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

Tenth Meeting  
Montreal, 28–30 June 1993

## **COUNTRY PROGRAMME: PHILIPPINES**

This document consists of:

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

## PHILIPPINES COUNTRY PROGRAMME EVALUATION SHEET

The Philippines Country Programme is submitted to the Tenth Meeting of the Executive Committee as document UNEP/OzL.Pro/ExCom/10/29. The document is consistent with the format provided in the "Procedures for Presentation of Country Programmes and Project Proposals to the Executive Committee (UNEP/OzL.Pro/ExCom/5/16).

It consists of:

- Letter of Transmittal
- Country Programme Cover Sheet (Prepared by the Secretariat)
- Executive Summary
- Introduction
- Current Situation, which includes:
  - Overview of ODS imports
  - Current Consumption of ODS by end use
  - Institutional Framework
  - Government response to the Montreal Protocol
  - Industry response to the Montreal Protocol
- Implementing Phase-Out, which includes:
  - Strategy Statement by Government
  - ODS control characteristics of the preferred strategy
  - Action Plan
  - Investment and technical assistance projects
- Appendices, which provide:
  - A list of industrial associations and other non-governmental organizations in the Philippines
  - Senate Resolution on the ratification of international agreements
  - Memorandum of Agreement on financial intermediation

Philippines neither manufactures nor exports ozone depleting substances (ODS). It imports all its requirements. The consumption based on imports in 1991 was 2651 ODP tonnes. In ODP terms CFCs (CFC-11: 32%, CFC-12: 41%, CFC-113: 10%) make up over 80% of the consumption. Methyl chloroform (7%), carbon tetrachloride (4%) and halons (4%) make up the rest. The total unconstrained consumption up to the year 2010 is estimated to be 74,417 ODP tonnes.

The major consuming industries are refrigeration and air conditioning (40%), electronics and metal cleaning (21%), foam manufacturing (15%) and tobacco expansion (13%). 90 percent of the domestic market for household refrigerators and freezers is satisfied by local industry which is predominantly Filipino-owned. Compressors for all household refrigerators and freezers are imported. The use of ODS in the aerosol sector has virtually been phased-out through the use of hydrocarbons, mainly propane and butane as propellants.

In the flexible foam sector, methylene chloride is used considerably while in flexible packaging foam only three out of 125 companies use CFC-12 as a blowing agent.

CFC-113 and methyl chloroform are used almost exclusively in the electronic industry which is about 80% foreign-owned.

An institutional framework which makes the Department of Environment and Natural Resources (DENR) the central co-ordinator for all Montreal Protocol activities has been defined by the Government.

The Government strategy is aimed at the early phase-out of the ODS. The latest target date for the phase-out of the use of all ODS except in the refrigeration service industry is 1998. CFC-113, carbon tetrachloride and methylchloroform used in the electronic industry are to be phased out by 1996. The use of CFC-11 and CFC-12 will be allowed in the refrigeration servicing industry to avoid high cost of early retirements and retrofits.

The estimated incremental cost of the phase-out by the selected strategy is US \$220.1 million at constant prices or US \$89.3 million at changing prices.

The action plan supporting the strategy involves institutional measures (creation of ozone desk and a financial intermediary), regulatory measures, including the use of controls and a series of bans on importation of ODS and ODS-containing products, incentives, awareness campaigns, monitoring, investment and technical assistance projects.

Prior to the submission of the Country Programme, four projects in the foam sector, five in the solvent sector and one tobacco expansion project were developed and submitted for approval by the Executive Committee. A total amount of US \$11.42 million was approved in March 1993 for the projects, bringing the total amount approved for projects in the Philippines to nearly US \$12.8 million. Appendix 1 provides a list of projects approved for Philippines as of March 1993. Three other projects in the refrigeration sector and seven technical assistance projects have also been identified and described in the Country Programme. The total cost of these projects is US \$3.32 million. This first group of projects is aimed at eliminating 829 ODP tonnes. Monitoring of ODS consumption to ensure that the phase-out targets are met and monitoring of the phase-out programme effectiveness based on quantifiable indicators and milestones will be undertaken.

Appendices A and B were removed following comments from the Secretariat on the draft of the document, hence the appendices start from C.

## **Recommendations**

To adopt the Philippines Country Programme for the Phase-Out of Ozone-Depleting Substances.

To invite the Government of Philippines to provide periodic reports on the implementation of the Country Programme and approved projects based on the monitoring procedures defined in the Country Programme.

## APPENDIX 1

PROJECTS APPROVED FOR THE PHILIPPINES  
(as of March 1993)

| Project                                        |                                                                                     | Date<br>Approved | Implementing<br>Agency | Cost US \$       |
|------------------------------------------------|-------------------------------------------------------------------------------------|------------------|------------------------|------------------|
| 1.                                             | Training programme in refrigeration sector                                          | June 1991        | UNDP                   | 64,000           |
| 2.                                             | Controlled substances engineering project                                           | June 1991        | World Bank             | 400,000          |
| 3.                                             | Country Programme preparation                                                       | June 1991        | World Bank             | 19,952           |
| 4.                                             | Country Programme preparation                                                       | Oct. 1992        | UNDP                   | 84,850           |
| 5.                                             | Preparation of investment projects                                                  | Feb. 1992        | World Bank             | 100,000          |
| 6.                                             | Preparation of investment projects                                                  | Mar. 1993        | World Bank             | 194,550          |
| 7.                                             | Information exchange programme                                                      | Mar. 1993        | World Bank             | 200,000          |
| 8.                                             | Institutional strengthening for Ozone Desk operations                               | Mar. 1993        | World Bank             | 209,000          |
| 9.                                             | Technical assistance for financial intermediary                                     | Mar. 1993        | World Bank             | 100,000          |
|                                                | Application of reduced CFC blowing agent and non-CFC applications:                  | Mar. 1993        | World Bank             |                  |
| 10.                                            | - Philippines Appliance Co. (Philacor)                                              |                  |                        | 1,770,000        |
| 11.                                            | - Concepcion Industries                                                             |                  |                        | 790,000          |
| 12.                                            | - Sanyo Philippines                                                                 |                  |                        | 660,000          |
| 13.                                            | - Federal Electric Co.                                                              |                  |                        | 770,000          |
| 14.                                            | Conversion to semi-aqueous and aqueous cleaning solvents at Ionic Circuits Inc.     | Mar. 1993        | World Bank             | 790,000          |
|                                                | Conversion to low emission processing and organic solvents at:                      | Mar. 1993        | World Bank             |                  |
| 15.                                            | - Pacific Semiconductors Inc.                                                       |                  |                        | 710,000          |
| 16.                                            | - Electronic Assemblies Inc.                                                        |                  |                        | 710,000          |
| 17.                                            | Conversion to high purity water cleaning at Integrated Micro-electronic Inc.        | Mar. 1993        | World Bank             | 430,000          |
| 18.                                            | Conversion to semi aqueous cleaning solvents at Solid Circuits Inc.                 | Mar. 1993        | World Bank             | 70,000           |
| 19.                                            | Conversion of tobacco fluffing process to carbon dioxide at Fortunate Tobacco Corp. | Mar. 1993        | World Bank             | 4,720,000        |
| TOTAL                                          |                                                                                     |                  |                        | US \$ 12,792,352 |
| Estimated ODS to be phased out: 743 ODP tonnes |                                                                                     |                  |                        |                  |

