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

Twelfth Meeting
Montreal, 28-30 March 1994

COUNTRY PROGRAMME: INDONESIA

This document consists of:

(a) Country Programme Evaluation Sheet (prepared by the Fund Secretariat)

(b) Transmittal Letter from the Government of Indonesia

(c) Country Programme Cover Sheet

(d) Country Programme

INDONESIA COUNTRY PROGRAMME EVALUATION SHEET

National Implementing Agency: Ozone Layer Protection Unit, State Ministry for Environment

Status of ratification of the Vienna Convention and the Montreal Protocol

	Signature	Ratification	Entry Force
Vienna Convention (1985)		26/Jun/92	24/Sep/92
Montreal Protocol (1987)	21/Jul/88	26/Jun/92	24/Sep/92
London Amendment (1990)		26/Jun/92	24/Sep/92
Copenhagen Amendment (1992)			

Production of controlled substances: 0 metric tonnes (mt)

Consumption of controlled substances (1992): 5,846.8 metric tonnes
6,469.5 weighted tonnes (ODP)

Substance	CFC						Halon			Solvents			M-Br
(ton)	11	12	113	114	115	Total	1211	1301	Total	CTC	MCF	Total	
ODS	933.0	4,164.0	160.0		40.0	5,297.0	154.0	61.0	215.0	115.0	219.8	334.8	
ODP	933.0	4,164.0	128.0		24.0	5,249.0	462.0	610.0	1,072.0	126.5	22.0	148.5	

Source: Country Programme (1994)

Distribution of ODP by substance:

CFC: 81.1% Halon: 16.6% CTC, MCF: 2.3%

Distribution of ODP by sector:

Sector:	Aerosol	Foam	Halon	Other	Refrig.	Solvent
Consumption (tonnes):	2,000.0	1,025.0	972.0		2,096.0	474.3
Percent of total:	30.9%	15.8%	16.6%		32.4%	2.3%

Country Programme

Duration of country programme: 4 years (1994-1997)

ODS phase-out target:

Phase-out of halons in 1996
Phase-out of all other ODS by 1997, except essential ODS uses (to be phased-out between 1988-2010)

Phase-out priority area:

Aerosol, foam, halon, refrigeration and solvent sectors

Cost of activities in country programme: $499,670,000

Strategy:

The Govt. proposes to phase-out all ODS by the end of 1997, except for halons which will be phase-out in 1996. The action plan combines the efforts of the Govt., industry and NGO into specific activities which will effect the phase-out strategy. The actions are classified in 6 categories: i) institutional measures, ii) regulatory measures, iii) incentives/disincentives, iv) information awareness, v) investment and technical assistance, and vi) monitoring.

COMMENTS AND RECOMMENDATION OF THE FUND SECRETARIAT

COMMENTS

1. The Country Programme conforms to the format and content of the approved guidelines. It represents a bold attempt by the Government of Indonesia to phase out the consumption of ODS within the shortest possible time, namely 1997, at the cost of US $499 million. The feasibility of achieving the phase-out target is, however dependent on availability of mature substitute technologies and funding from the Multilateral Fund. If the phase-out is achieved on schedule, there would still be some residual ODP to be phased out when HCFCs are used as substitutes in ODS elimination projects.

2. Investment projects in the aerosol and foam sectors and technical assistance including institutional strengthening worth a total of US $5.68 million have already been approved for the country.

RECOMMENDATION

The Fund Secretariat recommends as follows:

1. To approve the Indonesia Country Programme. Approval of the Country Programme does not denote approval of the projects identified therein or their funding levels.

KANTOR MENTERI NEGARA
LINGKUNGAN HIDUP

Jakarta, 22 February 1994

TO: Dr. El-Arini,
Chief Officer of Fund Secretariat
Montreal, Canada
Fax : 1-514-282-0068

Dear Dr. El-Arini,

The Government of Indonesia is pleased to transmit thereto its Country Programme for the Phaseout of Ozone Depleting Substances (ODS) of Indonesia. This Programme was prepared by an inter-agency group headed by the National Committee of Ozone Layer Protection and ODS Phaseout. This Country Programme is to be presented for the favourable consideration by the Executive Committee of the Montreal Protocol (MP). Multilateral Fund at its twelvth Meeting, scheduled for 11 March 1994.

The Government of Indonesia wishes to express its appreciation to the UNDP and the lead implementing agency of the Multilateral fund, for considering this Indonesia Country Programme before the MP's Executive Director.

Yours very truly,

Aca Sugandhy

Assistant Minister I To the State Minister for Environment, Division of Policy Formulation on Environmental Management / Chairman of the National Steering Committee for the Ozone Layer Protection and ODS Phaseout

cc.:
- Minister of Environment
- Secretary to The Minister of Environment
- Mr. Jan Kamp
  Resident Representative, UNDP
- Dr. Frank Pinto
  Principal Technical Adviser and Chief,
  Montreal Protocol Unit Environment &
  Natural Resources Group, UNDP, New York
- Mr. Clinton Norris
  UNDP Consultant

COUNTRY PROGRAMME COVER SHEET

Country	Indonesia
Date Received	February 1994
Period Covered	1994 - 2000
Lead National Agency	State Ministry for Environment
Lead Implementing Agency	UNDP

1. Phase-out Schedule

Substances	Current Consumption (Tonnes X ODP) in 1992	Planned Actual Consumption till Phase-out (Tonnes X ODP)	Planned Year of Phase-out
CFC-11	933	3913	1997
CFC-12	4164	14575	1997
CFC-113	128	395	1997
CFC-115	24	96	1997
H-1211	462	1782	1996
H-1301	510	1360	1995
Carbon Tetrachloride	126	689	1996
Methyl Chloroform	220	359	1996
TOTAL	6567	23169	

2. Government Action Plan

Year	Description of Action	Sector	Intended Effect
1990	Ministry of Health-Decree No.376 on Substances used in producing cosmetics	Aerosols	Prohibit use of CFCs in Aerosol/Cosmetics industries
1991	Pesticide Committee-Decree on Substances used in producing cosmetics	Aerosols	Ban use of CFCs in pesticide products
1992	Ministry of Environment and Ministry of Industry create Industry/Government Task Force	All	Develop Committee for determining use of ODS programme in each sector
1992	Ratify Montreal Protocol	All	Make commitment to eliminate use of ODS
1993	Create Technical Advisory Committee	All	Refine ODS consumption data, develop plans and strategies for phasing out of ODS
1994	Set up national Halon Banking at end 1994	Halons	Develop infrastructure for latter phaseout actions
1994	Prohibit import of any aerosol containing ODS	Aerosols	Stop growth of ODS
1994	Prohibit sale of ODS to Aerosols sector	Aerosols	Cause conversions from ODS
1994-5	Ban installation of fixed Halon systems, and ban aerosol fire extinguishers which use Halons	Halons	Stop growth of Halons
1994-6	Ban import of new Halon 1301 & new Halon 1211	Halons	Cause conversions from ODS
1996	Ban import, production and sale of new Halon portable extinguishers	Halons	Stop growth, start conversions
1994-7	Prohibit import of new materials and equipment containing ODS	Foams, R/AC	Eliminate growth in use of ODS
1994-7	Discourage new production facilities which consume CFCs	All	Limit growth in consumption of CFCs
1994-7	Give incentives for purchase of equipment, parts, materials directly related to phaseout programmes	All	Encourage investment actions to phase-out ODS
1994-7	Encourage use of non-ODS systems for all new installations	All	Start early use of new technologies. Force competition in early stages.
1994-7	Implementation of applicable International Standards	All	Drive conversions from ODS to ODS-free technology
1994-7	Develop awareness of programmes through publicity, audio-visual programmes and seminars	All	Promote customer awareness of need to convert from ODS, facilitate supplier conversions, provide economic climate for conversions
1994-7	Demonstration and trial of new technologies/alternatives	Foams, Halons, Refrigerants, Solvents	Learn new technologies, seek cost reductions, find problems before expanding
1994-7	Timely project approval and installation of technology/alternatives to ODS	All	Complete phase-out of ODS

3. PROJECT SUMMARY

Year(s)	Type of Project/ Project Description	Project Cost $ U.S., M	Tonnes ODP to be phased out
1993-7	**MOBILE AIR CONDITIONING**		3873
	Develop HCFC 134a retrofit	0.270	
	Training and seminars	0.900	
	Convert Production lines	7.600	
	Training and Programme for recycle and recovery	1.000	
	Equipment for recycle and recovery	1.120	
1994-5	Beacon" foam projects for plants representing all foam categories (4)	4.000	
	Slabstock - early phaseout program, individual large/medium companies	2.500	
	Slabstock-phaseout at small enterprises, Phase 1.	1.500	
1994-5	**SOLVENTS PROJECTS**		
	Publicity on ODS phascout in the year 1997 and the urgency to phaseout	0.100	
	Conduct training seminars for dealers to reach the small scale industries	0.250	
	Small scale plant for recycle /recover	0.500	
	TA for preparation and implementation of projects	0.200	
	Projects to convert to	8.200	1,200
	drop-in chlorinated solvents in 17 metal cleaning enterprises (40 lines)		
	aqueous cleaning in 3 electronic assembly enterprises (10 lines)		
	various non-ODS technologies in 12 precision cleaning enterprises (25 lines)		
	Project to convert	8.600	977
	to drop-in chlorinated solvents in 20 metal cleaning enterprises (40 lines)		
	SSI, through dealer network, to non-ODS purchases (9 lines)		
	to semi-aqueous technology for 12 electronic assembly factories (14 lines)		
	to various non-ODS technologies in 12 precision cleaning enterprises (25 lines)		
1996-7	Projects to convert remaining ODS solvent users- equivalent to about 20 lines	2.200	300

3. **PROJECT SUMMARY** (continued)

Year(s)	Type of Project/ Project Description	Project Cost $ U.S., M	Tonnes ODP to be phased out
1994-6	**FOAM INVESTMENT PROJECTS - FIRST BATCH**		3300.0
	Thermoplastic Foams - CFC phaseout completion	2.000	
	Slabstock-phaseout at small enterprises, Phase 2.	2.000	
	Molded - phaseout program, Phase 1.	4.300	
	General Insulation - individual projects	2.500	
	Appliances - phaseout program, Phase 1.	4.000	
1994-7	**DOMESTIC REFRIGERATION**		
	Demonstration Projects - design, test HCFC 134a compressors and new systems. Convert refrigerator production lines		
	PT Yasonta	10.410	26.0
	PT Lippo Melco	5.690	8.8
1995-7	**DOMESTIC REFRIGERATION**		
	General Phase out projects		
	PT National Gobel	10.410	25.4
	PT Sanyo	10.850	40.6
	PT Top Jaya	9.510	32.6
	PT Maspion Samsung	11.560	34.7
	PT Goldstar Astra	6.400	18.2
	PT Daichi	8.130	22.0
1995-7	**FOAM INVESTMENT PROJECTS - SECOND BATCH**		4300.0
	Molded - phaseout program, Phase 2.	1.300	
	General Insulation - individual projects	2.500	
	General Insulation - phaseout at small enterprises,	2.600	
	Appliances - phaseout programme, Phase 2.	12.000	
	RESIDUAL PHASEOUT PROGRAMME		
	Non-appliance foams	1.000	
1994-7	**AEROSOL PROJECTS**		11120.0
	HC purification Plant	2.000	
	HC Distribution	0.800	
	15-30 Filler Project	3.000	
	Filling Center - for SSI	2.000	
	Safety / Training	0.240	
1994 -6	**HALONS PROJECTS**		2689
	Halon fixed system replacement	50.000	
	Conversion of product related to halon extinguisher	10.000	
	Recycling & recovering of halon extinguisher	0.500	
	Setting up of national halon banking systems	1.000	
	Examination & evaluation on alternatives technologies in line with halon replacement (fixed)	1.000	
	Setting up guidelines, codes & related to clean agent use & development	0.200	
	Seminars & workshops pertaining to halon phaseout	0.100	

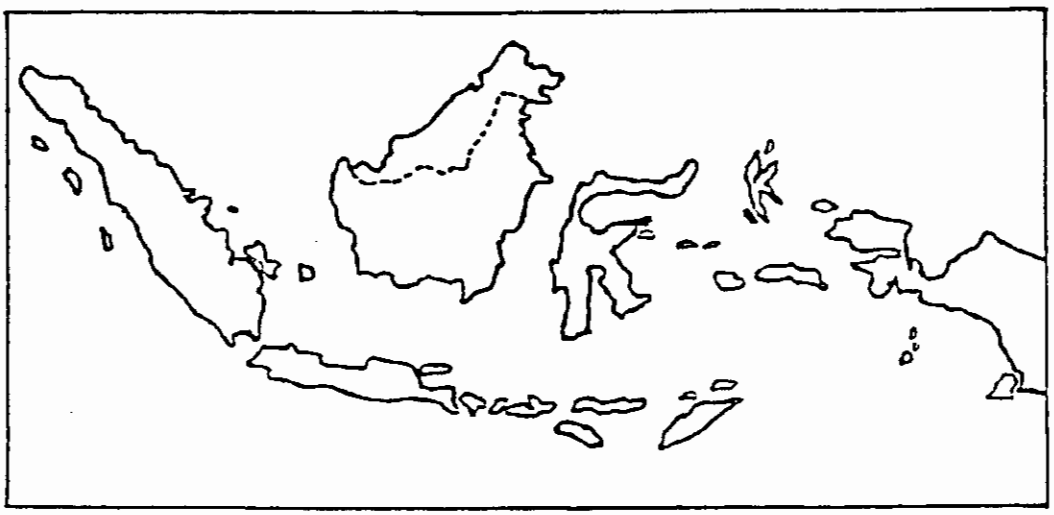
4 Net Incremental Cost for ODS Phaseout Under Indonesia Country Programme

Sector	Total Phaseout Cost ($ Million)	ODS Phaseout (Tonnes)	Unit Phaseout Cost (US $/kg)
Foams	26.2	5,855	4.48
Domestic Refrig. *)	89.26	5,045	17.69
Ind./Comm. AC.	92.14	4,451	20.70
M A C	200.98	26,439	7.60
Halons	62.8	2,689	23.35
Aerosols	8.04	11,119	0.72
Solvents	20.25	3,446	5.88
Total	499.67	59,044	8.46

*) The data for the Domestic Refrigeration sector includes the ODS consumption in the domestic appliance insulation foam, and the cost of its phaseout. However, please note that in the project listings, the projects for phaseout of ODS in the domestic appliance insulation foams are included in the foam projects.

INDONESIA
COUNTRY PROGRAMME

FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES
UNDER THE MONTREAL PROTOCOL



Submitted for Consideration at the
Twelveth Meeting of the Executive Committee
of the Multilateral Fund of
the Montreal Protocol
(March 1994, Montreal)

STATE MINISTRY FOR ENVIRONMENT
THE GOVERNMENT OF INDONESIA
JAKARTA, FEBRUARY 1994

FOREWORD

This Country Programme is a vital document which details the plans, programmes, and activities that Indonesia had taken and proposes to undertake on the immediate and long term phaseout of Ozone Depleting Substances (ODS). The Country Programme is the summation of concerted government efforts as it takes cognizance not only in phasing out the identified chemicals, but even acceding in accelerating the planned phaseout where and when needed with due consideration to the prevailing situation in the country.

The consultations that had preceded the implementation of programmes in phasing out ODS have been very active and productive. The result is this document which the Indonesia is committed to implement in doing its share for the greater good.

The Government of Indonesia wishes to extend its appreciation to the Multilateral Fund Executive Committee through its implementing agencies, especially, the United Nations Development Programme (UNDP) and The World Bank (WB) who provided support in the preparation of this programme, and to the various trade/ industry associations, the importers of ODS, NGOs, and the entire government bureaucracy, who, in their various capacities, actively participated in preparing this document.

I hope this document will be valuable for the consideration of the Multilateral Fund Executive Committee for phasing out ODS in Indonesia that could give benefit for both global and national environment.

The State Minister for Environment

Sarwono Kusumaatmadja

PREFACE

The Indonesia Country Programme is part of the requirements set by the Executive Committee to enable Indonesia to qualify for financial and technical assistance provided by the Multilateral Fund of the Montreal Protocol. The assistancies are needed to adopt completely and effectively the control measures enumerated under the Protocol. Although Indonesia was somewhat late in ratifying the Montreal Protocol, the Government intends to apply an accelerated phaseout schedule. It is proposed to phaseout CFCs and halon use by end 1997. This is not easy to achieve as in recent years, Indonesia's consumption of controlled substances has increased with high pace due to the rapid expansion of its national economy.

This document reflects initial extensive works through reconnaissance study, seminars, and meetings coordinated by the State Ministry for Environment, involving ODS-using industry sectors, trade associations, NGOs and related ministries. The draft produced was ultimately completed by the assistance of the UNDP.

This Country Programme expresses Indonesia's commitment, strategy and action plan to progressively reduce and finally ban the use of ODS by the end of 1997. Therefore, this document is also intended as the guideline for any activities related with the ozone layer protection and ODS phaseout in Indonesia.

The Government of Indonesia wishes to extend its deep appreciation to the Executive Committee of the Multilateral Fund, through its implementing agencies, especially the United Nations Development Programme (UNDP) and the World Bank (WB) for the assistance given during the preparation of the Indonesia's Country Programme, and to the related industries and trade associations, as well as the importers of ODS, NGOs, and the entire ministries, who in their various capacities, lent a hand in the preparation of this document.

Assistant Minister I for Policy Formulation on Environmental Management to the State Minister for Environment / Chairman of the National Steering Committee for the Ozone Layer Protection and ODS Phaseout in Indonesia,

Aca Sugandhy

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Background

Qualifying as a Party operating under Paragraph 1 of Article 5 of the amended Montreal Protocol, Indonesia ratified in May 1992 the Vienna Convention for Ozone Layer Protection and the Montreal Protocol on Substances that deplete the Ozone Layer. As an Article 5.1 country, Indonesia qualifies for assistance from the Multilateral Fund of the Montreal Protocol, including the preparation of the Country Programme.

The Indonesia Country Programme (CP) is Indonesia's response to the challenge as well as the compliance of its obligation to the Agreement on how it intends to reduce, and eventually to phaseout the use of Ozone Depleting Substances (ODS).

Under the coordination of the State Ministry for Environment (SME), the Government has established a National Committee and a National Technical Committee for Ozone Layer Protection and ODS Phaseout whose responsibilities include CP development, design and implementation of sectoral work programmes.

The CP drafting activities have been organized and coordinated by the SME. Extensive consultations with industry sectors, trade associations, NGOs and related offices were undertaken through seminars and meetings. The final CP was completed by the Government with assistance of the UNDP and is to be submitted to the 12 th Meeting of the Executive Committee in March 1994.

Structure of ODS Consumption and The Phaseout Schedule

Indonesia does not either produce nor export in bulk any of the ODS. Thus total consumption is equivalent to imports adjusted for stock changes. However, equipment containing ODS does leave the country, particularly domestic refrigerators, car air conditioners and aerosol products.

The country's calculated weighted consumption of Ozone Depleting Substamces in 1992 was 6,567.3 ODP tonnes which amounted to a per capita consumption of around 0.03 kg. CFC-12 accounted for 63.4 %, halons 14.8 %, and CFC-11 14.2 %, with CFC-113, CFC-115, 1,1,1-trichloroethane (TCA), and carbon tetrachloride (CTC) making up the balance.

By industrial sector, the ODP usage distribution in 1992 showed the refrigeration and air conditioning industry was the largest user, accounting for 31.9 % of the total. The other users were aerosols (30.5 %), foams (15.6 %), halons (14.8 %), and solvents (7.2 %). Methyl Bromide, HCFCs and HBFCs are not considered in this Country Programme.

It is estimated that cumulative consumption of ODS, based on unconstrained demand from the year 1992 up to year 2010, would be almost 500,000 ODP tonnes.

The Government is fully committed to rapid phaseout of ODS. Provided adequate financial resources are available from the Multilateral Fund, as well as access to needed and appropriate ODS subsitute technologies, Indonesia proposes to phaseout all ODS by the end of 1997, except for halons which will be phased out in 1996. This proposal moves well beyond the Montreal Protocol phaseout date of 2010 for Article 5.1 countries.

Action Plan

The Indonesia Action Plan details the combined efforts of the government, the industry and non-government organizations into specific activities which will effect the phaseout strategy. This Action Plan will ensure Indonesia meets its obligation as a Party to the Montreal Protocol. The actions are classified into six major categories :

1. Institutional Measures
2. Regulatory Measures
3. Incentives / Disincentives
4. Information Awareness
5. Invesment and Technical Assistance
6. Monitoring.

Table ES-1 summarizes the key items in the Action Plan.

Financial Cost

The net incremental costs by sector of ODS phaseout under the Country Pregramme are shown in **Table ES-2.** Costs are in 1993 US dollars.

