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Implementation of the Montreal Protocol

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Corrigendum

COUNTRY PROGRAMME: CUBA

This document consists of:

- a) Country Programme;
- b) Country Programme Evaluation Sheet (prepared by the Fund Secretariat);
- c) Country Programme Cover Sheet (prepared by the Fund Secretariat).

CUBA COUNTRY PROGRAMME EVALUATION SHEET

The Cuba Country Programme was revised in accordance with the "Procedures for Presentation of Country Programmes and Project Proposals to the Executive Committee" (UNEP/OzL.Pro/ExCom/5/5/Rev.2). It consists of:

- Letter of transmittal from the Government of Cuba;
- Country Programme Cover Sheet;
- Executive Summary;
- ODS consumption, forecast demand for ODS, industrial infrastructure, institutional and policy frameworks;
- National strategy, action plan and project proposals;
- Implementation of the first phase of the country programme (1993-1996) through:
 - i) institutional strengthening, and
 - ii) programmes in the industrial sector.

Cuba does not produce controlled substances. Between 1986 and 1990, the country's average annual consumption of ODS, including CFC, halons and carbon tetrachloride, was 995 tonnes. However, due to the economic situation in Cuba, in 1991 the total amount of ODS consumed was estimated at only 328.2 tonnes. Of this amount, 327.8 tonnes were CFC (mainly CFC-12) and 0.4 tonnes halons. Distribution of ODS per sector, in 1991, was estimated as follows:

- 93.4 per cent in the refrigerator sector (89.4 per cent in domestic and commercial refrigeration and 4.0 per cent in air conditioners);
- 5.2 per cent in aerosols for essential uses;
- 1.3 per cent in the solvent sector; and
- 0.1 per cent for fire extinguishers.

All CFC consumed in Cuba are used for servicing the refrigerator equipment, consisting of two million domestic refrigerators, 1.2 million air conditioning units and several thousand industrial freezers. While several units have already overpassed their life-time, CFC leakage is frequently presented.

The Government of Cuba proposes to eliminate 35 per cent of its ODS consumption between 1993 and 1996, by implementing training programmes for servicing technicians in the refrigerator sector. The remaining 65 per cent of ODS consumed, will be phased-out by the year 2010.

The Government's action plan is based on the following five actions:

1. Establishment of an appropriate regulatory framework to strengthen the actions proposed in its country programme;

2. Development of technical programmes by sector (i.e., training, recycling);
3. Analysis of existing infrastructure, providing the incremental cost estimates for using non-ODS technologies;
4. Establishment of an education and awareness programme; and
5. Creation of the National Group for the Implementation of the Montreal Protocol and the Technical Ozone Office (OTOZ).

The implementation of the first phase of the action plan is based on the following nine projects, at a total estimated incremental cost of US \$498,000:

1. Establishment of the Ozone Technical Office (institutional strengthening) (US \$122,000);
2. Public awareness programme (US \$56,000);
3. Training programme on extinguishing with alternative substances (US \$30,000);
4. Adaptation of domestic, industrial and commercial refrigerators to use alternative substances (US \$48,000);
5. Recovery, reclamation and recycling of CFC in the refrigeration sector (US \$109,000);
6. Adaptation of technologies for industrial and commercial refrigeration (US \$29,000);
7. Feasibility study for the conversion of air conditioning equipment in the public health sector (US \$33,000);
8. Feasibility study for the conversion of air conditioning equipment in the tourism sector (US \$23,000);
9. International technical assistance during the implementation of the first phase of the country programme (US \$40,000);
10. Contingency (US \$8,000).

OTOZ, the technical unit within the National Group for the Implementation of the Montreal Protocol, will co-ordinate proposed activities in the action plan and all of its agreements; will provide technical assistance to the Ministries related to the Montreal Protocol; will propose necessary changes in the legislation; will co-ordinate the training programmes and awareness campaigns; and will stimulate voluntary agreements among industries.

Recommendations

The following recommendations are made for the consideration of the Executive Committee:

1. Approval of the country programme;
2. Approval of funding level of US \$172,000 for the institutional strengthening programme, including the establishment of the Ozone Technical Office (OTOZ) and the public awareness programme. The activity is to be included as amendment to UNDP's work programme;
3. To request UNDP to collaborate with the Government of Cuba to further develop the first phase projects and include them in its future work programme or work programme amendment.

COUNTRY PROGRAMME COVER SHEET

Country: Cuba

Lead National Agency: Ozone Technical Office (OTOZ)

Participating Implementing Agencies: UNDP

Phase-out schedule

Substance	Current consumption (tons x ODP) in 1991	Planned cumulative consumption till phase-- out (ton x ODP)		Planned year of phase-out	
		Article 5 schedule (1)	Accelerated schedule (2)	Article 5 schedule	Accelerated schedule
CFC-11	14.6 x 1.0 = 14.6	221.0	118.1	2010	2010
CFC-12	309.0 x 1.0 = 309.0	4,701.0	2,478.0	2010	2010
CFC-114	4.2 x 1.0 = 4.2	63.2	33.6	2010	2010
Halon 1211	0.2 x 3.0 = 0.6	9.5	8.0	2010	2010
Halon 1301	0.3 x 10.0 = 3.0	41.3	24.5	2010	2010
TOTAL	331.4	5,036.0	2,662.2		

(1) Projected at an annual rate of 3.0 per cent through the year 2010.

(2) 35 per cent of ODSs will be phased-out in 1993-1996. The remaining 65 per cent will be phased-out in 1996-2010.

Government Action Plan

Year	Description of Action	Intended Effect	Sector	Estimated cost (US \$)			
				1993	1994	1995	Total
I. INSTITUTIONAL STRENGTHENING							
1993-1995	Establishment of the Ozone Technical Office (OTOZ)	Co-ordination, control, technical support	All	50,000	36,000	36,000	122,000
1993-1995	Public awareness programme	Create awareness in different sectors of the society on the impacts due to depletion of the ozone layer	All	26,000	15,000	15,000	56,000
	Sub-total cost			76,000	51,000	51,000	178,000
II. INDUSTRIAL SECTOR ACTIVITIES							
1993	Training programme on extinguishing with alternative substances	Extinguishing facility. Training	Halon	12,000	18,000		30,000
1993-1994	Adaptation of domestic, industrial and commercial refrigerators to use alternative substances	Training in using alternative chemicals (LPG, hydrocarbon mixtures)	Refrigeration	40,000	8,000		48,000
1993-1994	Recovery, reclamation and recycling of CFC in the refrigeration sector	Training in using CFC recovery equipment for domestic, commercial and industrial refrigeration	Refrigeration	83,000	26,000		109,000
1993-1994	Adaptation of technologies for industrial and commercial refrigeration	Training in using alternative chemicals	Refrigeration	20,000	9,000		29,000
1993-1994	Feasibility study for the conversion of air conditioner units in the public health sector	Feasibility study	Refrigeration	29,000	4,000		33,000
1993-1994	Feasibility study for the conversion of air conditioner units (tourism sector)	Feasibility study	Refrigeration	15,000	8,000		23,000
1993-1994	International technical assistance	Technical assistance	All				40,000
1993-1995	Contingency			199,000	73,000		320,000
	Sub-total cost			275,000	124,000	51,000	498,000
	TOTAL COST						

Project Summary

Year	Type of Project	Project Description	Agency (1)	Project cost (US\$)
1993–1995	Institutional strengthening	Establishment of appropriate institutional framework, and public awareness programme	UNDP OTOZ	178,000
1993–1994	Industrial sector activities	CFC recovery and recycling in refrigerator equipment; training in using alternative chemicals in refrigerator equipment; extinguishing facility and training	OTOZ	272,000
1993–1994	International technical assistance	Technical assistance during implementation of the country programme		40,000
1993–1995	Contingency			8,000
Total cost				498,000

(1) OTOZ: Ozone Technical Office

The Government of Cuba proposes to eliminate 35% of its ODS consumption between 1993 and 1996. The remaining 65% of ODS consumed, will be phased-out by the year 2010.

CUBA

IMPLEMENTATION OF THE MONTREAL PROTOCOL

NATIONAL PROGRAMME FOR THE GRADUAL REDUCTION OF THE CONSUMPTION OF SUBSTANCES THAT DEplete THE OZONE LAYER

**National Commission for the Protection
of the Environment and Rational Use of
Natural Resources**

COMARNA

**Havana
March 1993**

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EXECUTIVE SUMMARY

The Government of Cuba, demonstrating its firm intention to put an end to the consumption of substances damaging to the ozone layer, acceded to the Vienna Convention and the Montreal Protocol on 14 July 1992 and ratified it on 12 October 1992.

Cuba is operating under the status of Art. 5, paragraph 1, as a country eligible to receive financing from the Multilateral Fund of the Montreal Protocol.

The report submitted establishes the requirement of US\$ 0.5 million to finance the initial years of the Programme (1993-1996). A 35 per cent reduction is expected as a result of implementation under of this first stage of the Programme. Such a reduction is equivalent to approximately 100 metric tons.

