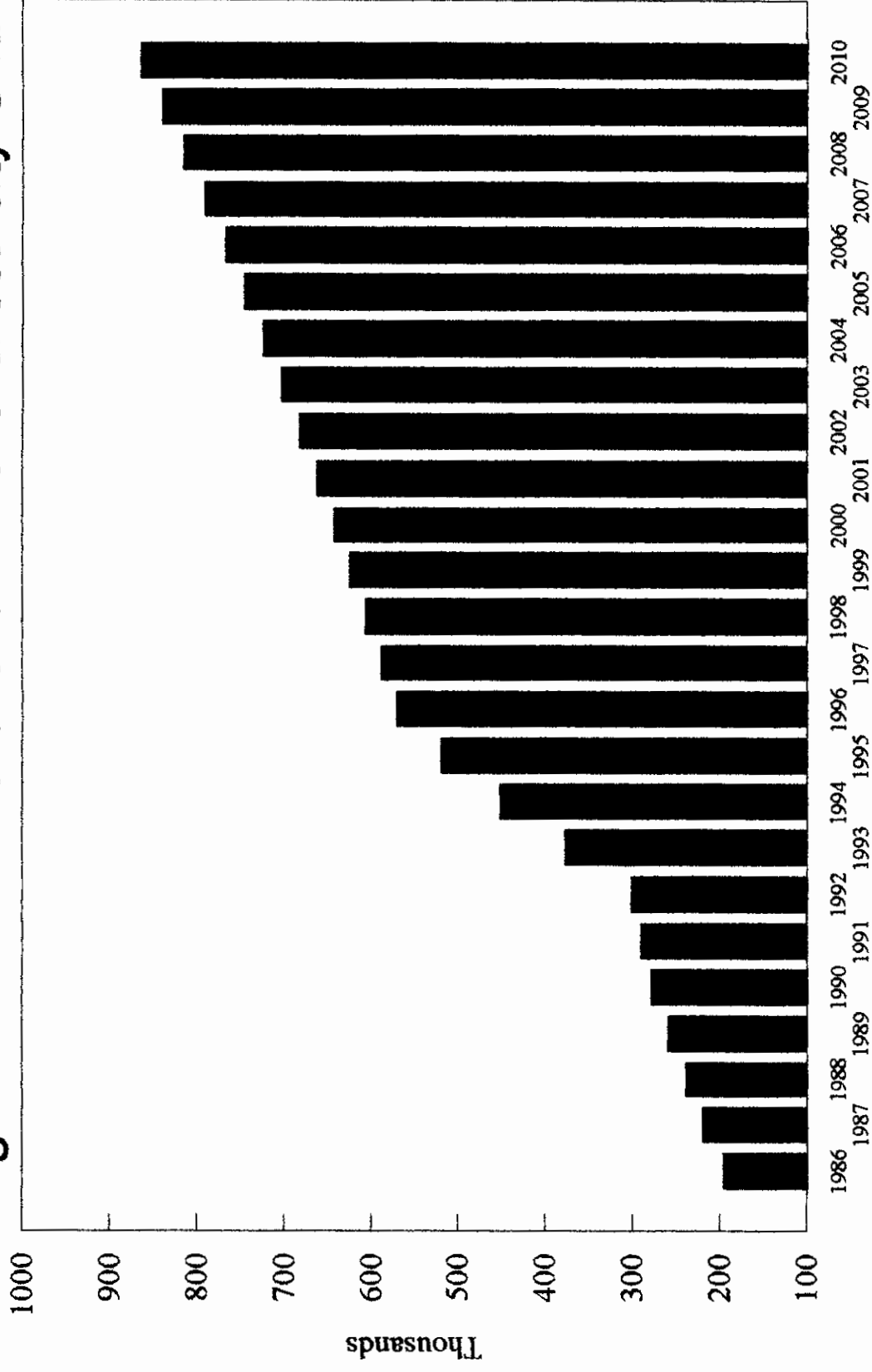
Table 11. Existing Refrigerators and Freezers in Cameroon (1986 - 1992)

Appliance	1986	1987	1988	1989	1990	1991	1992
Friges + Freezers	35000	30310	29383	26281	17140	16428	16700

Table 12. Demand for Refrigerators and Freezers in Cameroon (1986 - 1992)

Appliance	1986	1987	1988	1989	1990	1991	1992
Friges + Freezers	31500	27279	26445	22865	14056	12322	13360

Figure 14. Connections to National Electricity Grid



CAMEROON'S ANNUAL ODS CONSUMPTION ESTIMATE FOR THE PERIOD 1993-2010

2.15 The calculations for ODS forecast are based on the following assumptions:

Table 15. Growth and other assumptions for ODS consumption

Household appliances sales growth rate	3 %	1992-2010
Population growth rate	3,5 %	1992-2010
GDP growth rate	0,5-1,0 %	1992-2010
Number of refrigerators in use in the Country	301,270	1992
Number of freezers functioning in the Country	271,000	1992
Refrigerator average life span	8	years
Freezers average life span	6	years
Number of formal maintenance workshops	130	1992
Number of informal maintenance workshops	130	1992
Solvents consumption growth rate	3 5%	1993-2010
Halon consumption growth rate	3,5	1993-2010
CFC consumption for the repair of one unit	1 kg	CFC-12
SONEL clientele growth rate	25-10%	1993-1996
	3.5 %	1997-2010

INDUSTRY STRUCTURE

REFRIGERATION

2.16 The industries in the refrigeration sector in Cameroon that use CFC-11 and CFC-12 in their production are:

- FAEM (70 % share of the Cameroon refrigerators and freezers market and 80 % of the air conditioning market). The remaining 30% and 20 % of the market is supplied by imports.

It is to be noted that FAEM, which also services the appliances it sells, is the only licensed domestic appliances plant of the Central Africa Customs and Economic Union (UDEAC). This union includes: Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea and Gabon, . In total these countries have a population of 24,250,000 inhabitants. This represents a potential market of approximately 1,000,000 refrigerators, 900,000 freezers and 500,000 air conditioning units. Cameroon's annual demand being in the order of 55,000 units per year, whilst that of the sub-region is of approximately 100,000 units per year.

FAEM exports its products to these countries and hopes to supply at least 50 % of this market's needs.

- CFC-115 as part of R-502, is used in some mobile air conditioning units (refrigerated trucks). The consumption in 1991 was of 3.2 tonnes.
- Table 16 gives the history of sales of refrigerators/freezers in Cameroon for the years 1986 - 1992.
- Table 17 gives the forecast of household refrigerators to the year 2010. The figures take into consideration the rapid initial growth in the purchase of refrigerators as a consequence of the national electrification programme described earlier.
- Figure 15 gives the past and forecast number of domestic refrigerators and freezers in Cameroon.

FOAMS

2.17 SCIMPOS (leader in the production of flexible and rigid foams holds 60 % of the market, the remaining 40 % is shared by 3 small companies). The foams sector has modified its manufacturing processes for blowing foams by progressively replacing CFC-11 by Methylene Chloride.

2.18 The amount of CFC-11 consumed in the foam sector was 15 ODP tonnes in 1991.

TOBACCO INDUSTRY

2.19 SITABAC (70 % of the tobacco and cigarette market) uses approximately 1 ODP tonne of CFC-12 per year during the manufacture of cigarette filters. The remaining 30 % of the market is shared equally by the Bastos company (15 %).

SOLVENTS

2.20 Use of solvents is limited to two chemicals, namely, Methyl Chloroform (MC) and Carbon Tetrachloride (CTC); Annual consumption of CTC is of approximately 1.0 tonne, 1.1 ODP tonnes. This consumption is low when compared to that of MC which reached an average of 223 tonnes between 1986 and 1992.

HALONS

2.21 The fire extinguishing sector consumes low quantities of Halon 1211 and 1301 in fire extinguishers. In 1991, consumption of these two substances was respectively of 2 and 0.9 tonnes, 6 and 9 ODP tonnes.

AEROSOLS

2.22 Aerosol manufacturers in the cosmetics and insecticides industry have now fully replaced CFCs by hydrocarbons as propellants.