Table ES-1. Action Plan Summary

Sector: Foams

ITEMS	1994 - 1997
Recommendation	Discourage setting up any new production facilities which involves use of CFCs (July 1, 1994)
Taxation	- Tax credits for investment in new CFC-free and related equipment - Tax exemption from import duty on capital equipment - Tax exemption for Multilateral Fund grants
	Implementation of applicable standards by SII (SNI) in consultation with the industry
Awareness, education and technical information exchange	Implementation of awareness of programs through audio visual program and seminars for the smaller consumers
Phaseout scenario	"Beacon" projects (initial projects) for plants representing all foam categories - Slabstock-early phaseout program <u>Investment Projects - First Batch</u> - Thermoplastic foams - CFC phaseout completion - Slabstock - phaseout at small enterprises, phase I - Molded - phaseout program, phase I - General Insulation - individual projects - Appliances - Phaseout Programme Phase I <u>Investment Projects - Second Batch</u> - Molded - phaseout program, phase II - General insulation - individual projects - General insulation - phaseout at small enterprises, - Appliances - phaseout programme phase II <u>Residual Phaseout Programme Non-Appliance Foam</u>

ITEMS	1998 - 2010
Recommendation	**Use of ODS for essential uses only**

Sector : Refrigeration / AC

ITEMS	1994 - 1997
Recommendation	Prohibit import of new equipment containing ODS Give incentives for any equipments, parts, materials related directly to the ODS phaseout programme. Demonstrate and trial new technology alternatives Encourage the use of non-ODS systems for all new refrigeration and AC installations. Encourage local manufacturers of refrigeration and AC equipment to move non-ODS technology
Taxation	Tax deduction for the total cost of equipments for ODS phaseout
Awareness	Education, publication, and dissemination

ITEMS	1998 - 2010
Recommendation	**Use of ODS for essential uses only**

Sector: Halon

ITEMS	1994 - 1996
Recommendation	Ban to install new fixed halon system (at the end of 1994) Ban aerosol type fire extinguishers which use halons or other ODS (at the end of 1994) **Ban the import new halon 1301 at the end of 1994** **Ban the import new halon 1211 at the end of 1996** Ban the import, production, and sale of new portable halon extinguishers at the end of 1996
Awareness	Conduct intensive information and public awareness on halon phaseout and Banking
Management of phasing out scenario	Set up and operation of a National Halon Banking System commencing 1994

Sector : Aerosols

ITEMS	1994 - 1997
Recommendation	- Prohibit the import of any ODS containing aerosol *) - Prohibit the sale of ODS to the aerosols sector *) - Identify technology alternatives
Taxation	Given incentive to any efforts which related to the ODS phaseout programme
Awareness	- Education, publication, and information, dissemination to the aerosol industries - Campaign to make the supplier industry aware of environment policy and timing of ODS phaseout - Promotion of economically attractive alternative propellants. - Training programmes for the promotion of alternative propellants and their safe handling and filling - Consumer education and awareness campaign

*) With the possible exception of aerosol Metered Dose Inhaler's for inhalation therapy which may be granted "Essential Use" status in a future revision of the MP.

Sector : Solvents

ITEMS	1994 - 1997
Recommendation	Prohibit import of new equipment which utilized ODS Encourage installation of any manufacturing which use non-ODS Give incentives for any equipment, parts or material related directly to the ODS phaseout programme Demonstrate and trial new technology alternative Expand demonstration projects via replication process
Taxation	Tax deduction for the total cost of equipment for ODS phaseout
Awareness, education and technical information exchange	Education, publication and dissemination

ITEMS	1998 - 2010
Recommendation	Use of ODS for essential uses only

Table ES-2. Net Incremental Cost for ODS Phaseout Under Indonesia Country Programme.

Sector	Total Phaseout Cost ($ Million)	ODS Phaseout (Tonnes)	Unit Phaseout Cost (US $/kg)
Foams	26.2	5,855	4.48
Domestic Refrig. *)	89.26	5,045	17.69
Ind./Comm. AC.	92.14	4,451	20.70
M A C	200.98	26,439	7.60
Halons	62.8	2,689	23.35
Aerosols	8.04	11,119	0.72
Solvents	20.25	3,446	5.88
Total	499.67	59,044	8.46

*) The data for the Domestic Refrigerations sector include the ODS consumption in the domestic aplliance insulation foam, and the cost of its phaseout. However, please note that in Annex 4, the project for phaseout of ODS in the domestic appliance insulation foams are included in the foam sector.

I. INTRODUCTION

1.1. OBJECTIVE OF THE COUNTRY PROGRAMME

Qualifying as a Party operating under Paragraph 1 of Article 5 of the amended Montreal Protocol, Indonesia ratified in May 1992 the Vienna Convention for Ozone Layer Protection and the Montreal Protocol on Substances that Deplete the Ozone Layer . Indonesia has prepared its Country Programme (CP) for the Phase-out of Ozone Layer Depleting Substaces in accordance with Protocol guidelines as contained in paragraph 10 of Appendix II of Annex IV to the Report of the Second Meeting of the Parties. The preparation of the CP is part of the requirements set by the Executive Committee, which enable Indonesia to adopt completely and effectively the control measures enumerated under the Protocol and to qualify for technical assistance and funding from the Multilateral Fund of the Protocol.

The Indonesia CP, which is scheduled to be presented to the Twelveth Meeting of the Executive Committee of the Multilateral Fund, demonstrates the process of implementation of a basic national policy for environmental protection and Government's determination to implement the phaseout provisions of the Montreal Protocol. The Indonesia CP details the strategy, approach and actions that Indonesia has taken and proposes to undertake on the immediate and long term phaseout of identified ozone depleting substances (ODS). It also contains the technical assistance and funding requirement from the Multilateral Fund of the Protocol.

The process adopted by the Government of Indonesia for the CP development is as follows :

a. First, a reconnaissance study was conducted to compile and evaluate the ODS consumption by sector, as well as future trends and consequent ODS consumption implications nationwide;

b. Then sectoral appraisals of ODS substitutes and associated technologies, their effectiveness, and their applicability to Indonesia were conducted;

c. This was followed by development of a comprehensive and effective action plan for ODS phase out, with projects specified by sector. Projects have been costed to reflect total cost as well as the incremental cost component that would be requested from the Multilateral Fund.

d. Simultaneously, a set of policies, strategies, and the required institutional framework that the Government considers essential to support, direct and supervise the action plan were developed.

1.2. COUNTRY PROGRAMME FORMULATION PROCESS

Under the coordination of the State Ministry for Environment (SME), the Government has estabilished a National Steering Committee and a National Technical Committee for Ozone Layer Protection and ODS Phaseout whose responsibilities include CP development, design and implementation of sectoral work programmes.

The CP has been drafted in accordance with the content of the model CP format developed by the Executive Committee of the Multilateral Fund. The CP drafting activities have been organized and coordinated by SME.

The first draft CP was prepared mainly based on the results of a Reconnaissance Study conducted by Sucofindo (a state-owned consultancy company) in 1991 and the results of a Sectoral Workshop conducted on 24 - 27 August, 1993. Approximately 150 participants from government institutions, NGOs, and private sectors participated in the workshop. UNDP and the World Bank also participated in, and made presentations at, the workshop.

The second draft was developed and completed after the first draft was presented on the CP Preparation Workshop held on 28 - 30 October 1993. More than 100 participants represented almost all concerned and related government agencies, industry / private sectors, NGOs and designated international and national experts.

The final CP was then completed by the Government with the assistance of UNDP. Subsequently, after it was reviewed by related ministries, the final CP was submitted to the Montreal Protocol Fund Secretariat in Montreal for submition to the 12th Meeting of the Executive Committee in March 1994.

1.3. ASSISTANCE RECEIVED FOR COUNTRY PROGRAMME PREPARATION

The Government of Indonesia had estimated the total cost of developing and drafting the country programme at US $ 200,000 including the costs of international and national experts.

At the request of the Government, UNDP forwarded to the Executive Committee of the Multilateral Fund of the Montreal Protocol a request for US $ 200,000 for CP preparation in Indonesia. This request was approved by the Executive Committee at its Eighth Meeting in October 1992. Funds were received by UNDP from the Fund Treasurer in late-December 1992. Since CP preparation involves significant assistance from international experts, UNDP has included the funds allocated for the Indonesia CP preparation into its 1992 Montreal Protocol umbrella work programme (INT/92/G61) which is executed by UNDP's Office for Project Services (OPS).

The financial assistance received is allocated as follows :

a.	personnel costs (international & national staff)	$	100,000
b.	costs for the two national workshops, sectoral and national working group costs, other meeting expenses and rental of facilities	$	60,000
c.	Travel and per diem costs, telecommunications and other miscellaneous costs	$	40,000
	Total	US $	200,000

II. ODS SITUATION IN INDONESIA

2.1. ODS/ODP CONSUMPTION IN 1992

The following Ozone Depleting Substances (ODS) are commonly used in Indonesia :

Annex A Group I	:	CFC-11, CFC-12, CFC-113, CFC-115
Annex A Group II	:	Halon-1211, Halon-1301
Annex B Group II	:	Carbon Tetra Chloride (CTC)
Annex B Group III	:	Trichloroethane (TCA, also known as Methylchloroform or MCF).

This Country Programme document does not consider HCFCs, HBFCs and methyl bromide. These substances will be incorporated later after the completion of studies which are currently in progress, and after further review by the Parties to the Montreal Protocol on the extent and applicability of control measures.

Table 1 shows Indonesia's consumption of ODS (in metric tonnes) in 1992 as well as their equivalent in ODP weighted tonnes. Indonesia's total ODS consumption in 1992 was 7,815 tonnes. In ODP terms, total consumption in 1992 was 6,567 tonnes. All substances were imported, as Indonesia does not produce nor export any of the controlled ozone depleting substances. Thus, total consumption is equal to import.

Table 1. ODS / Weighted ODP Tonnes Consumption by Substance in 1992

Unite : Metric Tonnes and Percent

ITEMS	CFC-11	CFC-12	CFC113	CFC115	H1211	H1301	CTC	TCA	TOTAL
ODS Cons.	933	4,164	160	40	154	61	115	2,198	7,815
%-age share	11.94	53.28	2.05	0.51	1.97	0.86	1.47	28.13	100
ODP Value *)	1.0	1.0	0.8	0.6	3.0	10	1.1	0.1	
ODP Cons.	933	4,164	128	24	462	610	126.5	219.8	6,567.3
%-age share	14.21	63.40	1.95	0.36	7.03	7.77	1.93	3.35	100

*) Source : Ozone Secretariat, 1993. Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer (3rd edition)

Figure 1 shows the ODS consumption in Indonesia in metric tonnes by substance, where CFC-12 was the most used substance (53.28 %), followed by TCA (28.13 %), CFC-11 (11.94 %), Halons (2.63 %), CFC-113 (2.05 %), CTC (1.47 %) and CFC-115 (0.51 %).

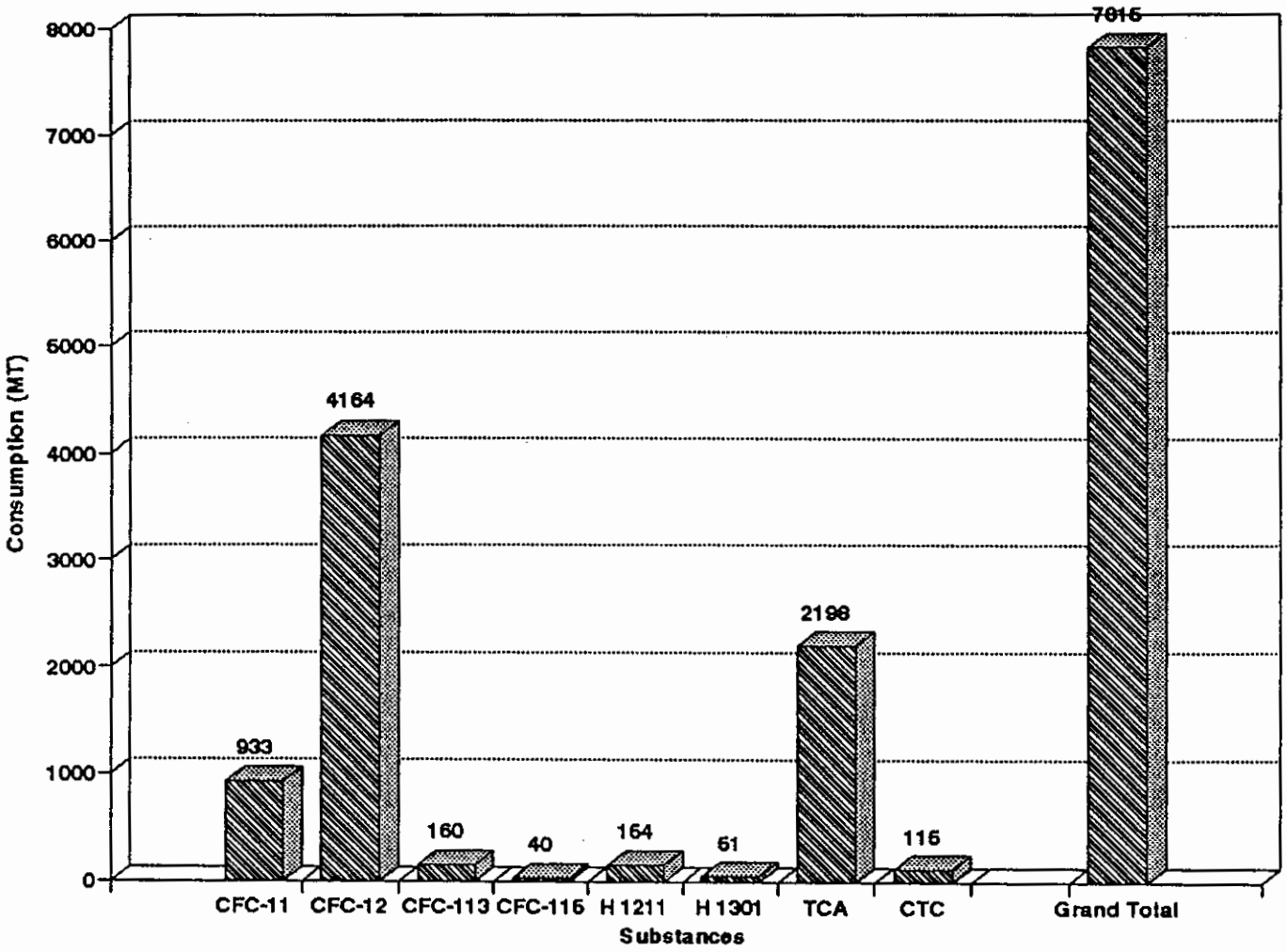

Figure 1. 1992 ODS Consumption in Indonesia

Figure 2 shows consumption shares expressed in ODP tonnes by substance used in 1992. Again CFC-12 was the most used substance accounting for 63.40 % of the total, followed by CFC-11 (14.21 %); Halons (14.80 %); TCA (1.93 %); CFC-113 (1.95 %); CTC (3.35 %) and CFC-115 (0.36 %).

Note that although halons consumption in metric tonnes was relatively low, due to their high ODP values, halons consumption expressed in ODP tonnes accounts for 14.80% of total consumption, which put them as the third biggest consumption after CFC-12 and CFC-11.

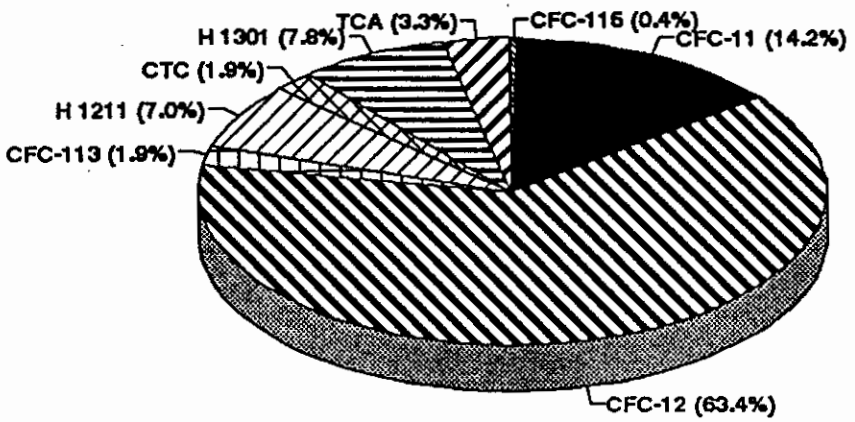

Figure 2. 1992 ODP Consumption Shares by Substances in Indonesia

Table 2. ODS and ODP Consumption by Sector in 1992

Unit : Metric Tonnes and Percent

ITEMS	FOAMS	REF/AC	FIRE EXT	AEROSOLS	SOLVENTS	TOTAL
ODS	1,025	2,112	205	2,000	2,473	7,815
%-age	13.12	27.02	2.63	25.59	31.64	100
ODP	1,025	2,096	972	2,000	474.3	6,567.3
%-age	15.61	31.91	14.80	30.46	7.22	100

Table 2 and **Figure 3** show the 1992 consumption of ODS expressed in metric tonnes and ODP tonnes by sector. In ODP terms, the

refrigeration/AC sector was the largest user amounting at 31.91 % of the total consumption, followed by Aerosols at 30.46 %, Foam at 15.61 %, Fire Extinguisher at 14.80 %, and Solvents use at 7.22 %,.

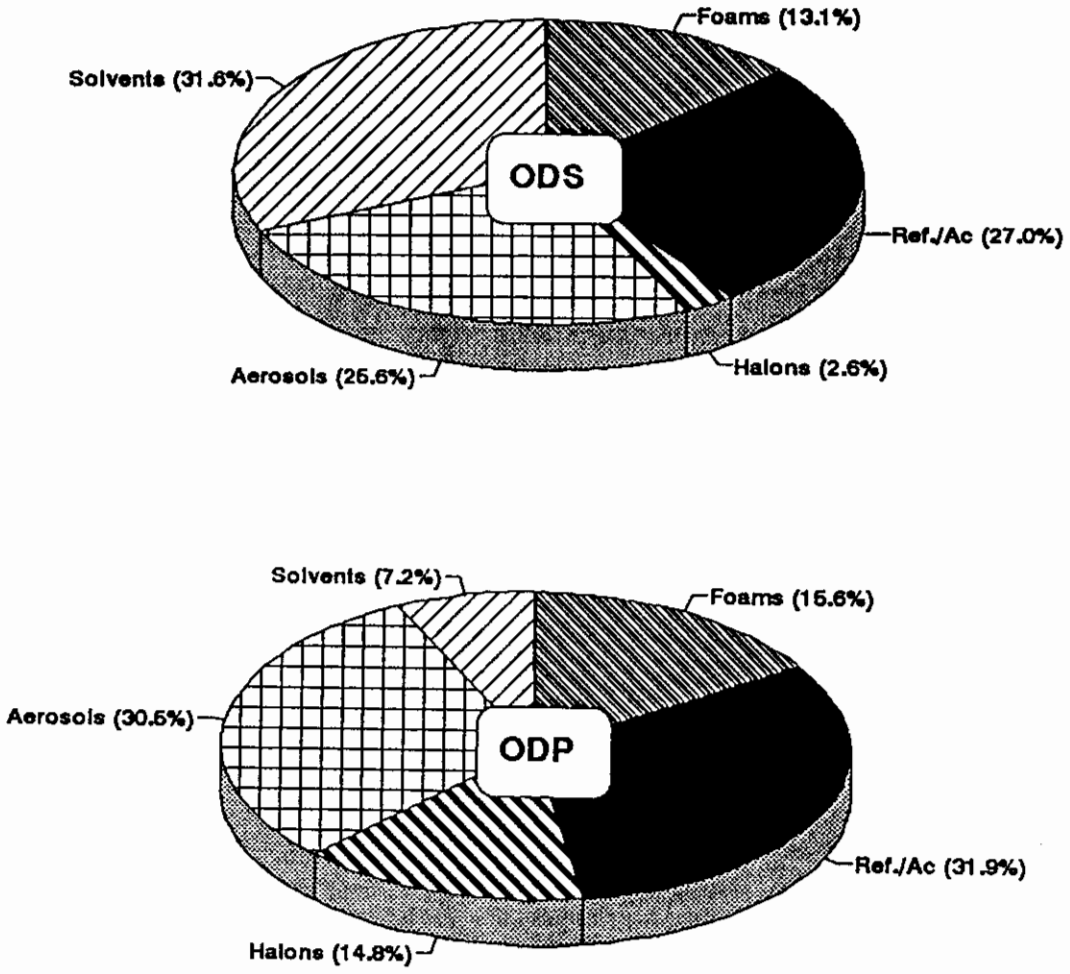

Figure 3. ODS and ODP Consumption by Sector in Indonesia

Table 3. ODS Consumption in 1992 Disagregated by Sectors and Final Applications

Sector	Subsector	ODS	Application	ODS Consumption (Tonnes)
FOAMS	Flexible PUF (Slabstock, Molding)	CFC-11	Mattress, furniture, padding, automotive, office furniture	490
	Rigid PUF *)	CFC-11	General Insulation (cold storage, boilers, building, thermo-ware)	125
	Thermoplastic foams (EPE & EPS)	CFC-12	Packaging, fast food	410
	Subtotal	**CFC-11** **CFC-12**		**615** **410**
	Total			**1,025**
REFRIGERATION / AIR CONDITIONING	Domestic Refrigeration	CFC-11 CFC-12	New product New product and Refilling	188 102
	Mobile Air Conditioners (MACs)	CFC-12	New product and Refilling	1,536
	Static Commercial Airconditioners (SCAs)	CFC-11 CFC-12	New product and Refilling New product and Refilling	130 76
	Commercial Refrigeration	CFC-12 CFC-115	New product and Refilling	30 20
	Refrigerated Transport	CFC-12 CFC-115	New product and Refilling New product and Refilling	10 20
	Subtotal	**CFC-11** **CFC-12** **CFC-115**		**318** **1,754** **40**
	Total			**2,112**

HALONS	Extinguishing	H-1211	Extinguishers, Extinguishing system, Refilling, Extinguishing usage	154
	Extinguishing	H-1301	Extinguishing systems and Refilling	51
	Subtotal	**H-1211** **H-1301**		**154** **51**
	Total			**205**
AEROSOLS	Non-Medical and Medical	CFC-12	Hair spray, etc. , Spray for asthma and respiratory diseases	2,000
SOLVENTS	Electronics	CFC-113 TCA	Consumer, Communication, Data Processing	111 253
	Metal Cleaning	CFC-113 TCA	Degreasing	9 1,204
	Precision Cleaning	CFC-113 TCA	Microcontamination removal	30 125
	Spot Cleaning Textiles	TCA	Removing processing soils	177
	Pharmaceutical	CTC	Process solvent	115
	Erasure Tape	TCA	Solvent	439
	Subtotal	**CFC-113** **TCA** **CTC**		**160** **2,198** **115**
	Total			**2,473**

*) ODS consumption in rigid foam insulation in domestic appliances included in refrigeration sector.

