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MALAYSIA COUNTRY PROGRAMME

MALAYSIA

COUNTRY PROGRAMME

PROJECT

THE CONSERVATION, LEAKAGE CONTROL AND RECYLING OF CFC 12, AND
DEMONSTRATION PROJECT IN AUTOMOBILE AIR-CONDITIONING SECTOR

Prepared by

DEPARTMENT OF ENVIRONMENT
Ministry of Science, Technology and the Environment

Kuala Lumpur
June 1991

PROJECT

THE CONSERVATION, LEAKAGE CONTROL AND RECYCLING OF CFC 12 AND DEMONSTRATION PROJECT IN AUTOMOBILE AIR-CONDITIONING SECTOR

PURPOSE

1. The purpose of this paper is to detail the proposal for financial assistance:

Part I) : to establish a National Network of Recycling (NNR) and collection of automotive air-conditioning (AAC).

Part II) : for the demonstration and training of service operators in automotive air-conditioning.

BACKGROUND

2. In 1989, the calculated consumption of controlled substances in Malaysia is approximately 4779.3 MT. Refrigeration and automotive air-conditioning industry accounts for around 48.5% and constitutes the largest consumer of CFCs among the other sectors. There are approximately 5 million cars in Malaysia, of which about 33% are air conditioned with each unit being charged an average of 1.2 kg CFC 12. Refilling, with the same amount, is done once or twice a year. There are five AAC manufacturers which involves 200 dealers and more than 2500 air conditioning shop servicing operators throughout Malaysia.
3. There exists a positive correlation between the car population growth and the consumption of CFC 12. In establishing the total CFC 12 consumption for the AAC industry it can be divided into Original Equipment Market (OEM) and Replacement After Sale market (REM). The combined CFC 12 consumption for both is estimated to be 1951.1 MT in 1990 and it is anticipated that the consumption would increase twofold (4006.2 MT in the year 1995).

4. AAC system leaks CFC 12 during installations, operations and servicing. There is due need to improve installation, maintenance and service technologies to reduce emission, and at the same time, to ensure that the CFCs which until now is freely discharged into the atmosphere, is collected, cleaned and reuse or stored for destruction using approved technologies, and when substitutes are available.

OBJECTIVE

5. The objectives of these projects are as follows:-

National Network of Recycling (NNR)

- 5.1 To minimise and eliminate the wastage of the CFC 12 emission during servicing and maintenance.
- 5.2 To reduce the consumption of CFC 12 in AAC industry.
- 5.3 To develop National Network of Recycling (NNR) throughout the country.
- 5.4 To develop a continuous series of in-house training programmes in AAC.

Demonstration and Training

- 5.5. To create public awareness programmes to eliminate unnecessary emission of CFC 12 on operators in the car air-conditioning sector.
- 5.6. To train and instill correct installation and servicing procedures in handling recycling equipment.
- 5.7. To encourage the use of alternative CFC-friendly technology.
- 5.8. To encourage understanding of the ozone and CFC problems as a result poor operating practices.

JUSTIFICATION

6. While awaiting the emergence of alternatives and suitable destruction technology, the more immediate solution is the recycling and recovery of CFC-12 and minimization stage of the said gas, while performing servicing or topping-up gas. The establishment of adequate recovery and recycling facilities in Malaysia would definitely reduce the consumption of CFCs. The refrigeration and air conditioning sector accounts for 50% of total CFCs consumption. Based on the study data of the Working Group, the adoption of this measures would in 1991 eliminate need for consumption of 394 tonnes per year rising to 1309 tonnes by year 2000.
7. The losses from air conditioners mainly occur as a result of leaks testing during manufacturing, material handling, loss during recharge, normal leakage due to system deterioration and venting during service and repair. When vehicle air conditioners are serviced, the remaining charge is usually vented to the atmosphere. Approximately 93% of emission occurs in operation and service. Servicing and maintenance are the major areas in which CFC 12 emission can be substantially reduced. There is also an underlying need to arrest and contain this CFC until technical facilities are available to 'destroy' and render them harmless.
8. Leaks and operating losses can be reduced if the car operators are encouraged to run vehicle air conditioners regularly to lubricate the seals. It means that public awareness can also be raised, by using the media, on the need to regularly run car for short periods.
9. Many have a limited understanding of the ozone and CFCs problem and poor operating practices, that a programme of awareness and the need for trade competence training is desirable. Training and retraining of car operators that service automotive air conditioners should be conducted by an experienced consultant together with local expertise. At the same time consultation from educationists would be required.
10. Currently there are more than 2500 air conditioning shops in the country. Out of which, 500 perform solely air conditioning servicing and maintenance functions while the remaining also deal with air conditioning servicing though smaller compared to its overall business turnover. Presently there are a few types of recovery equipment selling in the market, but the main problem, especially for small workshops, is the cost and also the purity of these recovery machines.

11. With the largest users of CFC 12 in AAC and the largest number of service workshops involved, the establishment of the National Network of Recycling (NNR) is immediately required. Other than to reduce and eliminate the consumption of CFC 12, NNR can also create public awareness and introduce a continuing series of in-house training.

PROPOSAL

12. It is proposed that the industry cooperate with Department of Environment (DOE) to establish a network of recycling and collection centres through acquisition of recycling and coolant saving components and at the same time propose a series of on-the-job training on the use and maintenance of these equipments by local experts.
13. To establish NNR throughout the country, recovery and recycling machines are immediately required. The number and location of NNR will be determined by the Government together with AAC industry itself using well-established government and industries mechanism to identify and install the equipment and the follow-up training.
14. Currently it has been identified and proposed that the number of NNRs required should be concentrated in central, northern and southern region of Peninsular Malaysia and the others in Sabah and Sarawak. A minimum of 200 NNRs should be established.
15. A series of in-house training through the trade associations and professional bodies such as ASHRAE and IEM, would be developed in each recycling network. It is proposed that trained local experts should conduct the programme activities. The achievement and progress of each recovery network to reduce consumption and the training programme activities should be monitored by the Government. A Government authorization certificate would be produced at the end of each training course.
16. The Government would develop a monitoring schedule and checklist activities on a monthly basis. The purpose of this, is to ensure that all NNRs are running smoothly in their programme to reduce the consumption, at the same time their in-house training activities and public awareness campaigns are developed and properly managed.

17. The training programme for car air-conditioning technicians in the use and recycling of CFC 12 has been drawn up (Attachment).

18. There is need for dealers/operators training in the maintenance of car air-conditioning unit and assistance is also required to establish a continuous demonstration programme to teach correct servicing procedures. To meet these requirements it is proposed that UN Implementing Agency send an equipment servicing training consultant to Malaysia. It has also been proposed that UN Implementing Agency consult with all parties in the final form of the training programmes.

ACQUISITION DESCRIPTION

19. The recycling and collection equipment will be acquired and established by DOE using established government procedures in accordance with the specifications proposed by the Working Group (WG) in consultation with the industries. The centres are those selected by the WG. The operators are required to enter into an agreement with DOE or an established expert non-profit body e.g. ASHRAE to operate and maintain the centres.

20. It is proposed that the Department of Environment (DOE) or its appropriate agent, acts as the focal point to coordinate and determine the specific location distribution of NNRs and to monitor the achievement of NNR throughout the country. These can be done by DOE regional offices in the country.

21. The Government will also determine detailed location distribution of NNRs and the number should be divided among AAC manufacturers. Table I shows the number of NNRs proposed and required throughout the country, according to major towns.