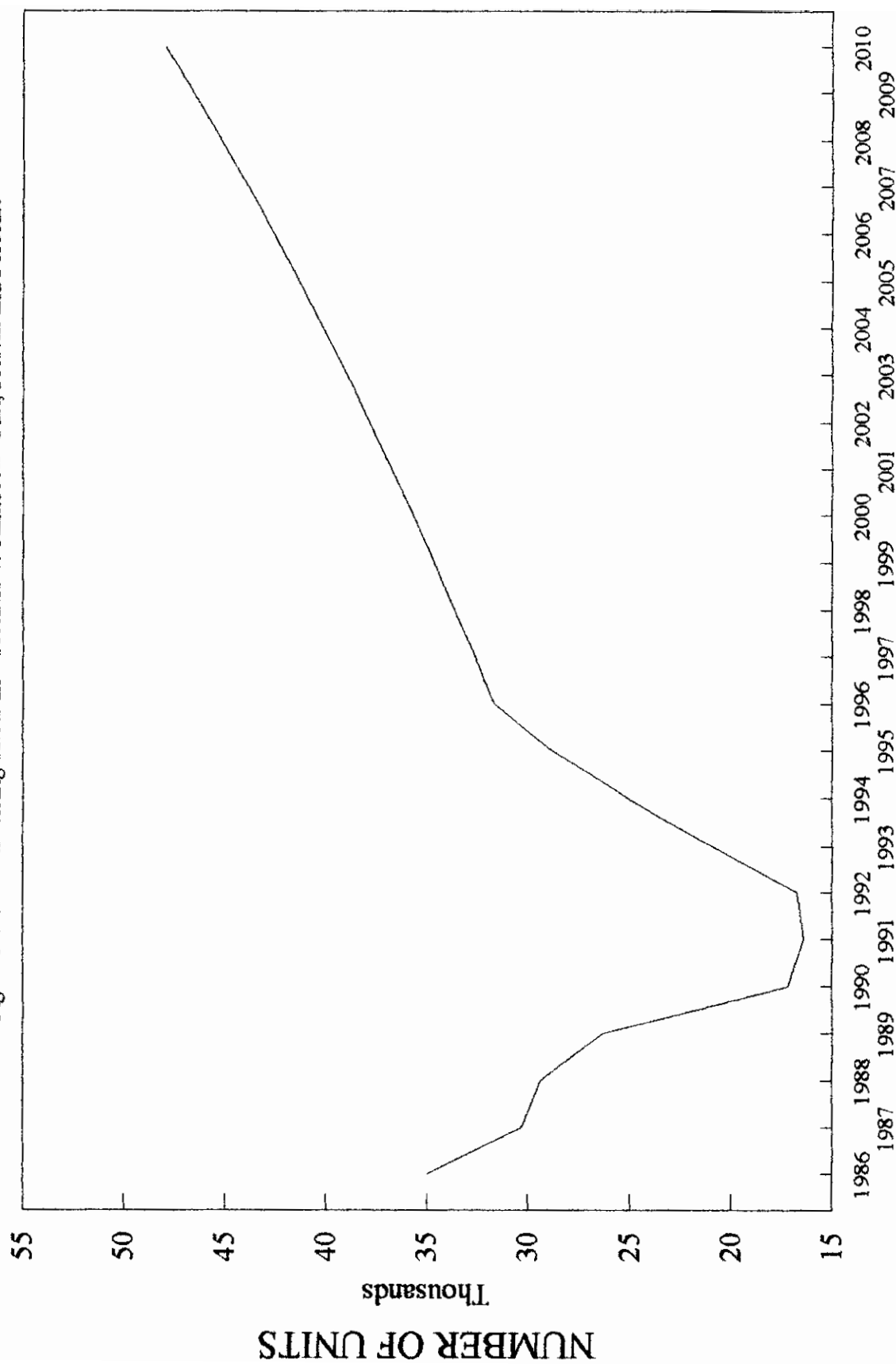
Table 16. Domestic appliances sales in Cameroon (1986-1992)

Year	Refrigerators	Freezers	Total
1986	20000	15000	35000
1987	17051	13259	30310
1988	14274	15109	29383
1989	12452	13829	26281
1990	8692	8448	17140
1991	7933	8495	16428
1992	8500	8200	16700

Table 17. Projections for the domestic appliances market in Cameroon (1993-2010)

Year	Refrigerators	Freezers	Total
1993	10625	10250	20875
1994	12750	12300	25050
1995	14663	14145	28807
2000	18153	17512	35665
2005	21044	20302	41346
2010	24396	23535	47931

Figure 15. Domestic Refrigerators and Freezers in Cameroon - Past, Present and Forecast



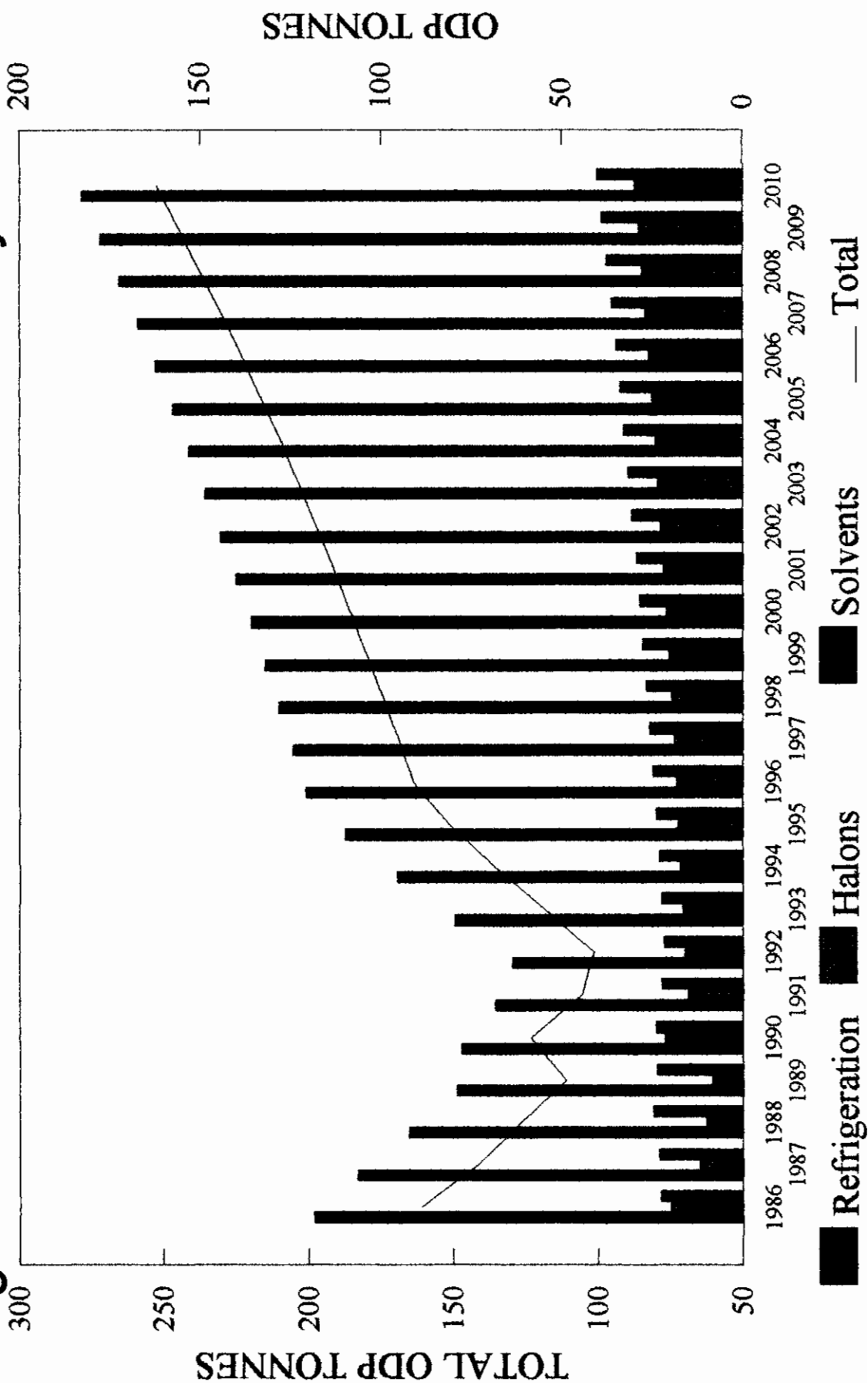
UNCONSTRAINED DEMAND FOR ODS BY SECTOR

2.23 The following table gives past present and forecast unconstrained consumption of ODS by sector. Figure 18. shows these values graphically. The figures are calculated using the assumptions given in Table 15.

Table 18. Past ,Present and forecast Demand for ODS

Sector	Refrigeration	Halons	Solvents	TOTAL
1986	118.5	19.9	22.5	160.9
1987	106.4	12.0	23.0	141.4
1988	92.1	9.9	24.6	126.6
1989	79.1	8.4	23.6	111.1
1990	77.7	21.5	23.9	123.1
1995	109.8	17.7	23.9	151.5
2000	136.0	21.1	28.4	185.5
2005	157.6	25.0	33.8	216.4
2010	182.7	29.7	40.1	252.6

Figure 18. Unconstrained Demand for ODS by Sector



INSTITUTIONAL FRAMEWORK

EXISTING FRAMEWORK AND TRENDS

2.24 The Government of Cameroon has had a great deal of interest in the question of the environment. Government of Cameroon representatives have attended most of the national and international meetings involved with questions relating to the environment.

2.25 In April 1992 the Government of Cameroon created the Ministry of the Environment and Forests. This is a portfolio that is of particular interest and importance to the Government.

2.26 Besides this ministry, there exists in the country numerous organizations that are interested in the question of the environment. Some of these organizations have interests in the refrigeration sector and the Ozone question. Others have interest in other aspects of the environment.

2.27 As a result of the interest of the Government in the question of the environment, it has gathered a team of national and international experts in 1992 to draft an Environmental Policy Plan for the Country.