2.2. ODS-USING INDUSTRIAL STRUCTURE IN INDONESIA

Indonesia does not produce or export, in bulk, any of the ODS. The demand for these substances is completely met by import from various countries : USA, Germany, France, The United Kingdom, Russia, China, Italy, Taiwan, Japan, India, South Korea. However equipment containing ODS does leave the country, particularly domestic refrigerators, car airconditioners and aerosols. A few consumers / end-users choose to import ODS directly from overseas producers. However, most users purchase primarily through companies that act as the agents of foreign chemical manufacturers.

A strong contributing factor to Indonesia's long, steady, uninterrupted growth has been the nurturing of "start up" companies, from which the present strong small- and medium-sized companies have developed. There are now a very large number of small scale companies, called the small scale industries, who are "in the pipeline" of development. This nurturing system is called the Bapak-Angkat (**foster parent**) system, where the larger, successful companies look after the small scale companies - as a father, so to speak, in order to raise the success rates of these start up companies.

Eight major national companies act as importers / dealers / representative agents, viz : Dow Chemical Indonesia Company (DOW), Udaya Anugerah Company, Perdoni Company (ICI), Jaya Abadi Mulia Kimia Company, Pioner Kimia Agung / Sari Sarana Kimia Company, Jaya Gas Indonesia Company, Genetrindo Prima Perkasa Company, and Du Pont Far East Incorporation. Agents handle the paperwork needed to load shipments, maintain warehouses, and oversee local distribution networks. Although most agents import and distribute a range of ODS products, they tend to sell to different segments of industry, as well as selling to retailers, who frequently break down the quantities into smaller amounts and resell to many small users in the Small Scale Industries. Several importers also sell a limited number of alternatives, including HCFC-123 and HFC-134a, although the customer demand is seemingly weak.

1. Foam Industry

There are 244 identified ODS consuming enterprises in Indonesia that manufacture foamed plastics. About 15 % of these companies are thought to be large or medium sized and have comparatively sophisticated manufacturing equipment.The remaining ones operate small scale units and are technically and chemically unsophisticated .

Table 4 provides more detailed information on the number and size of companies categorised by kinds of products. Significant chemicals for the industry in view of CFC phaseout are HCFCs, polyols, isocyanates, hydrocarbons (butane,LPG,pentane) and carbon dioxide.

From these chemicals, only generic polyols (one manufacturer), some hydrocarbons and carbon dioxide are locally produced. In addition, two system manufacturers supply specialty polyol blends for predominantly rigid foams. For all the other ones, established import channels exist with the exception of butane and pentane.

Table 4. Facilities Structure in the Indonesia Foam Industry

Catagory of Indusry	Total	Scale of Industry	
		Large/Medium	Small
Flexible PUF			
Slabstock	100	8	92
Molded	30	4	26
Rigid PUF			
Refr. Appliances	8	8	-
Gnl. Insulation	100	10	90
Thermoplastic Foams	6	6	-
Total	244	36	208

The Indonesia import system applies duties for chemicals which vary generally between 5 % and 15 %, the latter being the duty to protect local production. Companies are able to import directly under the same duty system.This requires, however,careful inventory planning in view of delivery times.

2. Refrigeration / Air Conditioning

Domestic Refrigeration

There are eight major companies involved in the manufacture or assembly of domestic refrigerators/freezers in Indonesia. Most produce primarily for domestic market. The exception being Samsung / Maspion who export an estimated 70% of their production. It is believed that Sanyo may be planning an increase in production capacity to expand their export business in 1995.

Each company is supported by some service stations throughout Indonesia. In addition to these service stations, there are a large number of small to medium size independent refrigeration service & repair companies.

Mobile Air-Conditioning

There are a number of vehicle assembly plants in Indonesia representing a wide range of manufacturers. Some AC systems are fitted during vehicle assembly, others are fitted post assembly by appointed AC contractors. In the minibus and commercial vehicle market it is not unusual for the AC system to be fitted after purchase of the vehicle, either by the dealer or by the owner using the services of one of the many AC workshops.

There are seven vehicle assemblers who fit AC systems during vehicle assembly. Three other vehicle assemblers contract out AC fitment to appointed installers. There are four major vehicle AC installers who each have a number of workshops. The foregoing comprises what is generally described as the "organised sector". However, in addition to these companies there are an estimated further 200 vehicle AC installation, service, and repair workshops throughout Indonesia, referred to in this report as the "unorganised sector".

Local manufacture of car AC systems started in 1978. Currently, two Japaneses AC systems suppliers, Nippon Denso and Sanden, manufacture approximately 100,000 AC systems locally each year, and they dominate the market with a combined 90 % share. Bus AC systems are also manufactured locally with three companies producing a total of approximately 900 units per annum.

Commercial Air-Conditioning

All major commercial AC equipment suppliers including Carrier, Trane, York, SnyderGeneral, Dunham Bush, Mitsubishi, Daikin, Hitachi etc., are represented in Indonesia via local companies acting as agents. There is no local manufacture of chillers and therefore most of the equipment in this sector is imported. A number of companies manufacture small unitary and split unit AC systems in Indonesia but these use HCFC-22 and they are not considered in this report.

3. Halons

The use of halons for fire protection is approximately 155 metric tonnes of halon 1211 and approximately 50 metric tonnes of halon 1301, which is equvalent to a total application approximately 1,000 ODP tonnes.

There are 5 producers of portable halon extinguishers in Indonesia with an annual production of arround 100,000 halon extinguishers and with a consumption of 100 - 130 tonnes of halon 1211 per year. The fire equipment manufactures produce all types of extingushers (e.g. powder, water, foam and halon extinguishers). Due to the high pressure requirements, cylinders for CO_2 extinguishers are presently imported.

Aside from the 5 producers of portable extinguishers, there are around 10 to 15 distributors and dealers which sell, service centers and maintain halon fire extinguishers. Most of them with offices and service centers in different cities around in Indonesia.

Fixed halon fire extinguishing systems are imported and installed by the various companies through contractors.

The main users of halons for fire protection are the oil industry, power plants, telecommunications, aviation, and defence, as well as protection of computer installations, special areas in high rise buildings, etc.

4. Aerosols

The larger scale manufacturers of aerosols have already converted to hydrocarbons (HC), especially those that fill insecticides, paints, and industrial aerosols. This has taken place even though the quality of

hydrocarbon propellant available in Indonesia is not aerosol grade. Because of unsatisfactory quality of HC propellant, and problems with low density, some aerosol producers have changed to mechanical pumps.

Cosmetics companies have been obliged to change due to Ministry of Health Decree No.376/Menkes/Per/VIII/1990; which prohibits the use of CFCs in cosmetic aerosols. However, it is known that many small and medium cosmetics companies continue to use CFCs. Some form of control of the sale of CFCs to the aerosols sector will be evaluated as an alternative measure.

5. Solvents

Solvent cleaning application in Indonesia are largely found in metal cleaning, electronics, and precision cleaning (70 %), although there is a significant amount found in pharmaceuticals, erasure liquid, and spot cleaning textile. The metal cleaning can be further broken down into transportation (land and air), shipyards, basic metals, and machinery. Electronics is broken down into communications, data processing, and consumer. There are 600 identified companies included in the electronics and metal subsectors. It is estimated that less than 40 % of them are ODS consummers. In electronics, there are approximately 20 large producers who are also ODS consumers. The major consumers in the metals subsectors are in the shipyards and the transportation industries (air and land - consisting of automotive, tractors and airplanes). All ODS used in the solvent sector is imported from the countries such as US, Japan, German, Holland, France, England, India, Korea, Russia, Italy, and Taiwan. All of the requirement of the country are met from imports using traders, distributors, and also direct purchasing.

The small scale sector is large in size, but the numbers are not yet known. While some register as businesses, many do not. They generally buy their solvents and their parts, etc. in relatively small quantities from retailers, and they manufacture kitchen tools, car polish, blacksmith products, ironwork, plastics (mold release), foam, jewelry, and circuit boards. Additionally there are in the industry tailors, service and repair shops, and sewing machine users, or garment manufacturers. The largest subsector within the Small Scale Industry (SSI) is construction people - who use solvents for cleaning parts and tools. Handicraft industries are another large category of user. The small scale industries generally purchase from retailers who are sourced from distributors. Thus, any SSI solvent phaseout will be greatly simplified by involving and training the retaikers.

The two primary ODS used in Indonesia solvent cleaning operations are CFC-113, and 1,1,1-trichloroethane (TCA); while carbon tetrachloride (CTC) is used in pharmaceuticals.

2.3. FORECAST OF UNCONSTRAINED ODS/ODP DEMAND TO YEAR 2010

Unconstrained demand for an ODS is the consumption of the ODS that would occur in the absence of the restrictions imposed by the Montreal Protocol and its London Amendments. This hypothetical demand is needed to assess the cost of the ODS phaseout, that is the economic expense of reducing consumption of ODS to zero from what it would have been without the Protocol restrictions.

Two assumption were used in predicting how industry and consumers would behave if there were no restrictions on ODS : 1) no one would take actions in anticipation of the phaseout or reduce ODS use by recycling the chemicals; 2) industries will continue to purchase production inputs in the same proportion as they do today, and that consumers will not change their relative preferences for products and services.

The starting point for the forecast is the 1992 ODP weighted consumption of ODS in each sector (foams, refrigeration / AC, halons / fire protection, aerosols, solvents). Because demand for an ODS in a particular end use is directly proportional to the demand for products or services in that end use, ODS consumptions is assumed to grow at the same rate as the demand for those products and services. Applying growth rates to 1992 ODP weighted consumption produces the projection of annual ODS use through 2010.

Total ODP Tonnes Demand

Total unconstrained ODP tonnes demand in year 2010 would be 893 % higher than actual 1992 ODP tonnes consumption. With respect to some key individual substances, the 2010/1992 percentage increase is as follows : CFC-11 (916 %), CFC-12 (1,043 %), Halon 1211 (274 %).

Foams (1992 : 1,025 ODP tonnes, 2010 : 5,855 ODP tonnes)

Indonesia's GNP has shown strong growth rates over the past years. This is expected to continue in the coming decade. Plastics are expected to even outperform GNP as the penetration rate of plastics is currently still very low. The highest growth rate is expected in automotive and related PUF molding industry, where currently a sharp recovery from a 1991/1992 slump is expected to convert smoothly into consistent growth through the year 2010. Another area of spectacular growth will be related to the production of domestic refrigerators, an item that is next to primary human needs and where the penetration rate is still very low. Also packaging and the associated thermoplastic foams will fare well.

Refrigeration/AC (1992: 2,096 ODP tonnes, 2010: 35,571 ODP tonnes)

The Refrigeration / AC sector is expecting a fast growth rate up to the year of 2010. Therefore unconstrained consumption of CFC in this sector will be very high. The current population of AC is still very low. To phaseout ODS in 1997 in this sector is possible but the cost is very high, especially in association with the rigid foam use in the domestic refrigerator.

Halons (1992 : 972 ODP tonnes, 2010 : 2,689 ODP tonnes)

Based on the increases of halon uses as a potential extinguisher and the non-availability of halon substitutes in the near future, also the increase high rise building in the urban cities, as for example in Jakarta, the unconstrained demand for halons in the year 2010 will be about 2,689 ODP tonnes (based on an annual increment of 20 metric tonnes of Halons).

Aerosols (1992 : 2,000 ODP tonnes, 2010 : 11,119 ODP tonnes)

It has proved very difficult to obtain precise information concerning the actual use of aerosols in Indonesia. It is known that the industry is growing quite rapidly.

Using a best estimate of 2000 metric tonnes of CFC consumption in the aerosols sector in 1992, combined with a 10 % projected growth factor, gives an estimate for unconstrained demand of 11,119 metric tonnes in the year 2010.

Solvents (1992 : 474.3 ODP tonnes, 2010 : 3,446.2 ODP tonnes)

The Electronics industry is in its early growth phase in Indonesia, characterized by very rapid growth. Information from the Ministry of Industry on historical and planned growth shows that this will continue, although it will taper off in several years, forming a traditional "S" growth pattern. For example, Consumer electronics is planned to grow at a rate of about 20% through the end of 1996, and taper to about 14 - 15% through the rest of the Country Programme planning horizon. Communications are even more dynamic. For example, telephones average 1 per 12 houses for a population of 180 million, with the concentration in city areas. This leaves a shortage in the cities, and an acute shortage in the countryside. Although the growth rate could be higher, it is expected to be held at about 26% through 1996, and that the growth rate will be tapering off to about 9% as the supply gap begins to diminish. Data processing growth is expected to track GNP for purposes of estimating unconstrained consumption in that subsector. While the precision cleaning will track the dynamic markets, the other subsectors' growth has been estimated at 6 - 8%, also in the range of anticipated GNP.

Figure 4 illustrates the Projected Unconstrained ODS Consumption for each sector until the year 2010.

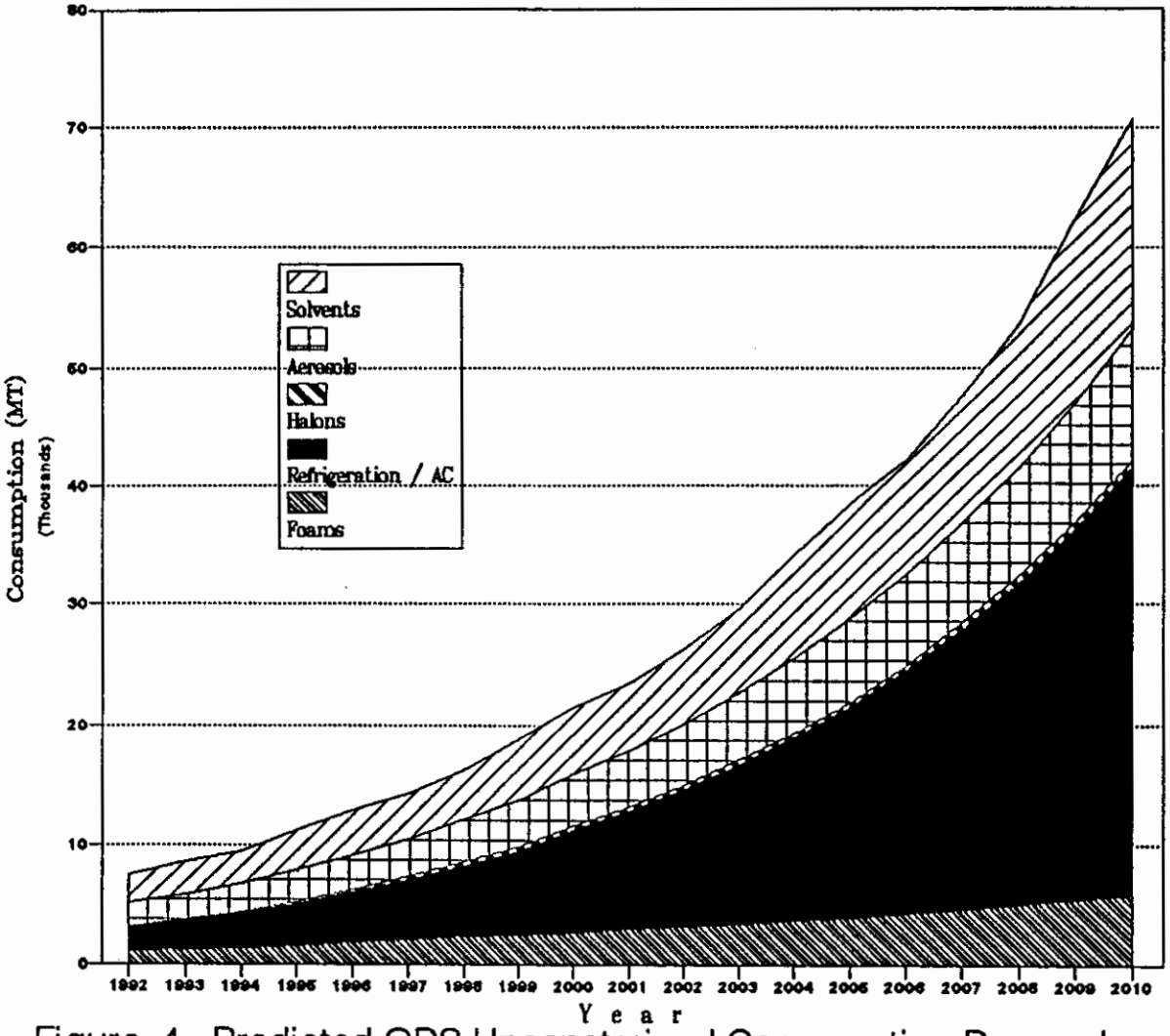

Figure 4. Predicted ODS Unconstrained Consumption Demand

2.4. INSTITUTIONAL STRUCTURE FOR ODS PHASEOUT IN INDONESIA

The Government of Indonesia has established a formal national institutional framework for ozone layer protection and ODS phaseout and for the implementation of the Montreal Protocol.

A National Technical Committee for Ozone Layer Protection and ODS Phaseout has been established. All concerned Governmental bodies as well as the chamber of commerce are members of the Steering Committee.

The composition of the National Technical Committee is as follows:

Chairman : State Ministry for Environment (SME)

Vice Chairmen : Ministry of Industry (MOI)
Ministry of Trade (MOT)

Secretary : Indonesian National Institutes of Aeronautics and Space (INIAS)

Members : Ministry of Foreign Affairs (MOFA)
Ministry of Health (MOH)
Ministry of Transportation (MOTP)
Ministry of Tourism, Postal and Telecommunications (MOTPT)
Ministry of Mines and Energy (MOME)
Ministry of Agriculture (MOA)
Meteorology and Geophysics Agency (MGA)
Ministry of Home Affairs (MOHA)
Agency for the Assessment and Application of Technology (AAAT)
National Development Planning Agency (NDPA)
Environmental Impact Assesment Agency (EIAA)
National Industry and Trade Chamber (NITC)
Secretariat to the Cabinet (SC)
National Logistics Bureau (NLB)
Ministry of Public Works (MOPW)
Indonesian Institutes of Science (IIOS)
National Consumers Institute (NCI)
Friend of the Earth (FOE) / Walhi
ICI Indonesia Corp.
Du Pont Far East Corp.
Sparindo Utama Corp.

The Indonesia Government has taken concrete steps in complying with the Montreal Protocol in the phasing out of ODS. The government had designated government agencies, all front lines, to map out, implement, oversee, and monitor projects and activities wich will collectively and ultimately reach the Protocol objective.

The agencies and their roles are as follows:

State Ministry of Environment

SME will act as the national central coordinator on programmes related to Montreal Protocol implementation. The Ministry has the mandate to prepare policies and device administrative measures for the implementation of the Montreal Protocol.