**COUNTRY PROGRAMME COVER SHEET**

Country : Philippines

Date Received : May 1993

Period Covered : 1993-1998

Lead National Agency : Department of Environment and Natural Resources

Lead Implementing Agency : World Bank

**1. Phase-out schedule**

| Substances           | Current Consumption<br>(Tonnes X ODP)<br>in 1991 | Planned<br>Consumption till<br>Phase-out<br>Tonnes X ODP | Planned Year of<br>Phase-out |
|----------------------|--------------------------------------------------|----------------------------------------------------------|------------------------------|
| CFC-11               | 845                                              | 5,241                                                    | 1996-2010*                   |
| CFC-12               | 1,097                                            | 9,817                                                    | 1996-2010*                   |
| CFC-113              | 271                                              | 897                                                      | 1996                         |
| CFC-114              | 5                                                | 41                                                       | 1998                         |
| CFC-115              | 34                                               | 204                                                      | 1998                         |
| Halon-1211           | 92                                               | 484                                                      | 1998                         |
| Halon-1301           | 24                                               | 137                                                      | 1998                         |
| Carbon Tetrachloride | 108                                              | 391                                                      | 1996                         |
| Methyl Chloroform    | 175                                              | 550                                                      | 1996                         |
| <b>TOTAL</b>         | <b>2,651</b>                                     | <b>17,762</b>                                            |                              |

\* CFC-11 and CFC-12 will be phased-out as follows:

|                                            |   |      |
|--------------------------------------------|---|------|
| Aerosol                                    | : | 1996 |
| Refrigeration/air conditioning (new)       | : | 1998 |
| Refrigeration/air conditioning (servicing) | : | 2010 |

## 2. Government Action Plan

| Year    | Description of Action                                                                                                                                       | Sector                                       | Intended Effect                                                                                                   |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 1990-93 | Issuance of Department Administrative Order (DAO)-Implementing Rules and Regulations for RA 6969 - Toxic substances, Hazardous Wastes and Nuclear Waste Act | All                                          | Strengthening procedures for restricting imports of ODS                                                           |
| 1990-93 | Issuance of importation clearance based on RA 6969                                                                                                          | All                                          | Ensuring compliance of timetables set for reducing ODS                                                            |
| 1990-93 | Creation of DENR Ozone Desk and ODS interagency Committee                                                                                                   | All                                          | Facilitation and coordination of ODS phaseout projects and policies                                               |
| 1990-93 | Initiation of industry consultations and regional conference/workshop on Country Programme                                                                  | All                                          | Facilitation of communication cooperation for ODS reductions                                                      |
| 1994-96 | Development and establishment of an information system to monitor and track ODS consumption                                                                 | All                                          | Monitoring of import reductions and collecting national data on ODS consumption                                   |
| 1994-96 | Coordination with BOC to streamline ODS data collection                                                                                                     | All                                          | Ensuring effective tracking of ODS imports                                                                        |
| 1994-96 | Announcement of phaseout schedules of ODS                                                                                                                   | All                                          | Ensuring timely compliance on reductions of controlled substances as scheduled in the country programme           |
| 1994-96 | Waiving of duties for five years on imported HCFC and HCFs in 1994 by the BOI                                                                               | All                                          | Obtaining reduction of ODS                                                                                        |
| 1994-96 | Require new firms seeking BOI incentives to install ODS-free technologies                                                                                   | All                                          | Obtaining reduction of ODS                                                                                        |
| 1994-96 | To ensure meeting of phaseout targets, import quotas will be issued                                                                                         | All                                          | Establishing the method to set reference for ODS reductions                                                       |
| 1994-96 | Ensure timely implementation of the first tranche of investment projects                                                                                    | Solvents<br>Refrigeration<br>Foam<br>Blowing | Elimination of approximately 829 ODP weighted MT out of the total current ODS consumption of 2660 ODP-weighted MT |

### 3. Project Summary

| Year(s) | Type of Project                                                                                                                                      | Project Description                                                                                                                                                               | Project Cost<br>US\$ M | Incremental<br>Cost US\$ M | Implementing<br>Agency   | Tonnes X ODP<br>to be Phased Out               |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------|--------------------------|------------------------------------------------|
| 1991    | Country Study on the Use of ODS<br>in the Philippines (pre-investment)                                                                               | The study established baseline<br>information on use and<br>consumption of ozone depleting<br>substances                                                                          |                        |                            |                          | n/a                                            |
| 1992    | Refrigeration and MACs<br>Recycling Feasibility Study (pre-<br>investment)                                                                           | The study assess the most cost<br>effective designs of CFC<br>recycling projects                                                                                                  | 0.160                  | 0.160                      |                          | n/a                                            |
| 1992    | Foams, Tobacco and Solvents<br>Feasibility Study<br>(pre-investment)                                                                                 | The study demonstrated the<br>viability of phasing out ODS in<br>electronic and metal cleaning<br>applications, foam<br>manufacturing, and tobacco<br>processing                  | 0.200                  | 0.200                      |                          | n/a                                            |
| 1992    | Likhaan Public Information<br>Campaign (information transfer)                                                                                        | A series of workshops was<br>conducted re: ODSs                                                                                                                                   | 0.065                  | 0.065                      | UNDP                     | n/a                                            |
| 1992    | Technical Assistance for the<br>Financial Intermediary (training)                                                                                    | Strengthen the technical<br>capability to appraise proposals<br>and supervise project<br>implementation                                                                           | 0.1                    | 0.1                        | World Bank               | n/a                                            |
| 1993    | Institutional Strengthening for<br>Ozone Desk Operations                                                                                             | Facilitation and coordination of<br>ODS phaseout projects and<br>policies                                                                                                         | 0.200                  | 0.200                      |                          |                                                |
| 1993    | Conversion of Tobacco Fluffing<br>Process to Carbon Dioxide at<br>Fortune Tobacco Corp.                                                              | This project will eliminate the<br>consumption of CFC-11 for<br>tobacco expansion and replace it<br>with a carbon dioxide based<br>system                                         | 11.81                  | 4.72                       | World Bank               | 350 x 1.0                                      |
| 1993    | Application of reduced CFC<br>blowing agent used in refrigerator<br>insulating foam at four majority<br>Filipino-owned refrigerator<br>companies at: | These projects will reduce and<br>eliminate the use of CFC-11 in<br>the manufacture of rigid<br>polyurethane (PU) foams for<br>refrigerators and other<br>household appliances    |                        |                            | World Bank               |                                                |
|         | 1. Philacor                                                                                                                                          |                                                                                                                                                                                   | 3.18                   | 1.77                       |                          | 120 x 1.0                                      |
|         | 2. Concepcion Industries                                                                                                                             |                                                                                                                                                                                   | 0.8                    | 0.79                       |                          | 35 x 1.0                                       |
|         | 3. Sanyo Philippines                                                                                                                                 |                                                                                                                                                                                   | 0.8                    | 0.66                       |                          | 9 x 1.0                                        |
|         | 4. Federal Electric                                                                                                                                  |                                                                                                                                                                                   | 0.66                   | 0.77                       |                          | 5 x 1.0                                        |
| 1993    | Conversion of Semi-Aqueous and<br>Aqueous Cleaning Solvents in three<br>majority Filipino-owned electric<br>companies                                | This project will eliminate the<br>use of CFC-113 and TCA by<br>dismantling and removing its<br>vapor degreasers and installing<br>aqueous and semi-aqueous<br>cleaning equipment | 0.51<br>0.56           |                            | World Bank<br>World Bank | 105 x 1.07<br>9 x 0.12<br>5 x 1.07<br>4 x 1.07 |
| 1993    | Conversion to High Purity Water<br>Cleansing at Integrated Micro<br>Electronics                                                                      | This project will eliminate the<br>use of CFC-113 in cleaning<br>operations through the use of<br>chlorinated solvent vapor<br>degreasing and pure water<br>aqueous cleaning      | 0.55                   |                            | World Bank               | 20 x 1.07                                      |