22. An experienced car air-conditioning consultant be engaged to consult with and advice car manufacturing industries and to draw up details for a demonstration/training programme.

23. It is therefore proposed that an UN Implementing Agency and Ministry of Science, Technology and the Environment - MOSTE (DOE as Focal Point) jointly organize an intensive four-day in-country on-hand training that would cover from batches of 50 car dealers/technicians per day using CFC 12 in their operations. The agency would be responsible for training arrangements. It is

proposed that training would be held in Kuala Lumpur by the end of the year 1991 or early 1992, immediately after the acquisition of equipments and establishment of Network (Table II). It is also proposed a team of local experts would be engaged to continue this on-hand retraining regularly over the next 3 years.

IMPLEMENTATION AND COST

24. An external consultant would be invited with each allocated for presentation of working paper and as a resource person in demonstration training. Three local resource persons would be needed as well in similar capacity.
25. This four-day training will enable operators to gain on hand coaching on equipment to use, the detection technologies, care, installation, services, maintenance of such equipment.
26. The detailed estimated costs are shown in Table IV. It is subsequently proposed that a team of local trainers would regularly visit those centres to provide on-the-job training in the local language and two further series of centralised training workshops be held to ensure the availability of a permanent core of trained personnel in recycling/recovery.

OUTPUT EXPECTED

1. A National Network of Recycling/recovery centres consisting of 200 equipments.
2. A yearly recovery/recycle of average estimated 870 tonnes of CFCs contained and prevented from escape into the atmosphere by the year 2000.
3. A trained 500 recycling/recovery experts, mechanics/operators and 90 core trained trainers.

Table I : Proposed Number of NHRS for AAC Throughout Malaysia

State	Number of Existing Service Station/ Workshop	Region	Specific Distribution of NHRS	
			Number of Location/ Major Town	Number Required
PERLIS	30	NORTHERN	1	2
KEDAH	155	NORTHERN	3	10
P. PINANG	220	NORTHERN	3	20
PERAK	185	NORTHERN	3	16
SELANGOR	450	CENTRAL	5	45
W. PERSEKUTUAN	550	CENTRAL	6	45
N. SEMBILAN	100	CENTRAL	3	8
MELAKA	75	CENTRAL	2	6
JOHOR	220	SOUTHERN	5	16
KELANTAN	70	EAST COAST	3	8
TERENGGANU	80	EAST COAST	3	6
PAHANG	155	EAST COAST	4	12
SABAH	100	EAST M'SIA	2	5
SARAWAK	100	EAST M'SIA	2	5
LABUAN	10	EAST M'SIA	1	2
TOTAL	2500		46	200

Table II: Implementation Schedule of the Project

Project Description	Total Project Cost (millions)		Date (month/year)											
			A				B				C			
			Start		Complete		Start		Complete		Start		Complete	
	US	USS	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
<u>Project I</u>														
ON-JOB TRAINING	0.12	0.50	JUL/91	JUL/91	AUG/91	SEP/91	SEP/91	OCT/91	NOV/91	DEC/91	FEB/92	MAR/92	MAY/92	JUN/92
<u>Project II</u>														
RECYCLING & RECOVERY (NMR)	2.400	0.880	SEP/91	OCT/91	NOV/91	DEC/91	JAN/92	JAN/92	FEB/92	FEB/92	MAR/92	MAR/92	APR/92	MAY/92
Total	2.52	1.38												

Note:

- A : Project Identification
 B : Project Preparation
 C : Project Funding

PROJECT I

Table III : Estimated Cost For the Purchase
of Recycling and Recovery Machines

Average Unit Cost		Number of Recycling & Recovery Equipment Required	Total Estimate (million)	
(M\$)	(US\$)		(M\$)	(US\$)
12,000	4444.40	200	2.4	0.9

PROJECT II

Table IV--Estimated Expenditure for Four-Days Demonstration
and Retraining-In-Country Training in 1991/1992

Subject	Number Required	Unit Cost (HS)	Total Estimated Cost	
			(HS)	(US\$)
1. Facilities rental (DOE)	4	1,500	2,000	730
2. Training Hall, Meals and light Refreshments	4 days	7,500	30,000	11,100
3. Three local resource persons	(3ps x 4dy)	500	6,000	2,200
4. Accomodation for local resource person	(3ps x 4dy)	250	3,000	1,100
5. Teaching Materials (in different languages)	(200 ps)	50	10,000	3,650
6. Misc. and Contingency		4,000	4,000	1,500
7. One automobile air- conditioning consultant/ Experts	(1ps x 4dy)	(aUS\$750 / day)	3,000	1,100
8. Round trip air travel of two consultants (if from overseas)	(1 ps)	(aUS\$4000)	11,000	4,000
9. Accomodation of one consultant	(1ps x 4dy)	(aUS\$120 / day)	1,380	500
			71,000	26,000
10. Retraining Programme by 2 experts on circuit for 3 years.		67,000	67,000	24,500
TOTAL			138,000	50,500

MALAYSIA

COUNTRY PROGRAMME

TITLE OF PROJECT

SERVICING, MAINTENANCE AND RECOVERY CHARGING KIT
FOR PORTABLE EXTINGUISHER (HALON 1211)
AND TRAINING PROJECT IN HALON SECTORS

Prepared by:

DEPARTMENT OF ENVIRONMENT
Ministry of Science, Technology & the Environment

Kuala Lumpur
July 1991

TITLE OF PROJECT

SERVICING, MAINTENANCE AND RECOVERY CHARGING KIT FOR PORTABLE EXTINGUISHER (HALON 1211) AND TRAINING PROJECT IN HALON SECTORS

PURPOSE

1. The purpose of this paper is to detail the proposal financial assistance:

- Part I : To establish servicing, maintenance, recovery and recycling centre at all major Fire Stations with kit charging equipment.
- Part II : To develop training and demonstration of service operations at recycling centre.
- Part III : To set up a Central Recycling Plan (CRP) at Central Fire Training School (CFTS).

BACKGROUND

2. Halon have been used widely in Malaysia. The installations of fire fighting portable extinguishers using BCF (Halon 1211) and fixed installations (Halon 1301) have normally been required by the Fire Services Department (FSD). These major uses of halons which are used to protect enclosures that house highly sensitive electronic, computing and telecommunications equipment such as aircraft engines, computer suites, sub-stations.
3. In 1989, Malaysia's calculated consumption of controlled substances is 4779.3 MT of which halon constitute 7.6 percent or 4338.0 MT. Although the quantity of halons used especially for new installations are relatively small, they have a high percentage Ozone Depleting Potential (ODP).
4. Therefore, as a proportion of the total ODP, they contribute a significant proportion and there are no immediate substitute.

OBJECTIVE

5. The objective of these projects are as follows:

Establish Servicing - Recovery Centre (SRC)

- 5.1 To minimise and eliminate the discharge of Halon 1211 contained in the existing portable extinguishers during servicing and maintenance.
- 5.2 To reduce the consumption of Halon 1211.
- 5.3 To develop Halon Services Centre Network (HSCN) at the major fire stations.
- 5.4 To develop a continuous series of in-house training.

Demonstration and Training Scheme

- 5.5 To create awareness programmes to eliminate unnecessary emission of Halon on operators.
- 5.6 To advise and teach correct servicing and maintenance procedures in handling recycling facilities.
- 5.7 To encourage the use of alternative friendly technology.
- 5.8 To encourage understanding of the Ozone Depleting Substances (ODS) problems as a result poor operating practices.