In accordance with the format for country programme preparation issued by the Executive Committee, this report describes Cuba's consumption of controlled substances, the best estimates of their use and the proposed programme to reduce them progressively, in accordance with the commitments undertaken in the Protocol.

The year 1991 was taken as a base. During that year, Cuba consumed 328.31 metric tons of ODS (ozone-depleting substances), equivalent to an ODP (ozone-depleting potential) of 331.43 tons.

Out of this total, 4.04 per cent is CFC-11, 93.2 per cent CFC-12, 1.2 per cent CFC-114, 0.19 per cent Halon-1211, and 0.9 per cent Halon-1301. Cuba produces none of the substances listed in Annex A of the Montreal Protocol; therefore its consumption requirements correspond to its imports.

Because of Cuba's economic situation, imports do not reflect the quantity of ODS that would be imported if foreign exchange was available for that purpose. The use of air conditioning and refrigeration equipment in hospitals and the use of ODS as solvents in companies has now been halted because of the current energy deficit, but under normal conditions consumption would be between 900 and 1200 metric tons.

From 1986 to 1991, the major uses in Cuba were in refrigeration and air conditioning maintenance, as solvents, and a small percentage in aerosols, basically for essential uses (medical).

Cuba does not manufacture any type of flexible or rigid foam, nor does it manufacture mattresses or slippers, products which take foam; its refrigerator production level is low.

A percentage of the use of ODS in services above the usual

indicators of replacement and maintenance is due to technical failures suffered by the equipment and the low level of training of the maintenance specialists, combined with the lack of adequate machinery and spare parts. A considerable amount could be saved through better use of this equipment. This element has been taken into account in preparing the programme.

In 1991, the distribution by use was as follows:

Aerosols	17.05 tons
Refrigeration	293.59 tons
Solvents	4.20 tons
Air conditioning	13.00 tons
Extinguishers	0.47 tons

The refrigeration sector is the major consumer of ODS in Cuba. While the domestic refrigeration sector used 3.00 tons of CFC-11 and 43 tons of CFC-12, the commercial refrigeration sector used 6.6 tons of CFC-11 and 37 tons of CFC-12.

A case to be considered is the use of carbon tetrachloride as a solvent. Over the past five years, consumption trends had averaged 92.67 metric tons annually. In the base year used, 1991, imports of CCL4 were zero. However, this does not correspond to the use of that substance. Currently, other solvents are being used with zero ODP, and CC14 has not been imported for three years.

The collection of data on imports and consumption (see Annex) was carried out by COMARNA (National Commission for Environmental Protection and Rational Use of Natural Resources) staff in consultation and cooperation with the Ministry of the Interior, the Ministry of Domestic Trade, the Refrigeration and Air Conditioning Institute and the State Committee on Supply of Technical Materials.

The import figures are highly reliable; however, in the area of usage the best possible estimates have been made, in view of the fact that not all that information was available in a centralized form. This best estimate was based on consultations and interviews, in addition to existing information and data.

From an institutional standpoint, Cuba has an organization devoted to environmental issues established in 1977, COMARNA, under the supervision of the Council of Ministers. It is also closely linked with the Academy of Sciences. COMARNA has an organizational structure including all 14 provinces of Cuba.

In order to ensure the implementation of this initial stage of the country programme, and assist Cuba to meet the phase-out provisions of the Protocol, it was deemed necessary to establish an institutional technical structure that would allow the greatest amount of flexibility and least bureaucracy in project execution.

According to the current political and administrative system in Cuba, at this initial stage, programme coordination, monitoring and administration would be the duty of a team of 2 engineers from the **Ozone Technical Office (OTOZ)**, with adequate infrastructure for implementation of its operations provided by the Fund of the Montreal Protocol. The team would provide the technical support necessary for the decisions taken by the **National Group on the Implementation of the Montreal Protocol**, made up of various organizations and institutions in related fields, and at the same time, they would suggest and/or recommend initiatives to the national implementation group, which is understood to be the governing body for the country's ozone policy and strategy.

The Government has entrusted the task of guiding activities related to the Montreal Protocol entirely to the COMARNA. Other organizations supporting the programme of implementation are the Ministries of Foreign Trade, the Iron and Steel Industry, Domestic Trade, Interior and the Customs Office of the Republic.

The major topics to be addressed in this initial three-year phase of the country programme are:

A. Programme of Institutional Strengthening

- Establishment of the Ozone Technical Office and the National Implementation Group
- Dissemination and public education
- Establishment of a body of standards and laws.

B. Industrial Programme

- Training in domestic and industrial refrigeration and air conditioning maintenance
- Investment in equipment for reclamation and recycling for refrigeration and air conditioning
- Study on the introduction of technology for conversion of refrigeration and air conditioning systems
- Study on adaptive alternative technologies with propane (LPG), ammonia and substitutes such as HFC-134a, HCFC-123, etc.
- Pre-investment study for replacement of ODS in hospital and tourism equipment, and in their repair

This initial stage of the programme in the short term will be considered a success if it results in development of projects for a 35 per cent decrease in ODS consumption over the base year of 1991, the target percentage for the first stage.

In recent years, the Government of Cuba has sought to develop policies to facilitate foreign investment by means of ownership agreements and promotion of investments, administration and joint training, etc. The predicted growth in the number of hotels and future development of other investments indicates that sector uses

such as air conditioning and industrial cold rooms could expand.

The proposed activity related to this area is training for the maintenance services sector. At the initial stage, this could mean a considerable savings just by providing that sector with better techniques and adequate machinery.

In agreement with its economic policy, the Government has decided to:

Avoid imposing taxes on imports of substances depleting the ozone layer. At the same time, put into effect legal provisions regulating the import of refrigeration and air conditioning equipment and ODS.

Accordingly, a Plan of Action is proposed in agreement with the economic policy objectives described above. Seven Government activities constitute its core:

1. Legal and regulatory structure for the reinforcement of the wishes of the Government expressed in this country programme.
2. Organization of technical programmes for conversion by specific sectors (training, equipment, recycling, etc.)
3. Studies of existing infrastructure by sector, with economic values of the incremental costs of conversion technology.
4. Implementation of a public dissemination and awareness programme.
5. Establishment of the National Group for the Implementation of the Montreal Protocol and the Ozone Technical Office (OTOZ).

At the request of the Cuban Government, technical assistance in the preparation of this country programme has been provided by the **United Nations Development Programme**, through consultants Mr. Sergio Oxman and Ms. Maria Vega, in close cooperation with national experts.

6. The compliance with a COMARNA Resolution that envisages the prohibition or the establishment of import quotas for ODS controlled by the Protocol.

7. The promotion on a National scale of the adoption of measures that guarantee the gradual reduction and limits the use of firefighting means that use substances controlled by the Montreal Protocol.

Technical Assistance received from the **United Nations Development Programme** at the request of the Government of Cuba helped in the preparation of this country programme with Mr Sergio Oxman and Mrs Maria Vega, who worked closely with the national experts.

1. INTRODUCTION

1.0 General Considerations

During 1992, Cuba faced the worst economic crisis of its history. This year has been recognized by the Government as its most difficult.

Cuba had to face for the first time in three decades a year without preferential prices for its products and without commercial credit in its principal markets.

The disappearance of the Soviet Union, which represented 85 per cent of Cuba's international trade, is a basic aspect in explaining the crisis. The Cuban Government had to enter into new trade agreements with the 12 republics of the former USSR, with resulting loss of resources and flows.

The availability of fuel has had a particular effect on the Cuban economy over the last triennium, with a drastic cut in supply, and up to a 50 per cent drop in availability. Petroleum represents 70 per cent of all energy production and 92 per cent of electricity. Promising programmes for alternative energy sources are visualized, able to provide over 50 per cent of the requirements. Only recently, tons of sugar were exchanged for petroleum and its derivatives. Also, agreements have been made with international firms for oil exploration on the island, which produces only 800,000 barrels itself out of an estimated annual requirement of 13 million barrels.

The Government has continued to guarantee a basic minimum and egalitarian standard of living by means of ration cards, although the elderly and children receive some additional food. The drastic cut in foreign trade has caused shortages of manufactured consumer goods. A currency surplus equivalent to 12 months is foreseen.

Previously in the Cuban economy, consumption of controlled substances, ODS, had responded in recent years more to budgetary restrictions on foreign exchange than to the needs of industrial development planning. This tendency has increased in the past two years.

As a socialist economy, Cuba concentrates all means of production - services, manufacturing and distribution mechanisms for controlled substances - in Governmental organizations. A mixed economic sector has developed in order to promote foreign investment, with various foreign trade guarantees helping to generate foreign exchange, mostly involving tourism, which shows annual growth rates on the order of 20 per cent. This, in turn, accounts for a major increase in the number of units of refrigeration and air conditioning with controlled substance

technology recently installed in the country.