INSTITUTIONAL FRAMEWORK AND THE MONTREAL PROTOCOL

2.28 The Government of Cameroon has decided to create an Ozone Monitoring Commission in the country. This office shall be within the Ministry of the Environment and Forests and shall be reporting directly to the Minister.

2.29 The Minister of The Environment and Forests has the responsibility of setting the national policy governing environmental issues and the Montreal Protocol. This is part of his responsibilities as per the Government decree covering the mandate of that Ministry.

2.30 Thus the Montreal Protocol shall be implemented by the Ministry of the Environment and Forests in collaboration with the technical departments that are involved in the Protocol and industry. The following are the organizations concerned:

- * Ministry of the Environment and Forests, Ozone Office - Coordinator.
- * Ministry of Industrial and commercial Development, Industrial Directorate -Member
- * Ministry of Mines, Water and Energy, Technical and industrial Activities Under- Directorate - Member.
- * Ministry of Finance, Customs Directorate - Member.
- * Ministry of Agriculture, Agricultural and Community Development Directorate - Member.
- * Ministry of Scientific and Technical research, Scientific Research Directorate - Member.
- * Syndicate of Cameroon Industries - FAEM Representative - Member.

POLICY FRAMEWORK

2.31 The policy framework within the Republic of Cameroon is described in this section of the Country Programme with emphasis on those items impacting economic and financial costs for ODS phase out.

BACKGROUND

2.32 The environmental policy will affect ODS phase out costs at both the country level as well as at the individual industry level. An understanding of existing policies and available policy options is therefore needed to estimate incremental costs. The costs to Cameroon depend on the existing economic policies and industrial strategies in the country. Any strategy will have to follow the institutional framework that exists in the country. Incremental financial costs to the individual companies depend on the overall economic policy of the country especially tax laws and eligibility rules to the Multilateral Fund.

POLITICAL STANDARDS

2.33 Cameroon is a republic that has a party system. President Paul Biya has been the head of the state since 1982. He was last elected in 1992.

2.34 The country's 1990 Gross National Product was 11486 Million US \$. The average growth in GNP for the years 1988-1990 was 0.6 %. The per capita GNP was 1048 US \$ in 1990. The main sectors contributing to the GNP are: Agriculture 25%; Industry 35%; and Services 40%.

2.35 Although Cameroon is an oil producing country, the balance of trade figures are negative. This is mainly due to the world economic recession. It is expected that with the world recovery from the recession, that Cameroon's economy will also improve.

2.36 In the context of the Montreal Protocol, the implementation of this Country Programme shall be in accordance with the environmental national policy. Cameroon shall make as part of its laws all the legal documents and agreements it has ratified. This applies to laws that ban the consumption of some ozone depleting substances. All legal documents covering the Vienna Convention, the Montreal Protocol and the London Amendments shall be prepared by the Minister of the Environment and Forests.

GOVERNMENT AND INDUSTRIAL RESPONSES TO THE PROTOCOL

2.37 The Republic of Cameroon was one of the first countries to ratify the Vienna Convention and the Montreal Protocol. This was deposited in the Montreal Protocol on 30 August 1989. Entry into force of the Convention and the Protocol was thus on 28 November 1989. The London Amendments were also ratified and deposited by the Republic of Cameroon on 8 June 1992. Entry into force of these amendments was on 6 September 1992.

2.38 The Government is presently preparing the necessary texts to include the ratified documents as part of its laws.

2.39 The Minister of the environment and Forests on behalf of the Government of the Republic of Cameroon has committed the government to scrupulously follow the strategies and action plan contained in this document as applied to the Montreal Protocol. The Minister has also committed the Government to follow all future measures agreed by the Parties to the Protocol with regard to the use of Ozone depleting Substances.

2.40 Exceptional collaboration was expressed by the Customs Directorate. Their willingness to adapt to the requirements of the Montreal Protocol shall have a positive impact on the implementation of the Country Programme.

2.41 Industry has also reacted favorably to the Montreal Protocol. The aerosol industry no longer uses CFCs as propellants. The foam industry is switching to non CFCs and the production in the refrigeration sector is trying to obtain the technical know-how in order to change to non ozone depleting refrigerants.

2.42 The collaboration between the industry and the team who prepared the present Country Programme was very good. It is thus expected that once the Country Programme and the projects it contains are approved by the Executive Committee, that all concerned shall immediately implement the action plan.

3.0 IMPLEMENTATION PHASE-OUT

STATE STATEMENT THE O E NMENT

3.1 According to the Montreal Protocol, paragraph 1 of Article 5 countries may phase out CFCs, Halons and Carbon Tetrachloride by the year 2010 and Methyl Chloroform by the year 2015. Although the Republic of Cameroon does not produce ODSs, it imports them. The ODSs are consumed by a few industries. Thus the coordination of phase-out activities by the Government would not be difficult. As an importer of controlled substances and associated technology, phase out before the year 2010 in Cameroon is feasible provided that the financial and technical support proposed in this country programme is received.

3.2 The Government of Cameroon expects to reduce the consumption of controlled substances by the amounts given in Table 19 and Figures 19a - 19d on the following pages. These tables and figures give the reductions of the different chemicals by Annex and Group as defined in the Montreal Protocol. Measures that are included in the action plan are consistent with the current policy framework for environmental protection in Cameroon. The Government will announce that import of controlled substances will be banned except for essential uses. Servicing of the remaining stock of refrigeration equipment will be done using "drop in" substitutes providing funds are made available to pay for the incremental costs of these substitutes. Medical and other very special applications would be allowed to consume ODSs until such a time as substitutes are made available. The Government will impose import quotas and bans during the transition to complete phase-out.

3.3 This government strategy has two main components, namely, a market strategy and an enforcement and implementation control strategy.

i. Market strategy

This strategy is based on the following principles:

- Introduction of an ODS import tax, enforceable from 1993 (beginning of the phase out)
- Incentives to promote imports of substitute products from ODS using sectors, by lowering import duties.
- Financing alternative technologies with Fund subsidies.
- Financing the acquisitions of patents and licenses adapted to the new foam and household appliance manufacturing technologies.

ii. Enforcement and implementation control strategy

This strategy will be primarily based on:

- Licenses for importing ODS issued by the Ministry of Industrial and Trade Development, upon technical assessment from the Ministry of the Environment and Forests.
- A ban on the use of ODS as per the described schedule
- A training and certifying program for technicians in ODS user industries.

Table 19. Phase out Scenario in ODP Tonnes

Year	Annex A Group I	Annex A Group II	Annex B Group I	Annex B Group II	Annex B Group III	TOTAL
1986	114.0	19.9		0.0	22.5	156.4
1987	106.4	12.0		0.0	23.0	141.4
1988	92.1	9.9		0.6	24.0	126.6
1989	79.1	8.4		1.1	22.5	111.1
1990	77.7	21.5		1.1	22.8	123.1
1991	68.4	15.0		1.1	21.2	105.7
1992	63.7	16.0		1.2	20.5	101.4
1993	50.9	12.8		1.1	16.4	81.2
1994	37.9	9.6		0.6	12.3	60.4
1995	31.6	8.0		0.0	10.3	49.8
1996	27.5	6.0			6.2	39.7
1997	12.7	4.0			4.1	20.8
1998	0.0	0.0			0.0	0.0
1999						
2000						
2001						
2002						
2003						
2004						
2005						
2006						
2007						
2008						
2009						
2010						