Ministry of Finance

a) Customs-to ensure that ODS is not imported after the regulated dates either alone or contained in other materials.

b) Tax Bureau-determine the amount of the tax on the materials being imported, and will determine any incentives, if any that should be granted

Bureau of Customs

The Bureau of Customs (BOC) is responsible for collecting import data as well as enforcing customs tariffs, levies, and taxes for each items entering the country. The BOC is also expected to coordinate with the SME in validating import data of chemicals, specifically ODS.

Ministry of Industry

Will be involved in the promotional campaigns to small scale industries and also to those industries that need to phaseout of ODS (user industries, importers). Will coordinate activities with the Ministry of Trade

Ministry of Trade

a) Issue the permission to import materials and they regulate what kind of substitutes are allowed.

b) Determine what incentives/taxes to promulgate in order to provide financial incentives for substitutes
c) Pursue what materials that need to be imported as substitutes

Ministry of Health

Will be involved in the arrangement of approvals to use substitutes for CTC currently used

Ministry of Foreign Affairs

This agency is the official channel for matters involving foreign relations including official communications to and from the Republic of Indonesia. The MFA will maitain effective linkages with organazations abroad and promote the exchange of informations and cooperation among personnel engaged with the ozone issue. This ministry will ensure the country's commitment to the Montreal Protocol and relay to international agencies about the Indonesia complience to the Montreal Protocol.

National Development Planning Agency

As the government's chief planning arm, the NDPA is responsible for the programming of official development assistance in the form of grants and concessional loan from foreign gavernments and Multilateral agencies and organization, and the monitoring and evaluation of identified projects and programmes.

Indonesian National Institutes of Aeronautics and Space

INIAS is responsible regarding the observation, collection, and assessment of ozone relative data. INIAS in collaboration with the Tokyo University, Japan and the MGA, had established an ozone monitoring station equipped with Dobson Spectrophotometer in 1990. The station regularly makes measurments of total column ozone.

Industry Trade Associations

Indonesian Electronics and Electriacal Industry Association
Basic Chemical Industry Association (MOI)
Textile Association
Indonesian Air-Conditioning and Electrical Manufactures Association (HATUR)

National Consumer Institute (Lembaga Konsumen Indonesia)

This institution has a role to protect the consumer from hazardous products, and they will review imports and substitutes, as well as respond to complaints

Indonesian Environmental Forum (WALHI), Law Advocacy Bureau (Lembaga Bantuan Hukum), NGO's

Any, or perhaps, all, of these groups will be involved in the response to workers if substitutes cause worker discomfort in the factories of INDONESIA.

Inter Department Meeting Quarterly

To look over special impacts, coordinate activities, develop and review applicable policies. Includes industry that is impacted by the policies

A Technical Committee for the Ozone Layer Protection and ODS phaseout has also been established under the National Committee and reports to it. The office of the Technical Committee is located at SME which services it and responsible for its routine operations. The Technical Team comprises concerned governmental agencies, industry and NGOs and is responsible for all technical matters relating to ozone layer protection in Indonesia. The Technical Team is the primary counterpart body for UNDP in CP preparation. The Technical Committee has been entrusted with :

a. Concrete implementation of the Convention and Protocol.
b. Financial analysis of the external funding needed for the implementation.
c. Proposing various options to the National Steering Committee.
d. Handling other affairs related to the Convention and Protocol.

Subsequently, five technical Sectoral Working Groups have been formed to formulate sectoral components of the country programme as well as project formulation. They report to the National Technical Committee. The sectors covered include : Foams, Refrigeration/AC, Halons, Aerosols and Solvents.

2.5. POLICY FRAMEWORK FOR ODS PHASEOUT IN INDONESIA

Indonesia currently uses approximately 0.02 kg CFC per capita/year, which is far below the maximum level set by the Montreal Protocol (0.3 kg/capita/year) to allow a party country to apply a grace period of 10 years after the year of phaseout scheduled in the Montreal Protocol and its amendments.

In order to anticipate the shortages of ODS in 1995 as a result of phaseout in many of the ODS producer countries, some systems of priority will be established to ensure supply for the servicing of essential equipment which still has a significant useful service lifetime, and which cannot be retrofitted to use non-ODS tecnology. Wherever possible, some systems of priority of supply will be developed to avoid the need for premature replacement of high capital cost equipment which has not reached the end of it's economic lifetime.

Agreeing an ODS phaseout date will not in itself enable the industry to make an orderly transition to non-ODS technology. Government will encourage ODS consumers in all sectors to replace ODS by way of incentives. Additional policies may be necessary as more experience is gained during the phaseout process. Following are some elements which should not be considered as exclusive:

The policies to be developed by the Government of Indonesia to phaseout ODS use are summarized below :

a) Invesment policy to encourage introduction of safe alternative technologies.

b) Policies to restrict "dumping" of ODS technologies and ODS products within the framework of the Country Programme.

c) Policies for the marking/labelling of substances those that are friendly to the environment, and/or those that are a danger to the environment. Combine with a public awareness campaign.

d) Provision of a framework for inspection and monitoring of the phasing out of ODS by both individuals and teams.

e) Appropriate fiscal taxing and credit policies, intended to maintain momentum of phaseout rate.

f) A policy framework to allow restrictions and to ban the creation of added manufacturing capacity using ozone depleting substances.

g) Minimization of the use of replacement compounds which require more than one switch over.

h) A policy which is intended to compensate those industries which will be closed down.

To meet ODS / weighted ODP tonnes reduction targets, Indonesia industry must implement controls that decrease ODS consumption. The control can be a chemical substitute, an alternative technology or process, a recycling or retrofit programme, or premature retirement.

2.6. GOVERNMENT & INDUSTRY INITIATIVES ON OZONE LAYER PROTECTION PRIOR TO CP PREPARATION

1. Government Initiatives

The first legal initiative that Indonesia took prior to the CP preparation was the ratification of the Vienna Convention and the Montreal Protocol through the Presidential Decree No. 23 dated May 13, 1992. Since then various meetings, symposiums, conferences, and workshops were conducted, at national and international levels.

Although Indonesia was somewhat late in ratifying the Montreal Protocol, the Government intends to apply an accelerated phaseout schedule.

Accordingly, Indonesia has drafted a National Strategy for Ozone Layer Protection and ODS Phaseout, prepared in January 1993.

Before the ratification, in 1990, the Ministry of Health had issued the Minister Decree No. 376/Menkes/PER/VIII/1990 concerning the groups of substances that can be used in producing cosmetics. The decree prohibits the use of CFCs in aerosols/cosmetics industry.

A year after, in 1991 the Pesticide Committee, a national body who regulates the production of, importation to and use of pesticides in Indonesia, banned the use of CFCs in pesticide products.

In August 1992, the Indonesian Ministry of Environment, together with the Ministry of Industry, constituted a Task Force comprising representatives from Government, industry, trading companies, and consultants, to formulate a National Strategy for the phaseout of Ozone Depleting Substances and the adoption of substitute substances / technologies. This Task Force appointed a sub-committee to look into all aspects of the refrigeration and air-conditioning sector. Other sub-committees were similarly charged with the same task for the foam, halon, solvents, and aerosol sectors.

2. Industry Initiatives

Under the coordination of the Technical Committee, five sectoral working groups had been set up to look and assist into all aspects of respective industrial sectors (foams, refrigeration/AC, fire protection, aerosols, and solvents). The working groups had representatives from industry, government, trading companies and consulting firms.

Several industrial sectors have already responded in some ways to the need of substituting ODS on a rather individual basis.

Foams

* In the flexible foam industry (slabstock) two large and some smaller companies have recently, entirely or partially, converted to the use of methylene chloride;
* One XPS producer has switched to hydrocarbons (LPG);
* Some appliance manufacturers have experimented with low CFC foam systems;
* One polyol manufacturer is actively promoting a CFC-free system for flexible molding.

Only in the flexible slabstock have those activities have led to a significant result in ODS reduction : without the mentioned activities, the 1992 CFC use figures in this catagory would have been 25 % higher.

Domestic Refrigerators

Most domestic refrigerator and freezer manufacturers in Indonesia have already begun to investigate the use of non-ODS technology. Some have started to use "Reduced CFC-11" technology in the manufacture of

the cabinet insulation. The manufacturers in this sector are willing to accept the proposed National strategy for ODS phaseout by the end of 1997 for the CFC-12 refrigerant, but concerns remain regarding the maturity and choice of non-ODS foam insulation technologies which are only just emerging in the industrialized countries.

Mobile Air-conditioning

A number of measures have already been adopted locally to reduce, or eliminate ODS in the mobile AC sector. These include:

- The use of CFC-12 recovery and recycling equipment by the mobile AC service workshops in the "organised sector" since 1991.
- Beginning in 1993, a progressive programme of conversion from ODS to non-ODS AC systems in new vehicles has been introduced. It is anticipated that the conversion to non-ODS AC systems in new vehicles will be complete by the end of 1995.
- Manufacturers of ODS based mobile AC systems have already completed preparations to convert to the production of new non-ODS technology based systems.

Whilst some very limited scale trials on retrofit of mobile AC systems have been conducted, vehicle manufacturers and AC systems suppliers are still formulating their strategies for the introduction of retrofit on a commercial basis.

Commercial Air-conditioning

As mentioned earlier, there is no manufacture of large scale commercial AC chillers in Indonesia. Most of the major foreign equipment suppliers have already discontinued the production of ODS chillers, and therefore little, if any, new ODS based equipment is now being imported.

The local agents and distributors who represent the major equipment suppliers are now offering "Reduced ODP" (HCFC-22 and HCFC-123) and "Zero ODP" (HFC-134a) options, and new systems based on all of these options have already been installed in Indonesia during 1993.

There is retrofit technology available from the equipment suppliers for most CFC-11 and CFC-12 chillers but due to lack of demand this technology has not yet been fully transferred to the local agents.

Halons

The halon industry has shown its intention through its participation in many national and international seminars and conferences. Some of the producers have already taken some action to reduce their production of halon extinguisher, and some distributors have offered alternative chemicals and technologies.

Aerosols

The aerosol industry is generally well aware of the potential that CFCs have to deplete the ozone layer. Most manufacturers of insecticides, paints, and industrial products have already converted to hydrocarbons.

The toiletries industry would prefer to keep its products in aerosol form, but due to the problem of the non-availability of suitable quality hydrocarbon propellant, some have converted to mechanical spray pumps.

There are many small manufacturers in the informal segment that work in crowded areas, often in residential neighbourhoods. For safety reasons, these companies cannot convert to hydrocarbons.

Solvents

Some partners of multinationals have committed to phaseout or already phased out the use of ODS according to the technology supplied by their multinational counterpart. Some metal cleaning users have already switched from the use of ODS to the use of trichloroethylene and perchloroethane, both of which can generally be used in the company's existing solvent degreasers. Others, especially those in the electronics industry have been unable to make the easy switch to new technology. They will require tests to determine the soil removal effectiveness of substitutes, as well as the effect of the substitutes on product quality, and most of them will require some investment project to replace their equipment which has become obsoleted by the needs for safely and cost effectively using the replacement materials.

III. ODS PHASEOUT IMPLEMENTATION

3.1. GOVERNMENT STRATEGY

In 1992 Indonesia consumption of ODS per capita was only approximately 10 % of the maximum level set by the Montreal Protocol (0.3 kg./capita/year) to allow a party country to apply a grace periode of 10 year after the year of phaseout scheduled under the Montreal Protocol and its amendments. However, the Government of Indonesia will strictly adhere to the provisions under the revised Protocol and will undertake the necessary obligations for the phaseout of ODS in Indonesia.

Indonesia is fully aware of the urgency for ozone layer protection, but is short of the funds and technology necessary for carrying out the elimination of ODS. So ODS phaseout progress in Indonesia will be determined by the availability of assistance from the Multilateral Fund. Assuming that the funding will be available when required, Indonesia has developed a strategy for implementation of the phaseout of ODS overall, and in each sector as well, using the CP development process that was described earlier in this document.

A major consideration in longer term, or delayed, phaseout strategy will be the cost of early obsolescence in general, but especially in the refrigeration sector which is a dominant sector in Indonesia. Along with the cost, a delayed strategy causes unnecessary consumer disruption as well as a loss of industrial competitiveness and a late industry retrofit. A delayed strategy is therfore, not an attractive strategy. However, some finite delay will be needed because the demand for products manufactured using ODS (or ODS containing substances) will be far from saturated in Indonesia before the year 2000. The ODS phaseout strategy must not interfere with this growth including, emerging demand factor in the Indonesian economy.

Also, the availability of servicing for these, and prior, products to meet the normal demands of local consumers should not be affected by the reduction of ODS consumption. So a smooth transition from ODS to their substitutes, i.e., starting from high ODP to low (if necessary), then zero ODP substances, should be carried out in the time frame that is consistent with available, demonstrated technologies. Local consumers should not be penalized during the replacement of the relevant durable such as refrigerators.

Indonesia demand for ODS substitutes, the substitute technologies for ODS consumption, and related equipment and raw materials will be based mainly on the development of local consumption. A strong factor offsetting the

need for a smooth transition to the new technologies is the growing export market, where the developed country destination markets will be demanding that the products arriving be supplied with non-ODS based technologies. Thus, the strategy chosen is to integrate and balance these factors, and on the basis of technical and economic feasibility, the complete phaseout of ODS will be carried out as early as possible.

The Government will organize the necessary technical and economic appraisals on projects as to ensure the effective use of assistance obtained from the Multilateral Fund. The Country Programme will be adjusted as needed during its implementation based on continuing development of domestic and foreign ODS substitution technologies.

The ODS phaseout in Indonesia will be closely linked to the economic reforms, and to the adjusment of the industrial structures and product configurations using ODS. Relevant laws and regulations and technical policies for industries will be established so that management of and guidance to ODS phaseout activities will be enhanced.

Several considerations and guidelines, outlined below, will be employed in implementing the ODS phaseout strategy :

- Regulations and technical guidelines have to be formulated which can accommodate the needs of society as well as those private sector.
- The grace period given to developing countries should be utilwed with the pwgrammes that support the ODS phaseout.
- A national consensus regarding phaseout has to be developed.
- Non-commercial cooperation has to be promoted in the transfer of technology in industrial cooperation project which intend to substitute ODS.
- Technologies transfer plans must assure coverage of all necessary conditions, including knowledge and manpower, for facing the world without ODS, in the form of training and education as well as in the preparation of the necessary equipment.
- Research and development on ODS substitutes and alternative system have to be promoted.
- A national campaign on ODS phaseout, as well as increasing public and users awareness on the importance of ozone layer protection have to be identified.
- Already developed International contacts on ODS phaseout programmes have to be maintained.
- A clearing house must be set up for exchanging information, data bases, and the operational mechanism for implementation.

- Economic incentives for industry to make ODS substitutions will have to be weighed versus the options of regulatory actions such as bans, restrictions, phase down schedules, etc.

By taking into consideration the length of time required to set up a national programme to phaseout ODSs, the time required for the industries to make conversions to alternative technologies, and the economic and social aspects affecting consumer behaviour, the preferred strategy for Indonesia is to phaseout all ODS by the end of 1997, except for halons will be phased out in 1996.

This requires the provisions of adequate financial resources are available from the Multilateral Fund, as well as access to needed and appropriate ODS substitute technologies. Given these conditions are fulfilled, Indonesia is determined to employ an agressive programme to accomplish the phaseout of ODS use by the end-1997. It is intended that the only remaining use of ODS after the end of 1997 will be for "essential uses" as defined and agreed by the Parties to the Montreal Protocol.

3.2. TECHNICAL APPROACH FOLLOWED FOR ODS PHASEOUT IN INDONESIA

Due to the rapid development of ODS phaseout technologies and the varying rate of development between the different sectors, each sector has completed a comprehensive survey of the development status and the prospective domestic and foreign substitution technologies in the sector, taking into account the economic, technical, and managerial feasibilities for implementing the phaseout programme in Indonesia. Hence, each sector has proposed its own technical approach to phaseout as the basis for the elaboration of sectoral ODS phaseout scenarios.

Some of the alternative technologies are already commercially available while others, so called "emerging technologies" are expected to become available by the late 1990s (see **Annex 1**). The term "technologies" refers to changes in operating practices, recycling or other capturing devices, substitute chemicals, and alternative processes. Commercially available technologies are those that : 1) reduce or eliminate the use of ODS, 2) are available today in the international marketplace, and 3) have already been successfully employed elsewhere.

The Country Programme has not yet considered the phaseout of transitional substances (such as HCFC-22) as the related technologies have not been clarified. In the future, with the development of related technologies, the revised Country Programme will cover these issues. Their use as transitional alternatives in instances where suitable long term alternatives already exist will be strongly discouraged.

3.3. FOAMS

A flood of CFC replacement technologies have been proposed recently for the manufacture of foamed plastics. The Indonesia foam industry will base its selection from these technologies on the following standards of acceptance :

- acceptable performance,
- proven technology,
- commercially available,
- acceptable processing,
- sufficient safety,
- environmentally acceptable,
- economically viable.

Not all replacement technologies meet these criteria, especially the environmental acceptability. These technologies, however may provide, sometimes an important interim function, and allow the industry to search for better solutions, while in the mean time, progressing with CFC phaseout. This is particularly the case with technologies that employ HCFCs. These interim technologies are preferrably implemented in such a way that a subsequent permanent solution will not require additional capital investments. However, the agresive phaseout policy to eliminate ODS by the end 1997 will need to be taken into account when considering interim technologies.

The more sophisticated companies are well aware of the whole array of available substitutes, and it is expected that these companies will select their own preferences. Small companies will need substantial support in the selection and implementation process. This can be done through demonstration projects, workshops and special documentation, and practical technical support.

Table 5. Technologies Believed to be Currently the Best Available Alternatives for Foam Industry

Category	Preferred Technology	Acceptable, Alternatives	Emerging Options
Flexible PUF			
- Slabstock	- MeCl	- Additives, special polyols	- Alternative Mfg. Technology
- Molded	- Water Blown	- MeCl	-
- Semi Rigid	- HCFCs	- HFC-134a	- Water Blown
Rigid PUF			
- Domestic Appliance	- Reduced CFC, Cyclo Pentane	- HCFCs	- Vacuum Panels, HFC -134a
- General Insulation	- Pentanes Water Blown	- HCFCs	-
Thermoplastics			
- Foams	- Hydrocarbons	- HCFC-22	Carbondioxide, HFCs

Significant chemicals for the industry in view of CFC phaseout are HCFC, polyols, isocyanates, hydrocarbons (butane, LPG, pentane) and carbon dioxide.

From these chemicals, only generic polyols (one manufacturer), some hydrocarbons and carbon dioxide are locally produced. In addition, two system manufacturers supply specialty polyol blends for predominantly rigid foams. For all the other ones, established import channels exist with the exception of butane and pentane.

3.4. REFRIGERATION / AIR CONDITIONING

The refrigeration and air-conditioning sector is aware of a range of technical options for ODS replacement. The Indonesian refrigeration and AC industry will base its selection from these options on the following standards of acceptance:

- acceptable performance
- proven technology
- commercial availability
- safety in production and use
- environmental acceptability
- economic viability

Not all replacement refrigerants or technologies meet all of the above criteria, especially in respect of environmental acceptability. Such technologies, nevertheless, can provide an important interim function, allowing the industry time to search for better, and mature, non-ODS solutions. This is particularly the case with HCFCs in certain sub-sectors of the industry.

The larger companies are well aware of both the currently available alternatives and those still under development, and they can be expected to make their own choice. Influence from multinational associates can be anticipated. Smaller companies will need support in the selection process and this can be done through seminars, workshops, etc. conducted by Trade Associations, etc.

Advice on the most appropriate technical option for the replacement of CFC-11 in the manufacture of insulation foam in the domestic refrigerator sector will be taken from the foam sector group.

Table 6 below lists the potential replacement technologies available for the refrigeration and AC industry.

Table 6. Potential ODS Replacement Technologies for Refrigeration and AC Industries

Sector	Existing ODS Technology	Reduced ODS Technology	Non - ODS Technology
Domestic Refrigeration			
Refrigerant	CFC-12	HCFC-22	HFC-134a Propane HFC-152a
Insulation	CFC-11	HCFC-141b HCFC-123 HCFC-22 HCFC-142b "Reduced CFC-11"	Water HFCs Cyclo-pentane Vacuum Panels
Mobile AC	CFC-12	HCFC/HFC Blends	HFC-134a
Refrigerated Transport	CFC-12 R 502	HCFC-22 HCFC/HFC Blends	HFC Blends
Commercial Refrigeration	CFC-12 R 502	HCFC-22 HCFC/HFC Blends	HFC-134a HFC Blends Propane Ammonia HFC-32
Commercial AC	CFC-11 CFC-12 R 500	HCFC-123 HCFC-22	HFC-134a
Industrial Refrigeration	CFC-11 CFC-12 CFC-13 CFC-114 R 500 R 502	HCFC-123 HCFC-22 HCFC/HFC Blends	HFC-134a HFC Blends HFC 32 Propane Ammonia

3.5. HALONS

Halons are used as a fire extinguishing media in portable fire extinguishers and fixed installations, and for explosion prevention and suppression.