This country programme has been designed with that situation in mind. Thus, in the Plan of Action, elements conducive to affecting supply and demand will reside basically in the mechanisms implemented and executed by the various organizations and institutions involved in the use and production of goods and services using ODS, which belong to the State.

In the methodology used, consumption equals imports, since Cuba does not produce ODS. This consumption, however, does not reflect the true level of consumption needed to satisfy existing infrastructure, given the economic and budgetary restrictions already mentioned. (See Annexes)

We considered it necessary to include in this country programme a detailed description of the State bodies and structures involved in the implementation of the Programme. The existing institutions bring with them advantages and disadvantages. They guarantee the Government's commitment to the execution of the programme in all its aspects if it receives access to the funds allocated for this purpose in the Protocol. On the other hand, the rate of implementation of these measures will be dictated by the wishes of those responsible for execution more than by pressures from unmet demands or the forces at play in any supply and demand market.

1.1 Purpose

The desire of the State of Cuba to create a policy to protect the environment was expressed through the establishment of the National Commission for Environmental Protection and Rational Use of Natural Resources (COMARNA) in 1977. It is now under the supervision of the Executive Committee of the Council of Ministers, and its membership includes representatives of 21 bodies of the central State administration in addition to the Chairmen of the 14 Provincial Commissions and representatives of mass organizations. It is chaired by Dr. Rosa Elena Simeón Negrín, President of the Academy of Sciences.

Environmental legislation in Cuba has the following legal basis 1/:

Constitution of the Republic

Adopted in 1975 by popular vote. Its art. 27 states that the State and Society protect nature and that it is the responsibility of the competent bodies and each citizen to watch over the quality of the environment.

Act No. 33

Title of the Environmental Protection and Rational Use of Natural Resources Act.

Promulgated in 1981 by the National Assembly of the people, it is general in character and establishes the basic principles for environmental protection in Cuba.

Decree No. 118, 18 January 1990

Deals with the structure, organization and operation of the National System for Environmental Protection and Rational Use of Natural Resources and its governing body.

In the field of the ozone layer, the Cuban Government, considering the possibility that emissions from and use of fully-halogenated CFC and other controlled substances under the Montreal Protocol could considerably deplete the ozone layer or modify it in some other way, which would have possible adverse effects for all humanity and especially for developing countries, and recognizing at the same time the need to continue to evaluate the possible changes and their potentially adverse effects, deemed it appropriate and necessary to adhere to the Vienna Convention and the Montreal Protocol on Substances that Deplete the Ozone Layer,

1/ Source: Republic of Cuba: National Report to the United Nations Conference on Environment and Development. Brazil, 1992

and therefore is committed to fulfilling the obligations undertaken and the provisions of those international instruments.

This document sets out the programme of activities the country will carry out from 1993 to 1996, corresponding to the first stage of the process of ending the consumption of ODS controlled by the Montreal Protocol. The plan of action designed for the first three years of the country programme has the objective of the progressive elimination of ODS over a ten-year period, taking advantage of the grace period granted to developing countries in accordance with Article 5, paragraph 1 of the Protocol. The principal aspects to be addressed in the first three years include institutional strengthening and training, reassessment and training projects, as well as a study on investment projects for technological conversion.

In this programme, the commitments for the reduction in ODS consumption for the first three years are established.

In accordance with the procedures established by the Secretariat of the Multilateral Fund, the programme registers and submits the information and analysis on which the Plan of Action for the country programme for Cuba is based.

Cuba meets the requirements to submit this programme to the Multilateral Fund of the Protocol, since it has a per capita annual consumption of 0.037 kg, and to request its financing. The initial three-year stage of the programme is estimated to cost US \$ 0.5 million.

1.2. Type

This programme was prepared by the Government of Cuba through the National Commission for Environmental Protection and Rational Use of Natural Resources (COMARNA), under the supervision of the Executive Committee of the Council of Ministers, as the coordinating organization.

Participants in its preparation were the Ministry of Domestic Trade (MINCIN), the focal point for teams in refrigeration, air conditioning and CFC, Ministry of the Interior, the Refrigeration and Air Conditioning Institute (IRC), the Ministry of the Iron and Steel Industry, and the State Committee on the Supply of Technical Materials (CEATM), focal point for carbon tetrachloride and equipment.

Those organizations:

CONCERNED by the results of recent scientific inquiries on the serious destruction of the ozone layer in the Northern and Southern hemispheres;

CONVINCED that technologies and substitutes more appropriate to the environment exist;

CONVINCED that the amendments and adjustments to the Protocol will result in benefits to the environment;

DECLARE

Their firm intention to take all relevant measures to achieve the elimination of the consumption of all fully-halogenated CFCs with the aid of the Fund within ten years, if the available technology and funds so allow.

Data on consumption and use were prepared by Dr. Carlos Noland, a COMARNA official, with the cooperation of the various institutions involved.

The version submitted was approved by the Government of Cuba through MINCIN, SIME, ACC and CEATM.

There was an initial study carried out with national resources on ODS consumption under the Protocol, which served as a basis for the preparation of this programme, and which is referred to in the annexes.

1.3. Assistance Received

At the request of the Government of Cuba, technical assistance from the United Nations Development Programme (UNDP) was received, through the consultants Mr. Sergio Oxman and Ms. Maria Vega, to assist in the preparation of the country programme.

2. CURRENT SITUATION

2.1. Current and Projected Consumption

Cuba does not produce any type of controlled substance and exports none of them; therefore, in agreement with economic research conducted and the existing definitions of the protocol, Cuba's consumption corresponds to its imports.

The consumption = imports data does not correspond to a balance between international supply and national demand, given the strict budgetary restrictions of the Cuban government. It explains import behavior in recent years. Basically, the drop in consumption in recent years is due to the foreign exchange deficit, and it is not believed to be due to the use of substitutes for ODS. Nevertheless, the consumption of CFC-113 and CFC-114 in the five year period 1986-1990 varied between 0.2 and 13 tons. Clearly, this does not justify the development of substitution projects, so that the Government is responsible for this and for the drafting of

standards and laws. The same situation is found in aerosol production, which uses CFC-11 and CFC-12 for essential uses in the public health sector.

Currently Cuba has an Institute of Refrigeration and Air Conditioning where 10 staff members have doctorates and 66 are engineers, 46 of which are rated in category "A", and 21 are researchers. In addition, there are over 300 technicians with recognized experience in project design, construction, implementation, operation and maintenance of air conditioning and refrigeration installations.

Historical data on imports for the last 5 years are the following:

**Group 1 of Annex A 2/
Amounts in metric tons**

Substance / Year	1986	1987	1988	1989	1990
CFC-11	48.4	70.2	88.6	52.0	63.0
CFC-12	822.1	1035.0	660.1	916.8	711.3
CFC-113	0.0	0.2	0.0	0.0	0.0
CFC-114	13.8	3.5	3.8	4.2	4.1
CFC-115					
TOTALS	884.4	1109.0	752.5	974.0	778.4

**Group 2 of Annex A 3/
Amounts in metric tons**

Substance/year	1986	1987	1988	1989	1990
HALON-1211	0.94	0.76	5.74	0.00	0.19
HALON-1301	0.10	0.12	0.19	0.00	0.21
HALON-2402	0.00	0.00	0.00	0.00	0.00
TOTAL	1.04	0.88	5.93	0.00	0.40

2/ Source: Chemical Imports Company - QUIMIMPORT - Ministry of Domestic Trade

3/ Source: Chemical Imports Company - QUIMIMPORT - Ministry of

Domestic Trade

During the five-year period 1986-1990, there were no imports of CFC-115, 211, 212, 215, 216, and 217, respectively.

During that period, 0.3 metric tons of CFC-13 were imported, in 1986 (0.1 tons) and 1988 (0.2 tons).

The following is the history of **Carbon tetrachloride** imports:

Group 2 of Annex B 4/ Amounts in metric tons

Substance/year	1986	1987	1988	1989	1990
Carbon tetrachloride	125.4	49.0	30.9	78.8	179.3

Current consumption is supplied by imports, but it is also necessary to point out that, according to domestic trade figures, demand required and allocated was 1.8 times greater than what was consumed in the base year for the Programme. (See Annex) However, for three years no CCL4 has been imported, which does not provide justification for projects for its substitution.