Figure 19a. Phase-out Scenario for Annex A Group I Substances

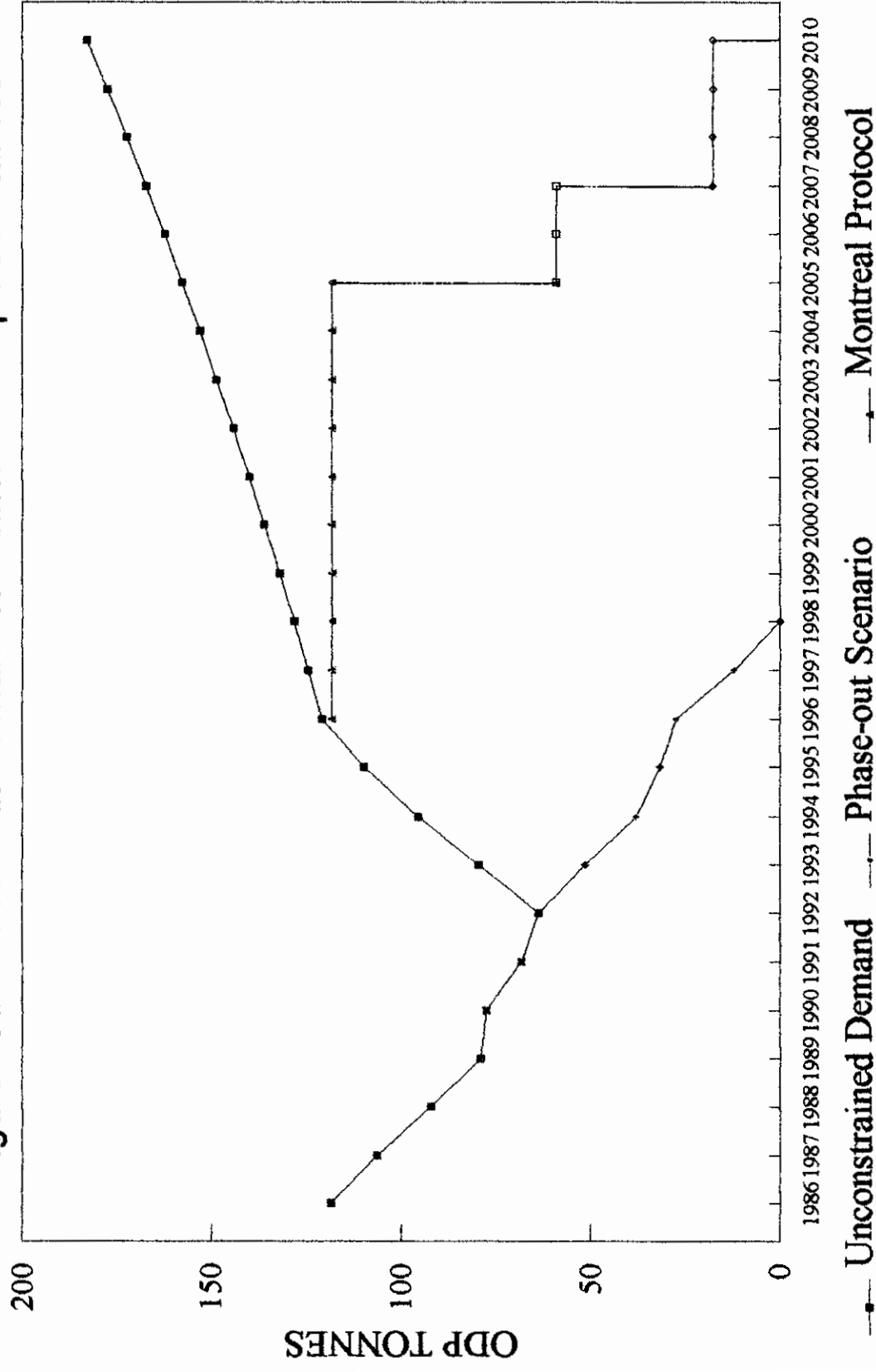


Figure 19b. Phase-out Scenario for Annex A Group II Substances

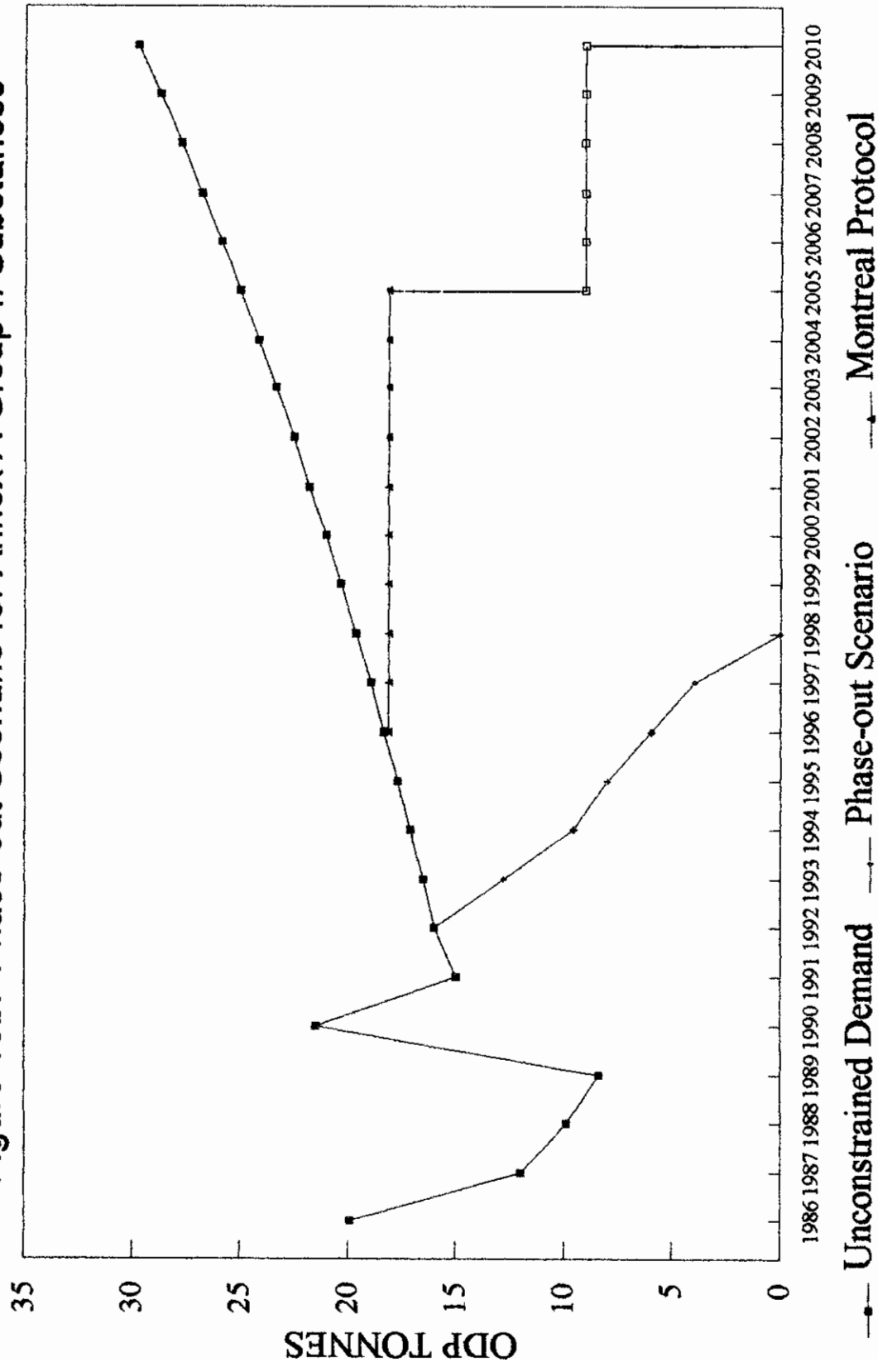
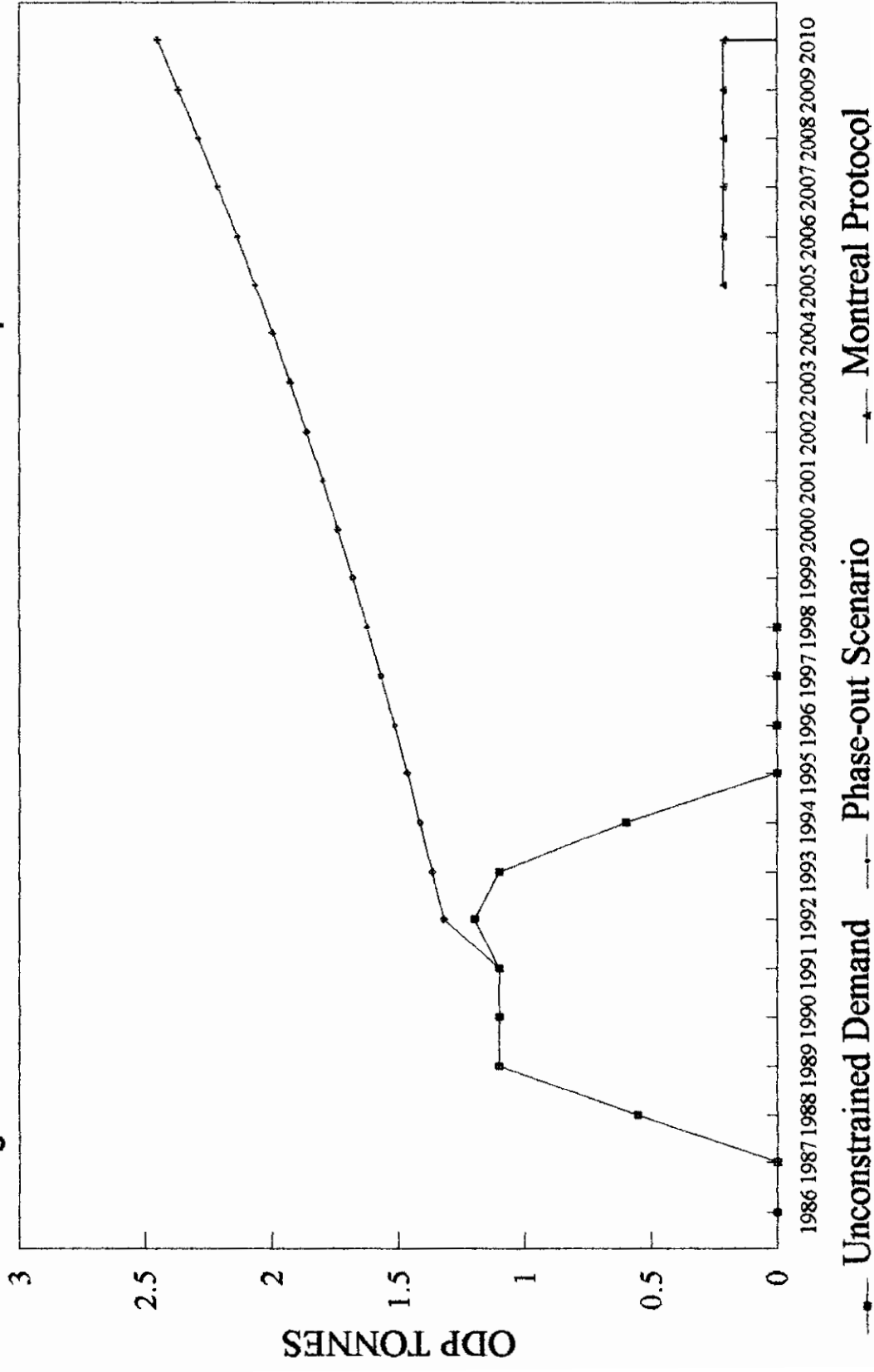