| Year(s)      | Type of Project                                                                                                                                | Project Description                                                                                                                                                                                | Project Cost<br>US\$ M | Incremental<br>Cost US\$ M | Implementing<br>Agency | Tonnes X ODP<br>to be Phased Out |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------|------------------------|----------------------------------|
| 1993         | Conversion to Low Emission Processing and Organic Solvents at Pacific Semi-conductor Inc.                                                      | This project will eliminate the use of CFC-113 and TCS by removing existing vapor degreasers and replacing them with low emissions vapor degreasers.                                               | 0.55                   |                            | World Bank             | 15 x 1.07                        |
| 1993         | Conversion from CFC-12 to HFC-134a Refrigerant in Household Refrigeration in four refrigerator manufacturers (Phase 1)<br><br>(Pre-investment) | These two-phase projects will fund engineering and design assistance at four majority Filipino-owned appliance manufacturers to replace the use of CFC-12 with HFC-134a in household refrigerators |                        |                            | World Bank             |                                  |
|              | 1. Philacor                                                                                                                                    |                                                                                                                                                                                                    | 1.24                   |                            |                        | 200 x 1.0                        |
|              | 2. Concepcion                                                                                                                                  |                                                                                                                                                                                                    | 0.9                    |                            |                        | 45 x 1.0                         |
|              | 3. Sanyo                                                                                                                                       |                                                                                                                                                                                                    | 0.18                   |                            |                        | 13 x 1.0                         |
|              | 4. Federal Electric                                                                                                                            |                                                                                                                                                                                                    | 0.12                   |                            |                        | 5 x 1.0                          |
|              | Centralized CFC Refrigerant Recycling Plant and Training Program (training and pre-investment)                                                 | This project will include establishment of a centralized refrigerant recycling network in Metro Manila that will analyze incoming refrigerant to ensure its purity                                 |                        |                            | World Bank             |                                  |
|              | Demonstration Program for Recycling CFC-12 in "MACs" (training)                                                                                | A selection of 100 MACs service and repair companies of varying sizes will participate in the project                                                                                              |                        |                            | World Bank             |                                  |
| 1993<br>1994 | Information Awareness Campaign conducted by DENR and Philippine Information Agency                                                             | Launching of a multimedia information/communication campaign to make people aware and understand the effect of ODS                                                                                 | 0.2                    | 0.2                        | UNEP                   | n/a                              |
|              | <u>Proposed Projects</u>                                                                                                                       |                                                                                                                                                                                                    |                        |                            |                        |                                  |
|              | Establishment of Computerized Database to Track Imports and Consumption of ODS                                                                 | Technical Assistance                                                                                                                                                                               | 0.080                  |                            | UNDP                   |                                  |
|              | Feasibility Study and Technical Assistance for the Commercial Refrigeration and Air Conditioning Sectors                                       |                                                                                                                                                                                                    | 0.050                  |                            | World Bank             |                                  |
|              | Feasibility Study for the Local manufacture of MACs Recycling Equipment                                                                        |                                                                                                                                                                                                    | 0.020                  |                            | UNIDO                  |                                  |
|              | Feasibility Study for Users of Methyl Bromide                                                                                                  |                                                                                                                                                                                                    | 0.050                  |                            | World Bank             |                                  |
|              | Feasibility Study for halons Conservation, Training, and Recycling                                                                             |                                                                                                                                                                                                    | 0.020                  |                            | US EPA                 |                                  |
|              | Technical Assistance for Implementing ODS Conversion Projects in the Semiconductor Industry                                                    |                                                                                                                                                                                                    | 0.050                  |                            | UNDP                   |                                  |
|              | Workshop for Small Users of ODS Solvents                                                                                                       |                                                                                                                                                                                                    | 0.050                  |                            | UNDP                   |                                  |

4. Cost of Activities and Projects in Country Programme US \$ 23.195 million
- (Total Cost of projects approved as of 31 March 1993, US \$12.792 million)
- Estimated cost of complete phase-out US \$ 89 - 220 million
- Estimated cost effectiveness US \$ 5,011 - 12,386  
per tonne X ODP



Kagawaran ng Agnayang Panlabas

Department of Foreign Affairs

MANILA

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OFFICE OF UNITED NATIONS  
AND OTHER INTERNATIONAL ORGANIZATIONS

03 June 1993

Dear Dr. El-Arini,

The Philippine Government is pleased to transmit thereto its Country Programme for the Phaseout of Ozone Depleting Substances (ODS) within the territorial jurisdiction of the Philippines. This Programme, prepared by an inter-agency group headed by the Department of Environment and Natural Resources (DENR), is to be presented for the favourable consideration by the Executive Committee of the Montreal Protocol (MP) Multilateral Fund at its Tenth Meeting, scheduled for 28 to 30 June 1993.

The Republic of the Philippines, as a Party to the MP, falls under the category of countries considered as Art 5(1) of the Protocol. As such, it is committed, with adequate financial assistance, to undertake such steps and measures as appropriate towards the eventual phase-out of the ODS within the time frame established under the MP, as later amended.

Towards the attainment of these goals, the Philippine action plan under the Country Program, consists of five main components, namely:

1. Institutional Strengthening;
2. Regulation;
3. Incentives;
4. Information Awareness; and
5. Investment Projects

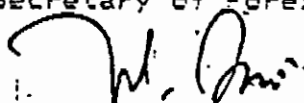
The Philippine...../

Dr. Omar El-Arini  
Chief Officer  
Multilateral Fund Secretariat  
Montreal, Canada

The Philippine Government wishes to express its appreciation to the UNDP, the lead implementing agency of the MP,<sup>12</sup> its presentation of the Philippine Country Program before the MP's Executive Director.

Very truly yours,

For the Secretary of Foreign Affairs:



NELSON D. LAVIÑA  
Assistant Secretary



**PHILIPPINE  
COUNTRY PROGRAM  
FOR THE  
PHASEOUT OF  
OZONE-DEPLETING  
SUBSTANCES**

**MAY 15, 1993**

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## F O R E W O R D

The Country Program for the Phaseout of Ozone Depleting Substances (ODSs) is a vital document which details the plans, programs, and activities that the Philippines had taken and proposes to undertake on the immediate and long term phaseout of these harmful chemicals. The Country Program 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.

We are proud of the fact that in our enthusiastic response to the Montreal Protocol, we have gone ahead in implementing policies, imposed sanctions and regulatory measures, and initiated dialogues with the industry concerned, with nongovernment organizations, and with environment-conscious groups. The process has enviably placed the Philippines in a unique position - most of its project proposals have been approved by the Executive Committee of the Multilateral Fund even before the Philippines had officially submitted its Country Program.

The consultations that had preceded the implementation of programs in phasing out ODSs have been very productive and provocative. The government only had to guide and gently prod along the way. The result is this document which the Philippines is committed to implement in doing its share for the greater good.

The Philippine Government wishes to extend its appreciation to the Multilateral Fund Executive Committee through its implementing agencies, the United Nations Development Program (UNDP) and the World Bank (WB) for the support given in the preparation of this program, and the UNEP/SIDA Project for CFCs, and to the various trade/industry associations, the importers of ODSs, NGOs, and the entire government bureaucracy who, in their various capacities, lent a hand in the preparation of this document.

ANGEL C. ALCALA  
Secretary  
Department of Environment  
and Natural Resources

## EXECUTIVE SUMMARY

### Background

The earth's ozone layer protects all living things from the harmful effects of ultra-violet radiation. The discovery that it is being depleted by heavy concentration of chemicals has led developing and developed countries to draw up an Agreement, known as the Montreal Protocol, that binds signatories to take immediate and stringent step towards the phasing out of the destructive elements.

The Montreal Protocol which came into effect on January 1987 was ratified by 111 countries, including the Philippines as a signatory in 1988, and ratified it on March 21, 1991. Both the London Amendments (June 1990) as well as the Copenhagen Amendments (November 1992) accelerated the Protocol's original phaseout timetables in the light of scientific evidences of further depletion of the ozone by harmful chemicals.

These chemicals, collectively known as ozone-depleting substances (ODSs) are composed mostly of chlorofluorocarbons (CFCs), halons, 1.1.1 - trichloroethane (TCE), carbon tetrachloride (CTC), and hydrofluorocarbons (HCFs). CFCs, more popularly known in the Philippines as freon, are used in the refrigerators and airconditioning system; halons in the fire fighting equipments, especially in portable fire extinguishers; and TCEs and CTCs as solvents in the electronic and metal cleaning industry, as well as used in cleaning of camera and watches.

### The Country Program

In view of the special needs of Article 5 countries, defined as developing countries whose per capita consumption of ODS is 0.05 kg, the signatories agreed to set up a special fund, known as Multilateral Fund, that will assist these countries in the phaseout of ODSs. The Multilateral Fund is managed by an Executive Committee composed of seven developing and seven developed countries. The Executive Committee has drawn up the eligibility criteria that would qualify Article 5 countries for assistance from the Fund, including the preparation of the Country Program.