4/ Source: Chemical Imports Company - QUIMIMPORT - Ministry of Domestic Trade

Consumption in 1991 listed by substance
(Imports = Consumption) 5/

1991

Source Tons	Consumption	ODP	Consumption ODP
Substance			
Group 1 Annex A			
CFC-11	14.60	1.0	14.60
CFC-12	309.00	1.0	309.00
CFC-113	0.00	0.8	0.00
CFC-114	4.20	1.0	4.20
CFC-115	0.00	0.0	0.00
Subtotal	327.80		327.80
Group 2 of Annex A			
Halon-1211	0.21	3.0	0.63
Halon-1301	0.30	10.0	3.00
Halon-2402	0.00	6.0	0.00
Subtotal	0.40		2.67
Group 2 of Annex B			
Carbon tetrachloride	0.00	1.1	0.00
Group 3 of Annex B			
1.1.1 trichloroethane	0.00	0.1	0.00
TOTAL CONSUMPTION/TONS	328.31	TOTAL ODP	331.43

In the case of Cuba, although centralized data on imports was available through the Ministry of Domestic Trade, with an accuracy rating of 80 per cent, data on use was collected based on interviews, investigations by COMARNA officials and estimates based on the national demand survey and interviews with Government officials. This data on usage has a reliability rating of 60 per cent, in the opinion of the consultants, because the posts were not well known.

5/ Source: Data collection, COMARNA Cuba, 1992. Ministry of Domestic Trade.

One factor influencing the data was the lack of information on the use of refrigeration, replacement of air conditioning equipment and installation by the mixed companies which have developed tourism in Cuba. Currently they operate with free imports. Maintenance services are provided by the maintenance departments of INTUR and GAVIOTA, the companies running the area of contacts and policies regarding international companies.

Import records, however, are all registered with the Ministry of Domestic Trade.

Use has been estimated in accordance with the evaluation of use in maintenance of the national supply of existing refrigeration and air conditioning equipment. 270 mixed companies are included; 15 of them are hotels.

NATIONAL SUPPLY OF REFRIGERATION AND AIR CONDITIONING EQUIPMENT 6/

EQUIPMENT	UNITS	AVG. LOAD	EST. LOAD
Refrigerators and freezers	2,000,000	0.20	100.0
-Domestic	1,450,000		
-Commercial	550,000		
Water closets and windows	100,000	1.5 - 3.0	53.0
Transport	100,000	5.0	125.0
Window units	1,179,500	2.0	50.0
Mid-sized installations	20,000	30.00	150.0
Large installations	100	500.00	12.5
Air conditioned vehicles	400	2.0 - 20.0	1.0

Assumed use and operation of equipment:
system of maintenance and replacement every 4 years
according to the condition of the equipment

6/ Source: Data collection COMARNA Cuba, 1992

DISTRIBUTION OF USES OF SUBSTANCES, 1992 7/

Substance	Use	Metric Tons	%
CFC-11	Refrigeration	9.6	8.51
	- Domestic	3.00	2.66
	- Commercial	6.60	5.80
	Flexible foam	0.0	0.0
	Rigid foam	0.0	0.0
CFC-12	Polystyrene foam	00.00	0.0
	Refrigeration	80.00	71.0
	- Domestic	43.00	38.10
	- Commercial	37.00	32.80
	Air conditioning	23.70	21.00
	Maintenance and services	00.00	
	Aerosols	000.00	0.00
	sterilization	00.00	
CFC-114	Solvents	0.00	0.00
Halon-1211	Extinguishers	0.00	0.00
Halon-1301	Extinguishers	0.00	0.00
Carbon Tetrachloride	Solvents	0.00	0.00

The national study on the demand for CFC during 1986-1990 shows that the needs of the country will increase at an annual rate of 3 per cent caused by economic development (industry and services). This has not been reflected in the import figures, however, because of the budget restrictions.

A large part of the refrigeration and air conditioning equipment now installed has deteriorated because it has reached the limit of its useful life, bringing about a high rate of breakdowns and elevated input of refrigerating gases, with their resulting emissions.

Another cause of the increases in consumption is the increasing spread of domestic electrical appliances, among them 2 million refrigerators and 1.2 million air conditioning units and several thousand industrial freezers.

2.1.1. Projected Consumption

The average annual demand for ODS up to 1990 was on the order of 900 tons and the estimated demand for the period from 1991 to 1995 is approximately 1958 tons. In the future it is hoped that

7/ Source: Data collection COMARNA Cuba, 1992

unlimited quantities of controlled substances will remain available, in view of the voluntary nature of the strategy described and our status as a country operating under article 5 of the Protocol. The average consumption of halons projected for the period 1991-1995 is on the order of 0.65 and 0.26 tons/year for 1211 and 1301 respectively, and 92.67 tons/year for carbon tetrachloride in that period.

Future annual growth of 4 per cent per annum is estimated. The historic growth in the GNP has been 5 per cent. It is assumed that demand behavior follows tendencies of economic growth.

The population of Cuba is 10,693,465, with an annual growth rate of 0.9 per cent. According to estimates, 74 per cent of the population is urban. The economically active population has reached 44 per cent, of which 64 per cent are men and 36 per cent women.

The adult literacy rate for both men and women is 97 per cent. Life expectancy at birth is 75 years. In rural areas, 100 per cent of the population has access to safe drinking water and 100 per cent to health services. In urban areas, those percentages have increased noticeably.

Possible projections for demand and consumption in the country up to the year 2010, taking into account that 1991 consumption was 328 tons, at a 3 per cent annual increase, would be 505.61 tons in 2010, as long as the budgetary limitations of this particular period do not exist. The tendency would be to assume a growth over the current demand of about 10 per cent, given the effects on consumption and imports of air conditioning and refrigeration for the tourism sector.

According to current economic conditions in Cuba, it is possible to assume an annual rate of economic growth for the consumption of ODS of 3 per cent, a conservative figure since it is impossible to be more specific at present.

2.2. Industrial Structure

Industries and other means of production are State property. The major importer of ODS in the country is the Ministry of Domestic Trade, which is the current focal point for such products, or the distributor to all sectors and/or national organizations. They are now imported for various countries of Europe and Latin America.

The main countries of origin of ODS imports are: Venezuela, Brazil, Germany, Spain, Italy, Austria and Russia.

No ODS are produced in the country.

CFCs are distributed to the following sectors and organizations:

Organization of the People's Power	OPP
Ministry of the Fishing Industry	MIP
Ministry of Agriculture	MINAGRIC
Ministry of Domestic Trade	MINCIN
Ministry of the Wood Industry	MINIL
Ministry of Basic Industry	MINBAS
Ministry of the Food Industry	MINAL
Ministry of Construction	MICONS
Ministry of Communications	MICOM
Ministry of Public Health	MINSAP
Ministry of the Iron and Steel Industry	SIME
Ministry of Sugar	MINAZ
National Tourism Institute	INTUR
others	

2.3 Utilization of ODS

Major users of CFCs are workshops for service and repair of refrigeration and air conditioning equipment, both domestic and industrial, 213 in all, located in municipalities in the 14 provinces of the country and in the capital. In addition to these workshops, there are similar workshops in each of the organizations mentioned in the previous section, which also use CFCs for purposes of replacing refrigeration and air conditioning equipment.

Structurally, each sector or Ministry has a certain number of workshops under it for service and repair, which are located in each area where it has an office or representation. At the same time, the workshops in each municipality report for administrative matters to the People's Power of the municipality and to MINCIN for matters of methodology.

Refrigeration sector

Cuba has produced around 60,000 domestic refrigeration units per year. It is estimated that, of the 2 to 2.4 million units, approximately 500,000 units have been produced locally using fiberglass insulation. Currently, this production is paralyzed due to a lack of supplies and financial restrictions.

Annually, Cuba uses 79 per cent of national consumption for refrigeration. Out of this figure, 10 per cent is for domestic refrigerators, 25 per cent for commercial refrigeration, 17 per cent for industrial refrigeration, 19 per cent for cold storage and 8 per cent for refrigerated transport.

In substance, consumption corresponds to replacement due to

loss in operating systems, and replacement parts for equipment maintenance.

In the programme, it is suggested that technology transfer should take place through the assistance of international consultants and visits abroad by local experts, and through basic equipment to begin the reclamation and recycling processes.

Foam sector

Cuba does not produce foam, meeting its needs through imports.

Air conditioning sector

Because of its climate, Cuba has imported air conditioning equipment on an ongoing basis. There are an estimated 1.2 million units, for use in the domestic, industrial, service (tourism and hospitals) and commercial sectors. The transport sector is insignificant.

In 1991, use in air conditioning represented 21 per cent of national consumption.

Solvents and sterilization sector

The data collected shows that from 1987 to 1990, Cuba's annual imports averaged 92.67 metric tons of CCL4. It is used basically as a solvent in cleaning motors and parts, and to dissolve mechanical impurities.

CFC-114 used as solvents was 4.2 metric tons of consumption for 1991.

Although import statistics for 1991 showed zero imports of CC14, the Cuban Government will take responsibility for finding and implementing alternatives for its substitution.

Halons

Preliminary data show consumption of Halon-1211 of 0.20 tons and Halon-1301 of 0.30 tons in 1991, corresponding to 0.57 and 2.80 tons of ODP respectively.

Under these conditions, consumption is believed to represent essential uses in Cuba.

Aerosol sector

About 15 metric tons are used in this application, and, according to the interviews conducted, its major uses are in medical applications and biotechnology.