Figure 19 c. Phase-out Scenario for Annex B Group II Substances



NET INCREMENTAL COST TO THE CAMEROON ECONOMY AS A CONSEQUENCE OF THE MONTREAL PROTOCOL

3.3 The net incremental economic cost to the Republic of Cameroon for forced phase-out of ODSs is approximately 13 Million US \$ (1991) using a 10 % discount rate.

3.4 The primary conclusion drawn from this analysis is that a prompt ODS phase-out will be beneficial to the protection of the Ozone layer. The determination of reimbursement of costs for financing the projects proposed in this country programme is an issue for the Multilateral Fund Executive Committee to decide in accordance with the set criteria of the Montreal Protocol.

3.5 In order of importance to the economy of Cameroon, the following conclusions were also reached:

1) The most significant net incremental costs to Cameroon are those associated with the potential forced early replacement of domestic refrigerators when virgin CFCs will no longer be available for recharge. It is to be noted that replacement costs only apply to those refrigerators which would not be able to find CFC-12 for recharge. An early transition to refrigerant HFC-134a for domestic refrigerators will reduce the population of CFC-12 refrigerators in 2010, and hence reduce early replacement costs. The average age of the CFC-12 refrigerator population in 2010 was also a factor. In the absence of recycling of CFC-12 refrigerant, the average age of CFC-12 refrigerators is substantially decreased.

2) The incorporation of recycle/recovery into any phase-out case will have the effect of directly reducing ODS consumption. Its primary benefit will be to assure local supplies of CFC-12 for recharging refrigerators. Additional savings (not included) should be expected from applying recycle/recovery technology to the conservation of HFC-134a.

3) The incremental costs associated with the foam industry is negligible as compared to that in the refrigeration sector.

4) Capital requirements are as determined in the section on projects. It is estimated, that the total costs of investment projects for this country programme would be 3 510 258 US \$. Any delay in the timing of investments shall increase the economic cost to the country.

ACTION PLAN

3.6 The action plan also comprises two main elements. These are:

- i. the measures taken by the government to give a framework to the previous strategy; and
- ii. the various projects necessary to carry out the action plan

PLANNED GOVERNMENT MEASURES

3.7 The following are the actions that are planned by the Government:

- Creation of an Ozone Monitoring Commission (CNBO) that will be the focal point for all ozone related activities in Cameroon. This commission, which is comprised of representatives from the concerned ministerial departments and from industries using ODS, will be under the Ministry of the Environment and Forests, and will carry out the following tasks:
- Montreal Protocol follow-up and evaluation of implemented actions for ODS phase-out,

- Establishment of a network linking all the parties involved in the Montreal Protocol implementation,
- Disseminating information, so that all concerned may take action.
- Drafting and establishment of an appropriate legislation regulating imports and use of ODS

PROJECTS TO CARRY OUT THE ACTION PLAN

3.8 A summary of the projects that are included in the present country programme. Detailed project presentations are given in the annexes.

SUMMARY OF PROJECTS AND THEIR COST ESTIMATE

YEAR	PROJECT	SECTOR	EXPECTED OUTPUT	COST IN US \$
1993 - 96	OZONE TEAM	ALL	COORDINATION OF ALL ACTIVITIES	201 300
1993 - 96	TRAINING MAINTENANCE TECHNICIANS	REFRIGERATION	TRAINED TECHNICIANS IN SUBSTITUTE TECHNOLOGIES	138 500
1994	TRAINING OF CUSTOMS OFFICERS	PUBLIC SECTOR CUSTOMS	INTRODUCTION OF CONTROL SYSTEM	20 200
1993 - 96	CONVERSION OF FAEM	REFRIGERATION	ELIMINATION PROGRAM FOR CFC USE	3 150 258
TOTAL PROGRAMME	BUDGET			3 510 258

ANNEX I

FAEM TECHNOLOGY CONVERSION PROJECT

FAEM TECHNOLOGY CONVERSION PROJECT

1. TITLE OF REQUEST : FAEM TECHNOLOGY CONVERSION PROJECT

2. NAME OF COUNTRY : Republic of Cameroon

3. EXECUTING AGENCY : Ministry of the Environment and Forests

4. IMPLEMENTING AGENCY : UNEP

5. CONSUMPTION OF CONTROLLED SUBSTANCES: 103.8 ODP/TONNES (1991)

6. ESTIMATED BUDGET : 30 000 US \$

7. OBJECTIVES: Elaboration and technical assistance to FAEM in the preparation of an investment project.

8. SCOPE OF PROJECT :

FAEM, the domestic refrigerator company, is the only refrigerator, freezer and air conditioning manufacturer in the Republic of Cameroon. The company's production is for the local as well as neighboring countries that form a union.

The investment project will be developed in close collaboration with FAEM for the phse-out of CFC-11 and CFC-12.

The proposal shall include:

- * assessment of current technology and plant equipment,
- * assessment of technology option identified,
- * equipment specification, costing and installation programme, with a schedule for tests,
- * calculation of incremental costs,
- * specification of training programme for the smooth operation of the plant and the servicing technicians.

PRESENTATION OF THE FAEM-S.A COMPANY

DATE OF CREATION: November 1979

NATURE OF ITS ACTIVITY: Production of domestic appliances (Refrigerators, Freezers, Stoves, Cold storage chambers and Air-conditioners)

PRODUCTION

UNIT			
Air-conditioners			
Refrigerators	15 000	15 000	16 000
Freezers	25 000	25 000	27 000
Cold rooms	20 000	20 000	21 500
	100	120	200
Total	60 100	60 120	64 700

Company Promoter: Dr James Onobiono

Chief Executive Officer: Roland Bibaya

Capital: 482 Million FCFA (1.8 M US \$)

Total Investment: 2 100 Million FCFA (8 M US \$)

Registered Office: Douala, Cameroon

Legal Status: Public Limited Company

Staffing:

	n	n	T ta
Senior Executives and Executives	9	3	12
Supervisors	10	12	22
Employees and Workers	55	72	127
Total	74	87	161

ADDRESS: BP 1105 DOUALA

TELEPHONE: 37 68 84 / 37 68 93

FAX: 37 65 37

TELEX: 57 51 KN

BACKGROUND

The Household appliances and Air-conditioner Manufacturing Company (FAEM) was established in November 1979.

During the first two years it began assembling semi-knock-down kits of refrigerators, freezers and air-conditioners. As of the third year it started manufacturing at an integration rate of 60%. This enabled the company to manufacture, in its own facilities, 60% of refrigerator, freezer and air-conditioning parts.

FAEM S.A. has benefited both from technology transfers and technical assistance of large companies, French (Air Conditionné Entreprises), Italian (Pargest, which was later taken over by CANDY) and Dutch (Philips, which was taken over by the American Whirlpool).

Thanks to the permanent cooperation, under license, of Air Conditionné Entreprises and of Whirlpool Corporation, FAEM has gained, for more than ten years, full mastery of refrigerator, freezer, air-conditioning and chiller manufacturing process; it has a production capacity of 120 units per day and per manufacturing line and has the possibility of increasing the number of its production teams.

FAEM's production is aimed at the Central African sub-regional market (UDEAC). It includes a wide range of:

- | | |
|---|---|
| - refrigerators (5 types): | 155, 220 and 270 l (one door)
300 and 420 l (two doors). |
| - freezers (4 types): | 200, 300, 500 and 600 l |
| - Cold storage chambers (4 types negative, 4 types positive): | 16, 25, 30 and 43 m ² |
| - Air-conditioners: single mono-blocks, bi-block split systems
and central air conditioning units. | From 1 to 23 HP. |

The estimated market for the 1991-1992 period is as follows:

- | | |
|--------------------|--------|
| - Refrigerators | 40 000 |
| - Freezers | 40 000 |
| - Air-conditioners | 20 000 |
| - Cold rooms | 2 000 |

After sales service covers 70 000 units per year. In Cameroon's climatic environment the average life of this kind of appliance is of about 7 years. After 7 years, return for repairs can represent up to 10% or more of the existing appliances. In the past 12 years, the annual average consumption of the sub regional market has amounted to 100 000 units.