Central Recycling Plant (CRP)

- 5.9 To recover and recycle all extinguishers not serviceable and be replaced by CO₂ fire extinguishers or withdraw from use.
- 5.10 To facilitate the storage point for the proposed National Halon Bank (NHB) for reusable stock and contaminated stock awaiting destruction.
- 5.11 To establish the Central Fire Training School (CFTS) at CRP.

JUSTIFICATION

6. There are 600,000 to 800,000 of portable extinguishers (Halon 1211) installed all over the country, equivalent to about 2000 tonnes of bottle capacity of portable halon 1211 extinguishers. Average replacement requirement per servicing and maintenance could be 100 tonnes or 80 percent to dissipation of contents held under pressure into the atmosphere, accidental discharge during training and fire extinguishment. The total installed capacity of Halon 1301 is estimated to be between 12,000-20,000 tonnes whose effect to the ozone layer is very high and will have to be closely monitored.
7. Halons are emitted during training, testing, servicing, maintenance, accidental discharge and leakage, as well as during fire fighting.
8. The more immediate solutions appear to be the recycling, especially of Halon 1211 and minimization stage of the gas, while performing servicing and maintenance. These recycling facilities would definitely reduce the consumption of Halon 1211 and it is believed that this portion of consumption constitutes more than 60 percent of the total Halon 1211 consumptions.
9. The losses from Halon 1211 portable extinguishers mainly occur as a result of leaks testing during manufacturing, material handling, loss during recharge, normal leakage due to system deterioration and venting during service and refill. There is need to ensure that the 2000 tons of Halon 1211 now contained in their system is not discharged into the atmosphere and stringent control will have to be introduced.
10. Many have a limited understanding of the ozone depleting issues and problems currently faced due to ineffective control that a programme of awareness and the need for trade competence training is desirable. Training and retraining of operators that service should be conducted by an experienced consultant together with local expertise. At the same time consultation from educationists would be required.
11. Currently most portable extinguishers are serviced by private companies, individuals using various forms of equipment. Almost invariably they are discharged or the contents are lost in the process. Practically, all halon 1211 portable extinguishers can and will be regulated at the fire stations over the next 10-20 years provided 'kits' are made available.

12. With a large number of portable extinguishers and the number of installations involved, the establishment of the HSCN is immediately required. Other than to reduce and eliminate the consumption of Halon 1211, HSCN can also create public awareness and introduce a continuing series of in-house training.

PROPOSAL

13. It is proposed that the users cooperate with FSD and DOE to establish a network of recycling and collection centres through acquisition of recycling and at the same time propose a series of on-the-job training on the use and maintenance of these equipments by local experts.
14. Currently it has been identified and proposed that the number of servicing centres required should be concentrated at the major fire stations will facilitate this operation. Approximately 50 HSCNs should be established. The specific number and location distribution will be determined depending on the number of recovery facilities approved by the Fund.
15. A series of in-house training would be developed in each recycling network. It is proposed that trained local experts should conduct the programme activities. The achievement and progress of each recovery network to reduce consumption and the training programme activities should be monitored by FSD and DOE. A Government authorization certificate would be produced at the end of each training course.
16. The Authority concerned would develop a monitoring schedule and checklist activities on a monthly basis. The purpose of this is to ensure that all are running smoothly in their programme to reduce the consumption, at the same time their in-house training activities and public awareness campaigns are developed and properly managed.
17. It is proposed that a Central Recycling Plant (CRP) can be set up at the Central Fire Training School (CFTS). The cost of such a plant is expected to be M\$1.5million or US\$0.6million. All extinguishers not serviceable would be replaced by CO₂ or withdrawn from use and sent to the CRP for recovery and recycling. The process will include purification and removal of contaminants. It is proposed that Halon Bank for storage of Halon 1211 be set up for refilling of Halon 1211 still in use or are required to be used in certain critical sectors.

18. There is need for training of technician operators in the maintenance of portable extinguishers unit and assistance is also required to establish a demonstration programme to teach correct servicing procedures. To meet these requirements it is proposed that UN Implementing Agency send an equipment servicing training consultant. It has also been proposed that UN Implementing Agency consult with all parties in the final form of the training programmes.

ACQUISITION DESCRIPTION

19. The recycling and collection equipment will be acquired and established by FSD using established government procedures in accordance with the specifications proposed by the Working Group (WG) in consultation with the users. The centres are those selected by the FSD. The operators are required to enter into an agreement with FSD or an established expert non-profit body e.g. MFPA to operate and maintain the centres.
20. It is, therefore, proposed that the FSD acts as the focal point to coordinate and determine the specific location distribution of HSCNs and the number should be divided among service centres. Monitoring the achievement of HSCNs throughout the country can be done by FSD and DOE regional offices in the country.
21. A local experienced Halon services person be engaged to consult with and advice manufacturing industries or users and to draw up details for a demonstration/training programme.
22. It is therefore proposed that an UN Implementing Agency and Ministry of Science, Technology and the Environment - MOSTE and FSD as focal point jointly organize an intensive two-day in-country training that would cover 100 technicians. The UN Implementing Agency would be responsible for training arrangements. It is proposed that training would be held in Kuala Lumpur by the middle or the end of 1992, immediately after the acquisition of equipments and establishment of network (Table I).

IMPLEMENTATION AND COST

23. Two external consultants would be invited with each allocated for presentation of working paper and resource person in demonstration training. Three local resource persons would be needed as speakers in local context.
24. This two-day training will enable operators representatives to discuss alternative technologies with experts. The experts will be available to discuss with individual industry, how each of these technologies and information might be applied in their operations.
25. The detailed estimated costs are shown in Table II. It is subsequently proposed that a team of local trainers would regularly visit those centres to provide on-the-job training in the local language and further series of centralised training workshops be held to ensure the availability of a permanent core of trained personnel in recycling/recovery.
26. At the moment, 50 units of recycling equipment are needed immediately. The detailed estimated costs are shown in Table III. The submission of these figures are based on information gathered and these cost estimates may vary from time to time depending on economic factors and also taking into consideration the possible facility changes.

OUTPUT EXPECTED

1. A Halon Service Centre Network of Recycling/recovery census consisting of 50 equipments.
2. A yearly recovery/recycle of average estimated 300 tonnes of CFCs contained and prevented from escape into the atmosphere by the year 2000.
3. A trained 500 recycling/recovery experts, mechanics/operators and 100 core trained trainers.