The Philippine Country Program (CP) is the country'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 ODSs.

### The Approach

The Government of the Philippines has taken the responsibility of formulating and preparing the Country Program. Two committees, comprising of relevant government agencies were organized. The Program Steering Committee (PSC), composed of senior government officials, provides the overall guidance and direction in the development of the CP. The Technical Working Group (TWG) which works under the PSC, is charged with the formulation of the CP. Extensive consultations with industry leaders, NGOs, trade associations, appropriate individuals, and relevant offices were undertaken by the group.

The Montreal Protocol Secretariat created by the Department of Environment and Natural Resources (DENR) coordinates the overall preparation of the CP.

The Steering Committee, upon the recommendation of the TWG, adopts and endorses the CP to the Cabinet "Cluster A" which handles issues on macroeconomy who, in turn, endorses it to the entire Cabinet.

### Structure of ODS Consumption

The Philippines is neither a producer nor an exporter of ODSs. Thus, total consumption is equivalent to imports adjusted for possible stock changes. Data culled from the country study, the feasibility study, end-users, importers, the Bureau of Food and Drug, and the Bureau of Customs were gathered, verified, evaluated and analyzed to establish consumption estimates. For 1992, total ozone depletion potential (ODP)-weighted consumption was 2,849 metric tons (MT).

Figure ES-1

CONSUMPTION OF ODS PER ESTIMATED APPLICATION IN THE PHILS., 1991

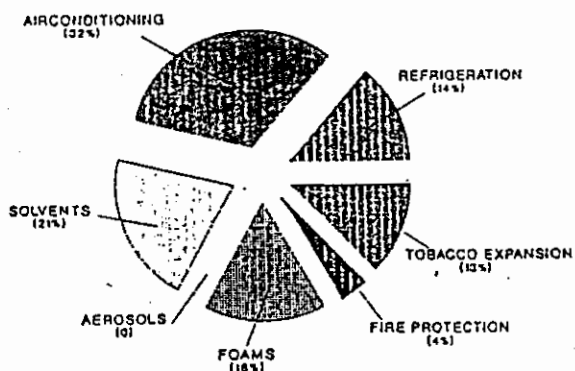
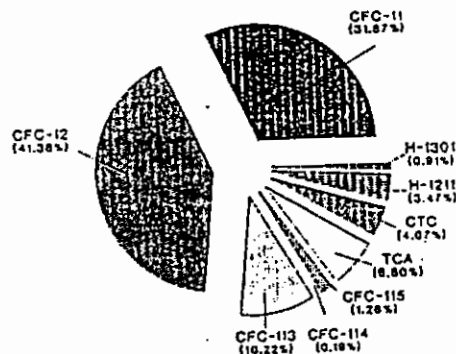


Figure ES-2

CONSUMPTION OF ODSs PER TYPE, 1991



It is estimated that consumption of ODSs, based on unconstrained demand up to year 2010, will be 74,417 MT ODP- weighted.

### The Phaseout Schedule

| <u>Substances</u> | <u>Year of Phaseout</u> |
|-------------------|-------------------------|
| CFC-11 (new)      | 1998                    |
| CFC-11 (service)  | 2010                    |
| CFC-12 (new)      | 1998                    |
| CFC-12 (service)  | 1998                    |
| CFC-113           | 2010                    |
| CFC-114           | 1998                    |
| CFC-115           | 1998                    |
| Halon 1211        | 1998                    |
| Halon 1301        | 1998                    |
| CTC               | 1996                    |
| MC                | 1996                    |

In determining the above phaseout schedule, the social and economic factors, and the institutional and logistical considerations were taken into account. Some of these were as follows:

1. earliest estimated availability of an alternative;
2. years to reach market penetration;
3. cost to industry and consumers; and
4. cost of premature retirement/retrofit

Qualitative factors which were deemed critical such as ownership of enterprises affected, intended market, and the size and structure of end-users were also considered in the selection of preferred strategy.

### Economic Cost of the Phaseout Strategy

In arriving at the preferred phaseout strategy, there were two scenarios considered and their incremental costs analyzed. The results of which are shown below.

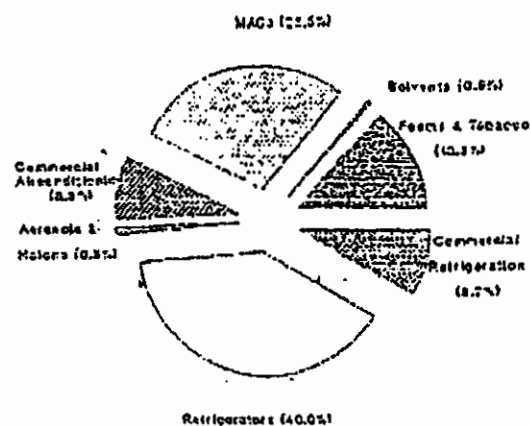
| Strategy          | Incremental Cost                     |                                      |
|-------------------|--------------------------------------|--------------------------------------|
|                   | <u>Constant</u><br><u>ODS Prices</u> | <u>Changing</u><br><u>ODS Prices</u> |
| Technology Driven | 242.1                                | 104.5                                |
| Delayed Action    | 224.4                                | 152.6                                |
| Preferred         | 220.1                                | 89.3                                 |

Technology driven means to undertake a phaseout that is as rapid as technology permits. Adapting this approach will be expensive on the part of those companies who are affected by early retirement of their machineries/equipment.

The other scenario considered is to delay the phaseout to the maximum limit in line with the schedule allowed for Article 5 countries. This alternative could minimize cost in each year without considering future consequences of actions taken. In concrete terms, this means that refrigerator manufacturers could delay conversion to new refrigerants as late as possible. However, this approach will be costly in the long run because of the service needs of refrigerators using CFC-12 as well as in retiring it prematurely after 2010.

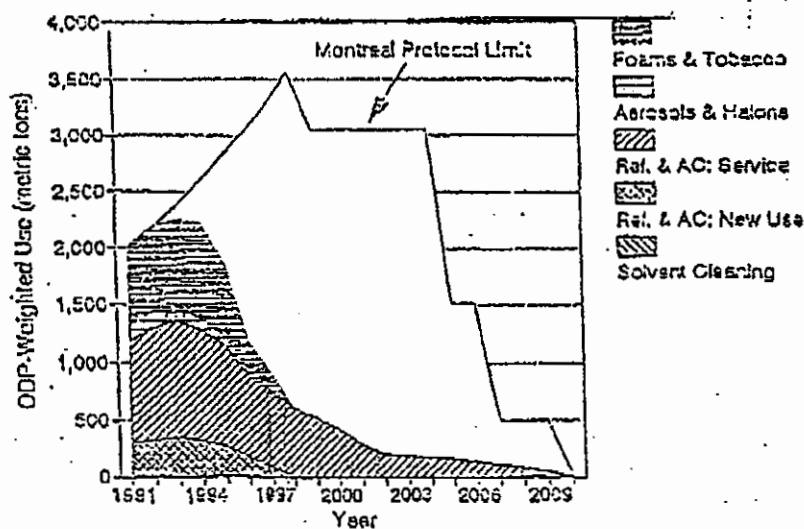
As shown in the above table, there are two sets of incremental costs. One is the constant ODS prices. This relies on the interpretation that eligible incremental costs are to be paid by the Multilateral Fund on an uncontrolled baseline. The changing ODS prices meanwhile assumes prices of ODSs to rise and prices of ODS substitutes to decline.

Figure ES-3  
Domestic Phaseout Costs  
by End Use



Most of the costs, occur in the refrigeration and air conditioning sectors because of the high per kilogram cost of converting to alternatives as well as the large amount of ODP weighted use of these sectors.

Figure ES-4  
Remaining ODS Use under Preferred Strategy  
vs. Montreal Protocol



As illustrated by the phaseout exhibit, with the exception of servicing existing refrigeration and air conditioning equipment, all ODS use in the Philippines is phase out by 1998. ODS use for servicing such equipment continues until 2010.