Imports represent 40% of the market. FAEM's production supplies the remaining 60%. After sales service of 70% of the marketed units is covered by FAEM.

As of 30/06/92, FAEM produced/repaired the following number of refrigeration and air conditioning units:

PRODUCTION

Refrigerators	25 000
Freezers	20 000
Air-conditioners	15 000
Cold storage chambers	100

REPAIRS (after sales service)

Refrigerators	22 000
Freezers	20 000
Air-conditioners	7 000
Cold storage chambers	50

As of 30 June 1992, the assessment in terms of volumes, of the potential market of household appliances in both Cameroon and the sub-region was:

Refrigerators	997 000
Freezers	880 000
Air-conditioners	540 000
Cold storage chambers	8 000

Beyond the present economic difficulties affecting the Countries of the sub-region, promising signs of economic recovery following implementation of the SAP, show that the household appliance market potential in the sub-region remains unchanged. As a result of the steady improvement of the economic situation, which will increase household revenues, as well as of the on-going rural electrification policy of the Country, the demand for household appliances is expected to recover and to continue to grow. The projections for this market are given in Table 16 and 17 of the Country Programme and shown on the following page. These tables show past present and projections to the year 2010 of the domestic appliance market.

DOMESTIC APPLIANCES MARKET IN CAMEROON (1986-1992)

Year	Refrigerators	Freezers	Total
1986	20000	15000	35000
1987	17051	13259	30310
1988	14274	15109	29383
1989	12452	13829	26281
1990	8692	8448	17140
1991	7933	8495	16428
1992	8500	8200	16700

PROJECTIONS FOR THE DOMESTIC APPLIANCES MARKET IN CAMEROON (1993-2010)

Year	Refrigerators	Freezers	Total
1993	10625	10250	20875
1994	12750	12300	25050
1995	14663	14145	28807
2000	18153	17512	35665
2005	21044	20302	41346
2010	24396	23535	47931

The following table gives statistical data on sub-region.

1991 STATISTICAL DATA FOR THE MEMBER COUNTRIES OF UDEAC

UDEAC Countries	1991 Population	GDP per capita (US \$)	Potential Market by volume	Real Market by volume
Cameroon	11 800 000	1 000	1 165 000	54 000
Gabon	1 250 000	3 000	126 000	18 000
Congo	2 200 000	900	220 000	11 000
C.A.R	2 950 000	400	295 000	8 000
Chad	5 650 000	200	550 000	6 000
Guinea	400 000	180	36 000	3 000
	-----		-----	-----
	24 250 000		2 392 0000	100 000

POTENTIAL MARKET IN THE REGION BY PRODUCT

References	Cameroon	Gabon	Congo	C.A.R	Chad	Guinea
Refrigerators	475 000	51 000	90 000	120 000	225 000	16 000
Freezers	430 000	45 000	80 000	110 000	205 000	10 000
Air-conditioners	260 000	20 000	50 000	65 000	125 000	10 000
Overall potential market	1 165 000	126 000	220 000	295 000	550 000	36 000

FAEM'S MARKET IN THE REGION BY PRODUCT

	Cameroon	Gabon	Congo	C.A.R.	Chad	Equa. Guinea	Total
Friges	24000	8500	5500	35000	3000	1500	46000
Freezers	23000	7500	4300	30000	2500	1200	41500
Air Cond.	7000	2000	1200	1500	500	300	12500
Demand	54000	18000	11000	67000	6000	3000	100000

The estimated FAEM production projections are as follows:

	1993	1994	1995	1996	1997	1998
Friges	25 000	25 000	25 750	26 500	27 300	28 120
Freezers	20 000	20 000	20 600	21 220	21 850	22 500
Air-con.	15 000	15 000	15 450	15 900	16 400	16 900
Cold chamb.	100	100	103	106	110	115
Total	60 100	60 100	61 903	63 726	65 660	67 635

	1999	2000	2001	2002	2003
Friges	29 120	28 120	28 120	28 120	28 120
Freezers	22 500	22 500	22 500	22 500	22 500
Air-con.	16 900	16 900	16 900	16 900	16 900
Cold chamb.	115	115	115	115	115
Total	67 635	67 635	67 635	67 635	67 635

TECHNICAL PRESENTATION OF THE PRODUCTION PLANT

PHYSICAL PRESENTATION

The plant has been built on a 15 000 m² site. The facilities include a well equipped 1000 m² steel plate workshop.

Cutting/shearing tools, presses, point welding, degreasing baths, surface treatment area for painting jobs, a heating and drying oven, constitute the bulk of the machinery.

This machinery feeds steel plates and exchangers to the five assembly lines:

- freezers
- refrigerators
- special air-conditioning units, central air conditioning units and cold storage chambers
- air-conditioning units
- stoves

A 7 000 m². building houses these facilities.

Freezers, refrigerators and chiller manufacturing lines appear to be environmentally unsafe, as showed in the following schematic description of their manufacturing process:

MANUFACTURING PROCESS PRESENTATION

Description of the manufacturing process

Phase one: Steel plate workshop

The following operations are carried out on the electro zincated or galvanized steel plates: cutting, punching, grutting, folding, welding, degreasing, surface treatment and painting, drying, as per the design plans of each component.

Exchangers undergo a drying process. The resulting components feed the different production lines.

Phase two: Manufacturing by panel pre assembly and Polyurethane foam injection, of refrigerator and freezer cabinet shells, and insulation panels for cold rooms.

The steel plate parts and the internal refrigeration piping are manufactured and pre assembled on gages. Assembly is carried out by application of the adhesive strips and by riveting. Hermetically is achieved by application of the by-adhesive and of the hot melt glue. The country obtains the panels for the cold rooms, the cabinets (case and doors) for the refrigerators and freezers.

These sub sets are introduced into the injection molds. A polyurethane foam injection machine on each production line allows the precise quantity of foam to be injected. This gives the different units the required rigidity and thermal insulation properties.

The formula for the polyurethane foam is generally of 140 parts isocyanate, 100 parts polyol and 34 parts CFC-11, by weight . These chemicals are automatically mixed in precisely defined proportions and temperature specifications. The homogenous liquid mixture is injected into the molds. The mixture is then allowed to expand and solidify. Rigid polyurethane foam is thus obtained.

This phase requires CFC-11 as an expansion agent. This also harms the environment. 30 molds for the cases and doors, 3 injection machines and a fork lift for handling and storage are included in this section.

At this stage the density of the foam is controlled and its shrinkage at - 30°C.

Phase three: Assembly

Refrigerator and freezer cabinets are fitted with a series of accessories: compressor, condenser, evaporator for one door units, dehydrator, thermostat, etc.

Soldering of the refrigeration wiring and circuitry is also carried out.

The following process is evacuation of the units and charging them with CFC-12.

Dielectric, insulation, foam continuity and power tests are also carried out. As well as temperature drop, CFC-12 leak detection tests and packaging.

As for refrigeration units for cold rooms, the above parts are mounted on a welded or bolted frame. The process is basically the same.

As far as the CFC-12 refrigerant is concerned, each line is equipped with a 2200 gram DANFOSS type charging machine with 3 electronic leak detectors for CFC-12.

This presentation is limited to the assembly lines that represent a risk for the environment.

PROJECT PRESENTATION

A OBJECTIVE

This project aims at:

- a) The complete phase out of CFC-11 and CFC-12 in the workshops for the manufacturing process; acquiring new technologies and using new substitutes .
- b) Recovery and recycle of CFC-12 in the units sold and serviced by the company.
- c) Preparation of joint actions including other household appliances distributors in order to incorporate within the ecological program the household appliances repairmen of the informal sector.
- d) Use of substitutes.

To replace CFC-11 the company could use the following chemical products:

- 1 - H2O/CO2
- 2 - HCFC-22, HCFC-142, HCFC-123, HCFC-141
- 3 - HFC-134a, HFC-152a, HFC-356
- 4 - C5F12, C6F14
- 5 - C5H12

Even though toxicology test results are to be confirmed, the company can replace CFC-12 by using:

- 1 - HFC-134a
- 2 - NH3 (ammonia)

The only drawback with ammonia is its toxicity under certain conditions. In the USA and Canada, ammonia is used five times as much as other refrigerants. In Europe they are equally popular according to DANFOSS, who are working towards the renaissance of this ecological refrigerant.

The company is presently waiting for further information about a new product called SUVA developed by Du Pont de Nemours in 1991. The company understands that this chemical might be used as a refrigerant for freezers, refrigerators and mobile air conditioners.

BASIC DATA

a. CFC consumption

The company has estimated the following average consumption:

- 180 g of CFC-12 for initial charge of a refrigerator or freezer
- 4 000 g of CFC-12 for initial charge of a chiller
- 1 000 g of CFC-11 for the polyurethane foam insulation of a unit.
- 6 000 g of CFC-11 for the panels chillers.

b. Market

Based on market demand data, FAEM's production, the number of repaired units in FAEM's servicing network and the informal sector, the project will allow phase out of the following amounts of CFCs:

- 1 - phase out in the manufacturing process of
 - 8 500 kg of CFC-12 per year
 - 45 600 kg of CFC-11 per year
- 2 - recovery, processing and possible recycle of 7 760 kg of CFC-12 per year during repairs in FAEM's distribution and servicing network.
- 3 - recovery, processing and possible recycle of 1 552 kg minimum of CFC-12 per year during repairs in the informal sector

According to the company's estimate, the CFC-12 that the informal sector consumes is equivalent to 20% of repairs carried out by FAEM's servicing network.