2.4 Institutional Framework

Cuba has an organization dedicated to the environment established in 1977, COMARNA. Since 1992 it has been under the supervision of the Council of Ministers, and it also has close ties with the Academy of Sciences. COMARNA has to its credit an organizational structure in all 14 provinces of Cuba.

In order to ensure the completion of this initial stage of the country programme, and to leave open the possibility, according to investigations to be conducted regarding pre-investment projects for technology conversion, of a request for funds for a second stage, a need was seen to create a technical institutional structure that would allow flexibility and avoid bureaucracy in project execution.

Under the political and administrative system existing in Cuba, at this initial stage, coordination, supervision and administration of the programme will be the responsibility of a team of two Technicians (Ozone Technical Committee), with adequate infrastructure to perform their functions provided by the Multilateral Fund for the Montreal Protocol. They will provide all the technical support needed for decision-making by the National Group for the Implementation of the Montreal Protocol, which is composed of various organizations and institutions in the field, and will at the same time propose and/or recommend initiatives to the National Implementation Group, which is understood to be the governing body for the country's ozone policy and strategy.

The Cuban Government has entrusted the task of guiding activities related to the Montreal Protocol entirely to the **Cuban Academy of Sciences**. Other organizations supporting the programme of implementation are the Ministries of Foreign Trade, the Iron and Steel Industry, Domestic Trade, Interior, the Customs Office, and the State Committee for Technical Equipment Supply (CEATM).

The above is formed through draft resolution No. 3 of COMARNA, which states the following in its article 2:

"Any physical or moral person, individual or national or foreign collective which proposes to bring into national territory refrigeration or air conditioning equipment and/or controlled substances under the Montreal Protocol is required to request authorization from the Ministry of Foreign Trade upon evaluation of the equipment by the Refrigeration and Air Conditioning Institute of the Ministry of the Iron and Steel Industry, and its agreement with the nomenclature in force for such equipment set out in Annex 2, which is an integral part of this resolution."

In subsequent articles, that resolution establishes the

responsibilities of organizations involved and establishes the National Group for the Implementation of the Montreal Protocol and the Ozone Technical Committee (OTOZ).

2.5 Policy background

The government policy for the progressive elimination of SDO in Cuba is supported both in fiscal policy and in environmental legislation in force, and the Resolution by COMARNA in the consultation and approval phase prohibiting the import without prior authorization from the competent body of SDO controlled by the Montreal Protocol and technologies using those gases.

2.6 Government and Industry Reaction to the Protocol

The Cuban Government signed the instruments of adherence to the Vienna Convention and the Montreal Protocol on 14 June 1992; they were ratified on 12 October 1992.

To conform to the ratification of the Convention and the Protocol, regulations were introduced on the operation and maintenance of refrigeration and air conditioning equipment and the appropriate use of CFCs controlled under the Protocol. Government measures were taken to reduce the consumption of SDO, for example, substitutes for CFC-11 and CFC-12 propellants in the cosmetic industry by ecological bottles or air atomizers, and use of CFC-11 and CFC-12 substitutes in packaging, and in production of medicines using HFC-134a as a substitute. A National Group chaired by the President of the Cuban Academy of Sciences was established, with members from COMARNA, as the coordinating body for activities to implement the Montreal Protocol, MINCIN, the focal point for equipment, CFC and Halons, CEATM - the State Committee for Technical Material Supply, the focal point for equipment, and the IRC, the Refrigeration and Air Conditioning Institute of SIME, a scientific and technical unit, and from other state bodies.

The country programme includes plans to conduct publicity and information dissemination campaigns in the national mass media, and steps to be taken on the part of industry to introduce substitutes and technological alternatives needed in this context.

3. EXECUTION OF PROGRESSIVE ELIMINATION

3.1. Statement on Government strategy

The strategic objectives taken into account in the plan of action for the progressive elimination of ODS are greatly affected by current economic conditions the country is undergoing which do not allow compliance with the measures established in the Protocol without necessary aid from the Multilateral Fund of the Montreal Protocol. Accordingly, the Government of Cuba intends to observe the limits established by the Protocol for consumption of SDO for

countries protected by article 5, paragraph 1. For the substances listed in Annex 1, Part A and B of the Protocol, during the initial stage of the programme between 1993-1996, an estimated ODS decrease of 100 metric tons equivalent to 100 tons ODP is expected.

3.2. Plan of Action and Projects involved

3.2.1. Government measures

Six actions the Government plans to put into effect constitute the essentials of the Plan of Action to achieve the progressive elimination of ODS:

1. Regulatory structure, to support the wishes of the Government as expressed in this country programme.
2. Organization of technical programmes for conversion by specific sector (education, training, recycling, etc.)
3. Studies of existing infrastructure by sector, with economic values of the incremental costs of technological conversion.
4. Implementation of a public information and awareness programme.
5. Establishment of the National Group for the Implementation of the Montreal Protocol and the Ozone Technical Office.
6. Application of a COMARNA resolution considering the prohibition or the establishment of quotas for the import of technology and ODS controlled under the Protocol.
7. Promotion at the National Level of the adoption of measures that guarantee the gradual reduction and limits the use of means and firefighting systems that use substances controlled by the Montreal Protocol.

The Ozone Technical Office will carry out tasks of organization and technical direction for the Government, using its operating mechanisms, and will prepare regulations, standards and procedures supporting the Minister/Ministry and the Government in any required legislative initiatives.

It will be responsible for the evaluation, coordination and supervision of all Government activities and corresponding projects.

For the first three years of the programme, the **Ozone Technical Office (OTOZ)** hopes to operate with two professionals and technical infrastructure.

Their responsibilities will be the following:

Professional 1:

Will coordinate and promote all necessary activities for the successful implementation of the Vienna Convention and its Montreal Protocol, and inform the Secretariat of the Convention of the results of those activities.

Professional 2:

Will establish access to the international data bank Ozone Action, model national information, create national data banks and exchange information with various international centres and systems.

The central role of decreasing emissions and consumption of controlled substances will be assigned to the **National Group for the Implementation of the Protocol**, as informed and coordinated by the Ozone Technical Office.

If the results of stage I equal a 35 per cent reduction in 1996, in stage II the potential consumption of 3900 metric tons ODP will remain to be eliminated.

The following table gives a succinct description of the strategy for the projects of stage I and the goals to be reached.

The Plan of Action that the Government will implement to achieve the elimination of controlled substances under the Montreal Protocol, according to the strategy, includes:

COUNTRY PROGRAMME PROJECT MATRIX - MONTREAL PROTOCOL

SHORT TERM (1993-1995)	DESCRIPTION OF ACTIVITIES	TOTAL PROJECT VALUE US\$	DATE
OTOZ	Management, Coordination Monitoring Plan of Action	122,000	1993 1994 1995
Extinguishers with alternative substances	Training in use of alternate substances	30,000	1993 1994
Public information	Leaflets, videos and media campaign	56,000	1993 1994 1995
REFRIGERATION Adapting domestic refrigeration equipment to alternative subst.	Practical information Feasibility study work with 134a, 123 Propane (LPG)	48,000	1993 1994
Adaptation of industrial and commercial refrigeration	Training, applications assessment and techno- economic study	29,000	1993 1994
Domestic Refrigeration	Reclamation, regeneration and recycling of CFCs	109,000	1993 1994
AIR CONDITIONING Adaptation in public health sector	Cost-benefit analysis, assessment and practical training	33,000	1993 1994
Tourism Sector	Cost-Benefit analysis, assessment and practical training	23,000	1993 1994
International technical assistance	During implementation of the Country Programme in Cuba	40,000	1993 1994
ESTIMATED SUBTOTAL		490,000	
Increase for concept of cost of equipment and materials		8,000	
TOTAL FOR COUNTRY PROGRAMME		498,000	

The initial programme has a duration of 3 years, from 1993 to 1996, with the understanding that the execution years include part of the following year, or year 1993 (1993-1994), year 1994 (1994-1995) and year 1995 (1995-1996).

3.2.2. Institutional Projects

Name of Project: Ozone Technical Office (OTOZ)

Purpose: Establishment and operation of the Ozone Technical Office (OTOZ). Institutional measure.

Years: 1993-1996

Description:

The purpose of the Office will be to:

1. Coordinate and monitor agreements and proposed Plan of Action.
2. Propose changes in the relevant legislation.
3. Provide technical support to the various public sector Ministries involved.
4. Direct training and information campaigns.
5. Promote voluntary agreements between businesses.
6. Provide technical support to the National Implementation Group.

Estimated costs of OTOZ

Item	1993	1994	1995	Total US\$
Human resources	21,000	21,000	21,000	63,000
Professional 1	12,000	12,000	12,000	
Professional 2	6,000	6,000	6,000	
Secretary	3,000	3,000	3,000	
Infrastructure	14,000			14,000
Operations	15,000	15,000	15,000	45,000
Total	50,000	36,000	36,000	112,000

This project is expected to have an initial duration of three years, beginning its execution in 1993 and ending in 1996, and will be national in scope, with a view to coordination and monitoring of the execution of the plan of action. UNDP technical assistance as the implementing agency will be requested.