Phasing out the use of halons for fire protection means stopping the production of new fire fighting equipment using halons, and the installation of new halon fire extinguishing systems (except for possible essential uses).

In order to avoid the high cost for retrofitting and replacement of existing equipment and installations, existing installations and portable extinguishers will be kept in place for a reasonable lifetime depending on the criticallity, cost of replacement and available halons of the extinguishers and fixed installations. Servicing, maintenance and, if needed, refilling will be based on the existing stock of halons within the country, organized through a national halon banking system.

Halon 1301

Halon 1301 is mainly used for fire extinguishing systems. Alternatives to halons depend on the type of hazard protected with the halons. For halon 1301 for fixed Installations, the alternatives are :

* Gaseous fire extinguishing systems, e.g. :
  - CO_2 fire extinguishing systems,
  - Nitrogen based fire extinguishing system (Inergen, Argonite)
* Water based fire extinguishing systems, e.g. :
  - Automatic sprinkler systems and pre action sprinkler systems
  - low and high pressure water mist and water fog systems
* Powder based fire extingushing systems
* Halon like chemical replacements :
  - FC-3-1-10, trade name : PFC-410 (3M, USA)
  - HFC-227ea trade name : FM-200 (Great Lakes, USA)
  - HFC-23 trade name : FE-13 (DuPONT, USA)
  - HFC-125 trade name : FE-25 (DuPONT, USA)
  - Blend of HCFCs trade name : NAF3 (North American Fire Guard)

Halon 1211

Halon 1211 is mainly used in portable exinguishers, the alternatives are water, CO_2, powder, foam and halon-like chemical replacements (HCFCs)[1].

It is also used for fixed fire extinguishing systems for some applications in aviation, and military equipment and installations.

Alternatives listed in **Table 7** will be used as guidelines for selection of alternative fire protection systems for new installations and for the replacements of existing facilities. That includes present experience and will be adjusted in accordance with new developments and experience gained worldwide. The activities will include :

* Establishment of technical background for utilizing new fire protection systems, evaluation of performance, standards and guidelines, education and training.
* License agreements with foreign companies.
* Manufacturing and installation.

Note: 1) These substances are not commercially available. Indonesia will keep following the development of the halon-like chemical substances.

Table 7. Alternative to Halons by Types of Risk

Type of Risk	Alternatives to Halons
Computer Rooms	CO_2 fire extinguishing systems Nitrogen based fire ext. systems Sprinkler systems
Control Rooms	Nitrogen based fire ext. systems Sprinkler systems
Telecommunication Installations Telephones Exchange Centers	Nitrogen based fire ext. systems Water mist systems Pre action sprinkler systems CO_2 fire extinguishing systems
Generator Rooms and Electrical Installation	CO_2 fire extinguishing systems Nitrogen based fire ext. systems Water mist systems
Machine Rooms Engine Rooms	CO_2 fire extinguishing systems Water mist systems
Flammable Liquid Storage Facilities	CO_2 fire extinguishing systems Foam fire extinguishing systems Nitrogen based fire ext. systems Water mist systems
Flooting Roof Tanks	Foam fire extinguishing systems
Aircraft, Engine Protection	No alternatives available yet
Defence Equipment and Installations	No alternatives available yet

3.6. AEROSOLS

Most manufacturers of insecticides, paints, and industrial products have converted to hydrocarbons. This was due principally to cost factors.

Because of high odor in locally available hydrocarbons and its low density, many cosmetics manufacturers have had problems. Some have converted to pumps.

There are many small manufacturers in the informal segment that work in crowded areas, often in residential neighborhoods. For safety reasons, these companies cannot convert to hydrocarbons where they are presently located.

In response to these factors, the following procedure may be implemented, using financial assistance from the Multilateral Fund of the Montreal Protocol :

- Establish a plant for the purification of hydrocarbon propellants.
- Establish a proper storage and distribution system.
- Assist approximately 15 - 30 aerosol fillers to convert.
- Establish a filling center for those small manufacturers that cannot convert without moving their plant.
- Establish a safety audit / safety training / technical assistance programme to facilitate the change over.

3.7. SOLVENTS

The Indonesia programme will be resorting to advanced and generally some of the more mature technologies for its phase out of use of ODS-solvents. Wherever possible, good houseskeeping and emissions reduction programmes will be helpful in gaining initial reductions in the consumption of ODS in the sector.

The complete phase out will take place in each sub-sector by applying appropriate and safe alternative technologies. Since such a large percentage of the sector's consumption is in general metal cleaning applications, it is expected that those cleaning production lines will be converted to "drop-in" chlorinated solvents, such as trichloroethylene and perchloroethylene. Since there is no single alternative to ODS-solvents in many sub-sectors, the introduction of alternative technologies will often require evaluation and carefully monitored demonstration projects, followed by rapid scale up.

The key sub-sectors and main candidate replacement technologies are as follows :

Table 8. Technologies Believed to be Currently the Best Available Alternatives for Solvents Sector.

Category	Preferred Technology	Acceptable, Alternatives	Emerging Options
Electronics and Precision Cleaning	-no clean fluxes -aqueous cleaning -organic, non-halogenated solvents	-chlorinated solvents -perfluorocarbons	-no clean pastes for surface mount technology
Metal Cleaning	-aqueous cleaning -organic, non-halogenated solvents -no clean fluxes	-chlorinated solvents -perfluorocarbons	
Spot Cleaning of Textiles	-aqueous systems -chlorinated solvents	-hydrocarbons -HCFCs	
Tipp Exx (typing correction fluid)	-aqueous systems -organic solvents		
Pharmaceuticals	-organic solvents	-chlorinated solvents	

3.8. ODS RECOVERY AND RECYCLING

Domestic Refrigeration

Recovery and recycling during the servicing of domestic refrigerators are not considered as being practical or economic given the very small quantities of CFC-12 involved per unit, together with the highly fragmented structure of the service sector. The Sector Group is aware of schemes which have been adopted in other countries to deal with the recovery and recycling of CFC-12 from domestic refrigerators which have reached the end of their useful life. Such schemes are usually operated by local Governments as a part of their waste disposal operations, or by very large appliance retailers, with the CFC-12 refrigerant recovery facilities located at designated centres.

It may be possible to adopt similar schemes in Indonesia, or to incorporate the recovery of CFC-12 from scrap domestic refrigerators into any centralised CFC-12 recovery and recycling operation which is established for other use sectors, e.g. mobile AC. The establishment and implementation of a recovery and recycling policy for the domestic refrigerator sector is, therfore a Government, rather than industry, issue.

At the present time, Indonesia will await maturation of the recovery and recycling of the CFC-11 used in the refrigerator insulation foam, before including it as an option in the Country Programme.

Mobile Air-conditioning

Recovery and recycling of CFC-12 is considered essential in the mobile AC sector, both to reduce emissions to atmosphere during servicing, and to provide a source of refrigerant for the servicing of existing CFC-12 AC systems after ODS phase-out. Recovery and recycling is then necessary in the following areas:

- At the AC system/vehicle dealer service stations.
- At mobile AC service and repair workshops in the "unorganised sector".
- At all centres offering mobile AC retrofit to non-ODS (or reduced ODS") technology.

However, to successfully implement recovery and recycling in the mobile AC sector there is a need for education, demonstration, and training in the use of recovery and recycling equipment at service and repair shops in both the "organised sector" and the "unorganised sector".

To establish recovery and recycling in the mobile AC sector it will also be necessary to:

- Increase awareness of the need for recovery and recycling so that it leads to voluntary action.
- Offer financial incentives, such as a rebate on the cost of recycled CFC-12 when recovered CFC-12 is returned for recycling.
- Provide funds (from the Montreal Protocol Multilateral Fund) for the purchase of recovery and recycling equipment for all of the prospective users referred to above.
- Provide exemption from duties and taxes on all imported ODS recovery, recycling, and reclaim equipment.

- Provide encouragement and financial incentives to enterprises in Indonesia who wish to manufacture ODS recovery, recycling, and reclaim equipment.

One of the problems in successfully implementing recycling and recovery in the mobile AC sector is the large number (estimated as circa 200) service and repair workshops scattered throughout Indonesia (the "unorganised sector"). Assistance may be necessary from Government and the Small Scale Industries Development Commission) to identify such enterprises, and to arrange appropriate seminars/workshops on the need for recovery and recycling, with demonstrations and training on the use of such equipment. This should include advice on better service and maintenance practices, leak prevention, leak detection etc., in order to avoid unnecessary emissions, and to conserve more CFC 12 for future recycling. Information on the most suitable equipment to meet the needs of the small workshop, and the financial assistance available to purchase it, will also need to be provided.

Commercial Air-conditioning

Recovery and recycling of CFC-11 and CFC-12 is considered essential in the commercial AC sector, both to reduce emissions to atmosphere during servicing, and to provide a source of refrigerant for the servicing and repair of existing CFC AC systems after ODS phase-out. This is particularly important for those CFC-11 systems which are still within their anticipated economic lifetime but for which retrofit is not an economic proposition. Recovery and recycling therefore needs to be adopted in the following areas:

- By commercial AC servicing companies who will require portable recovery, or portable recovery/recycling equipment.
- By large industrial and commercial enterprises who maintain their own central AC installations.

The commercial AC sector is likely to demand a higher purity specification for recycled CFCs than, for example, that which would be acceptable to the mobile AC sector, and one, or more, centralised CFC reclaim facilities may be required.

To establish recovery, recycling, and reclaim in the commercial AC sector it will also be necessary to:

- Increase awareness of the need for recovery, recycling and reclaim so that it leads to voluntary action.
- Provide funds (from the Montreal Protocol Multilateral Fund) for the purchase of recovery and recycling equipment for all of the prospective users referred to above.

- Provide funds (from the Montreal Protocol Multilateral Fund) for the purchase of reclaim equipment and the establishment of the appropriate centralised CFC reclaim facilities.
- Provide exemption from duties and taxes on all imported ODS recovery, recycling, and reclaim equipment.
- Offer financial incentives, such as a rebate on the cost of purchasing reclaimed CFC when recovered CFC is returned for reclaiming at any centralised facility.

However, to better understand the CFC needs of the commercial AC sector in Indonesia after the ODS phaseout, and to facilitate decision-making on possible reclaim facilities, that a study will be conducted to establish the following:

- The number, type (centrifugal, reciprocating, screw, hermetic, open drive, CFC-11, CFC-12 etc,), and age of CFC chillers in the country, together with a typical value for annual service requirements for the CFC refrigerant involved. The data should be gathered by end user so that those with several chillers can be identified.
- From the above data an assessment can be made as to which chillers can be retrofitted easily and at reasonable cost, which are already due for retirement/replacement, which are still within their expected useful life-cycle but which would not be economic to retrofit.

This data should enable a more precise judgement of post ODS phase-out CFC-11 and CFC-12 requirements in the sector, and the quantities likely to become available from retrofit/replacement. Such data will greatly assist the assessment of reclaim facility needs.

To reduce unnecessary CFC emissions and to reduce demand for refrigerant "top up", both during operation and servicing, training and awareness seminars should be organised for the chiller operators and service companies. This should include advice on all aspects of refrigerant management, including better service and maintenance practices, leak prevention, leak detection, high efficiency CFC-11 purge units, CFC-11 purge capture units etc.

3.9. ODS PHASEOUT SCENARIO TO YEAR 2010

The phaseout scenario was based on ODS consumption in 1992, forecast of unconstrained ODS demand to year 2010, industrial structural framework and availability of funding. **Figure 5, 6, 7, 8, and 9** shows the Indonesia ODS unconstrained demand in Annex A Group I, Annex A Group II,