TABLE 1: IMPLEMENTATION SCHEDULE OF THE PROJECT

Project Description	Total Project Cost (million) U.S.	Date (month/year)											
		A				B				C			
		Start		Complete		Start		Complete		Start		Complete	
		(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
PROJECT VI(c) Recovery and charging kit for BCF (Halon 1211)	1.5	10/91	11/91	12/91	01/92	02/92	03/92	04/92	05/92	06/92	07/92	08/92	09/92
PROJECT VI(d) Central Recycling Plant	0.6	12/91	01/92	02/92	03/92	04/92	05/92	06/92	07/92	08/92	09/92	10/92	11/92
PROJECT V Demonstration & Training	0.2	11/91	12/91	01/92	02/92	03/92	04/92	05/92	06/92	07/92	08/92	09/92	10/92

NOTE:

A : Project Identification

B : Project Preparation

C : Project Funding

TABLE II : ESTIMATED EXPENDITURE FOR TWO DAYS
IN-COUNTRY TRAINING IN HALON SECTOR

Subject	Number Required	Unit Cost (HS)	Total Estimated Cost	
			(HS)	(US\$)
1. Equipment rental	2	8,000	16,000	5,930
2. Conference Hall, Lunch tea break	2 days	15,000	30,000	11,111
3. Three local resource person	(3ps x 2dy)	500	3,000	1,111
4. Two session chairmen	(2ps x 2dy)	500	2,000	740
5. Organizing committee	(2 times)	1,500	3,000	1,111
6. Accomodation for local resource person	(3ps x 2dy)	500	3,000	1,111
7. Proceeding	(100 ps)	30	3,000	1,111
8. Miscellaneous and contingency		4,000	4,000	1,481
9. Two halon consultant/ experts	(2ps x 2dy)	(@US\$500 / day)	5,400	2,000
10. Round trip air travel of two consultants	(2 ps)	(@US\$4000)	10,800	8,000
11. Accomodation of two consultant	(2ps x 2dy)	(@US\$100 / day)	1,080	400
12. Establishment of a demonstration programme and equipment	3	(@US\$30000)	240,000	90,000
TOTAL			321,280	124,106

Table III : Estimated Cost For the Purchase
of Recycling Machines and to
Set Up Central Recycling Plant

Average Unit Cost		Number of Recovery Equipment	Total Estimate (million)	
(M\$)	(US\$)		(M\$)	(US\$)
80,000	29,629.60	50	4.0	1.5
		Central Recycling Plant		
1,500,000	555,555.60	1	1.5	0.6

DRAFT III

MALAYSIA

COUNTRY PROGRAMME

TO REDUCE AND ELIMINATE EMISSION OF
OZONE DEPLETING SUBSTANCES UNDER
THE INTERIM MULTILATERAL FUND OF THE
MONTREAL PROTOCOL

NATIONAL STEERING COMMITTEE ON THE OZONE LAYER

KUALA LUMPUR - MALAYSIA
SEPTEMBER 1991

EXECUTIVE SUMMARY

This country programme paper is prepared to inform the Executive Committee of the Interim Multilateral (EXCOM) established under the Montreal Protocol on Substances That Deplete The Ozone Layer, on the programme of activities and project proposals to reduce and subsequently eliminate emission of ozone depleting substances (ODS) in Malaysia.

2. The paper presents the background and current status on the consumption of ODS together with the Institutional and Policy Framework, the actions taken by the the Government and Industry, Implementation Strategies, Future Action Plans, Timeframe and Budget to implement the action plans.

3. Preliminary assessment have shown that Malaysia consumed 2740.7 metric tonnes of ODS in 1990 which represents 0.23 kg per capita. Malaysia has initiated the process to reduce and eliminate CFCs and Halon from automobile air conditioners, refrigerant, solvent cleaning, aerosol propellant, foam manufacturing and Halon for fire protection well before the time schedule mandated. The target date set for complete elimination of CFCs and Halon usage is the year 2000. Implementation of these projects is scheduled to begin in 1992 and 1993.

(ii)

4. The total cost of the scheduled projects is US\$257.70 million of which US\$255.74 million is for investment and pre-investment projects and US\$1.96 million for public awareness and training programmes.

5. The Government of Malaysia is seeking for financial support from the Interim Multilateral Fund (MLF) under the Montreal Protocol to finance these programmes and projects in line with decisions of the meeting of the parties in London, 1990.

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OBJECTIVES

The objective of this paper is to present to the EXCOM the programmes activities and project proposals undertaken by Malaysia in compliance with the provisions of the Montreal Protocol on Substances That Deplete the Ozone Layer. In line with the provision of Article 5, paragraph 1 of the Protocol, Malaysia is seeking financial support to carry-out the programmes, activities and projects to eliminate the use of ODS.

BACKGROUND

Malaysia acceded to the Vienna Convention and the Montreal Protocol on 29th August 1989, which came into force in Malaysia on 27th November 1989. By the decisions of the meeting of the parties to the Protocol, Malaysia has been granted status as a developing country operating under Article 5, paragraph 1 of the Protocol.

The Interim Multilateral Fund as established by the meeting of the parties of the Protocol came into operation on 1st January 1991. The purpose of the fund is to provide financial and technical cooperation to developing countries which are parties operating under Article 5 paragraph 1 of the Protocol. Under this provision, Malaysia is eligible for financial support to phase out ODS in line with the obligations to the Vienna Convention and the Montreal Protocol.

CURRENT STATUS ON THE USE OF ODS

Malaysia does not produce any controlled substances but imports its needs mainly from developed countries. Preliminary trade estimates of the calculated weighted consumption in 1986 of the controlled substances was 3840 MT. Studies have shown that the consumption in 1989 was 4211 MT which represents 0.29 kg. consumption per capita. When Malaysia became a party in November 1989, internal processes were initiated to minimise the use of CFCs and Halon. The Customs Duty (Amendment) (No.35) Order 1989 to monitor the import and use of CFCs and Halon was introduced in December 14, 1989. Preliminary figures obtained through this regulation indicated that in 1990, 3740.7 metric tonnes of CFC's and Halons were consumed which represents 0.23 kg per capita.

Figure 1 shows the different types of CFCs and Halon used in the Malaysian market in 1989. The refrigeration and car air-conditioners sector were the main users compared to the electronic, foam and aerosol sectors. Studies on the consumption of CFCs and Halon show that there was a decline in consumption in 1987 and 1988 which can be attributed to the slow-down in the economy which adversely affected the motor-car and construction industries. The dramatic increase in foreign investments in the electronic industry in 1989 and 1990 especially by multinational companies, increased

the consumption of CFCs especially as cleaning solvents. During the same period there was a decline in the use of CFCs for aerosol propellants because of the increased use of Liquefied Petroleum Gas (LPG) as a substitute. The decline in the use of CFCs as a refrigerant can be attributed to the increase in usage of HCFC 22 (which is not a controlled substance during the transition period) and methyl chloroform which is used as a cleaning solvent in the small and medium scale industries.

INSTITUTIONAL FRAMEWORK GOVERNING CONTROL SUBSTANCES

In pursuance of the objective to reduce and eliminate the consumption of CFCs and Halon, Malaysia has established an institutional framework to oversee the programmes being undertaken to meet this objective.

A National Steering Committee on the Ozone Layer (NSC) set up in 1985, whose members include ministries, government agencies, organisations representing the various industries, major suppliers of CFCs and Halon, universities, consumer associations and other non-governmental organisations. Figure II shows the organisational structure of the National Steering Committee. The NSC has convened a number of meetings to formulate strategies and control measures in order to comply with the provisions of the Protocol. The

Department of Environment (DOE) under the Ministry of Science, Technology and the Environment is the focal point directly involved in the implementation of the provisions of the Protocol with the various committees under the NSC being responsible for specific issues.

POLICY FRAMEWORK, REGULATORY SYSTEM AND INCENTIVES SCHEMES

Malaysia has made known its position in the various environmental meetings of its commitment to the global concern of mankind on the protection of the ozone layer. Malaysia as a party operating under Article 5, paragraph 1 of the Protocol has been given a ten-year grace period before it is required to initiate actions to reduce the consumption of the controlled substances. Due to the proactive role of Malaysia on environmental issues, the Government has already started the process to define the policies and regulations which are necessary to restrict the use of the controlled substances, way ahead of the time frame granted.