## Action Plan

The Philippine Action Plan to implement the Phaseout Strategy is in essence the substance of the Country Program. It details the combined efforts of the government, the industry, and nongovernmental organizations into specific activities which will effect the phaseout strategy.

The Action Plan attempts to provide an integrated approach to ensure that the appropriate elements are present for an effective and efficient phaseout within the constraints facing Philippine economy. The actions are classified into six major categories: (1) institutional measures; (2) regulatory measures; (3) incentives/disincentives; (4) information awareness; (5) investment technical assistance; and (6) monitoring.

The strongest components of the Philippine action plan for the period 1990-93 have been the Institutional and Regulatory Measures, Information Awareness, and the 16 Investment Projects recently approved by the Executive Committee of the Multilateral Fund. These activities will serve as the foundation in phasing out ODSs and will be the bases for such actions as proposed bans on specific ODSs, particularly enforcement of regulations proposed under Republic Act 6969, and the provision of incentives for conversion to non-ODS technology provided by the Board of Investment and Republic Act 6939 during the 1994-96 period.

The proposed 1994-96 regulatory, institutional and incentive measures will be complemented by the second tranche of investment projects to be submitted to the Multilateral Fund Secretariat. These second tranche investment projects will include: technical assistance for semi-conductors and chillers sector, feasibility studies for the commercial refrigeration sector, methyl bromide for the agricultural sector, and for the garments and small users sectors, local fabrication of recycling machines for MACs, halon recycling, and development of an ODS import and consumption database. Establishment of database and monitoring system will also be part of this plan.

A successful 1997-98 phase of the action plan will ensure that the industrial, commercial and consumer sectors shift to non-ODS technologies. In addition, it will ensure the continued servicing of remaining ODS equipment for total non-ODS profile by the 2010 deadline for Article 5 countries including the Philippines.

Tables ES-2 and ES-3 summarize the key items in the Action Plan.

Table ES-1. Planned Phaseout Schedule

| Substances                   | Current Consumption<br>(ODO-Weighted)<br>in 1991 | Planned Total Consumption<br>Till<br>Phaseout | Planned Year of<br>Phaseout |
|------------------------------|--------------------------------------------------|-----------------------------------------------|-----------------------------|
| CFC-11 - New (Ref/AC)        | 45                                               | 272                                           | 1998                        |
| - Service (Ref/AC)           | 45                                               | 501                                           | 2010                        |
| - Foams and Tobacco Aerosols | 750                                              | 4452                                          | 1998                        |
|                              | 5                                                | 16                                            | 1996                        |
| CFC-11 - New (MACs)          | 240                                              | 1452                                          | 1998                        |
| - Service (MACs)             | 835                                              | 8249                                          | 2010                        |
| - Foams and Tobacco Aerosols | 17                                               | 100                                           | 1998                        |
|                              | 5                                                | 16                                            | 1996                        |
| CFC-113                      | 271                                              | 897                                           | 1996                        |
| CFC-114                      | 5                                                | 41                                            | 1998                        |
| CFC-115                      | 34                                               | 204                                           | 1998                        |
| Halon 1211                   | 92                                               | 484                                           | 1998                        |
| Halon 1301                   | 24                                               | 137                                           | 1998                        |
| CTC                          | 108                                              | 391                                           | 1996                        |
| MC                           | 175                                              | 550                                           | 1996                        |
| TOTAL                        | 2651                                             | 17,762                                        |                             |

Table ES-2. Government Action

| YEAR    | DESCRIPTION OF ACTION                                                                                                                                       | SECTOR<br>(If any)                        | INTENDED EFFECT                                                                                                   | ESTIMATED<br>COST* |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------|
| 1990-93 | Issuance of Department Administrative Order (DAO)-Implementing Rules and Regulations for RA 6969 - Toxic Substances, Hazardous Wastes and Nuclear Waste Act | A11                                       | Strengthening procedures for restricting imports of ODS                                                           |                    |
| 1990-93 | Issuance of importation clearance based on RA 6969                                                                                                          | A11                                       | Ensuring compliance of timetables set for reducing ODS                                                            |                    |
| 1990-93 | Creation of DENR Ozone Desk and ODS Interagency Committee                                                                                                   | A11                                       | Facilitation and coordination of ODS phaseout projects and policies                                               |                    |
| 1990-93 | Initiation of industry consultations and regional conference/workshop on Country Program                                                                    | A11                                       | Facilitation of communication cooperation for ODS reductions                                                      |                    |
| 1994-96 | Development and establishment of an information system to monitor and track ODS consumption                                                                 | A11                                       | Monitoring of import reductions and collecting national data on ODS consumption                                   |                    |
| 1994-96 | Coordination with BOC to streamline ODS data collection                                                                                                     | A11                                       | Ensuring effective tracking of ODS imports                                                                        |                    |
| 1994-96 | Announcement of phaseout schedules of ODS                                                                                                                   | A11                                       | Ensuring timely compliance on reductions of controlled substances as scheduled in the country program             |                    |
| 1994-96 | Waiving of duties for five years on imported HCFC AND HCFs in 1994 by the BOI                                                                               | A11                                       | Obtaining reduction of ODS                                                                                        |                    |
| 1994-96 | Require new firms seeking BOI incentives to install ODS-free technologies                                                                                   | A11                                       | Obtaining reduction of ODS                                                                                        |                    |
| 1994-96 | To ensure meeting of phaseout targets, import quotas will be issued                                                                                         | A11                                       | Establishing the method to set reference for ODS reductions                                                       |                    |
| 1994-96 | Ensure timely implementation of the first tranche of investment projects                                                                                    | Solvents<br>Refrigeration<br>Foam Blowing | Elimination of approximately 829 ODP weighted MT out of the total current ODS consumption of 2660 ODP-weighted MT |                    |

\* Incorporated into existing activities of government, thus, incremental cost is difficult to ascertain.

Table ES-3 Project Summary

| YEAR | TYPE OF PROJECT                                                                                                                             | PROJECT DESCRIPTION                                                                                                                                             | PROJECT COST<br>(US\$ M) | INCREMENTAL COST<br>(US\$ M) | PARTICIPATING IMPLEMENTING AGENCY | METRIC TONS<br>X ODP<br>PHASEOUT |
|------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------|-----------------------------------|----------------------------------|
| 1991 | Country Study on the Use of ODS in the Philippines (pre-investment)                                                                         | The study established baseline information on use and consumption of ozone depleting substances                                                                 |                          |                              |                                   | n/a                              |
| 1992 | Refrigeration and MACs Recycling Feasibility Study (pre-investment)                                                                         | The study assess the most cost effective designs of CFC recycling projects                                                                                      | 0.160                    | 0.160                        |                                   | n/a                              |
| 1992 | Foams, Tobacco and Solvents Feasibility Study (pre-investment)                                                                              | The study demonstrated the viability of phasing out ODS in electronic and metal cleaning applications, foam manufacturing, and tobacco processing               | 0.200                    | 0.200                        |                                   | n/a                              |
| 1992 | Likhaan Public Information Campaign (information transfer)                                                                                  | A series of workshops was conducted re: ODSs                                                                                                                    | 0.065                    | 0.065                        | UNDP                              | n/a                              |
| 1992 | Technical Assistance for the Financial Intermediary (training)                                                                              | Strengthen the technical capability to appraise proposals and supervise project implementation                                                                  | 0.1                      | 0.1                          | World Bank                        | n/a                              |
| 1993 | Institutional Strengthening for Ozone Desk Operations                                                                                       | Facilitation and coordination of ODS phaseout projects and policies                                                                                             | 0.200                    | 0.200                        |                                   |                                  |
| 1993 | Conversion of Tobacco Fluffing Process to Carbon Dioxide at Fortune Tobacco Corp.                                                           | This project will eliminate the consumption of CFC-11 for tobacco expansion and replace it with a carbon dioxide based system                                   | 11.81                    | 4.72                         | World Bank                        | 350 x 1.0                        |
| 1993 | Application of a reduced CFC blowing agent used in refrigerator insulating foam at four majority Filipino-owned refrigerator companies at : | These projects will reduce and eliminate the use of CFC-11 in the manufacture of rigid polyurethane (PU) foams for refrigerators and other household appliances |                          |                              | World Bank                        |                                  |
|      | 1. Philacor                                                                                                                                 |                                                                                                                                                                 | 3.18                     |                              |                                   | 120 x 1.0                        |
|      | 2. Concepcion Industries                                                                                                                    |                                                                                                                                                                 | 0.8                      |                              |                                   | 35 x 1.0                         |
|      | 3. Sanyo Philippines                                                                                                                        |                                                                                                                                                                 | 0.8                      |                              |                                   | 9 x 1.0                          |
|      | 4. Federal Electric                                                                                                                         |                                                                                                                                                                 | 0.66                     |                              |                                   | 5 x 1.0                          |