Infrastructure costs for acquisition of the following equipment:

Microcomputer - 486 DX	
Speed - 33 MHz	
Coprocessor 80387	
RAM - 8 MGB (minimum)	
Memory - 64K	
5 1/4" and 3 1/2" ports	
SVGA display	
Hard Disc - 220 to 300 MGB	
Battery	
	Subtotal
	5,000
Necessary software including diskettes	400
HP LaserJet printer	2,500
BELL/CCITT modem (9,000 baud or more)	280
Air conditioning	700
FAX	600
Photocopier (master and copier)	4,220
Telephone (equipment and international line)	300
	Total
	14,000

Operational costs

Telecommunications	2,000
Service and Maintenance	1,000
Office supplies	4,000
Local transportation	3,000
Collection and dissemination of information on country programme implementation	2,000
Services to national coordination mechanisms	2,000
Assistance costs	1,000
	Total
	15,000

The office will be located in a 35 sq. meter space belonging to the National Commission for Environmental Protection and Rational Use of Natural Resources (COMARNA), provided by the Government, and will be responsible for evaluation, coordination and supervision of all Government activities and the corresponding projects of the country programme.

Name of project: **Public information programme**

Purpose: Provide information to influence public opinion on the implications of damage to the ozone layer and its consequences for human, animal and plant life.

Years: 1993-1996

Description:

1. To inform and raise awareness both among the public and the various sectors on the implications of the Protocol and the implications of the depletion of the ozone layer.
2. Provide information on the measures and activities conducted in Cuba.
3. Design and distribute explanatory leaflets.

Estimated costs of public information programme

Item	1993	1994	1995	Total US\$
Campaign Design	13,000	5,000	5,000	23,000
Media broadcast	13,000	10,000	10,000	33,000
Project total	26,000	15,000	15,000	56,000

This project is expected to have an initial duration of three years; its execution will begin in 1993 and end in 1996, and will be national in scope, covering the 14 provinces and the special municipality. Activities for public awareness and information will be developed related to current knowledge on the condition of the ozone layer and international measures being taken. UNDP assistance will be requested as the implementing agency.

3.2.3. Specific Industrial Sector Programmes

EXTINGUISHER SERVICE AREA

Name of project: Extinguishers using alternative substances

Year: 1993-1994

Desired results: Extinguisher apparatus using alternative substances. Training of personnel.

Project description: Training in methods of extinguishing using alternative substances.

Relevant Government Action: Training and public information.

Estimated training costs:

Item	1993	1994	Total US\$
Local expert	2,000	1,000	3,000
Materials	1,000	2,000	3,000
Equipment	2,000	10,000	12,000
Infrastructure	2,000	10,000	12,000
Project total	7,000	23,000	30,000

This projected is expected to have a duration of one year - 1993-1994, and will consist in the construction of an experimental installation for training of around 200 technicians in the use of alternative substances for extinguishers in place of halons. UNDP assistance will be requested as the implementing agency.

REFRIGERATION SERVICE AREA**DOMESTIC REFRIGERATION**

Name of project: Adaptation of domestic refrigeration equipment to use alternative non-ODS substances

Year: 1993-1994

Objectives: Training of over 300 technicians throughout the country in techniques for replacement with LPG, propane and propane-butane, and practical applications using substitutes such as HFC-13134a and HCFC-123, as well as a feasibility study

Description of project: Practical training in the use of alternative substances (LPG) or propane, and propane-butane mixtures. The acquisition of HFC-134a and HCFC-123 for experiments in advanced technology is being considered. Feasibility study.

Relevant Government action: Practical training, adaptation and trials of equipment and public information.

Estimated training costs:

Item	1993	Total US\$
Training visits -		
4 national technicians	14,000	14,000
Materials	25,000	25,000
Equipment	5,000	5,000
Infrastructure	4,000	4,000
Project total	48,000	48,000

This project is expected to last one year beginning in 1993 and ending in 1994. Its major objective is to complete the studies on the adaptation of domestic refrigeration equipment to use LPG, propane or propane-butane. These studies have been in progress for some time and are considering modifications and innovations in that equipment so that the existing equipment can continue being adapted gradually. The acquisition of HCFC-134a and HCFC-123 is for conducting tests with equipment using advanced technology which operate with these new gases. This will allow educational materials to be developed for use in the training of over 300 refrigeration and air conditioning technicians throughout the country. For the development of this project, UNDP assistance will be requested as the implementing agency.

REFRIGERATION SERVICE AREA
DOMESTIC REFRIGERATION

Name of project: Reclamation, regeneration and recycling of CFCs

Year: 1993-1994

Objectives: Reduction of 20 metric tonnes of CFC/yr.
 The reduction of consumption of 20 t. of CFC is based on the processing of 100,000 broken units per year at an average of 0.20 kg for replacement

Project description:

Practical training in use of CFC regeneration equipment: domestic, commercial and industrial uses, with the possibility of producing such equipment.

Estimated training costs:

Item	1993	Total US\$
Training visits		
4 national technicians	18,000	18,000
Materials	4,000	4,000
Equipment	83,000	83,000
Infrastructure	4,000	4,000
Project total	109,000	109,000

Details of Equipment

Reclamation of 25 units US\$ 2,000 c/u \$50,000

Recycling 6 units US\$ 5,500 c/u \$33,000

Centres for receiving and charging with recycled refrigeration gases in the 14 provincial workshops

This project will provide service to an estimated 100,000* domestic, industrial and commercial refrigeration and air conditioning units (*70,000 domestic, 29,900 commercial and 100 industrial). These reclamation and regeneration teams will be located in the following provinces:

Province	Reclamation Teams	Regeneration Teams
Pinar del Rio	1	
La Habana	1	
Habana City	9	2
Matanzas	1	
Cienfuegos	1	
Villa Clara	1	1
Sancti Spiritus	1	
Ciego de Avila	1	
Camaguey	1	1
Las Tunas	1	
Holguin	2	1
Granma	1	
Santiago de Cuba	2	1
Guantanamo	1	
Municipio Especial	1	
Total	25	6

The procedure that will be employed for recycling of CFC in the country will be similar to that of the firm Dansk DFD Genvinding of Denmark, which will cooperate as appropriate with our country in developing this project. It consists of a system of collection in balloons, a stage where the gas in question is classified (the burned gases will be destroyed by heat), and their subsequent regeneration and redistribution. Currently we have for the project a CFC regeneration plant developed by the Refrigeration and Air Conditioning Institute of the Ministry of the Iron and Steel Industry (SIME) with a view to its national use and commercialization to make possible its execution. UNDP assistance will be requested as the implementing agency.

REFRIGERATION SERVICE AREA**INDUSTRIAL REFRIGERATION**

Name of project: Adaptation of Industrial and Commercial Refrigeration Technology

Year: 1993-1994

Objectives: Training of over 300 technicians in the country to provide them with a better knowledge of alternative technologies and to make available possible new technology.

Project Description:

Training in industrial refrigeration methods using alternative technology to SDO in large operations.

Relevant Government

Activities: Training and public information

Estimated training costs:

Item	1993	Total US\$
Human resources	3,000	3,000
Local expert	4,000	4,000
Materials	16,000	16,000
Equipment	4,000	4,000
Infrastructure	2,000	2,000
Project total	29,000	29,000

This project is expected to last one year, beginning in 1993 and ending in 1994. UNDP assistance will be requested as the implementing agency, and 300 technicians throughout the country will receive up-to-date training.

AIR CONDITIONING SERVICE AREA**AIR CONDITIONING**

Name of project: Adaptation of air conditioning equipment in the public health sector

Year: 1993-1994

Objectives: Make available a registry of equipment and their technical condition, a cost-benefit analysis and a pre-investment study for the development of the technological conversion programme in the sector

Project description:

Pre-investment study and elaboration of a registry, and a cost-benefit analysis for technological conversion.

1. Registry of equipment, value and remaining use.
2. Evaluation of technical alternatives for conversion and/or adaptation with alternative and/or transitional substances.
3. Cost-benefit analysis to determine the substitution, operation and/or replacement of equipment. Pre-investment study and public information campaign.

Relevant Government

Activities: Elaboration of a registry, cost-benefit analysis for technological conversion. Pre-investment study and public awareness campaign.

Estimated training costs:

Item	1993	Total US\$
Human resources	4,000	4,000
Local expert	4,000	4,000
Materials	23,000	23,000
Equipment		
Infrastructure	2,000	2,000
Project total	33,000	33,000

This project is expected to last one year beginning in 1993 and ending in 1994, and will permit decisions to be taken on the technological conversion process in the sector. UNDP assistance will be requested as the implementing agency.