The Government has initiated, among others, the following strategies and measures.

5

National Policy Framework

- (i) Investors in new industries are encouraged to promote investment in ozone friendly CFC's and technologies especially non-Halon technologies and also to use substitutes or new alternatives.
- (ii) To monitor the use of controlled substances:
- (iii) To encourage the existing industries to use substitute or new alternatives.
- (iv) To discourage further investments relating to the production and use of the controlled substances.
- (v) To encourage universities, related industries and research institutions to carry out research on resource development of alternatives to CFC's and ozone friendly technologies which can be applied to domestic needs.
- (vi) To promote educational and public awareness programmes related to ozone protection.

- (vii) To encourage Malaysia's participation in international conventions and meetings to be able to contribute effectively to the objectives of the Protocol.

Regulatory and Control Measures

- (i) The Customs Duty (Amendment) (No. 35) Order 1989 came into force on 14th December 1989 for the purpose of updating import inventory and to monitor import-export of controlled substances.
- (ii) The following draft regulations have been proposed:
 - (a) Customs (Prohibition of Imports and Export) (Montreal Protocol) (CFC's and Halon) Order 199__
 - (b) Environment Quality (Use of CFC's and Other Gases as Propellant and Blowing Agent) 199__

- (iii) Amendment to the Environment Quality Act (EQA) 1974 may be necessary to regulate and prohibit to use of controlled substances.

Incentive Schemes

The Government is considering proposals for tax reduction and import duty exemption for activities related to the reduction of consumption of the controlled substances.

ACTIVITIES PERTAINING TO THE REDUCTION OF ODS UNDERTAKEN BY THE GOVERNMENT AND INDUSTRY

Six Working Groups (W.G's) of different user sectors namely solvent, Refrigerant, Car Air-Conditioners, Foam, Aerosol and Halon with the Department of Environment as the co-ordinator was formed in July 1990. Members of the these W.G's are to outline and prepare individual sector plans for reduction of ODS strategies, substitution, phase-out, voluntary compliance, inventorying and documentation of technological costs both investment and incremental cost.

The W.G's have submitted their report to the Government for verification and approval. Together with these reports, the study undertaken by the Canadian International Development Agency (CIDA), and the administrative and legal measures instituted by the Government, the National Study on ODS is expected to be completed by October 1991. The National Study based on the reports and recommendations of the W.G's would identify specific plans for the reduction of CFC's and Halon. The W.G's have submitted their project proposals to the Government for financial consideration under Multilateral Fund.

In addition to the regular meetings and consultations between the Government and the industries concerned, there is close co-operation between them with regards to participation in public awareness programmes, workshops and seminars.

IMPLEMENTATION STRATEGY

The Role of The Government

Malaysia's commitment to the protection of the ozone layer is evidenced by the control measures it adopted to reduce and eliminate the consumption of CFC's and Halon. The Customs Duties (Amendment) Order of 1989 to monitor the import of the controlled substances is the initial measure. Other laws and regulations on restriction of usage and mandatory elimination of ODS are being finalised.

The Government is studying proposals to provide tax rebates and exemption for individual corporations and industries for activities related to the reduction in the usage of ODS.

The National Study with the cooperation of CIDA and the private sector is in the final stages of completion. The action plans and strategies proposed by the National Study would accelerate the process of eliminating completely the consumption of ODS.

The Role of Industry

The six W.G's set-up by the related user-sectors have given voluntary support in working towards the objectives of the Protocol. The reports submitted by these W.G's would form the basis for report preparation of the National Strategy on the Protection of Ozone Layer to be adopted by the Government. An accelerated reduction and elimination is likely in the use of CFC's and Halon from automobile air-conditioners, refrigerant, solvent cleaning, aerosol propellant, foam manufacturing and Halon for fire protection, with the cooperation of the industries concerned.

ACTION PLAN=PROJECT INVESTMENT AND TECHNICAL ASSISTANCE

The W.G's set-up by the user-sectors have identified several CFC's reduction projects that can be implemented immediately. These projects can satisfy the criteria set for financial assistance such as technologies that are commercially available, cost-effective, environmentally sound and has short and long term solutions for reduction of ODS. These projects (in order of priority) would bring immediate effects in minimising emission of CFC's and Halon. Activities pertaining to these priority projects which can be categorised under Investment and Pre-investment and Public Awareness and Training Program are as follows:-

Investment and Pre-investment Projects

Automobile Air-Conditioners

- (i) Recycling and Recovery Equipment
- (ii) Introduction of coolant saving components
- (iii) Research and Development
- (iv) Manufacture of HFC 134a Air-Conditioning System

Halon Elimination

- (i) Phase-out of Halon in Petroleum industry

- (ii) Manufacture of CO₂ cylinder and valve
- (iii) Recovery and charging kit for Halon 1211
- (iv) Central Recycling Plant
- (v) Halon 1211 extinguishers phase out by 1999
- (vi) Halon National Data Bank
- (vii) Alternatives in Telecommunication Exchanges with assistance from UNEP/SIDA

Commercial and Residential Refrigerant

- (i) Project of driveline retrofitting and replacement of large central plant (LCP)
- (ii) Change tools and dies for residential system
- (iii) CFC disposal and recycling centre

CFC 113 of Solvent Reduction

- (i) Degreasing - semi-aqueous alternatives on-line system
- (ii) Metal cleaning - aqueous surfactant
- (iii) Precision cleaning - application for high-tech piece part and hardware

Conversion of CFCs in Aerosol System

- (i) Design of products to packaging component
- (ii) Configuration plant and accessories
- (iii) Safety needs and necessary approval

CFC Elimination in Petroleum Industry

- (i) Recovery and Recycling before phase-out
- (ii) Complete phase-out of CFC 12 before 1995
- (iii) Complete phase-out of HCFC 22 before 2010

Public Awareness And Training Projects

Public awareness promotion campaigns and on-the job training programmes have been proposed. These training programme will be conducted in automobile air-conditioners, refrigerant, CFC solvent cleaning sector, aerosol manufacturing and Halon Sector.

Project description, costs and time schedule for start-up and completion is shown in Table I.

TIME FRAME AND ACTION PLAN FOR PHASING-OUT ODS

Table II, shows the time-frame and a brief description of the action plans that have been undertaken and the proposed action plans up to the year 2000. A review of the strategies, policies and control measures is anticipated when the National Study is completed and the cost of compliance and technical options are determined.

To date 23 potential sub-preinvestment projects and 5 training programmes have been identified (Table 1). A detail description of the priority projects and the training activities that need urgently to be considered for financial support by the Multilateral Fund is shown in Appendix I and II. It has been proposed that the implementation of these projects should begin in 1992 and 1993.

BUDGET AND COSTS

Table I, shows the proposed cost of each project component and cost-effective measures to be undertaken. Total cost of investment and preinvestment projects is US\$255.74 million. The cost of Public Awareness and Training Programmes is US\$1.96 million. Hence the total cost of the projects proposed is US\$257.70 million.

These cost effective measures to be undertaken and the capital costs are based on the information gathered and estimated may vary and have to be adjusted when detailed figures are available.

CONCLUSION

Malaysia, being a party to the Protocol has initiated measures towards promoting international cooperation in the pursuit of protecting the global environment. Malaysia has participated actively in the three (3) meeting of the parties; Helsinki 3-5 May 1989, London 20-29 June 1990 and Nairobi 10-21 June 1991. Malaysia has given strong support in the establishment of the Interim Multilateral Fund under the Montreal Protocol and has been a member of the Executive Committee since its inception in 1990.