Table ES-3 (Cont.)

| YEAR | TYPE OF PROJECT                                                                                                        | PROJECT DESCRIPTION                                                                                                                                                                                | PROJECT COST<br>(US\$ M) | INCREMENTAL COST | PARTICIPATING IMPLEMENTING AGENCY | METRIC TONS<br>X ODP<br>PHASEOUT |
|------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------|-----------------------------------|----------------------------------|
| 1993 | Conversion of Semi-Aqueous and Aqueous Cleaning Solvents in three majority Filipino-owned electric companies           | This project will eliminate the use of CFC-113 and TCA by dismantling and removing its vapor degreasers and installing aqueous and semi-aqueous cleaning equipment                                 | 0.51                     |                  | World Bank                        | 105 x 1.07                       |
|      | 1. Ionics Circuits                                                                                                     |                                                                                                                                                                                                    | 0.56                     |                  | World Bank                        | 9 x 0.12                         |
|      | 2. Electronic Assemblies                                                                                               |                                                                                                                                                                                                    |                          |                  |                                   | 5 x 1.07                         |
|      | 3. Solid Circuits                                                                                                      |                                                                                                                                                                                                    | 0.09                     |                  | World Bank                        | 4 x 1.07                         |
| 1993 | Conversion to High Purity Water Cleansing at Integrated Micro Electronics                                              | This project will eliminate the use of CFC-113 in cleaning operations through the use of chlorinated solvent vapor degreasing and pure water aqueous cleaning                                      | 0.55                     |                  | World Bank                        | 20 x 1.07                        |
| 1993 | Conversion to Low Emission Processing and Organic Solvents at Pacific Semi-conductor Inc.                              | This project will eliminate the use of CFC-113 and TCA by removing existing vapor degreasers and replacing them with low emissions vapor degreasers.                                               | 0.55                     |                  | World Bank                        | 15 x 1.07                        |
| 1993 | Conversion from CFC-12 to HFC 134a Refrigerant in Household Refrigeration in four refrigerator manufacturers (Phase 1) | These two-phase projects will fund engineering and design assistance at four majority Filipino-owned appliance manufacturers to replace the use of CFC-12 with HFC-134a in household refrigerators |                          |                  | World Bank                        |                                  |
|      | (Pre-Investment)                                                                                                       |                                                                                                                                                                                                    |                          |                  |                                   |                                  |
|      | 1. Philacor                                                                                                            |                                                                                                                                                                                                    | 1.24                     |                  |                                   | 200 x 1.0                        |
|      | 2. Concepcion                                                                                                          |                                                                                                                                                                                                    | 0.9                      |                  |                                   | 45 x 1.0                         |
|      | 3. Sanyo                                                                                                               |                                                                                                                                                                                                    | 0.18                     |                  |                                   | 13 x 1.0                         |
|      | 4. Federal Electric                                                                                                    |                                                                                                                                                                                                    | 0.12                     |                  |                                   | 5 x 1.0                          |
|      | Centralized CFC Refrigerant Recycling Plant and Training Program (training and pre-investment)                         | This project will include establishment of a centralized refrigerant recycling network in Metro Manila that will analyze incoming refrigerant to ensure its purity                                 |                          |                  | World Bank                        |                                  |
|      | Demonstration Program for Recycling CFC-12 in "MACs" (training)                                                        | A selection of 100 MACs service and repair companies of varying sizes will participate in the project                                                                                              |                          |                  | World Bank                        |                                  |
| 1993 | Information Awareness Campaign conducted by DENR and Philippine Information Agency                                     | Launching of a multimedia information/communication campaign to make people aware and understand the effect of ODS                                                                                 | 0.2                      |                  | UNEP                              | n/a                              |

Table ES-3 (Cont.)

| YEAR | TYPE OF PROJECT                                                                                          | PROJECT DESCRIPTION  | PROJECT COST<br>(US\$ M) | INCREMENTAL COST | PARTICIPATING<br>IMPLEMENTING<br>AGENCY | METRIC TONS<br>X ODP<br>PHASEOUT |
|------|----------------------------------------------------------------------------------------------------------|----------------------|--------------------------|------------------|-----------------------------------------|----------------------------------|
|      | Proposed Projects                                                                                        |                      |                          |                  |                                         |                                  |
|      | Establishment of Computerized Database to Track Imports and Consumption of ODS                           | Technical Assistance | 80                       |                  | UNDP                                    |                                  |
|      | Feasibility Study and Technical Assistance for the Commercial Refrigeration and Air Conditioning Sectors |                      | 50                       |                  | World Bank                              |                                  |
|      | Feasibility Study for the Local Manufacture of MACs Recycling Equipment                                  |                      | 20                       |                  | UNIDO                                   |                                  |
|      | Feasibility Study for Users of Methyl Bromide                                                            |                      | 50                       |                  | World Bank                              |                                  |
|      | Feasibility Study for Halons Conservation, Training, and Recycling                                       |                      | 20                       |                  | US EPA                                  |                                  |
|      | Technical Assistance for Implementing ODS Conversion Projects in the Semiconductor Industry              |                      | 50                       |                  | UNDP                                    |                                  |
|      | Workshop for Small Users of ODS Solvents                                                                 |                      | 50                       |                  | UNDP                                    |                                  |

# **COUNTRY PROGRAMME**

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## **ABBREVIATIONS AND ACRONYMS**

|        |                                                                               |
|--------|-------------------------------------------------------------------------------|
| ARI    | Air Conditioning and Refrigeration Institute                                  |
| ASAP   | Appliance Service Association of the Philippines                              |
| ASHRAE | American Society of Heating, Refrigeration, and<br>Air Conditioning Engineers |
| BFAD   | Bureau of Food and Drugs                                                      |
| BOC    | Bureau of Customs                                                             |
| BOI    | Board of Investments                                                          |
| CB     | Central Bank                                                                  |
| CEC    | Commission of the European Communities                                        |
| CFC    | chlorofluorocarbon                                                            |
| COSCOM | Country Study Cost Model                                                      |
| CTC    | Carbon Tetrachloride                                                          |
| DENR   | Department of Environment and Natural Resources                               |
| DFA    | Department of Foreign Affairs                                                 |
| DME    | Dimethyl Ether                                                                |
| DOF    | Department of Finance                                                         |
| DOH    | Department of Health                                                          |
| DOST   | Department of Science of Technology                                           |
| DTI    | Department of Trade and Industry                                              |
| EMB    | Environmental Management Bureau                                               |
| GATT   | General Agreement on Tariffs and Trade                                        |
| GDP    | Gross Domestic Product                                                        |
| GFI    | Government Financial Intermediary                                             |
| GOP    | Government of the Philippines                                                 |
| GWP    | global warming potential                                                      |
| HBFC   | hydrobromofluorocarbon                                                        |
| HCFC   | hydrochlorofluorocarbon                                                       |
| HFC    | hydrofluorocarbon                                                             |