AIR CONDITIONING SERVICE AREA**AIR CONDITIONING**

Name of project: Adaptation of air conditioning equipment in the tourism sector

Year: 1993-1994

Objectives: An up-to-date registry of equipment for the purpose of knowing its technical condition, cost-benefit analysis to determine substitution and pre-investment study for the later technological conversion programme

Project description:

1. Registry of equipment, value and remaining use.
2. Evaluation of technological alternatives for conversion and/or adaptation with alternative and/or transitional substances.
3. Cost-benefit analysis to determine substitution, repair and/or replacement of equipment and substances.

Relevant Government actions:

Pre-investment study, elaboration of the registry and cost-benefit analysis for technological conversion and public information

Estimated cost:

Item	1993	Total US\$
Human resources	4,000	4,000
Local expert	4,000	4,000
Materials	13,000	13,000
Equipment		
Infrastructure	2,000	2,000
Project total	23,000	23,000

The relationship of projects in public health and tourism is based on common training activities for their technicians and the

exchange of information and experience between those sectors. These projects are expected to have an initial duration of one year, with execution beginning in 1993 and ending in 1994; they will be national in scope, with the participation of all the organizations involved. Technical assistance will be requested for their execution from UNDP. Parallel to the execution of this programme, the second country programme, or the technological conversion programme, will be executed. The tourism sector contains public and mixed companies. This project will cover only public enterprises.

3.3 Bodies involved in the implementation of the strategy

The National Commission for Environmental Protection and Rational Use of Natural Resources (COMARNA) coordinates national programmes.

The Cuban Academy of Sciences will execute the projects of the Ozone Technical Office, public information and specialized international technical assistance.

The Ministry of Public Health (MINSAP), INTUR and MININT will execute projects in adaptation of existing installations of refrigeration and air conditioning equipment, and extinguishers, respectively.

MINCIN, focal point for refrigeration and air conditioning equipment and CFC, will execute the project in administration, recycling and destruction of CFC.

The Refrigeration and Air Conditioning Institute (IRC) of SIME will execute the project in training for refrigeration and air conditioning.

The following organizations: Peoples' Power, MIP, MINTRANS, MINAGRI, MINCIN, MINIL, MINBAS, MINAL, MICOM, MINSAP, SIME, MINAZ, INTUR and others will execute the projects for technological conversion as part of the long-term national programme. The Cuban State Committee for Economic Cooperation will function as a financial intermediary which will direct, within the country, the financing provided by the Multilateral Fund.

3.4 Schedule and effects on consumption

Profile of the progressive elimination under the Protocol Group I and II of Annex A, in tons of ODS x ODP and projected demand without financial restrictions at an annual rate of increase of 3 per cent.

SDO - Substances depleting the ozone layer
 ODP - Ozone layer depleting potential

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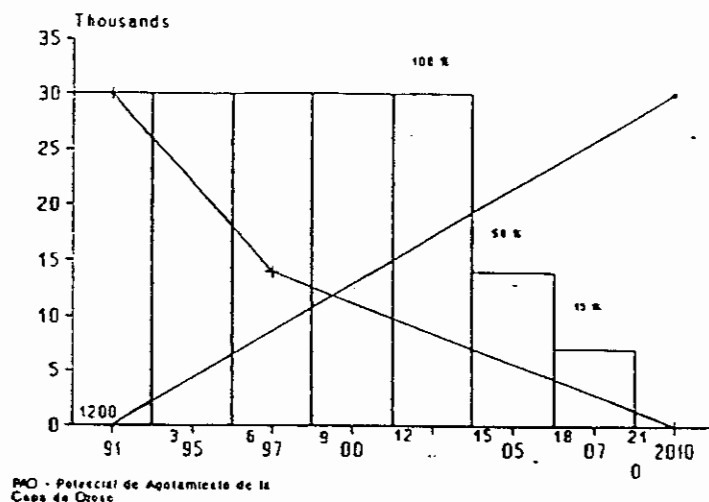
3.4 Schedule and effects on consumption

Profile of the progressive elimination under the Protocol Group I and II of Annex A, in tons of ODS x ODP and projected demand without financial restrictions at an annual rate of increase of 3 per cent.

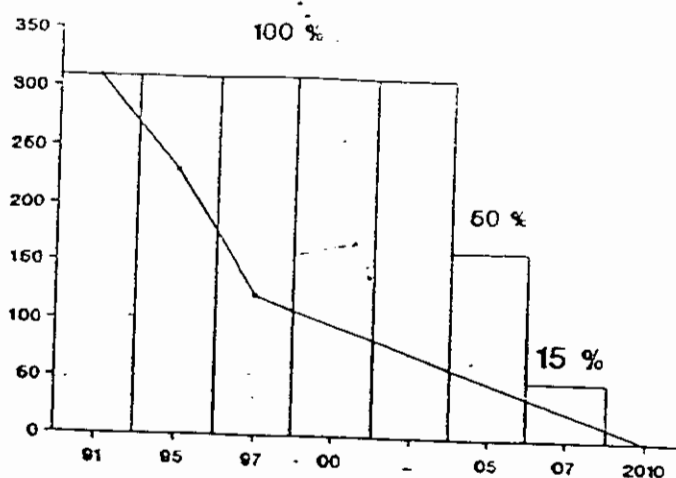
SDO - Substances depleting the ozone layer
 ODP - Ozone layer depleting potential

1. Projected demand (530 t of ODP)
2. Progressive elimination

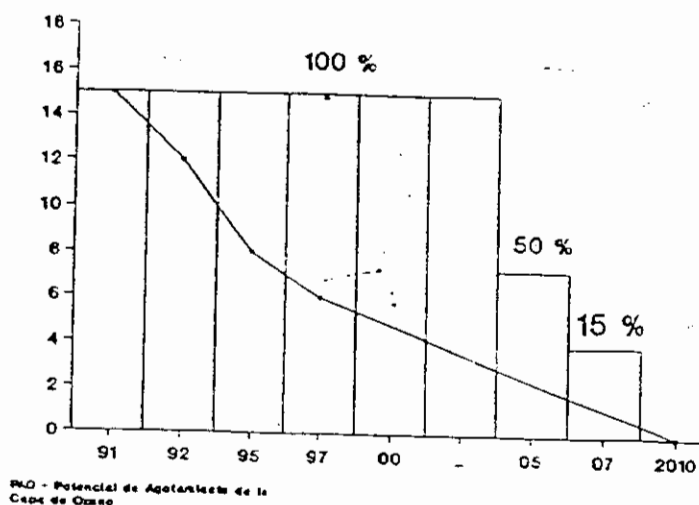
Profile of progressive elimination under the Protocol, Group I and II, Annex A in tons of ODS x ODP, and projected demand without financial restrictions at an annual growth rate of 3 per cent. The total increase in consumption of ODS would be between 20,000 and 30,000 tons until the year 2010, taking 1991 as a base year.



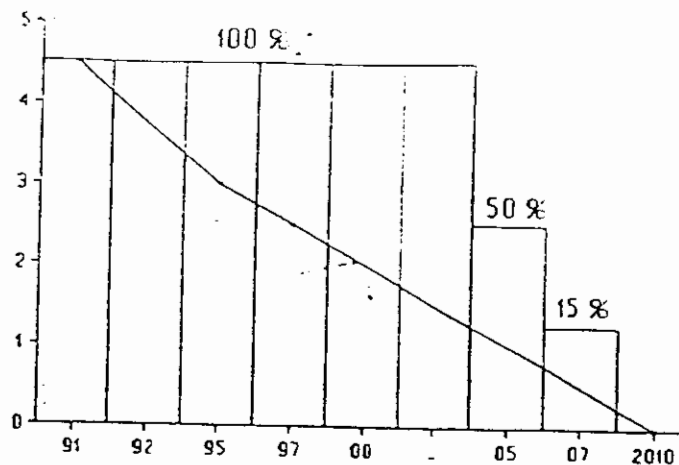
Profile of progressive elimination under the Protocol. CFC 12, Group I of Annex A, in tons of CFC x ODP.



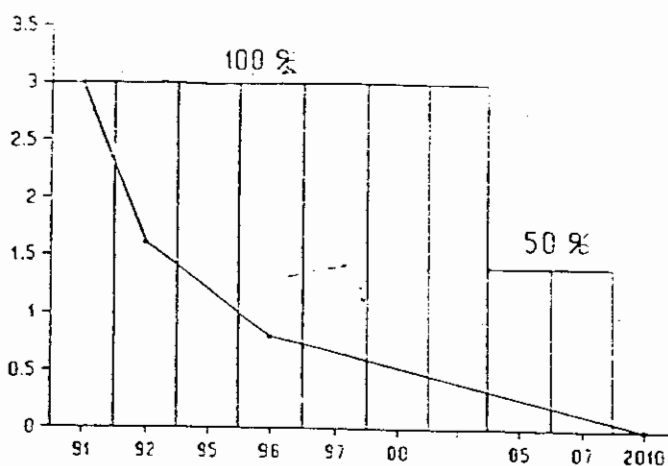
Profile of progressive elimination under the Protocol of CFC 11, Group I of Annex A, in tons of CFC x ODP.