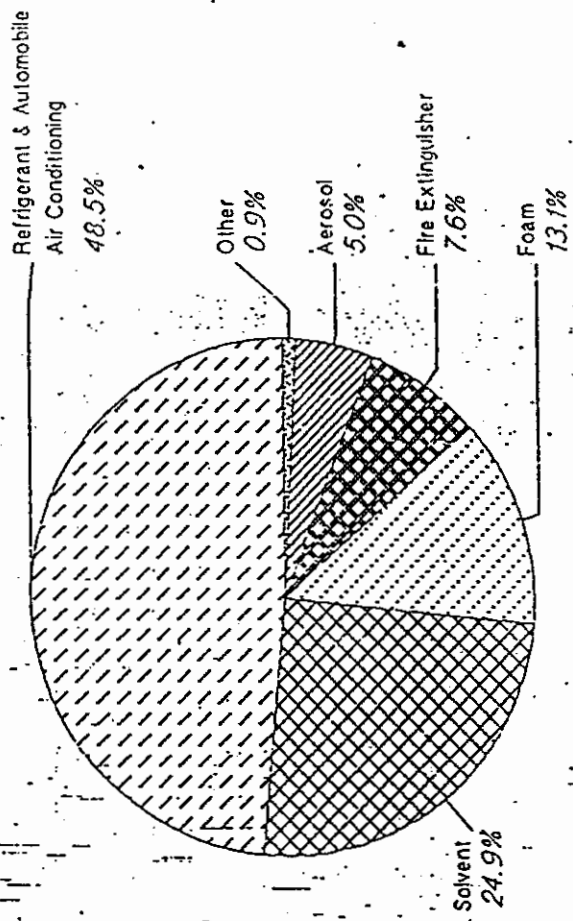
Malaysia has also been active in Asia and the ASEAN region in addressing environmental issues. Malaysia has organised and actively participated in the following conferences on environment.

- o The Langkawi Declaration on the Environment adopted by the Commonwealth Heads of Government in October 1989

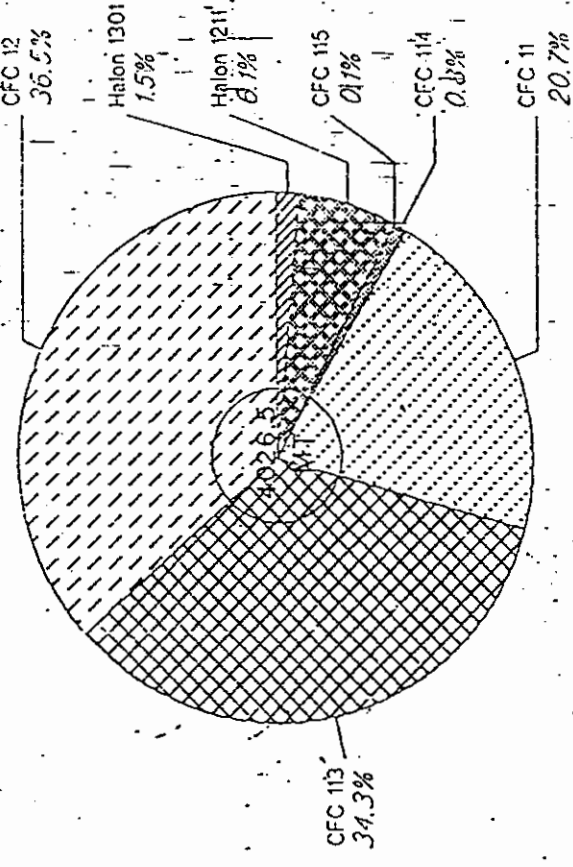
- o The Kuala Lumpur Accord on Environment and Development issued at the Fourth ASEAN Meeting of Ministers on Environment in Kuala Lumpur, June 1990. Both these meetings voiced strong support for the global effort in the protection of the ozone layer.
- o The 20th ASEAN Economic Ministers Meeting in October 1989 agreed that ASEAN should accede to the Montreal Protocol as a regional grouping. This agreement, in principal, paves the way for further cooperation in environmental issues in terms of harmonising approaches and strategies for more effective control
- o In February 1990, Malaysia with the cooperation of UNEP organised the International Symposium on Tropical Ozone in Penang. Malaysia was amongst the first developing countries to participate in international programmes on National Study approach in order to seek solutions to reduce and eliminate CFC's and Halon
- o ASEAN Officials Meeting on Environment (ASOEN) in February 1991 had identified cooperation on R&D studies on ODS

The Government of Malaysia fully support the global effort to reduce and eventually eliminate ODS. The efforts by bilateral, multilateral and UN Agencies to initiate projects to reduce and eliminate ODS is strongly supported by Malaysia. As a party operating under Article 5, paragraph 1, Malaysia needs financial and technical support to augment internal especially from the implementing agencies which have the necessary expertise and financial resources.

The Executive Committee's support in providing the necessary finance for projects to reduce and eliminate ODS in Malaysia would contribute greatly to the achievement of the objective of the Protocol.



By Application



By ODS

Figure 1: Malaysia, Breakdown of Consumption of Ozone Depleting Substances, 1989

Figure II: National Organisational Structure: Direct and Indirect Involvement in the Implementation of the Montreal Protocol