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|         |                                                                                 |
|---------|---------------------------------------------------------------------------------|
| IPCC    | Intergovernmental Panel on Climate Change                                       |
| kg      | kilogram                                                                        |
| LPG     | liquefied petroleum gas                                                         |
| LTO     | Land Transportation Office                                                      |
| MAC     | mobile air conditioner                                                          |
| MT      | metric ton                                                                      |
| NARMS   | nonazeotropic refrigerant mixtures                                              |
| NEDA    | National Economic and Development Authority                                     |
| NGO     | nongovernment organization                                                      |
| ODP     | ozone-depleting potential                                                       |
| ODS     | ozone-depleting substance(s)                                                    |
| OPT     | Ozone Protection Tax                                                            |
| PAG-ASA | Philippine Atmospheric, Geophysical and Astronomical<br>Services Administration |
| PO      | people's organization                                                           |
| POD     | Philippines Ozone Desk                                                          |
| PSC     | Program Steering Committee                                                      |
| PU      | polyurethane                                                                    |
| TDI     | toluene diisocyanate                                                            |
| TET     | carbon tetrachloride                                                            |
| TR      | tons of refrigeration                                                           |
| UNDP    | United Nations Development Programme                                            |
| UNEP    | United Nations Environment Programme                                            |
| UNIDO   | United Nation Industrial Development Organization                               |
| UV      | ultraviolet                                                                     |
| VAT     | value added tax                                                                 |
| WB      | World Bank                                                                      |
| WMO     | World Meteorological Organization                                               |
| WTP     | waste treatment plant                                                           |
| XPS     | extruded polystyrene                                                            |

## CHAPTER I

# **INTRODUCTION**

## STRATOSPHERIC OZONE DEPLETION

The layer known to clothe the globe from harmful rays such as ultraviolet (UV) radiation is called the stratospheric ozone. Recent studies and events have confirmed fears that the ozone layer is being depleted. This means that increasing UV radiation is entering the earth's surface, posing real threat and danger to human health such as cancer of the skin and cataracts and suppression of the human immune system; and to the environment - damage to crops, aquatic organisms, and natural ecosystems. Increased UV radiation also contributes to an increase in ground-level ozone, commonly called smog concentrations thereby polluting the air.

The main culprits in the depletion of the ozone layer are increasing concentrations of manmade chemicals including chloroflourocarbons (CFCs), halons, 1,1,1 trichloroethane, carbon tetrachloride, and hydrochloroflourocarbons. In addition, almost all of these substances are suspected greenhouse gases and may contribute to changes in the global climate.

## THE MONTREAL PROTOCOL

In September 1987, 24 nations met to negotiate the final text and sign the "Montreal Protocol on Substances that Deplete the Ozone Layer". The Montreal Protocol, which entered into force on January 1, 1989, limited production of the most commonly used CFCs to 50 percent of 1986 levels by the year 1998, and called for a freeze in production of halons at 1986 levels beginning in 1992. While the 1987 meeting was convened by the United Nations Environment Programme (UNEP), two other bodies, the World Bank (WB) and the United Nations Development Programme (UNDP), became involved when the Interim Multilateral Fund was set in 1990.

### London Amendment and the Copenhagen Meeting

Shortly after the 1987 Protocol was negotiated, new scientific evidence showed that ozone depletion was occurring at a rate significantly faster than previously expected. In June 1990, the 24 nations met in London and agreed to amend the Protocol requiring more stringent controls on the substances included in the original agreement, and added controls on other important ODSs such as carbon tetrachloride and 1,1,1-trichloroethane.

Still, hardly had two years passed when recent scientific data suggest that depletion has been occurring at a rate twice as fast, as originally observed. Where two percent depletion had been observed over the last decade, latest satellite data show that the actual depletion is closer to four or five percent. This startling evidence was considered by Parties to the Protocol during the November 1992 meeting in Copenhagen, where the Protocol was again revised and considerably strengthened. The changes will be enforced on January 1, 1994.

As of March 6, 1993, 111 nations including the Philippines, became Parties to the Protocol. These countries represent over 95 percent of the world's production of CFCs and halons. Developing countries classified as Article 5 are marked with an asterisk.

Table 1.1 shows the MP schedules and amendments done. In Copenhagen, the Parties also passed an amendment which limits the areas of application of the HCFCs.

#### MULTILATERAL FUND

##### Interim Multilateral Fund to Assist Article 5 Countries in Technology Transfer

At their June 1990 meeting in London, the Parties established an Interim Multilateral Fund (hereafter referred to as "the Fund") to finance the incremental costs of eliminating the use of controlled substances in developing countries who are Parties to the Protocol. The Fund, formally established in January 1991, is managed by an Executive Committee made up of Parties - seven each from developing and industrialized countries. At present, the Fund's four implementing agencies are the UNDP, the World Bank, the UNEP, and the United Nations Industrial Development Organization (UNIDO). Financial and technical assistance from the Fund is available only to Parties operating under Article 5, paragraph 1 of the Montreal Protocol.

##### Funds to Assist Article 5 Countries

The Fund will finance projects that reduce the production, consumption, or emission of controlled substances in developing countries. Projects may be funded only in countries which are Parties to the Montreal Protocol such as the Philippines, and only if they meet certain eligibility and funding criteria set by the Executive Committee of the Fund.

Table 1.1  
Montreal Protocol Phaseout Schedule  
(As of November 1992)

| Chemicals                                                                                                                                                                                           | Montreal Protocol<br>September<br>1987                                   | London<br>Amendments<br>June<br>1990                                               | Copenhagens<br>Amendments<br>November<br>1992                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Chloroflourocarbons<br>(CFCs)<br>(Annex A, Group I)<br>11,12,113,114,115                                                                                                                            | Base year<br>1986<br><br>Freeze by<br>1989<br>20% by 1993<br>50% by 1998 | Base year 1986<br><br>Freeze by 1989<br>50% by 1995<br>85% by 1997<br>100% by 2000 | Base year<br>1986<br><br>Freeze by<br>1989<br>75% by 1994<br>100% by 1996                                            |
| Halons<br>(Annex B, Group II)<br>1211,1301,2402                                                                                                                                                     | Base year<br>1986<br><br>Freeze by<br>1992                               | Base year 1986<br><br>Freeze by 1992<br>50% by 1995<br>100% by 2000                | Base year<br>1986<br><br>Freeze by<br>1992<br>100% by 1994                                                           |
| Other fully halogenated<br>CFCs<br>(Annex B, Group I)<br>13,111,112,211,212,<br>213,214,215,216,217                                                                                                 | No regulation                                                            | Base year 1989<br><br>20% by 1993<br>85% by 1997<br>100% by 2000                   | Base year<br>1989<br><br>20% by 1993<br>75% by 1994<br>100% by 1996                                                  |
| Carbon Tetrachloride<br>(CCl <sub>4</sub> )<br>(Annex B, Group II)                                                                                                                                  | No regulation                                                            | Base year 1989<br>85% by 1995<br>100% by 2000                                      | Base year<br>1989<br>85% by 1995<br>100% by 1996                                                                     |
| 1,1,1 Trichloroethane<br>Methyl Chloroform<br>(CH <sub>3</sub> CCl <sub>3</sub> )<br>(Annex B, Group III)                                                                                           | No regulation                                                            | Base year 1989<br>Freeze by 1993<br>30% by 1995<br>70% by 2000<br>100% by 2005     | Base year<br>1989<br>Freeze by<br>1993<br>50% by 1994<br>100% by 1996                                                |
| Hydrochloroflourocarbons<br>(HCFCs)<br>21,22,31,121,122,123,<br>124,131,132,133,141,<br>142,151,221,222,223,<br>224,225,226,231,232,<br>233,234,235,241,242,<br>243,244,251,252,253,<br>261,262,271 | No regulation                                                            | 2020 but not<br>later than<br>2040<br>(non-binding)                                | Base year<br>1989<br>Freeze by<br>1996<br>35% by 2004<br>65% by 2010<br>90% by 2015<br>99.5% by 2020<br>100% by 2030 |
| Hydrobromoflourocarbons<br>(HBFCs)<br>(Annex C, Group II)                                                                                                                                           | No regulation                                                            | No regulation                                                                      | 100% by 1996                                                                                                         |
| Methyl Bromide<br>(Annex E)                                                                                                                                                                         | No regulation                                                            | No regulation                                                                      | Base year<br>1991<br>Freeze by<br>1995                                                                               |

Source: Montreal Protocol and its London and Copenhagen  
Amendments

## 1.1 Philippine Country Program

### Purpose

The preparation of the CP is part of the requirements set by the Executive Committee to qualify for assistance from the Multilateral Fund. It contains an analysis of ODS consumption and structure of end users. A phaseout strategy taking into account the socio-economic conditions within the country and at the same time, its commitments to the Montreal Protocol is presented in the CP. The Action Plan, which translates the Program into specific activities and timetables, hopes to make the CP implementable.