Profile of progressive elimination under the Protocol of CFC 114, Group II of Annex A, in tons of CFC x ODP.

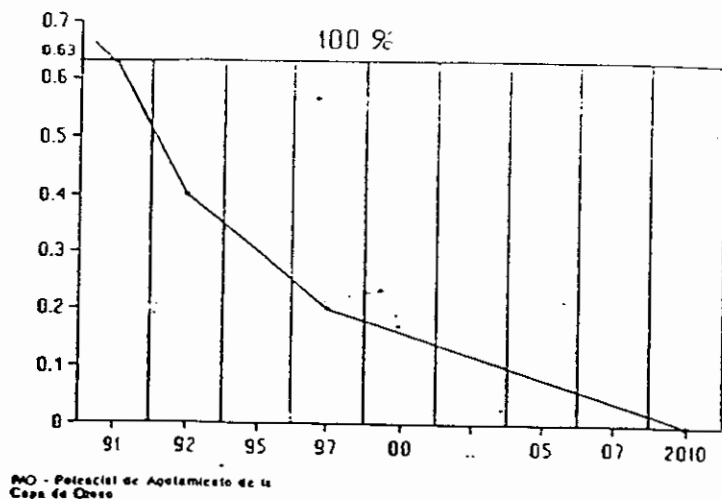


Profile of progressive elimination under the Protocol of Halon 1211, Group II of Annex A, in tons of Halon 1211 x ODP



RAC - Potencial de Agotamiento de la
Carga de Ozono

Profile of progressive elimination under the Protocol of Halon 1301, Group II of Annex A, in tons of Halon 1211 x ODP



3.5 Priorities in project financing

The projects to be carried out in industry for which it is proposed that aid from the Multilateral Fund be requested will be contained in the second National Programme and will cover technological conversion of existing air conditioning and refrigeration capacity of 15 institutions in the country.

3.6 Monitoring of agreements

The Government of the Republic of Cuba, through COMARNA, will establish a twice-yearly review of implementation of this programme and will have available existing mechanisms for supervision and monitoring in the organizations involved for the monitoring of annual consumption of ODS in the country, the degree to which consumption is lower than the limits established by the Protocol, monitoring of the effectiveness of Government measures in turn in the achievement of projected results, and monitoring of execution of projects in the Plan of Action. Regular reports will be submitted to the Fund.

ANNEXES

TABLE A-1

Table of estimates of inhabitants per province and number of workshops for training purposes

Province	Population	Towns	Workshops
<u>Pinar del Rio</u>	636 851	14	6
La Habana	590 605	19	15
<u>Havana City</u>	2 000 000	15	32
Matanzas	556 665	14	8
Cienfuegos	325 808	8	11
<u>Villa Clara</u>	776 505	13	21
Sancti Spiritus	402 454	8	16
Ciego de Avila	308 776	10	13
<u>Camaguey</u>	636 851	14	6
Las Tunas	439 620	8	9
<u>Holguin</u>	916 136	14	11
Granma	757 680	13	15
<u>Stgo. de Cuba</u>	930 417	9	24
<u>Guantanamo</u>	480 729	10	12
Municipio Especial	50 316	1	1
Subtotal	10 000 000	169	213
Total with 8 for-profit workshops			221

TABLE A-2

Table of Needs and Allocations according to the Central Plan.
Consumption equals real imports.

Demand, allocation and consumption of controlled refrigeration
gases in metric tons

Year	Demand	Allocation	Consumption
1986	1553.00	1317.00	884.00
1987	1602.00	1368.00	1109.00
1988	1650.00	1291.00	752.70
1989	1705.00	1358.00	974.40
1990	1776.00	1429.00	780.40
Total	8286.00	6763.00	4500.50
Projected demand 1991-1993 = 9790.00 tons			

TABLE A-3

Country: Cuba
 National coordination agency (OTOZ)
 Implementing agency (UNDP)

SCHEDULE OF GRADUAL REDUCTION						
Substance	Current consumption (t x ODP) in 1991	Cumulative planned consumption until gradual reduction (t x ODP)			Planned year for gradual reduction	Planned year for gradual reduction
		Reduction Schedule Art. 5(1)	Accelerated Reduction (2)	Scheduled Reduction Art. 5		
CFC 11	14,6 x 1,0 = 14,60	221,00	118,10		2010	2000
CFC 12	309,0 x 1,0 = 309,00	4701,00	2478,00		2010	2000
CFC 113	0,0 x 0,8 = 0,00				2010	2000
CFC 114	4,2 x 1,0 = 4,20	63,20	33,60		2010	2000
CFC 115	0,0				2010	2000
Halón 1211	0,21 x 3,0 = 0,63	9,50	8,00		2010	2000
Halón 1301	0,30 x 10 = 3,00	41,26	24,50		2010	2000
Total	328,31	4986,53	2662,20	331,43		

(1) Calculated on the basis of 3 % annual decrease in consumption of ODS to 2010.

(2) Calculated on the basis of 5 % annual decrease in consumption of ODS. Because of current financial restrictions, consumption of CFC has been reduced to 90 % of average national consumption.

SUMMARY OF PROJECTS BY SECTOR

(Page 1)

Year	Description of Activity	Desired effect	Sector	Agency	1993	1994	1995	
1	2	3	4	5	6	7	8	9
A. Program of institutional strengthening.								
1993-95	Establishment of Ozone Technical Office and National Implementation Group.	implementation of Plan of Action.	All	OTOZ UNDP	50,000	36,000	36,000	122,000
1993-95	Public education and information and elaboration of a body of laws.	Provide information to affect public opinion on the implications of damage to the ozone layer and its consequences to human, animal and plant life.	All	OTOZ UNDP	26,000	15,000	15,000	56,000
B. Industrial Sector Activities.								
1993-94	Studies on the use of alternative substances and extinguisher systems without using halons.	Make available an installation for extinguishing using alternative substances and training of technical personnel.	All	OTOZ UNDP	12,000	18,000		30,000
1993-94	Training in the use of alternative substances (LPG), propane-butane mixtures and Substitutes such as 134a, 123 in domestic and industrial refrigeration and air conditioning.	Make available more than 300 technicians trained to provide services for the development of the most advanced technology mentioned.	All	OTOZ UNDP	40,000	8,000		48,000
1993-94	Investment in CFC reclamation and regeneration equipment for the recycling of those gases	Reduction in consumption of 20 t/yr of CFC between 1993 and 1994 and 100t between 1993 and 1996	All	OTOZ UNDP	83,000	26,000		109,000

SUMMARY OF PROJECTS BY SECTOR

(Page 2)

Year	Description of Activity	Desired effect	Sector	Agency	1993	1994	1995	
1	2	3	4	5	6	7	8	9
1993-94	Studies of alternative technologies for adapting LPG, propane and butane, ammonia and substitutes such as 134a and 123.	Training of over 300 technicians and making available possible new technologies for adaptation.	All	OTOZ UNDP	20,000	9,000		29,000
1993-94	Pre-investment studies for conversion of refrigeration and air conditioning equipment in the Public Health sector.	Registry and diagnosis of the technical status of equipment, cost-benefit analysis to determine its substitution, and pre-investment study for a later re-investment program in the sector.	All	OTOZ UNDP	29,000	4,000		33,000
1993-94	Pre-investment study for technological conversion of refrigeration and air conditioning equipment in the national tourism sector.	Registry and diagnostic of the technical status of equipment, cost-benefit analysis to determine its substitution and a pre-investment study for a later conversion program in the sector.	All	OTOZ UNDP	15,000	8,000		23,000
Subtotal					275,000	124,000	51,000	450,000
International Technical Assistance.								40,000
Increase for cost of equipment and materials.								8,000
Total								498,000

Overall Summary of Funds Requested for the First Stage of the Cuba Country Programme

Year	Type of Project	Project Description	Implementing Agency	Cost of Project in US \$
1	2	3	4	5
1993-95	Institutional strengthening.	Establishment of the National Group for the Implementation of the Montreal Protocol and its technical office OTOZ, elaboration and entry into force of COMARNA resolution 3/93 establishing that Group; regular imports of SDO and technologies. Public information to cover education and allegorical campaigns on the activities of the Protocol.	PNUD/OTOZ	178,000
1993-94	Industrial sector activities.	Recycling of CFC in refrigeration workshops, training of technicians, workshops, seminars, practical training, adaptation of refrigeration and air conditioning equipment to the use of alternative substances, as well as practice in the use of new substitutes, registry and pre-investment studies in the sectors of public health and national tourism. Studies on the application of alternative substance to extinguishers not using Halons.	OTOZ/PNUD	272,000
1993-95	Short-term consultations for project preparation.	Consultations during implementation of the country program.		40,000
Subtotal				490,000
Contingency				8,000
Total				498,000

OTOZ = Ozone Technical office

COMARNA = National Commission for Environmental Protection