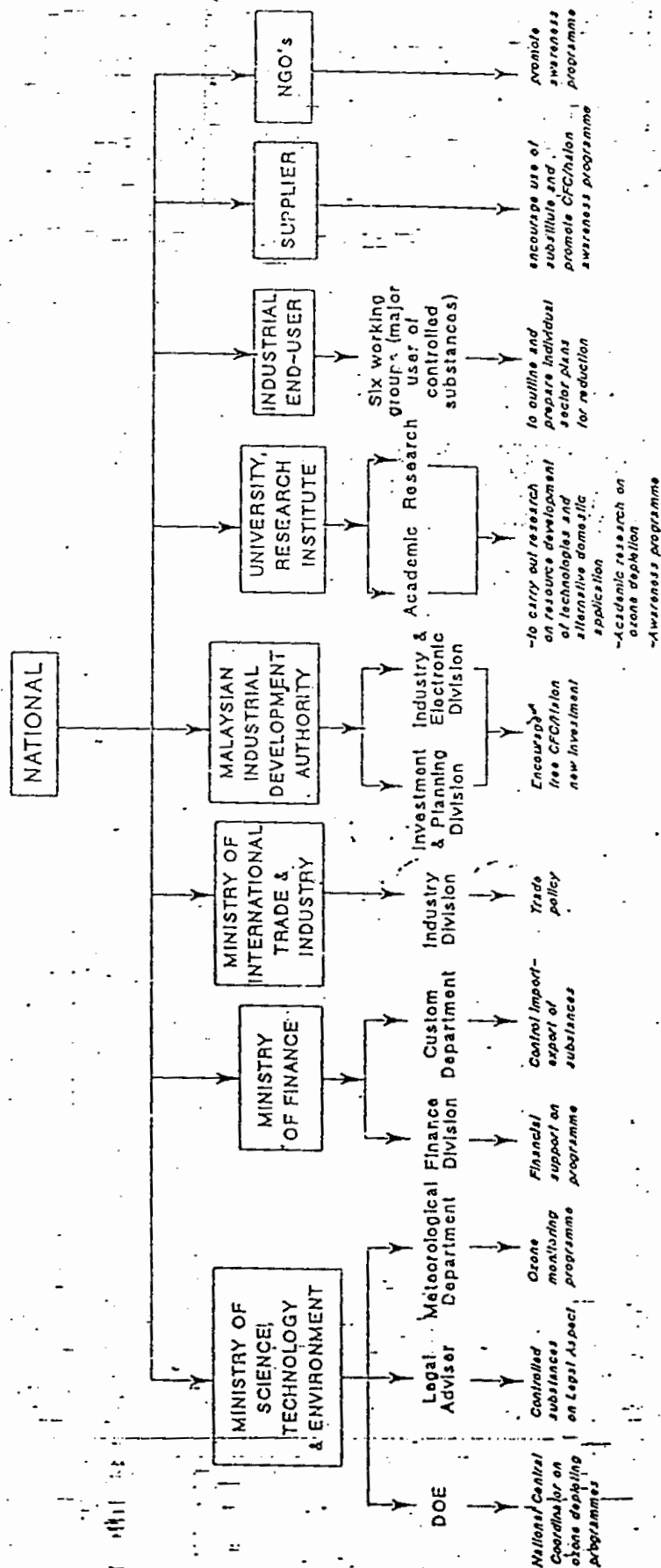


Table 1-IMPLEMENTATION SCHEDULE AND ESTIMATED PROJECT COST
OF THE OZONE DEPLETING SUBSTANCES, 1992-1995

PROJECT DESCRIPTION	TOTAL PROJECT		DATES (MONTH/YEAR)											
	COST		A				B				C			
	(millions)													
			Start		Complete		Start		Complete		Start		Complete	
	(US)	(US\$)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
INVESTMENT AND RE-INVESTMENT PROJECT														
PROJECT I: AUTOMOTIVE AIR CONDITIONING ¹														
Project I(a): recycling and recovery equipment of CFC 12	2.400	0.880	SEP/91	OCT/91	NOV/91	DEC/91	JAN/92	JUN/92	FEB/92	FEB/92	MAR/92	APR/92	APR/92	MAY/92
Project I(b): introduction of coolant-saving components														
- condenser	1.580	0.733	AUG/91	SEP/91	OCT/91	DEC/91	FEB/92	MAR/92	APR/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92
- evaporator														
- fitting parts/hose kit	1.250	0.466	AUG/91	SEP/91	OCT/91	DEC/91	FEB/92	MAR/92	APR/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92
Project I(c): Research and Development	3.000	1.100	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	JUN/92	AUG/92	SEP/92	NOV/92	JAN/93
Project I(d): manufacture of complete HCFC 134a air-conditioning systems														
- equipment machinery	12.000	4.440	JAN/92	FEB/92	APR/92	MAY/92	JUL/92	AUG/92	OCT/92	NOV/92	JAN/93	FEB/93	APR/93	JUN/93
- compressor & hose kit	12.000	4.440	JAN/92	FEB/92	APR/92	MAY/92	JUL/92	AUG/92	OCT/92	NOV/92	JAN/93	FEB/93	APR/93	JUN/93
- dismantle of existing machinery equipment (tools, jigs and mould)	15.000	5.550	JAN/92	FEB/92	APR/92	MAY/92	JUL/92	AUG/92	OCT/92	NOV/92	JAN/93	FEB/93	APR/93	JUN/93
TOTAL PROJECT I	47.640	17.610												
PROJECT II: COMMERCIAL AND RESIDENTIAL SYSTEM														
Project II(a): Project of driveline recycling and replacement of Large Central Plant														
- CFC recovery machine ²	26.000	8.880	SEP/91	OCT/91	DEC/91	JAN/92	FEB/92	APR/92	MAY/92	JUN/92	AUG/92	SEP/92	NOV/92	DEC/92
- driveline retrofit ³	100.000	40.700	NOV/91	DEC/91	JAN/92	MAR/92	MAY/92	JUN/92	AUG/92	OCT/92	NOV/92	DEC/92	FEB/93	MAY/93
- chiller replacements ⁴	26.000	91.100	NOV/91	DEC/91	JAN/92	MAR/92	MAY/92	JUN/92	AUG/92	OCT/92	NOV/92	DEC/92	FEB/93	MAY/93
Project II(b): Change tools and Dies for residential system	1.500	0.550	DEC/91	JAN/92	FEB/92	MAR/92	MAY/92	JUN/92	JUL/92	AUG/92	OCT/92	NOV/92	JAN/93	FEB/93

PROJECT DESCRIPTION	TOTAL PROJECT		DATES (MONTH/YEAR)							
	COST									
	(millions)		A				B			
			Start		Complete		Start		Complete	
	(PS)	(US\$)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Project III(c): CPC Disposal and Recycling Centre		(COST KGS)								
TOTAL PROJECT III	371.500	141.230								
IV										
PROJECT IV: CONVERSION COST OF CPCs IN AEROSOLS SYSTEM ⁵										
Project III(a): Design to products to packaging components and formulation (R&D)	0.550	0.350	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92
Project III(b): Configuration Plant, accessories and machineries	1.200	0.440	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92
Project III(c): Safety needs & necessary approvals	0.600	0.220	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92
TOTAL PROJECT III	2.750	1.010								
V										
PROJECT IV: CPC 113 SOLVENT REDUCTION SECTOR										
Project IV(a): Degreasing semi-aqueous alternative in-line system - 40 line system	8.000	2.950	OCT/91	NOV/91	DEC/91	FEB/92	APR/92	MAY/92	JUN/92	JUL/92
- capital cost of equipment, operating material & maintenance	4.000	1.480	OCT/91	NOV/91	DEC/91	FEB/92	APR/92	MAY/92	JUN/92	JUL/92
Project IV(b): Metal Cleaning - Aqueous surfactant required downstream waste treatment	1.200	0.400	JAN/92	FEB/92	MAR/92	APR/92	JUN/92	JUL/92	SEP/92	OCT/92
- capital cost	0.400	0.150	JAN/92	FEB/92	MAR/92	APR/92	JUN/92	JUL/92	SEP/92	OCT/92
- operating cost	0.400	0.150	JAN/92	FEB/92	MAR/92	APR/92	JUN/92	JUL/92	SEP/92	OCT/92
Project IV(c): Precision Cleaning - Application for high-tech piece part and hard-ware sub-assembly	4.200	1.550	JAN/92	FEB/92	MAR/92	APR/92	JUN/92	JUL/92	SEP/92	OCT/92
- capital cost	1.700	0.630								
- operating cost	1.700	0.630								
TOTAL PROJECT IV	19.500	7.170								