ESTIMATE OF RETROFITTING COSTS

In order to bring the company's units up to ecological standards for the complete phase out of CFC-11 and CFC-12, investments, for the above plant, are as follows:

New equipment required for a CFC-11 to HCFC-123 conversion

3 injection machines and parts	78 115 000 FCFA	294 966 US \$
1 testing laboratory for:	45 149 000 FCFA	170 502 US \$
thermal conductivity		
rigidity		
foam shrinking		
1 complete PC computer and associated software for the design and calculations of refrigeration systems and simulation of their behavior under different climatic conditions.	16 535 000 FCFA	62 443 US \$
TOTAL:	139 799 00 FCFA	527 941 US \$

New equipment for the transition period management

One complete recovery and processing system including containers etc. for recovery and reuse of CFC-12 in recovered or warranted equipment, either at the plant or within the distribution network	66 000 000 FCFA	249 245 US \$
One laboratory for refrigerant fluid analysis	25 000 000 FCFA	94 411 US \$
TOTAL:	91 000 000 FCFA	343 655 US \$

New equipment required for CFC-11 to HCFC-124 conversion

- 3 charging stations	45 000 000 FCFA	169 940 US \$
- 3 electronic leak detectors	21 500 000 FCFA	81 193 US \$
- 5 leak calibrators	1 500 000 FCFA	5 665 US \$
- 1 long term testing bench for climate and tropicalization tests	38 000 000 FCFA	143 505 US \$
TOTAL	106 000 000 FCFA	400 302 US \$

Required modifications to the production facilities

Modifications to existing production facilities and equipment for a CFC-11 to HCFC-123 conversion:

- Modification of the dimensions of the 30 moulds. This requires machining and treatment of the cores and conformity tests.	182 000 000 FCFA	687 311 US \$
- Masonry work, floor coating following reinstallation of the moulds	30 000 000 FCFA	113 293 US \$

- Installation in important trade centers of the Country, such as Yaounde, Bafoussam, Bamenda, Garoua, Maroua, etc., of CFC-12 recovery, storage and reuse stations as part of the distribution and after sales service network.

Equipment cost	13 500 000 FCFA	50 982 US \$
Installation	7 100 000 FCFA	26 813 US \$
Training of local personnel	2 500 000 FCFA	9 441 US \$
Total	235 100 000 FCFA	887 840 US \$

Training of FAEM personnel

The objective of this training is in the use of this new technology and its maintenance.

The training will be carried out in two phases:

- phase one consists in sending a four-people team to be trained during 6 months in the company's partners' plants.
- phase two will be carried out in the company's facilities. The technical partners will send specialists for new technology transfer, as well as training of production and maintenance staff.

The staff to be trained abroad include 2 engineers and 2 technicians highly qualified. Costs are budgeted as follows:

--- Training abroad of FAEM staff

56 954 000 FCFA	294 966 US \$
-----------------	---------------

--- Installation of equipment for manufacturing polyurethane foams, of a laboratory for measures and tests and technical assistance over a 6-month period requires 1 expatriate:

25 500 000 FCFA	96 299 US \$
-----------------	--------------

--- Installation of equipment for CFC-12 recovery, treatment, storage and possible reuse.

--- Installation of a laboratory for monitoring refrigerant fluid properties, as well as the environment

--- Set-up and follow-up of the installation

The above requires the presence of an expatriate expert for 6 months

25 500 000 FCFA	96 299 US \$
-----------------	--------------

Details on training costs are given below:

Technical expert cost:

- One round-trip plane ticket	688 300 FCFA	2 599 US \$
- Rent. 250 000 FCFA x 6 month	1 500 000 FCFA	5 665 US \$
- Rental of Vehicle	3 000 000 FCFA	11 329 US \$
- Expert's per diem	9 000 000 FCFA	33 988 US \$
- Fee of the technical partner	11 311 700 FCFA	42 718 US \$
Total	25 500 000 FCFA	96 299 US \$

Cost for training abroad of FAEM staff

- Four round-trip plane tickets	2 754 000 FCFA	10 400 US \$
- Per diems for missions		
75,000 FCFA x 4 x 180 days	54 000 000 FCFA	203 927 US \$
- Expenses for shipping documents	200 000 FCFA	755 US \$
TOTAL	56 954 000 FCFA	294 966 US \$

TECHNICAL ASSISTANCE

Beyond the six-month technical assistance contract, the visit of an expert mandated by the company's technical partners is expected every 4 months during 3 years, and once a year afterwards, each visit lasting 2 weeks. As a whole there will be 11 visits in 5 years.

Total cost of the technical assistance visits (9 000 000 FCFA per year)

49 500 000 FCFA	186 933 US \$
-----------------	---------------

--- Purchase of a license allowing supply and installation of CFC-12 recovery and recycling equipment for informal sector technicians:

14 000 000 FCFA	52 870 US \$
-----------------	--------------

FUND

--- Revolving fund for CFC destruction and/or purchase of the first quantities of substitutes including tests for measuring their adaptability to the local climatic environment; 2.5 months of manufacturing are necessary:

15 000 000 FCFA 56 646 US \$

The company's technical partners in this project are:

1 - PHILIPS WHIRLPOOL

2 - DOW - CHEMICAL

3 - DANFOSS SARL

4 - ICI

The first three potential partners are the company's suppliers.

Given the annual number of refrigeration units that FAEM either manufactures or services, and taking into account the overall estimated investment necessary to bring the production unit up to ecological norms which will permit the phase out of CFC-11 and CFC-12, the per unit treatment cost is estimated at 9 500 FCFA (39.58 US \$) for the first year, 4 780 FCFA (19.92 US \$) for the second year and 3 200 FCFA (13.33 US \$) for the third year. From the fifth year onwards this cost becomes zero. It should be noted that these retrofit costs do not take into account the increase of market size nor the cost of products.

On the other hand, if one introduces the market growth parameter at 3 % the per unit cost for retrofitting the production facilities becomes zero from the third year onwards.

SUMMARY TABLE OF COSTS FOR THE FAEM PROJECT

Cost element	Cost in FCFA x 1000	Cost in US \$
A. Equipment for CFC-11 to HCFC-123 Conversion		
A1. 3 injection units incl. spare parts	78 115	294 966
A2. Laboratory equipment	45 149	170 502
A3. Computing equipment	16 535	62 443
A sub total	139 799	527 942
B. Equipment for management of transition		
B1. Recovering equipment	66 000	249 245
B2. Lab equipment	25 000	94 411
B sub-total	91 000	343 656
C. Equipment for CFC-12 to HFC-134a		
C1. 3 Charging stations	45 000	169 940
C2. 3 Leak electronic detectors	21 500	81 193
C3. 5 Leak standards	1 500	5 665
C4. Test bench	38 000	143 504
C sub-total	106 000	400 302
D. Modifications to Production Facilities		
D1. Modifications to moulds	182 000	687 311
D2. Foundation and other work for mould installation	30 000	113 293
D3. Recovery equipment for the cities of Yaounde, Bamenda, Garoua, Maroua and Bafoussam	13 500	50 982
D4. Installation of recovery equipment	7 100	26 813
D5. Training of local personnel	2 500	9 441
D. Sub-total	235 100	887 840
E. Training of Personnel		
E1. Training abroad	56 954	294 966
E2. Technical Assistance	25 500	96 299
E3. Laboratory expert	25 500	96 299
E. Sub-total	107 954	407 681
F. Technical Assistance		
F1. 11 visits by an expert	49 500	186 933
G. Licenses and Patents	14 000	52 870
H. Operating funds cost of substitutes for CFC-11 and 12 for 2.5 months of production	15 000	56 647
Sub- Total for project	758 353	2 863 871
Contingencies 10 %	75 835	286 387
Grand total	834 188	3 150 258

ANNEX II

OZONE MONITORING COMMISSION

(CNBO) PROJECT

OZONE MONITORING COMMISSION

(CNBO) PROJECT

GENERAL

1. TITLE OF REQUEST : Creation of an Ozone Monitoring Commission
2. NAME OF COUNTRY : Republic of Cameroon
3. EXECUTING AGENCY : Ministry of the Environment and Forests
4. IMPLEMENTING AGENCY : UNEP
5. CONSUMPTION OF CONTROLLED SUBSTANCES: 103.8 ODP/TONNES (1991)
6. ESTIMATED BUDGET : 201 300 US \$

7. OBJECTIVES:

This commission would be responsible for the evaluation, coordination and supervision of all Government actions and the projects. For the first five years (1993-1997) of the programme, the commission would operate with two professionals and four assistants. A consultant from abroad may also be needed. The responsibility of the commission would be as follows:

- A. To monitor the commitments made by the Government as described in this country programme
- B. To supervise a public awareness programme
- C. To communicate with the Montreal Protocol and other agencies
- D. To provide the industries with the latest information on the substitution of ODSs
- E. To provide the industries with the latest technologies in other parts of the world
- F. To propose an action plan for the period following the one covered by the present Country Programme
- G. To evaluate potential applicants for specific training programmes
- H. To organize and conduct seminars
- I. To investigate application of Montreal Protocol problems with industries
- J. To supervise the operations of transition in the different industry sectors
- K. To monitor the collection of the latest information on import of ODSs and its use in the country.