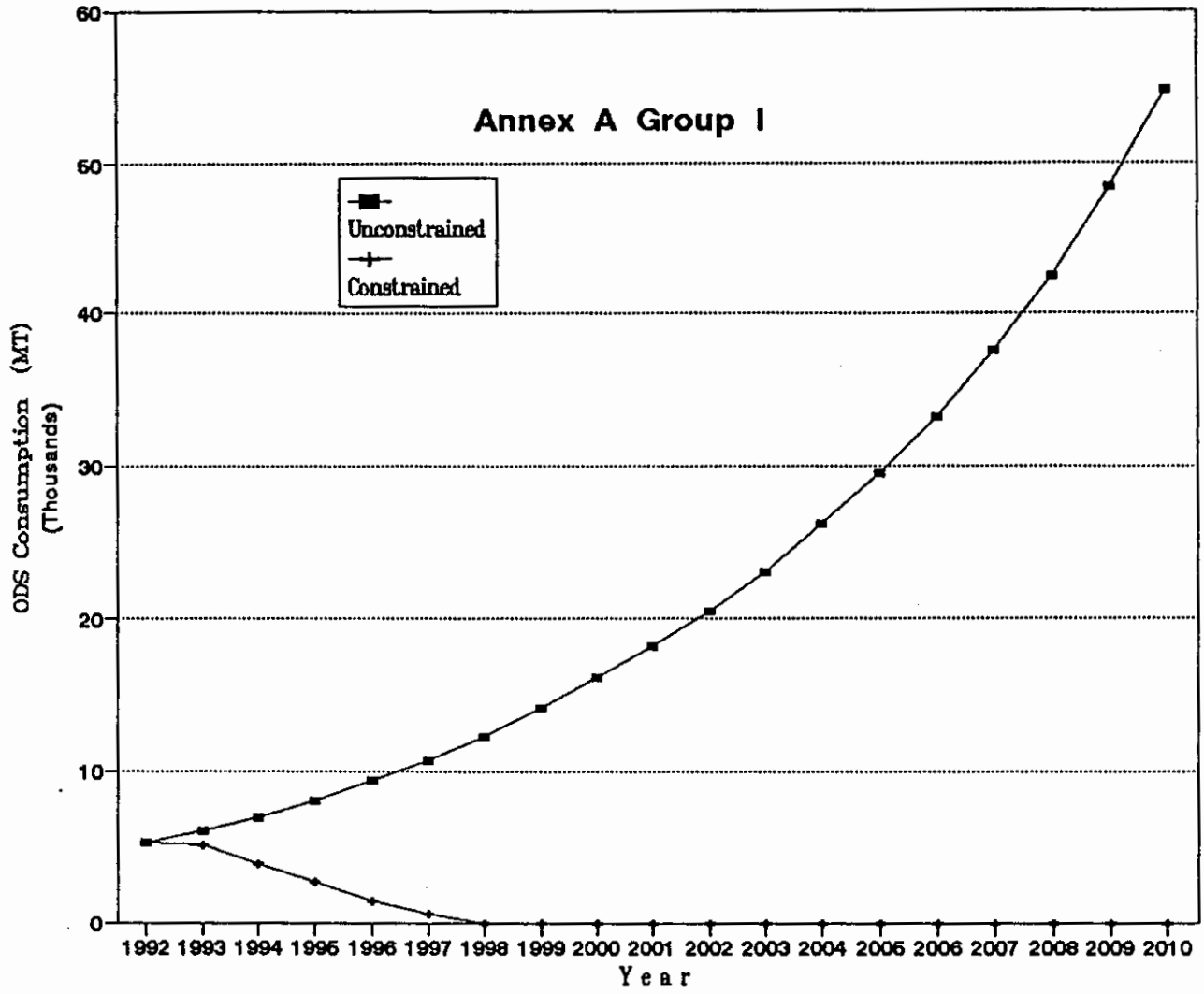

Figure 5. ODS Unconstrained Demand Vs C.P. Plan in Indonesia

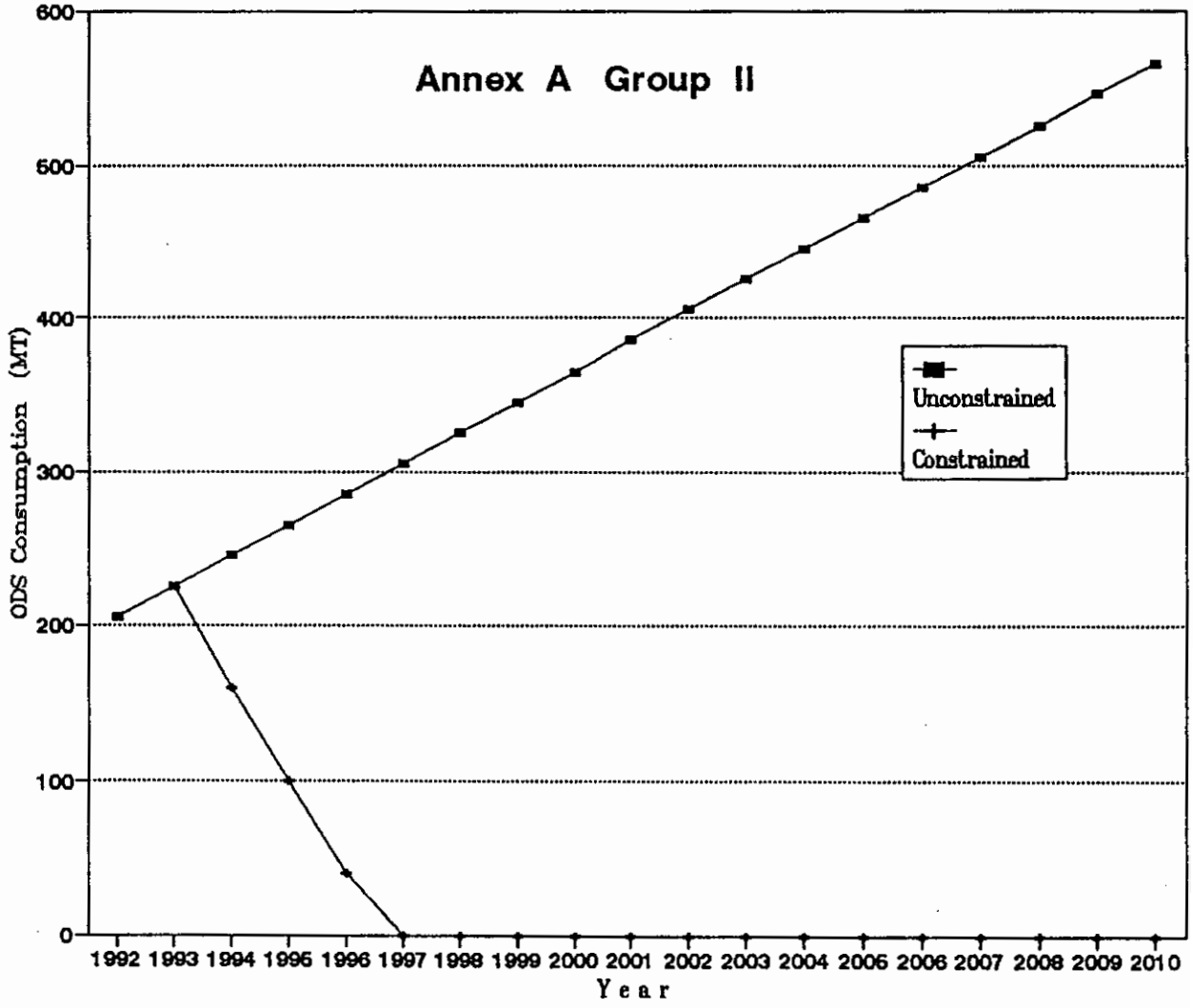

Figure 6. ODS Unconstrained Demand Vs C.P. Plan in Indonesia

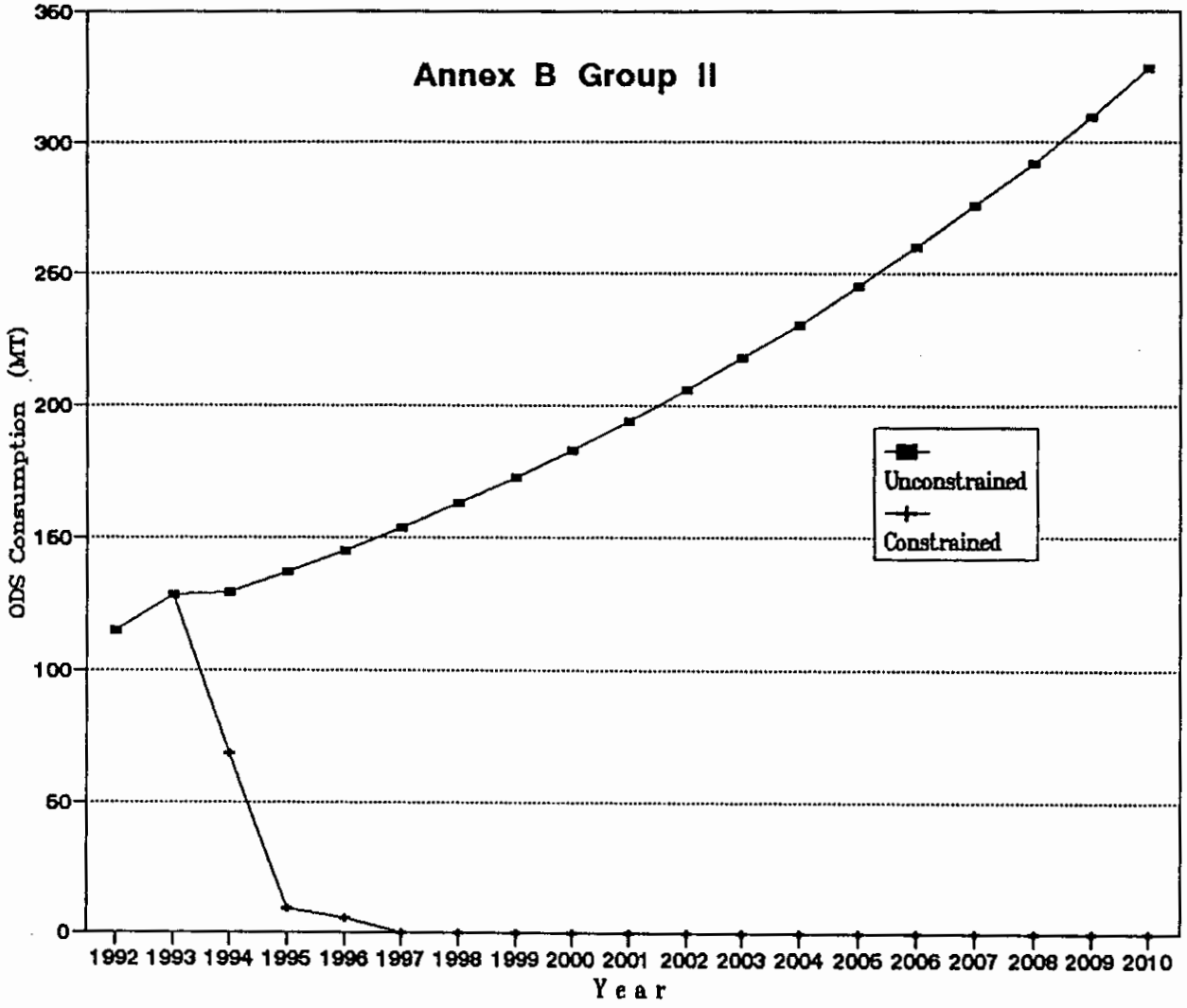

Figure 7. ODS Unconstrained Demand Vs C.P. Plan in Indonesia

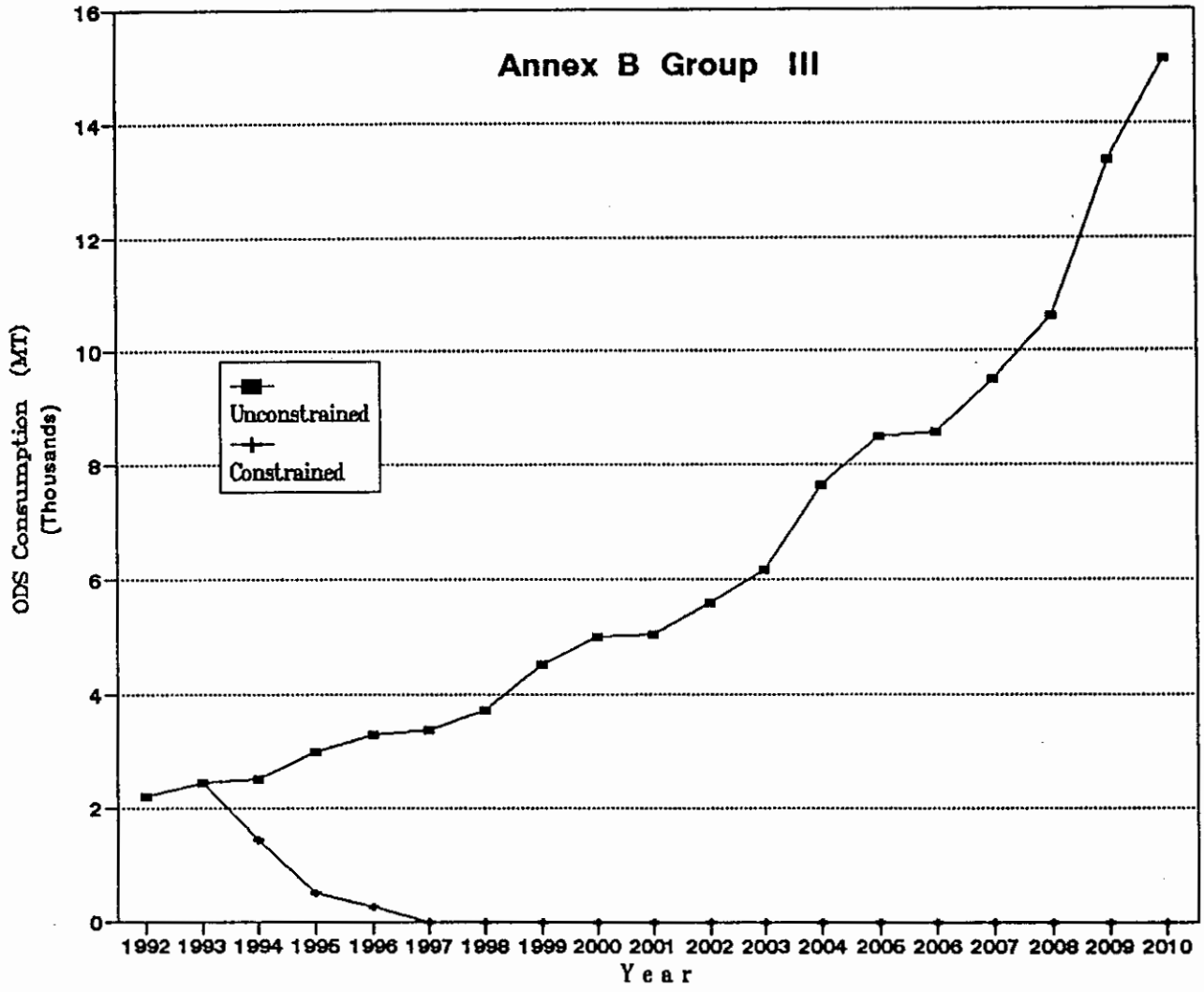

Figure 8. ODS Unconstrained Demand Vs C.P Plan in Indonesia

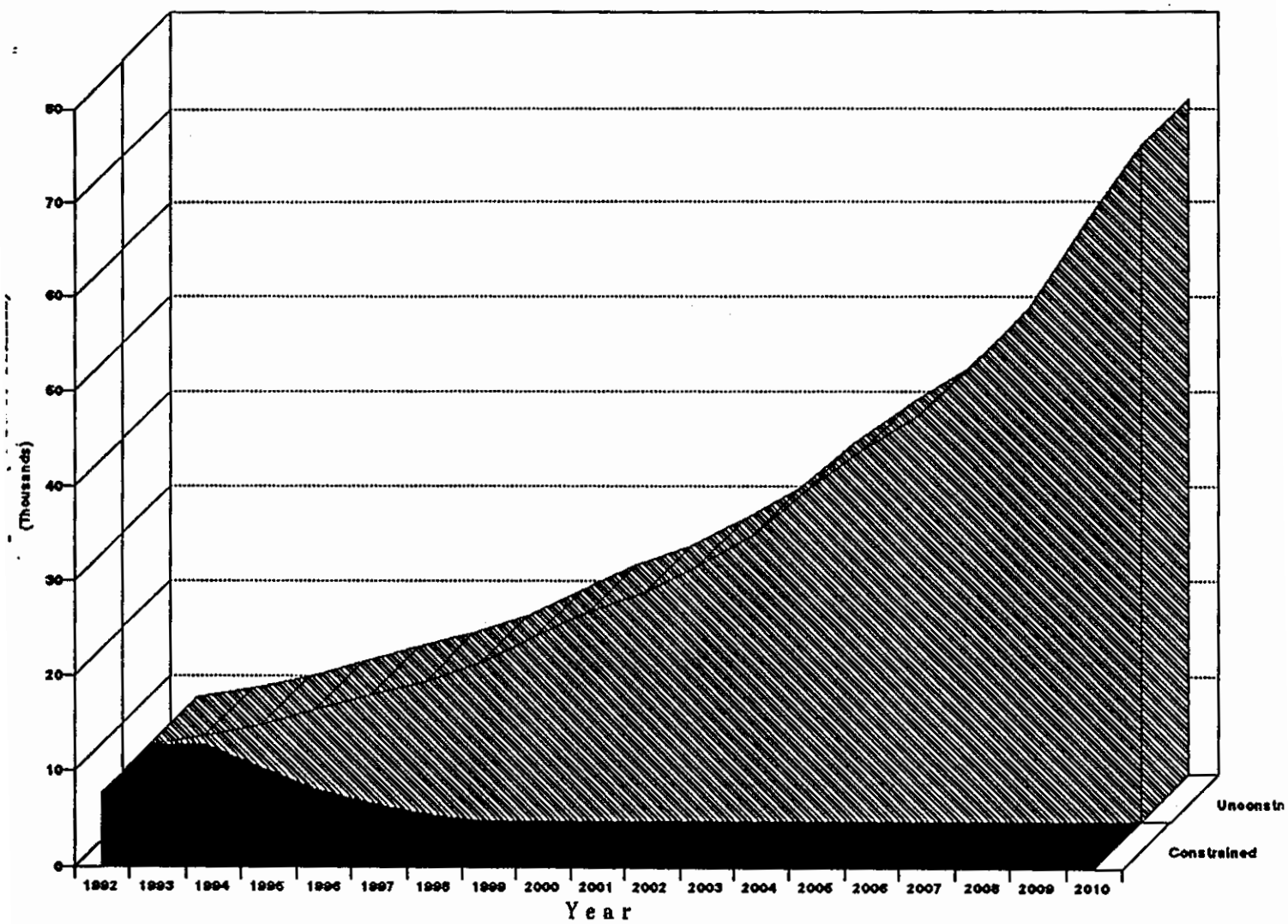

Figure 9. ODS Unconstrained Vs Constrained Demand in Indonesia

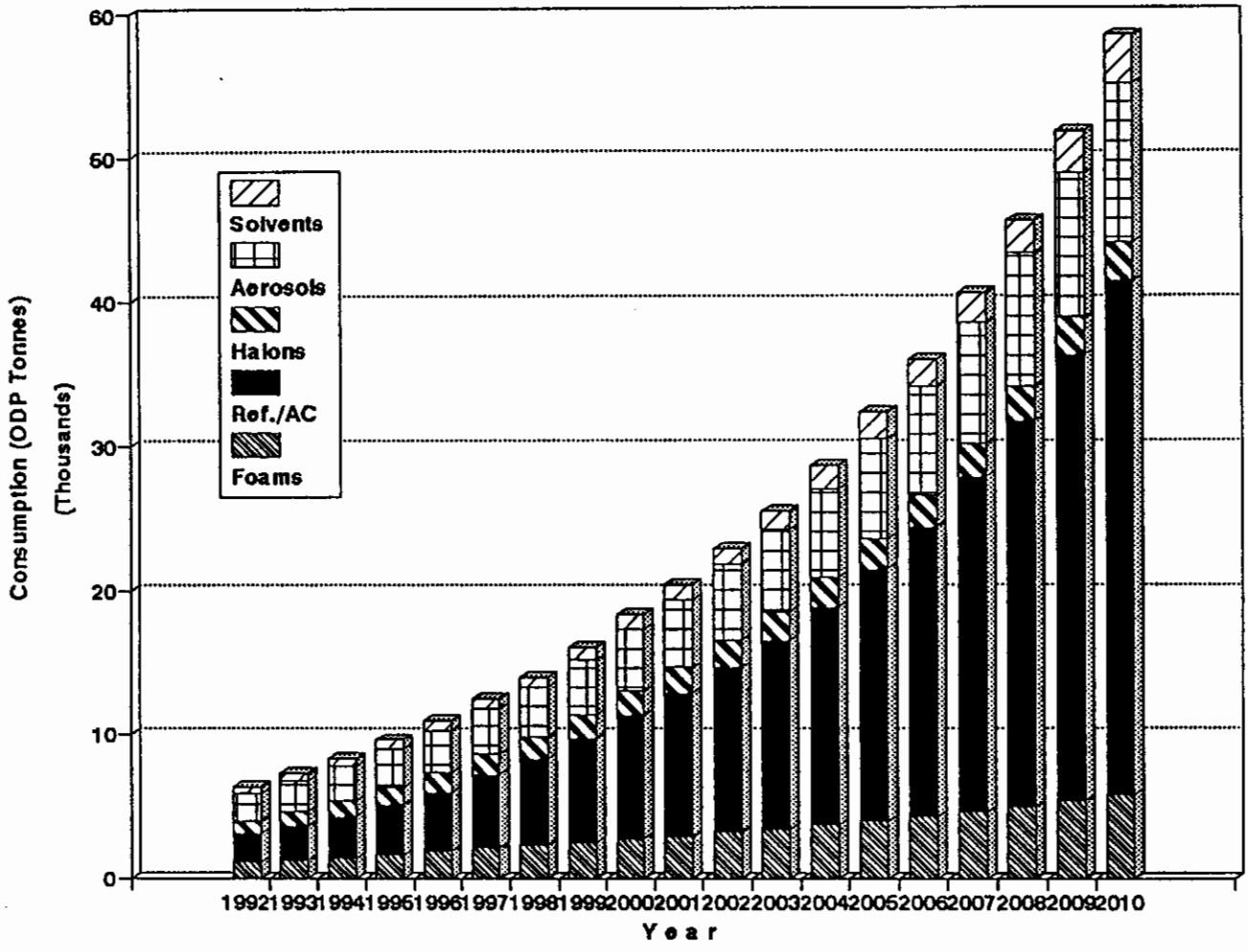

Figure 10. Unconstrained Demand by Sector

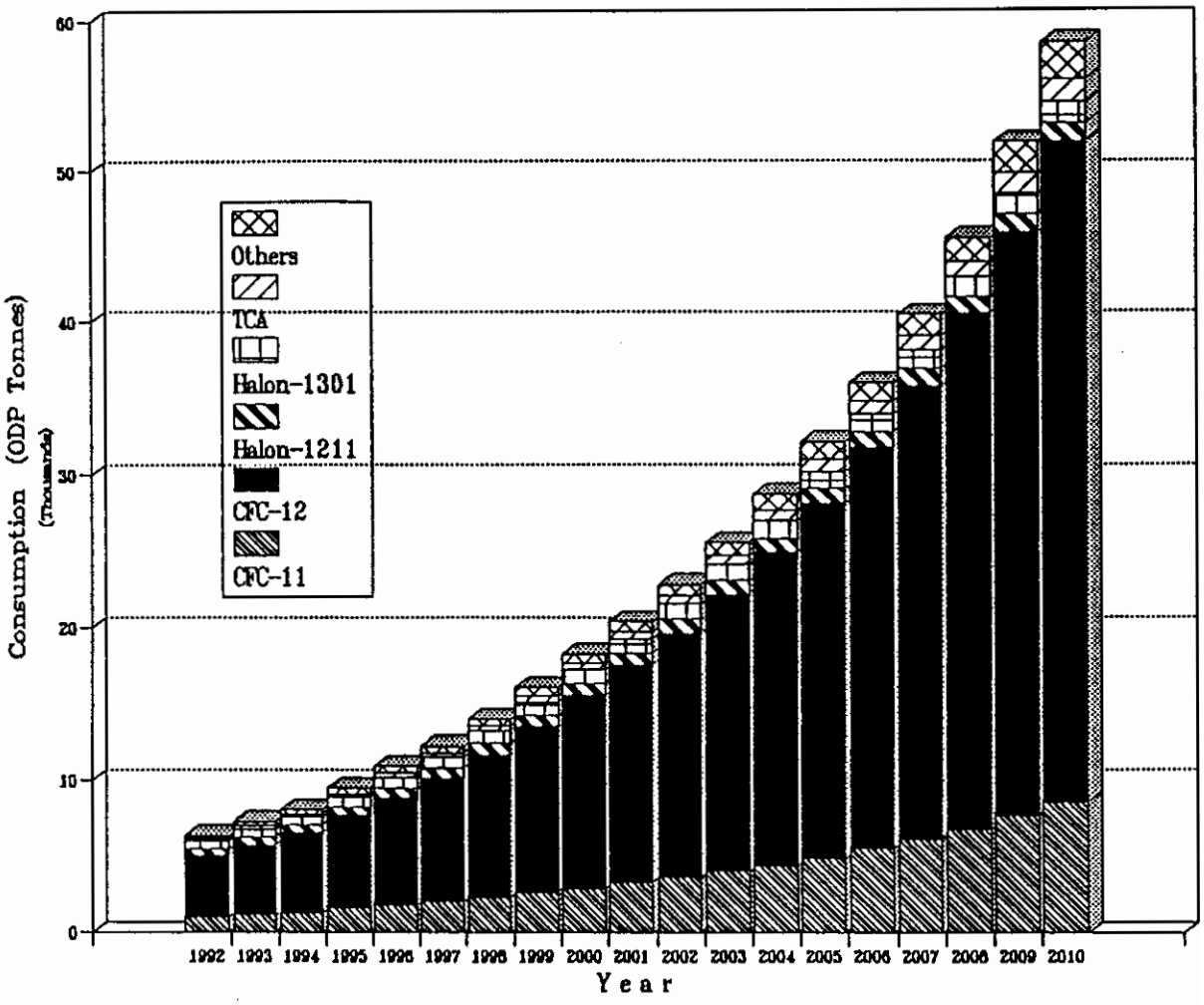

Figure 11. Unconstrained Demand by Substances

Annex B Group II, Annex B Group III and the Total Groups of the Montreal Protocol where expressed in metric tonnes respectively. **Figures 10 and 11** show the unconstrained ODS demand by sector and substances respectively and expressed in ODP tonnes (numerical data can be seen in **Annex 2 and 3**).

1. Foams

The foam industry can phaseout ODS in, or before 1997. It is expected that foams for domestic refrigerators will be the last category to phaseout as technologies in this category are just emerging. The industries in this category all have ties with foreign companies, and would, under normal circumstances, adopt technology through these channels after 1996. However, simultaneous evaluation at the mother company and in the Indonesia subsidiary, or licencee, will speed up the process and will lead to an earlier phaseout.

Successful implementation of the strategy will require actions from raw material suppliers and trade associations. These actions should guarantee suitable availability of replacement chemicals at acceptable prices, evaluation capacities and training facilities for the ODS consuming foam industry and institutional support for the phaseout programs, promotional programs, etc.

Specifically, there is need for the following supporting actions :

Chemical Suppliers :

- Participation in awareness programmes and project identification;
- Polyols and systems for different new developments;
- Regional evaluation capabilities for the application of new technologies;
- Training facilities and demonstration facilities.

Association of Foam-Manufacturers in Indonesia (API)

- Support for Awareness Programme;
- Participation in technical assistance projects for the small scale industry;
- Representation of the industry in the development of a labelling policy (by the Government);
- Organization of an industry statistical system that will allow to track the CFC consumption.

2. Refrigeration / AC

The phaseout schedules of ODS in this sector are as follows :

Domestic Refrigeration

In the domestic refrigerator sector, CFC-11 phase-out in the cabinet insulation foam is possible by the end of 1997 if the newly emerging replacement technology matures quickly and there is early availability of funding for both trialling of the new technology and the incremental costs associated with full scale conversion of the production facilities. **Table 9** illustrates estimated CFC-11 consumption in the domestic refrigerator sector for the period 1993 - 1998.

Table 9. Estimated CFC-11 Consumption in the Domestic Refrigerator Sector (1993-1998)

Year	Unconstrained CFC-11 Growth (Tonnes)	Estimated CFC-11 Consumption (Tonnes)
1993	226	226
1994	271	271
1995	325	260
1996	390	312
1997	468	262
1998	561	0

Phaseout of CFC-12 in the domestic refrigerator sector is feasible by the end of 1997 by moving to the use of the non-ODS HFC-134a. However, the Sector Group believes this timescale for CFC-12 phaseout is dependent upon receiving funding from the Montreal Protocol Multilateral Fund during 1994 for the initial phase of trial production. Suitable HFC-134a compressors must also be available, currently CFC-12 compressors are ASIAN sourced.

Each manufacturer has a single production line, CFC-12 phaseout cannot, therefore, be a gradual process. Taking all of these factors into account, complete CFC-12 phaseout is not possible before 1997 and the following **Table 10.** illustrates estimated CFC-12 consumption in the domestic refrigerator sector for the period 1993 - 1997.