PROJECT DESCRIPTION	TOTAL PROJECT COST		DATES (MONTH/YEAR)											
	COST		A				B				C			
	(millions)													
			Start		Complete		Start		Complete		Start		Complete	
	(NS)	(USS)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
PROJECT V: PETROLEUM INDUSTRY ¹¹														
Project V(a): Recovery and recycling of CFC 12 and HCFC 22 before complete phase-out of CFCs and HCFC	3.220	1.190	JUL/91	AUG/91	SEP/91	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92
Project V(b): Complete Phase-out of CFC 12 before 1995	9.450	3.500	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	SEP/92	NOV/92	DEC/92
Project V(c): Complete phase-out of HCFC 22 before the year 2010	53.900	19.950	FEB/92	MAR/92	APR/92	MAY/92	JUL/92	AUG/92	SEP/92	OCT/92	NOV/92	DEC/92	FEB/93	APR/93
TOTAL PROJECT V	66.570	24.640												
PROJECT VI: HALON ELIMINATION														
Project VI(a): Complete phase-out of Halon before 1995 in Petroleum Industry	12.460	4.620	FEB/92	MAR/92	APR/92	MAY/92	JUL/92	AUG/92	SEP/92	OCT/92	NOV/92	DEC/92	FEB/93	APR/93
Project VI(b): Manufacture of CO ₂ cylinder and valve	5.000	1.850	JAN/92	FEB/92	MAR/92	APR/92	JUN/92	JUL/92	SEP/92	OCT/92	JAN/93	MAR/93	APR/93	JUN/93
Project VI(c): Recovery and charging kit for BCF (Halon 1211) ¹²	4.000	1.500	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92
Project VI(d): Central Recycling Plant	1.500	0.560	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92	NOV/92
Project VI(e): Existing Halon 1211 extinguisher to be phased out by 1999 ¹³	140.000	51.850	SEP/92	OCT/92	DEC/92	JAN/93	MAR/93	APR/93	MAY/93	JUL/93	SEP/93	DEC/93	APR/94	JUN/94
Project VI(f): National Data Bank: The conversion of existing test facilities	10.000	3.700	OCT/92	JAN/93	FEB/93	MAR/93	MAY/93	JUL/93	SEP/93	OCT/93	NOV/93	FEB/94	MAY/94	AUG/94

PROJECT DESCRIPTION	TOTAL PROJECT COST		DATES (MONTH/YEAR)											
	(\$ MILION)	(\$ MILION)	A				B				C			
			Start		Complete		Start		Complete		Start		Complete	
			(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Project Va): Removal and recycling of CFC 12 and HCFC 22 before complete phase-out of CFCs and HCFCs	3.220	1.190	JUL/91	AUG/91	SEP/91	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92
Project Vb): Complete phase-out of CFC 12 before 1995	9.450	3.500	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	SEP/92	NOV/92	DEC/92
Project Vc): Complete phase-out of HCFC 22 before the year 2010	55.500	19.950	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92	NOV/92	DEC/92	FEB/93
TOTAL PROJECT V	68.170	24.640												
PROJECT VI: HALON ELIMINATION														
Project VI(a): Complete phase-out of Halon before 1995 in Petroleum Industry	12.480	4.680	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92	NOV/92	DEC/92	FEB/93
Project VI(b): Halon 1211														
Project VI(c): Recovery and charging kit for R-12 (Halon 1211)	4.000	1.500	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92
Project VI(d): Central Recycling Plant	1.500	0.560	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92	NOV/92
Project VI(e): Existing Halon 1211 extinguisher to be phased out by 1999	140.000	51.250	SEP/92	OCT/92	NOV/92	DEC/92	JAN/93	FEB/93	MAR/93	APR/93	MAY/93	JUN/93	JUL/93	AUG/93
Project VI(f): National Data Bank: The conversion of existing test facilities	10.000	3.700	OCT/92	JAN/93	FEB/93	MAR/93	APR/93	MAY/93	JUN/93	JUL/93	AUG/93	SEP/93	OCT/93	NOV/93

	TOTAL PROJECT		DATES (MONTH/YEAR)											
	COST		A				B				C			
	(millions)													
PROJECT DESCRIPTION			Start		Complete		Start		Complete		Start		Complete	
	(US)	(LSS)												
			(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Project VI(g):														
Alternative to Halon for fire									1992-1994					
protection in Telecommunication		(CFC 113/14)												
Exchanges under UNE/SDA														
assistances														
TOTAL PROJECT VI	172.960	64.080												
TOTAL COST OF INVESTMENT AND														
PRE-INVESTMENT PROJECT	690.550	255.740												
EDUCATION, PUBLIC AWARENESS AND														
TRAINING PROGRAMS														
Project I:														
Automotive Air Conditioning ^{6,7}														
- Phase I	0.550	0.310	JUL/91	JUL/91	AUG/91	SEP/91	SEP/91	OCT/91	NOV/91	DEC/91	FEB/92	MAR/92	MAY/92	JUN/92
- Phase II	0.550	0.310	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92	JAN/93	FEB/93
	1.700	0.620												
Project II:														
Refrigerant Sectors ⁸	0.418	0.160	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92	NOV/92
	0.418	0.160												
Project III:														
Aerosol Manufacture System ⁹	1.620	0.610	AUG/91	SEP/91	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92
	1.620	0.610												
Project IV:														
CFC 113 Solvent Sectors ¹⁰	1.000	0.370	AUG/91	SEP/91	OCT/91	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUL/92	SEP/92
	1.000	0.370												
Project V:														
Halon														
- Phase I	0.300	0.110	NOV/91	DEC/91	JAN/92	FEB/92	MAR/92	APR/92	MAY/92	JUN/92	JUL/92	AUG/92	SEP/92	OCT/92
- Phase II	0.20	0.09	NOV/92	DEC/92	JAN/93	FEB/93	MAR/93	APR/93	MAY/93	JUN/93	JUL/93	AUG/93	SEP/93	OCT/93
	0.500	0.200												
TOTAL COST OF EDUCATION AND														
PUBLIC AWARENESS PROGRAMS	4.738	1.960												

Table 14: Timeframe and Action Plan Activities to Eliminate
the Ozone-Depleting Substances (ODS)

Activities and Framework	Action Plan (Year)															
	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000
I. Committee																
a) National Steering Committee	X															
b) Technical Steering Committee		X														
c) Industrial Working Groups						X										
II. Policy Statement																
a) Encourage																
- use of substitute	X															
- promote non CFCs technology investment	X															
- research & Development	X															
III. Control Measures																
a) Custom Duty (Amendment) Order 1989					X											
b) to study and introduce																
- Control of import-export						X										
- Use of CFCs as Propellants and blowing agents							X									
- Prohibition under ECA 1974								X								
IV. CFC Case Study						X										
V. Incentive																
a) Tax incentive								X								
b) Duty import-export								X								

Activities and Framework	Action Plan (Year)															
	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000
VII. Reduction Plan/Strategy																
a) Car Air-Conditioning-refrigerant																
b) CFCs Solvent																
c) Foam																
e) Aerosol																
f) Halon																
Overall Ozone Depleting Substances Reduction Programme																

NOTE:

- A : Project Identification
- B : Project Preparation
- C : Project Funding
 - (a) : Planned
 - (b) : Actual

- oOo -

- 1 No. of Car Air Conditioner Manufacturer = 5
 - 2 No. Required = 750 @ HS32,000
 - 3 No. Required = 500 @ HS220,000
 - 4 No. Required = 820 @ HS300,000
 - 5 No. of Aerosol Manufacturer = 6
 - 6 No. of Service Dealers = 200
 - 7 No. of times Training and Seminar are expected to be conducted = 17
 - 8 No. of times Training and Seminar are expected to be conducted = 5
 - 9 No. of times Training and Seminar are expected to be conducted = 6
 - 10 No. of times Training and Seminar are expected to be conducted = 1
 - 11 No. of Petroleum Industry = 7
 - 12 No. of recovery charging kits required = 50
 - 13 No. of existing Halon 1211 to be phased out = 800,000
- Currency rate : HS2.7 = US\$1.0