8. SCOPE OF PROJECT : Covers all sectors within the country

9. JUSTIFICATION :

A. The lack of awareness of the phenomenon of stratospheric ozone depletion and the potential impact on humanity as well as technical and scientific issues regarding the protection of the ozone layer in general, and in using ODS substitute technology in particular.

B. To assist the institutional infrastructure in dealing with issues covering phase-out of the ODSs.

C. The commitment to earlier ODS phase-out schedules than under the Protocol.

10. BENEFICIARIES OF THE PROJECT: Consumers of ODS.

11. STRUCTURE AND MANAGEMENT:

The Ozone Monitoring Commission will be responsible for the implementation of the Montreal Protocol and the Country Programme. The Ministry of the Environment and Forests shall be responsible for this commission.

The Commission will be responsible for the following:

monitoring the commitments made by the government as stated in this country programme

supervise public awareness programmes

communicate with the Montreal Protocol and other agencies

provide the industries with the latest information on substitution of ODSs

provide the industries with information on the latest technologies in other parts of the world

propose an action programme for the period following the one covered by the present country programme

evaluate potential applicants for training

conduct seminars

investigate problems with industries regarding ODS substitute

supervise the transition to ODS substitution in industry

monitor the gathering of the latest information on import of ODSs and its use in the country.

12. ESTIMATED BUDGET : 201 300 US \$

The budget covers the following:

1. CAPITAL EXPENDITURE FOR A 3 YEAR PERIOD

THIS INCLUDES:

COMPUTER WITH DISK DRIVE, MONITOR,
PRINTER AND SOFTWARE
PHOTOCOPIER
TYPE WRITER
FAX MACHINE

2. RECURRENT EXPENDITURE

2 PROFESSIONAL STAFF
4 SUPPORTING STAFF

3. OPERATIONAL COSTS

TELECOMMUNICATIONS
OFFICE SUPPLIES

TOTAL US \$ 201 300

13. EXPECTED OUT PUTS

- * Preparation of Country Programme for period following that covered by present country programme**
- * Monitor progress of implementation of actions within the country programme to phase out ODSs and report to the Multilateral Fund**
- * Submit annual accounts of expenditure on the institutional support activities**
- * Collect and process local data**
- * Exchange relevant information with other countries**
- * Disseminate information to local end-users on the ODS phase-out**
- * Facilitate access of local entrepreneurs to expertise.**

ANNEX III

TRAINING IN THE REFRIGERATION AND AIR CONDITIONING SECTOR

TRAINING OF TECHNICIANS, OTHER THAN FAEM PERSONNEL, IN THE REFRIGERATION AND AIR CONDITIONING SECTOR

GENERAL

1. TITLE OF REQUEST : Training of technicians, other than FAEM personnel, in the refrigeration and air conditioning sector

2. NAME OF COUNTRY : Republic of Cameroon

3. EXECUTING AGENCY : Ministry of the Environment and Forests

4. IMPLEMENTING AGENCY : UNEP

5. CONSUMPTION OF CONTROLLED SUBSTANCES: 103.8 ODP/TONNES (1991)

6. ESTIMATED BUDGET : 138 500 US \$

7. OBJECTIVES:

Training of technicians who repair household refrigerators in proper repair procedures and techniques. The project will encompass the use of drop in substitutes, recovering and recycling of CFC-12 as well as new technologies.

8. SCOPE OF PROJECT : Covers refrigerator repair technicians other than FAEM technicians within the country

9. JUSTIFICATION :

The lack of awareness of proper repair procedures and in using ODS substitute technology in particular.

10. DETAILED BUDGET

The table on the following page gives an estimate of the budget requirements.

YEAR	NUMBER OF WORKSHOPS	DURATION	NUMBER OF PARTICIPANTS	SECTOR	EXPECTED OUTCOMES	COST IN US \$
1993	1	1 WEEK	60 MAINTENANCE TECHNICIANS 40 FROM INFORMAL SECTOR AND 20 FROM FORMAL SECTOR	REFRIG/ AIR CON.	TRAINING IN NEW TECHNOLOGIES AND SUBSTITUTES	27 700
1994 1 st quarter	1	1 WEEK	60 MAINTENANCE TECHNICIANS 40 FROM INFORMAL SECTOR AND 20 FROM FORMAL SECTOR	REFRIG AIR CON.	TRAINING IN NEW TECHNOLOGIES AND SUBSTITUTES	55 400
2 nd quarter	1	1 WEEK				
1995 1 st quarter	1	1 WEEK	60 MAINTENANCE TECHNICIANS 40 FROM INFORMAL SECTOR AND 20 FROM FORMAL SECTOR	REFRIG AIR CON.	TRAINING IN NEW TECHNOLOGIES AND SUBSTITUTES	55 400
2 nd quarter	1	1 WEEK				
TOTAL						138 500

ANNEX IV

TECHNICAL ASSISTANCE IN THE CUSTOMS DEPARTMENT

TECHNICAL ASSISTANCE TO CUSTOMS OFFICERS

GENERAL

1. TITLE OF REQUEST : Technical assistance to the customs officers
2. NAME OF COUNTRY : Republic of Cameroon
3. EXECUTING AGENCY : Ministry of the Environment and Forests
4. IMPLEMENTING AGENCY : UNEP
5. CONSUMPTION OF CONTROLLED SUBSTANCES: 103.8 ODP/TONNES (1991)
6. ESTIMATED BUDGET : 20 200 US \$
7. OBJECTIVES: Training of customs officers in identification of ODS and in classification of imports according to the Brussels Harmonized System (BHS).
8. SCOPE OF PROJECT : Covers training of customs officers
9. JUSTIFICATION :
- The lack of awareness of proper identification of ODS and their classification according to the BHS.

10. DETAILED BUDGET:

YEAR	NUMBER OF WORK SHOPS	DURATION	NUMBER OF PARTICIPANTS	SECTOR	EXPECTED OUTCOMES	COST IN US \$
1994	1	1 WEEK	50 CUSTOMS OFFICERS	PUBLIC	DEVELOPMENT OF A CONTROL STRUCTURE FOR IDENTIFICATION AND CONTROL OF CFC ENTRANCE INTO CAMEROON	20 200

ANNEX V

COST OF COUNTRY PROGRAMME

SUMMARY

This annex gives a summary of the costs of the Country Programme for Cameroon.

Although Cameroon is a country that consumes low amounts of ODS, the country has a manufacturing facility for refrigerators and freezers. This facility operates under license. The private sector facility itself is in Douala. The company exports refrigerators and , freezers and air conditioning units to UDEAC, the Central Africa Economic and Customs Union. The countries included in this union are:

Cameroon, Congo, Gabon, Equatorial Guinea, Central African Republic, and Chad.

The conversion of FAEM is the most economic and efficient. It allows for recycling while repairing the units in operation. In 1992 these are 300 000 refrigerators and 290 000 freezers.

The following table gives the estimated costs for the conversion of FAEM facility.

Cost	Cost in FCFA	Cost in US \$
Conversion of existing installations using substitute refrigerants	270 799 000	1 022 655
Training of personnel in new technologies	56 954 000	215 083
Conversion of existing equipment	212 000 000	800 604
Technical Assistance	100 500 000	379 532
Licenses and patents costs	14 000 000	52 870
Costs for new chemicals	15 000 000	56 647
Cost of recycling of personnel	2 500 000	9 441
CFC-12 Recovery and recycling	86 600 000	327 039
SUB-TOTAL	758 353 000	2 863 871
Contingencies (10 %)	75 835 300	286 387
GRAND TOTAL FOR PROJECT	834 188 300	3 150 258

SUMMARY OF PROJECT COSTS

YEAR	PROJECT	SECTOR	EXPECTED OUTPUT	COST IN US \$
1993 - 96	OZONE TEAM	ALL	COORDINATION OF ALL ACTIVITIES	201 300
1993 - 96	TRAINING MAINTENANCE TECHNICIANS	REFRIGERATION	TRAINED TECHNICIANS IN SUBSTITUTE TECHNOLOGIES	138 500
1994	TRAINING OF CUSTOMS OFFICERS	PUBLIC SECTOR CUSTOMS	INTRODUCTION OF CONTROL SYSTEM	20 200
1993 - 96	CONVERSION OF FAEM	REFRIGERATION	ELIMINATION PROGRAM FOR CFC USE	3 150 258
TOTAL PROGRAMME	BUDGET			3 510 258

COST OF ELIMINATION OF ODS 33.8 US \$ / KG ODP