Table 10. Estimated CFC-12 Consumption in the Domestic Refrigerator (1993-1998)

Year	Unconstrained CFC-12 Growth (Tonnes)	Estimated CFC-12 Consumption (Tonnes)
1993	122	122
1994	147	147
1995	176	176
1996	212	212
1997	254	254
1998	305	0

Little work has been carried out on the subject of retrofit of small hermetic compressor-based refrigeration systems such as those used in domestic refrigerators and freezers. This is because, typically, in developed countries at least, failure rates of such hermetic systems are extremely low during typical refrigerator lifetimes, appliances are often scrapped for other reasons before mechanical failure of the compressor, or other components in the system.

Retrofit of some domestic refrigerators to use HFC-134a may be possible but it will require a careful assessment of the compatibility of the materials of construction with the new refrigerant/lubricant involved (particularly the motor winding slot insulation film), and will involve thorough cleaning of the system to remove all residual mineral oil and CFC-12. The opportunity for retrofit is likely to vary from manufacturer to manufacturer and in some cases may only be possible by replacing the compressor. The decision whether to attempt retrofit or scrap the refrigerator will ultimately be taken by the consumer based on the economics of the individual situation.

At this stage, no reduction scenario can be developed for ODS phaseout in the repair and servicing of domestic refrigerators and virgin ODS consumption in this sector is simply asummed to end at the end of 1997.

Mobile Air-conditioning

CFC-12 phase-out in the mobile AC sector is possible by the end of 1997 according to the following outline schedule:

1992 : Recovery & recycling installed at service workshops in the "organised sector" reducing CFC-12 consumption.

1993 - 95 : 50% of new vehicle production will be using non-ODS AC systems according to existing changeover plans already agreed between manufacturers and system suppliers.

1994 : Mobile AC retrofit to "reduced ODS" or non-ODS commercially available.

1996 : 100% of new vehicle production will be using non-ODS AC systems according to existing agreed changeover plans.

1997 : Recovered and recycled CFC-12 or retrofit to "reduced ODS" or non-ODS are the options for the remaining vehicle population fitted with CFC-12 based AC systems. CFC-12 availability and cost, retrofit costs, vehicle age, convenience, etc. will all influence the individual vehicle owners decision.

The CFC-12 phaseout schedules for the car air-conditioning sector is shown in **Table 11.**

Table 11. The CFC-12 Phaseout Schedule for the Car AC

Year	Unconstrained CFC-12 Demand (Tonnes)	Estimated CFC-12 Consumption (Tonnes)
1992	1,480	1,480
1993	1,776	1,480
1994	2,131	1,065
1995	2,557	767
1996	3,069	307
1997	3,683	184
1998	4,419	0

Table 12. presents the CFC-12 phaseout schedule for the bus air-conditioning sector.

Table 12. The CFC-12 Phaseout Schedule for the Bus AC

Year	Unconstrained CFC-12 Demand (Tonnes)	Estimated CFC-12 Consumption (Tonnes)
1992	56	56
1993	64	51
1994	74	37
1995	85	26
1996	98	10
1997	113	6
1998	130	0

It must be emphasized that in order to achieve ODS phaseout according to the preceding schedule, a number of supporting actions, including the following, will be required:

- Penalties or disincentives for the manufacture, import and supply of mobile AC systems that are designed for CFC-12 use.
- Educate and assist the "unorganised sector" to use recovery and recycling.
- Duty/tax exemptions for equipment/parts/materials used for retrofit to non-ODS, and for new non-ODS equipment.
- Educate and assist the "unorganised sector" to introduce retrofit.
- Consider subsidising (from the Montreal Protocol Multilateral Fund) the cost of retrofit components and materials (e.g. compressor lubricant) to reduce the cost of retrofit to the consumer in order to encourage its early adoption.

Commercial Air-conditioning

CFC-11 and CFC-12 phaseout in the commercial AC sector can be achieved by the end of 1997 and a possible scenario is provided in **Table 13** :

Table 13. CFC-11 and CFC-12 Phaseout for the Commercial AC Sector

Year	Unconstrained CFC-11 Demand (Tonnes)	Estimated CFC-11 Consumption (Tonnes)	Unconstrained CFC-12 Demand (Tonnes)	Estimated CFC-12 Consumption (Tonnes)
1993	150	135	87	80
1994	172	130	101	75
1995	198	100	116	59
1996	227	90	133	53
1997	261	50	153	30
1998	301	0	176	0

To achieve this phaseout scenario a number of supporting actions by both industry and Government are required, including the following:

- Selection of HCFC-22, HCFC-123, or HFC-134a refrigerant based systems for all new chiller installations by the building owners. To encourage this, early notification and increased awareness of the Government's plans for ODS phaseout by the end of 1997 is critical (particularly within the building designer/consultants field).
- Ban on the import and sale of CFC chillers with effect from 1 January 1995. (Note: this date is chosen to take account of the long lead time between chiller selection, ordering, and delivery for new building projects). It is recognised that there are existing orders for CFC chillers which will only be delivered in 1994. The quantity of CFC involved is small and it would be wrong to disrupt existing plans by imposing an earlier ban, however, with increased awareness of the issues building owners may choose to review their decisions on choice of chiller.)
- Retrofit options for different chiller designs need to be demonstrated to the building owners and it is recommended that a number of selected prestigious building chillers be retrofitted with funding from the Montreal Protocol Multilateral Fund.
- Duty/tax exemptions for equipment/parts/materials used for retrofit to non-ODS.

3. Halons

As the developed countries have already stopped the productions or will stop the production, of halons by January 1st 1994, the traditional suppliers will no longer be able to supply the market. The demand for servicing, maintenance and eventual essential uses will have to be covered by import from China and India and through the existing stock of halons in Indonesia.

The phaseout schedule (see **Table 14.**) for the halon sector is based on those conditions, where a rapid stop for new equipments and installations is envisaged :

Table 14. The Phaseout Schedule in Halons Sector

Year	Halon-1211 (Metric Tonnes)	Halon-1301 (Metric Tonnes)	Total ODP (Tonnes)
1993	170	55	1060
1994	130	30	690
1995	100	0	300
1996	40	0	120
1997	0	0	0

For the implementation of this halon phaseout strategy, projects have to be prepared, approved and implemented as specified in **Table 15.**

Table 15. The Implementation of the Phaseout Strategy for Halons

T i m e	Action Required
Jan 1994 - Dec 1997	Information and Public Awareness
Jan 1994 - Dec 1995	Setting up and Running in of a National Halon Banking System
Dec 1994	Stop the Import and Production of Aerosol type using halon or other ODS Fire Extinguishers
Dec 1994	Stop the Import of new (virgin) Halon 1301
Dec 1995	Stop Installation of new Fixed Halon Fire Extinguishing Systems Except for Essential Uses
Dec 1996	Stop the Import of new (virgin) Halon 1211
Dec 1996	Stop the Import and Production of new Portable Halon fire Extinguishers

Note : Instead of a stop on the import and production, the same goal can be achieved through a high taxation on imported halons.

For the implementation following projects is required. The estimated cost is based on a preliminary evaluation of the overall costs. The actual cost will depend on each individual project. A main cost is the Halon Phaseout Programme for major/critical users. In order to limit the cost, a carefull planning will be carried out.

4. Aerosols

Industries using CFCs in aerosols should conform to the schedule of ODS phaseout in Indonesia, which states that in 1997 CFCs should be completely phaseout. The only exception being aerosol product esential for human healths, e.g. aerosol metered dose inhalers used for inhalation theraphy. To meet such a policy, there should be a special programme to deal seriuosly with the problems by small industries, such as :

- A compaign to make the supply industries aware of government policy, and of the programme concerning the ODS phaseout. This should be conducted by interested institutions as well as related associations.
- Alternate propellants which are economically attractive must be promoted.
- Training programme for aerosol industries which promote the replacement of CFCs are necessary.

The obvious substitutes are odorless hydrocarbons, but they are susceptible to safety problems because they are not detectable by smell sense of smell when leaks occur. The handling procedures of these substitutes must be very clear.

The programme described earlier will be adhered to :

a. Aerosol grade hydrocarbon propellant (Hydrocarbon Aerosol Propellant" or "HAPs") will be available in 1996.
b. Proper distribution will also be available in 1996.
c. A filling center for small company substitution will be ready in 1996.
d. 15 - 30 aerosol fillers will recieve assistance in converting in 1994, 1995, and 1996.
e. A safety programme for those that have already converted, and a technical assistance programme for all parties in the Indonesian aerosol industry will be carried out in 1994.

Given the above, CFCs should be completely phased out in 1997, in accordance with the country phaseout programme.

5. Solvents

The electronics and metal cleaning sectors are two of the fastest growing sectors in Indonesia. They are also the second largest consuming ODS sectors. It will be of the most importance to gain early awareness so that growth occurs using non-ODS and does not have to be replaced at a later date. The successful efforts of the multinationals, who have taken steps to reduce consumption, as well as the rapid implementation of demonstration projects, will be used to form the basis of the replication/ dissemination of technology in combination with use of the ***Bapak-Angkat*** system to aid the small scale industries. In the metal cleaning sectors, where large users exist such as the airlines and shipyards, many users will be able to convert rapidly to other, non-ODS chlorinated solvents, with minimal investment required for control of occupational health and safety. Combined with use of housekeeping measures for reduced usage, will result in initial large reductions in ODS use. The remaining metal cleaning, and the electronics subsectors will require more difficult replacement programmes, including the use of no-clean alternatives and the related process changes, quality tests, and customer approvals associated with these subsectors. The phaseout plan is very ambitious, and shows an initial rapid drop in ODS usage as the in-kind replacements, mentioned above, are adopted.

3.10. GOVERNMENT ACTION PLAN

Government action will be needed to develop product standards as well as for the institution and implementation of awareness programs. Government action should be preferably supportive and not restrictive. However, in the later phase of the programme some restriction in the use of CFCs may be needed to enforce compliance with the Montreal Protocol.

This government Action Plan consists of specific policies and actions recommended to be undertaken in Indonesia which will ensure Indonesia meets its obligation as a party to the Montreal Protocol. The **Table 16** presents the Government Action Plan to implement the proposed ODS phaseout strategy.

The administrative and management costs for implementing the government Action Plan is part of institutional strengthening activities to be financed by the Multilateral Fund.

1. Institutional Measures

Functioning as the national center for coordinating, monitoring and implementing all Montreal Protocol activities including ODS phaseout project under the CP, as well as other matters relating to environment, the SME has a limitation on its ability to speedily and effectively implement as well as monitor the approved projects. In order to relieve this shortage and help speed up implementation of projects related to ODS phaseout, under the financial support of the Multilateral Fund of the Montreal Protocol.

The operational objective of Institutional Strengthening (IS) is to monitor provision of financial and technical assistance to the Government to carry out the projects in accordance with the recommended ODS phaseout strategy and action plan in Indonesia's Country Programme.

The overall objective is to assist the SME and related institution to effectively and efficiently phaseout ODS through the adoption of policy, technological and monitoring measures in compliance with the provisions of the Montreal Protocol.

US $ 314,780 was approved by the MF Committee in July 1993 in Montreal to strengthen the Ozone Layer Protection and ODS Phaseout Unit. The assistance will cover acquisition for expendable equipments, salaries and wages for dedicated staff for a period of three years, travel expenses and a consultant required for work 60 manmonths each year.

The expected outcomes of the IS project are as follows :

1. The acceleration of ODS phaseout project implementation.
2. Policy direction and coordination of national ODS phaseout efforts as well as reliance on a data base to monitor Indonesian's compliance with the provisions of the MP.
3. The promotion of public awareness and understanding on ODS related issues.
4. Information system developed for better monitoring the consumption of controlled substances, and for providing the industry with information on the latest development of non-ODS technologies.
5. Programmes development for media, i.e. television, radio and press, to raise public awareness on the issue of the ODS.
6. Experiences with other countries and national and international organizations concerned with the implementation of the ODS phaseout activities.

7. Recommendation provided to government, and particular, to the National Committee on the implementation of the MP, on the policies, measures and plans on the ODS phaseout programme.

2. Regulatory Measures

State Ministry of Environment (SME) should increase its efforts promoting among other government agencies, academic institutions, industry groups, chemical suppliers, and inter-governmental organzations understanding about the Montreal Protocol and its effects on Indonesia. There evidence of increasing interest in the issue, but many smaller users of ODSs are still unaware of the global phaseout or have received inaccurate information about its implications. Experience in other countries has proved the importance of seminars, workshops, informational brochures, telephone hotlines, and smillas outreach activities in spreading general and technical information about phaseout options.

SME should take the lead role in according outreach activities, but should strongly encourage the Federation of Indonesian Industries to make the ODS phaseout a priority. Chemical suppliers should be required to inform their customers about public and private sector initiatives regarding the phaseout, and existing and potential alternatives to ODSs. An efficient, cost-effective transition to non-ODS technologies cannot occur if there is confusion about the government's phaseout policies, the alternatives available to industry and the sources of financial assistance available.

Sub-sector working groups are organized around a specific industry sector, and provide the government with advice about the feasibility of adopting alternative phaseout options. The technical committee recommends that working groups be set up for the foams, refrigeration and air conditioning, halons, aerosols and solvent cleaning sectors. The federation of Indonesian industries should provide the nucleus around which the working groups are formed. The working groups should have a clear mandate to provide SME with advice ranging from general phaseout strategy to priority projects for funding with money provided by Interim Multilateral Fund.

ODS taxes and voluntary phaseout actions alone might not ensure that Indonesia meets its adopted phaseout schedule and it might become necessary to limit imports of ODS. By reducing the percentage over time, Indonesia can ensure that it meets its phaseout targets. Such quota systems have work well in other countries, to determine whether a quota system need be imposed, SME and customs Department should closely monitor import and consumption patterns.

3. Financial Measures

ODS are currently generally less expensive than their non-ODS replacement, although the difference in price is expected to get smaller in the future as worldwide demand for substitutes increases. A higher tax on ODS imports would raise the cost of using these chemicals and discourage consumption, particularly in applications where low cost substitutes are available. By increasing costs to users, taxes would also promote recycling and conservation and create an incentive to develop in Indonesia ODS-free technologies that are not subject to the tax. A steadily increasing tax will send a signal to both ODS users and the world community that the government is serious about meeting its phaseout goals.

In the other hand, the government should make adopting alternative technologies more attractive by reducing the duty on imported substitute chemicals and equipment. The duty on recycling equipment is already low, and the same approach should be used in setting duties on all substitute technologies. The combination of increased duties on ODS and reduced duties on substitutes will narrow the price gap, making the substitutes more attractive.

Table 16. Action Plan Summary

Sector: Foams

ITEMS	1994 - 1997	1998 - 2010
Recommendation	Discourage setting up any new production facilities which involves use of ODS (July 1, 1994)	Use of ODS for essential uses only
Taxation	Tax credits for investment in new CFC-free and related equipment Tax exemption from import duty on capital equipment Tax exemption for Multilateral Fund grants	
	Implementation of applicable standards by SII (SNI) in consultation with the industry	
Awareness, education and technical information exchange	Implementation of awareness of programs through audio visual program and seminars for the smaller consumers	

Phaseout scenario	"Beacon" projects (initial projects) for plants representing all foam categories Slabstock-early phaseout program <u>Investment Projects - First Batch</u> Thermoplastic foams - CFC phaseout completion Slabstock - phaseout at small enterprises, phase I Molded - phaseout program, phase I General Insulation - individual projects Appliances - Phaseout Programme Phase I <u>Investment Projects - Second Batch</u> Molded - phaseout program, phase II General insulation - individual projects General insulation - phaseout at small enterprises, Appliances - phaseout programme phase II <u>Residual Phase Out Program Non-Appliance Foam</u>	

Sector : Refrigeration / AC

ITEMS	1994 - 1997	1998 - 2010
Recommendation	Prohibit import of new equipment containing ODS Give incentives for any equipments, parts, materials related directly to the ODS phaseout program. Demonstrate and trial new technology alternatives Encourage the use of non-ODS systems for all new refrigeration and AC installations. Encourage local manufacturers of refrigeration and AC equipment to move non-ODS technology	Use of ODS for essential uses only
Taxation	Tax deduction for the total cost of equipments for ODS phaseout	
Awareness	Education, publication, and dissemination	

Sector: Halon

ITEMS	1994 - 1996	1997 - 2010
Recommendation	Ban to install new fixed halon system (at the end of 1994) Ban aerosol type fire extinguishers which use halons or other ODS (at the end of 1994) Ban the import new halon 1301 at the end of 1994 Ban the import new halon 1211 at the end of 1996 Ban the import, production, and sale of new portable halon extinguishers at the end of 1996	
Awareness	Conduct intensive information and public awareness on halon phaseout and Banking	continue
Management of phasing out scenario	Set up and operation of a National Halon Banking System commencing 1994	continue

Sector : Aerosols

ITEMS	1994 - 1997	1998 - 2000
Recommendation	Prohibit the import of any ODS containing aerosol *)	review
	Prohibit the sale of ODS to the aerosols sector *)	review
	Identify technology alternatives	
Taxation	Given incentive to any efforts which related to the ODS phaseout programme	
Awareness	Education, publication, and information, dissemination to the aerosol industries	
	Compaign to make the supplier industry aware of environment policy and timing of ODS phaseout	
	Promotion of economically attractive alternative propellants.	
	Training programmes for the promotion of alternative propellants and their safe handling and filling	
	Consumer education and awarness campaign	

*) With the possible exception of aerosol Metered Dose Inhaler's for inhalation therapy which may be granted "Essential Use" status in a future revision of the MP.

Sector : Solvents

ITEMS	1994 - 1997	1998 - 2010
Recommendation	Prohibit import of new equipment which utilized ODS Encourage installation of any manufacturing which use non-ODS Give incentives for any equipment, parts or material related directly to the ODS phaseout programme Demonstrate and trial new technology alternative Expand demonstration projects via replication process	Use of ODS for essential uses only
Taxation	Tax deduction for the total cost of equipment for ODS phaseout	
Awareness, education and technical information exchange	Education, publication and dissemination	

IV. FINANCIAL IMPLICATIONS OF THE COUNTRY PROGRAMME

4.1. OVERVIEW OF THE PROJECTS PROPOSED TO IMPLEMENT THE PHASEOUT STRATEGY

A detailed list of projects is specified in **Annex 4.** These include institutional support, technical assistance, technology development, demonstration / promotion, industrial process transformation and recovery / recycle projects proposed by Indonesia for the implementation of the year 1997 ODS phaseout strategy. Due to their technical continuities, these projects comprise an inseperable integral package of actions and activities. The implementation of these projects as scheduled, and achievement of their predicted results, are of vital importance to the timely phaseout of ODS in Indonesia.

The technical assistance and investment projects specified in Annex 4 have been proposed by the responsible sectoral groups / organizations based on the phaseout targets in the Country Programme. These have been amended where needed and then approved by the respective Ministries utilizing the advice of both UNDP and World Bank international experts in several cases. Following this approval, each project has been reviewed by SME for consistency of objectives. These technical assistance and investment projects and their priorities have been reviewed and evaluated based on :

- cost-effectiveness,
- substitutes based on different technologies,
- potential for recycle / recovery, improvement of operation, and reduction of ODS leakage and emissions
- availability of substitute technologies with the zero ODP value,
- priority for substitutes with low energy consumption,
- substitute technologies with low ODP values for use mainly in air conditioning and referigeration during the interim period, and
- interconnections and priorities of the investment projects in the phaseout plans of the implementing sectors.

Only the incremental costs of these projects quality for assistance by the Multilateral Fund which is essential to implement these projects as scheduled and achieve their predicted results. The net incremental costs of these projects have been estimated based on the " Indicative List of Categories of Incremental Cost" adopted by Second Meeting of Parties to the Protocol as well as the guidelines issued by the Executive Committee of the Multilateral Fund. It should be noted that :

- The first batch of the projects have had their feasibility studies completed and some of these projects have already been approved by the Executive Committee of the Fund,
- The second batch of projects will be initiated in 1994, and
- The third batch of projects will all probably need to be initiated and approved during 1995 in order to ensure ODS phaseout in 1997.

These projects have been proposed on the basis of existing state-of-the-art substitute technologies. Some of the projects might have to be adjusted with progress in the development of substitute technologies.

4.2. FINANCIAL COSTS BY SECTOR

The net incremental costs by sector of ODS phaseout under the Country Programme are shown in **Table 17.** Costs are in current 1993 US dollars.

Table 17. Net Incremental Cost for ODS Phaseout Under Indonesia Country Programme.

Sector	Total Phaseout Cost ($ Million)	ODS Phaseout (Tonnes)	Unit Phaseout Cost (US $/kg)
Foams	26.2	5,855	4.48
Domestic Refrig. *)	89.26	5,045	17.69
Ind./Comm. AC.	92.14	4,451	20.70
M A C	200.98	26,439	7.60
Halons	62.8	2,689	23.35
Aerosols	8.04	11,119	0.72
Solvents	20.25	3,446	5.88
Total	499.67	59,044	8.46

*) The data for the Domestic Refrigeration sector includes the ODS consumption in the domestic appliance insulation foam, and the cost of its phaseout. However, please note that in Annex 4, the projects for phaseout of ODS in the domestic appliance insulation foams are included in the foam sector.

The net incremental cost estimates based on the following additional assumptions :

1) Operational cost / savings have been calculated. As each project is formulated, it will be possible to determine the lifetime operational costs/savings and to evaluate the component qualifying as net incremental costs.

2) Potential incremental benefits have been deducted from the project costs for the aerosols pojects.

3) All Multilateral Fund assistance necessary for technical industry use as feedback are termed incremental invesment costs, and are reflected in the sectoral costs for industry end-users.

4) A significant portion of the Multilateral Fund assistance necessary for the foams industry will be used as incremental operational costs, which can be divided into two parts. The first part is for the promotion of technology covering 50 % reduction of CFC-11 during the production of hard polyurethane boards and materials for refrigerators, the second part is the loss to users due to the increase in weight per unit volume of the insulating material foamed using the water-based process.

5) Multilateral Fund assistance necessary for the industrial / commercial refrigeration and the domestic refrigeration sectors includes the incremental operational costs associated with raw materials, new refrigerants, and the replacement lubricants.

6) In addition to the capital invesment in the halons, aerosols, solvents, and recycle / recovery sectors, Multilateral Fund assistance would also go to technical support costs including the restructuring of enterprises.

7) The net incremental costs of ODS phaseout in the mobile AC sector should be regarded as Indicative only. Approximately 70 % of the incremental operating costs are associated with retrofit of the existing vehicle population in Indonesia. The assumption used is that all vehicles will be retrofitted but clearly this is unlikely. Additionally, the retrofit of car and bus AC systems has yet to be introduced on a significant scale commercially even in the developed countries and procedures and costs remain to be defined.

A significant element of the cost of retrofit will be the labour charge. Rates of pay for vehicle AC mechanics in Indonesia are very low and the actual cost of retrofit in Indonesia could be significantly lower than in the developed countries. The incremental costs of ODS phaseout in this sector will therefore require review in the light of emerging experience, and the present figures may be expected to show a considerable decrease.

Material incremental costs account for most of the remaining 30 % of the incremental costs of ODS phaseout in the mobile AC sector. Recent vehicle fleet trials indicate that few components will need to be changed when retrofitting from CFC-12 to HFC-134a. In addition, the cost of HFC-134a, and the cost of the new lubricants required in retrofitting, have both decreased substantially and can be expected to further decrease, again reducing the present estimated incremental cost of ODS phaseout in this sector.

4.3. SUPERVISION ARRANGEMENT

SME is responsible for the overall supervision and management of the import, and consumption of ODS in Indonesia. Quantities of ODS (including CFCs and Halons) imported are managed by the Ministry of Trade and the statistical data on their categories, quantities, and applications are reported by the Ministry of Industry.

Specified of quotas for ODS consumption will be established by the State Ministry of Trade and Industry, jointly with other related authorities and will be based on the phaseout plan in the Country Programme.

SME is responsible for reporting the data on ODS consumption in Indonesia to Protocol's Ozone Secretariat in Nairobi. SME jointly with other related authorities, will establish a unified systems for reporting ODS data, so as to report the data according to the requirements under the Protocol. SME will periodicaally gather ODS data through a survey of ODS consuming enterprises throughout the country and will assist the local authorities establish an identical data collection and reporting system.

An inspection and measurement center for ODS and their substitutes will be established, which will be responsible for the inspection and measurement of ODS and their substitutes. It will evaluate the predicted targets and results obtained using substitute technologies, and the applicability of the planned phaseout dates.

ODS consuming enterprises will provide the following detailed data : catagories and quantities of ODS consumed per product unit, sources of ODS, production and growth rates of ODS-containing products, market demand and development trends, and the status of products manufactured using ODS substitute technologies.

Local environmental protection bureau, directed by SME, will supervise the data reporting systems of local enterprises consuming ODS so that Government provisions on ODS phaseout are followed.

The working group for Ozone Layer Protection will carry out regular inspections and assessments on the status of ODS consumption in Indonesia according to the phaseout plan under the Country Programme, so as to revise the phaseout plan when needed and implement it effectively.

The Government of Indonesia has empowered the related authorities and SME to supervise project implementation in Indonesia. SME will submit regular reports on the use of Multilateral Fund assistance and the progress of the projects to the Executive Committee of the Fund.

Annex 1. Potential ODS Replacement Technologies

Sector	Subsector	Existing ODS Technology	Preferred Technology	Acceptable Alternative Technology	Emerging Option Technology
I. Foams	A. Flexible PUF				
	1. Slabstock	CFC-11	MeCl	Additives, Special Poly	Alternative Manufacturing Technology
	2. Molded		Water Blown	MeCl	-
	3. Semi Rigid		HCFCs	HFC-134a	Water Blown
	B. Rigid PUF				
	1.Dom.Appliance	CFC-11	Reduced CFC, Cyclo Pentan	HCFCs	Vacuum panels HFC-134a
	2.Gen.Insulation		Pentanes, Water Blown	HCFCs	-
	C. Thermoplastics - Foams	CFC-12	Hydrocarbons	HCFC-22	Carbondioxide, HFCs
II. Refrigerat./ AC	A.Domestic Ref. Refrigerant	CFC-12	HFC-134a	HCFC-22 Propane HFC-152a	
	B. Mobile AC	CFC-12	HFC-134a	HCFC/HFC blends	
	C. Refrigerated transport	CFC-12 R-502	HFC-134a HFC blends	HCFC/HCFC blends HCFC/HCFC blends HCFC-22	
	D.Commercial refrigeration	CFC-12 R-502	HFC-134a HFC blends HFC-32	HCFC-22 HCFC/HFC blends Propane Ammonia	
	E. Commercial AC	CFC-11 CFC-12	HCFC-123 HFC-134a	HCFC-22	
	F. Industrial Refrig.	CFC-11 CFC-12 R-502	HCFC-123 HFC-134a HFC blends HFC-32	HCFC/HFC blends Propane Ammonia	

Annex 1. (continued)

Sector	Subsector	Existing ODS Technology	Preferred Technology	Acceptable Alternatif	Emerging Option
III. Halons	A.Computer Rooms	H-1211 H-1301	CO2 fire ext.Syst. Nitrogen based fire ext. Syst. Sprinkler Syst.		
	B.Control Rooms		Nitrogen based fire ext.Syst. Sprinkler Syst.		
	C.Telecommunication installation,telephone exchange centers		Nitrogen based fire ext.Syst. Water mist Syst. Pre action sprinkler Syst. CO2 fire ext. Syst		
	D. Generator Rooms& Electrical installation		CO2 fire Ext. Syst. Nitrogen based fire ext. Syst. Water mist System		
	E.Machine Rooms Engine Rooms		CO2 fire Ext.Syst. Water mist. System		
	F.Flammable liquid storage facilities		CO2 fire ext. Syst. Foam fire ext. Syst Nitrogen based fire ext.Syst Water mist System		
	G.Flooting Roof tanks		Foam fire ext. System		
	H.Aircraft,Engine protect		No alternative available yet		
	I. Defence equipment andinstallation		No alternative available yet		
IV. Aerosols	Medical&non medical	CFC-12	Hydrocarbons, HFC-134a		
V. Solvents	A. Electronic and Precision cleaning	CFC-113 TCA	no clean fluxes Aqueous cleaning Organic,non halogenated solvent	Chlorinated solvent Perfluorocarbons	No clean pastes for surface mount tech
	B. Metal cleaning	CFC-113 TCA	Aqueous cleaning Organic, non halogenated solvents No clean fluxes	Chlorinated solvent Perfluorocarbons	
	C. Spot cleaning textile	TCA	Aqueous System Chlorinated solvents	Hydrocarbons HCFCs	
	E. Tipp ex	TCA	Aqueous Systems Organic Solvents		
	F. Pharmaceutical	CTC	Chlorinated Solvents		

Annex 2. Unconstrained and Constrained ODS Consumption by Sectors Expressed in ODP Tonnes

Unconstrained (ODP Tonnes)

Sectors	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Foams	1025	1141	1340	1576	1860	2037	2240	2465	2712	2929	3163	3416	3689	3967	4276	4646	5019	5421	5855
Ref./Ac	2096	2501	2985	3563	4254	5081	6069	7249	8657	9972	11484	13225	15227	17539	20199	23266	26801	30875	35571
Halons	972	1060	1155	1264	1359	1454	1549	1651	1739	1834	1929	2024	2119	2214	2309	2404	2499	2594	2689
Aerosols	2000	2200	2420	2662	2928	3221	3543	3897	4287	4716	5187	5706	6276	6904	7594	8354	9189	10108	11119
Solvents	474	528	541	667	727	727	798	1005	1101	1089	1202	1328	1717	1890	1856	2060	2289	3030	3446
Grand Total	6567	7431	8441	9732	11128	12520	14198	16267	18496	20540	22966	25700	29028	32514	36235	40730	45797	52029	58680

Constrained (ODP Tonnes)

Sectors	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Foams	1025	1025	768	512	512	257	0	0	0	0	0	0	0	0	0	0	0	0	0
Ref./Ac	2096	2091	1574	1129	637	358	0	0	0	0	0	0	0	0	0	0	0	0	0
Halons	972	1060	690	300	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aerosols	2000	1800	1500	1000	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solvents	474	528	302	84	46	7	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	6567	6504	4834	3025	1615	622	0	0	0	0	0	0	0	0	0	0	0	0	0

(ODP Tonnes)

Items	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Annex A/I																			
Uncons	5249	5985	6891	8016	9278	10558	12098	13975	16057	17988	20252	22818	25891	29180	32784	37072	41918	47759	54117
Const	5249	5058	3924	2663	1463	622	0	0	0	0	0	0	0	0	0	0	0	0	0
Annex A/II																			
Uncons	972	1060	1155	1264	1359	1454	1549	1651	1739	1834	1929	2024	2119	2214	2309	2404	2499	2594	2689
Const	972	1060	690	300	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annex B/II																			
Uncons	127	141	142	151	160	169	179	190	201	213	227	240	254	270	286	304	321	341	361
Const	127	141	75	10	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annex B/III																			
Uncons	220	245	253	301	332	338	372	451	499	505	558	618	764	850	856	951	1059	1335	1513
Const	220	245	145	53	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Annex 3. Unconstrained and Constrained ODS Consumption by Substances Expressed in ODP Tonnes

Unconstrained (ODP Tonnes)

Substances	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CFC-11	933	1117	1303	1523	1786	2006	2266	2565	2903	3222	3578	3975	4421	4905	5459	6119	6834	7639	8548
CFC-12	4164	4697	5409	6239	7210	8279	9522	10971	12665	14289	16129	18220	20589	23285	26347	29831	33796	38310	43451
CFC-113	128	142	146	215	236	219	246	364	401	371	418	470	698	770	714	806	909	1354	1572
CFC-115	24	28	33	39	46	54	64	75	88	106	127	152	182	220	263	316	379	455	546
H 1211	462	510	555	594	639	684	729	771	819	864	909	954	999	1044	1089	1134	1179	1224	1269
H 1301	510	550	600	670	720	770	820	880	920	970	1020	1070	1120	1170	1220	1270	1320	1370	1420
TCA	220	245	253	301	332	338	372	451	499	505	558	618	764	850	856	951	1059	1335	1513
CTC	127	141	142	151	160	169	179	190	201	213	227	240	254	270	286	304	321	341	361
Grand Total	6567	7431	8441	9732	11128	12520	14198	16267	18496	20540	22966	25700	29028	32514	36235	40730	45797	52029	58680

Constrained (ODP Tonnes)

Substances	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CFC-11	933	933	764	519	506	258	0	0	0	0	0	0	0	0	0	0	0	0	0
CFC-12	4164	3959	3060	2110	931	351	0	0	0	0	0	0	0	0	0	0	0	0	0
CFC-113	128	142	82	22	14	7	0	0	0	0	0	0	0	0	0	0	0	0	0
CFC-115	24	24	18	12	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0
H 1211	462	510	390	300	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H 1301	510	550	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TCA	220	245	145	53	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTC	127	141	75	10	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	6567	6504	4834	3025	1615	622	0	0	0	0	0	0	0	0	0	0	0	0	0

Annex 4. PRELIMINARY LISTS OF PROJECTS TO ACHIEVE ODS PHASEOUT IN INDONESIA BY THE END OF 1997

1. Project for ODS Phaseout in the Foams Sector

#	DESCRIPTION	PERIOD/COSTS
1.	**INITIAL PROJECTS**	**1994 - 1995**
1.1	"Beacon" projects for plants representing all foam categories (4)	$ 4,000,000
1.2	Slabstock - early phaseout program, individual large/medium companies	$ 2,500,000
1.3	Slabstock-phaseout at small enterprises, Phase 1.	$ 1,500,000
2.	**INVESTMENT PROJECTS - FIRST BATCH**	**1994 - 1996**
2.1	Thermoplastic Foams - CFC phaseout completion	$ 2,000,000
2.2	Slabstock-phaseout at small enterprises, Phase 2.	$ 2,000,000
2.3	Molded - phaseout program, Phase 1.	$ 4,300,000
2.4	General Insulation - individual projects	$ 2,500,000
2.5	Appliances - phaseout program, Phase 1.	$ 4,000,000
3	**INVESTMENT PROJECTS - SECOND BATCH**	**1995 - 1997**
3.1	Molded - phaseout program, Phase 2.	$ 1,300,000
3.2	General Insulation - individual projects	$ 2,500,000
3.3	General Insulation - phaseout at small enterprises,	$ 2,600,000
3.4	Appliances - phaseout programme, Phase 2.	$ 12,000,000
3.5	RESIDUAL PHASEOUT PROGRAMME Non-appliance foams	$ 1,000,000
	TOTAL PHASEOUT COSTS	**$ 42,200,000**

2. Projects for ODS Phaseout in the Refrigeration and Air-Conditioning Sector

2.1. Domestic Refrigeration

Sector Strategy

The domestic refrigeration sector uses CFC-11 in the manufacture of the refrigerator cabinet insulation foam, and CFC-12 as the refrigerant fluid. A two stage strategy is proposed in this sector as follows :

1995 : Implementation of two "demonstration projects" to phaseout both CFC-11 and CFC-12.

1995-1997 : General phaseout at remaining enterprises in the sector (6 projects).

The cost elements associated with the CFC-11 replacement in the cabinet insulation foam are dealt with in the foam sector project list. The projects described below consider only the replacement of the CFC-12 refrigerant.

Demonstration Projects (1994 - 1995)

Enterprises : P.T. Yasonta (100 % local ownership)
P.T. Lippo Melco (50 % local ownership)

Stage 1. Design and test HFC-134a compressors, and new refrigerator systems, all models.

Stage 2. Convert refrigerator production lines to use HFC-134a

Enterprise	Estimated Capital Cost US$	Inc. Operating Cost US$	ODS Reduction Metric tonnes CFC-12
P.T. Yasonta	2,310,000	8,100,000	26.0
P.T. Lippo Melco	2,310,000	3,381,000	8.8

General Phaseout Projects (1995 - 1997)

Enterprises : P.T. National Gobel (40 % local ownership)
P.T. Sanyo Industries (35 % local ownership)
P.T. Top Jaya (100 % local ownership)
P.T. Maspion Samsung (% local ownership n/a)
P.T. Goldstar Astra (% local ownership n/a)
P.T. Daichi (100 % local ownership)

Stage 1. Design and test HFC-134a compressors, and new refrigerator systems, all modles.

Stage 2. Convert Refrigerator Production Lines to Use HFC-134a

Enterprises	Estimated Capital Cost US$	Inc. Operating Cost US$	ODS Reduction Metric Tonnes CFC-12
P.T. National Gobel	2,310,000	8,204,000	25.4
P.T. Sanyo Ind.	2,310,000	8,640,000	40.6
P.T. Top Jaya	2,310,000	7,200,000	32.6
P.T. Maspion Samsung	2,310,000	9,252,000	34.7
P.T. Goldstar Astra	2,310,000	4,185,000	18.2
P.T. Daichi	2,310,000	5,821,000	22.0

2.2 Mobile Air Conditioning

(Costs in US $ million)

Activity of Project	1993	1994	1995	1996	1997	1998
Reduction CFC-12 (tonnes)	1,471	1,102	793	317	190	0
Develop HFC-134a AC system	0.050	0.040	0.030			
Develop Retrofit HFC-134a to Existing system	0.040	0.070	0.040			
Training & Seminar	0.430	0.260	0.210			
Convert Prod. Line	1.800	5.800				
Training & Promotion for Recovery & Recycling	0.400	0.300	0.210	0.080		
Equipment for Recovery & Recycling	0.240	0.400	0.240	0.240		
Total	2.960	6.870	0.730	0.230	0	0
Grand Total	10.880					

2.3. Commercial AC Subsector

(US $)

	Description	Activity	1994	1995
1.	Study of structure of Installed chillers in the commercial AC sector	a.Gathering chiller data in type & numbers b.Analize above data to judge numbers of chiller for retrofit, replacement or to use reclaimed ODS	10,000	
2.	**Recycling / recovery :**			
	a.Training to prepare human resource on recovery / recycling	a.Hold a workshop for technicians	20,000	
	b.Provision of recycling / recovery units	b.Provide 50 units recycling / recovery units for local reps	300,000	
	c.To raise awareness	c.Hold a seminar for end users		15,000
3.	**ODS Containment in Negative Pressure Chillers**	"Demo" Pilot projects providing 4 (four) negative pressure chillers with high efficiency purge units	60,000	
4.	**Retrofit**			
	a.To prepare local human resources for doing retrofit	a.Overseas training of technicians from local agence/subsidiaries at their principal's HQ.	124,180	
	b.To increase local human resources for retrofit	b."Demo" Pilot training projects on retrofitting 2 (two) CFC-11 chillers and 2 (two) CFC-12 chillers	280,000	
	c.To disseminate actual result / performance of retrofitted chiller and raise end user's awareness	c.Holding a seminar for end users		15,000
5.	**Replacement**			
	a.To show benefit on replacement	a."Demo" Pilot projects to replace 2 (two) CFC-11 chillers and 2 (two) CFC-12 chillers	600,000	
	b.To raise awareness	b.To hold a seminar for end users		15,000
		Total	1,394,180	45,000

3. Projects for ODS Phaseout in the Halons Sector

Project	Cost (US $)
Halon fixed system replacement	50,000,000
Conversion of product related to halon extinguisher	10,000,000
Recycling & recovering of halon extinguisher	500,000
Setting up of national halon banking systems	1,000,000
Examination & evaluation on alternatives technologies in line with halon replacement (fixed)	1,000,000
Setting up guidelines, codes & related to clean agent use & development	200,000
Seminars & workshops pertaining to halon phaseout	100,000
Total	62,800,000

4. Projects for ODS Phaseout in the Aerosols Sector

Project	Cost (US $)
HC Purification plant	2,000,000
HC Distribution	800,000
15-30 Filler Project	3,000,000
Filling Center	2,000,000
Safety / Training	240,000
Total	8,040,000

5. Projects for ODS Phaseout in the Solvents Sector

Project	Cost (US $)	Annual ODS Reduction (T/yr)
Publicity regarding ODS phaseout in the year 1997 and the urgency to phaseout	100,000	
Conduct training seminars for dealers in order to reach the small sector industries	200,000	
Conduct training seminar for industry users to phaseout by SME and introduce non ODS technologies to generate project activities	250,000	
Pilot plant for recovery and recycling, and R & D for non ODS to be used in the various substances	500,000 (1,000,000)	
Technical assistance for preparation and implementation of ODS phaseout project	200,000	
Implementation of the plan to phaseout ODS solvents via invesment project - including Bapak Angkat system for small scale industry		
1994 Project to convert to drop-in chlorinated solvents in 17 metal cleaning enterprises (40 lines) Project to convert to aqueous cleaning in 3 electronic assembly enterprises (10 lines) Project to convert to various non-ODS technologies in12 precision cleaning enterprises (25 lines)	8,200,000	1,200
1995 Project to convert to drop-in chlorinated solvents in 20 metal cleaning enterprises (40 lines) Project to convert SSI, through dealer network, to non-ODS purchases (9 lines) Project to convert to semi-aqueous technology for 12 electronic assembly factories (14 lines) Project to convert to various non-ODS technologies in 12 precision cleaning enterprises (25 lines)	8,600,000	977
1996 - convert 19 lines	1,900,000	287
1997 - convert 1 line	300,000	9