The Philippine Government however does not consider the preparation of the CP as a mere compliance to get assistance from the Multilateral Fund. The process itself is seen as an opportunity for the Government to be more familiar with an environmental problem, establish realistic goals to solve the problem by optimizing limited resources within the country and assistance from multilateral and bilateral agencies, and learn from the entire exercise in order to apply some general principles in attacking another environmental concern. For this purpose, the Government of the Philippines had taken the responsibility of formulating the Country Program for the ODS phaseout.

### Assistance Received

The Executive Committee of the Multilateral Fund through United Nations Development Programme (UNDP) and the World Bank (WB), has approved financial assistance for the CP preparation.

### Status

The CP was already approved and accepted by the Program Steering Committee and endorsed to the Cabinet "Cluster A" composed of Departments incharge of the socio-economic sector for eventual presentation to the entire Cabinet.

Consultative meetings/workshops have been organized to inform and consult the regions regarding the CP. To date, the CP has been presented to four out of the fourteen regions.

These processes will ensure that the CP particularly the action plan will get the necessary support at the national and local levels of government bureaucracy.

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CHAPTER II

**CURRENT  
SITUATION**

## 2.1 OVERVIEW OF ODS IMPORTS

The Philippines does not produce nor export, in bulk, any of the controlled ozone-depleting substances, thus, total consumption is equal to imports adjusted for possible stock changes. Consumption estimates were based on the data gathered and validated for the country study and the feasibility studies. Consultations and interviews were made with end-use industries and agencies like the Bureau of Food and Drugs or BFAD, Bureau of Customs (BOC), and the Department of Trade and Industry (DTI), who are in charge in the issuance of importation clearance, import monitoring and trade regulations, respectively. In cases of conflicting data, importers were consulted.

Nine major chemical companies manufacturing ODSs are represented in the Philippines: Pacific (Australia), ICI (U.S.A.), Du Pont (U.S.A.), Kali (Germany), Montedison (Italy), Hoechst (Germany), AtoChem (France), and Asahi (Japan). They are represented in the country by eight importers/dealers: The Motor and Industrial Products Company, Aboitiz and Company, Delsa Chemicals, Manhattan Chemicals, Frezz Marketing Corporation, Thermmo Engineering Supply, Utility Marketing Company, and Wise and Company. Considerable direct imports are made by one cigarette manufacturer, two refrigerator companies, and one foam producer. In 1992, the direct imports of these four companies comprised some 29 percent of total CFC imports.

Halons are imported primarily from ICI, DuPont, and Kali. Prior to 1989, AtoChem was a major halon supplier. The main importers/traders of halons are Wise and Company, the Motor and Industrial Products Company, and Thermo Engineering Supply.

1,1,1-trichloroethane is supplied primarily by three manufacturers: Dow Chemicals, ICI, and Solvay and distributed primarily through five importers/traders, viz. Himmel Industries, Impex, Glee Chemicals, L.G. Atkinson, and Marvic Marketing.

Carbon tetrachloride is imported primarily by Himmel Industries and Utility Marketing, Inc.

Patterns on ODS imports are shown in Table 2.1. Data show an increasing consumption between 1986 and 1989, followed by a declining trend for the next two years. By 1992, imports exhibited a slight increase. The upsurge in imports recorded in 1989 could be explained by panic buying and hoarding of CFCs.

Based on the data presented, CFC-11 and CFC-12 combined, accounted for about 80 percent of the total CFC imports and 50 percent of the total imports of ODSs.

TABLE 2.1  
Imports (Consumption) of Controlled Ozone Depleting Substances, 1986-92  
(In Metric Tons)

| Ozone Depleting Substances | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|----------------------------|------|------|------|------|------|------|------|
| CFC-11                     | 650  | 960  | 850  | 1260 | 900  | 845  | 1200 |
| CFC-12                     | 1100 | 1400 | 1600 | 1900 | 1800 | 1097 | 1300 |
| CFC-113                    | 100  | 150  | 170  | 100  | 150  | 253  | 210  |
| CFC-114                    | 30   | 20   | 10   | 15   | 15   | 6    | 6    |
| CFC-115                    | 0    | 10   | 10   | 10   | 10   | 68   | 6    |
| Sub-Total (MT)             | 1880 | 2540 | 2640 | 3285 | 2875 | 2269 | 2722 |
| Sub-Total ODP (MT)         | 1881 | 2542 | 2645 | 3284 | 2878 | 2252 | 2733 |
| Halons                     |      |      |      |      |      |      |      |
| Halon 1211                 | 20   | 40   | 40   | 45   | 45   | 23   | 25   |
| Halon 1301                 | 0    | 5    | 10   | 5    | 5    | 2    | 2    |
| Sub-Total (MT)             | 20   | 45   | 50   | 50   | 50   | 25   | 27   |
| Sub-Total ODP (MT)         | 80   | 220  | 280  | 240  | 240  | 116  | 124  |
| 1.1.1 Trichloroethane      | 650  | 500  | 800  | 900  | 1500 | 1459 | 1350 |
| Carbon Tetrachloride       | 50   | 100  | 100  | 200  | 100  | 100  | 80   |
| Sub-Total (MT)             | 700  | 600  | 900  | 1100 | 1600 | 1559 | 1430 |
| Sub-Total ODP (MT)         | 132  | 168  | 204  | 324  | 288  | 283  | 248  |
| GRAND TOTAL                | 2600 | 3185 | 3590 | 4435 | 4525 | 3853 | 4179 |
| GRAND TOTAL                | 2093 | 2930 | 3129 | 3848 | 3406 | 2651 | 3105 |

Sources: 1986- 1990 - Country Study.  
1991 - Feasibility Studies.  
1992 - Business Statistics Monitor.

There is an increasing trend in the imports of 1,1,1-trichloroethane, which could be attributed to the increased growth in the semiconductor and electronic sectors. However, a decrease in import data was seen for carbon tetrachloride.

## 2.2 CURRENT CONSUMPTION OF ODSS BY END-USE

### Refrigeration

Household-type refrigerators and freezers are manufactured locally and it accounts for about 90 percent of the domestic market. Total production is estimated at around 400,000 units in 1989 of which around 10 percent were exported. Only 2,470 units of household refrigerators and freezers were imported. Ownership of manufacturing of household refrigerators is predominantly Filipino owned. Philacor, the single biggest manufacture is 60 percent Filipino owned. Other important manufactures like Concepcion and Sanyo are 100 percent Filipino and majority Filipino owned, respectively.

Compressors for all Philippine-made refrigerators and freezers are all imported. The Philippines got 278,000 hermetically sealed compressors in 1989 and 333,000 units for the first six months of 1990.

Based on interviews with manufacturers of household appliances, the average per unit consumption of CFC is estimated at 165 gram (g) of CFC-12 and 590 g of CFC-11 per refrigerator/freezer. A total of 70 MT of CFC-12 and 285 MT of CFC-11 were used in the production of new refrigerators/freezers and around 65 MT of CFC-12 were used for servicing household refrigerators and freezers.

The Philippines does not manufacture commercial and industrial refrigerators although it makes smaller units used as beverage coolers, and refrigerators and freezers for small stores.

Refrigerated fishing vessels mainly use ammonia and crushed ice partly because of the lower price of ammonia compared to CFC-12 or HCFC-22. Another source, however, reported that fishing vessels use at least 40 MT of CFC-12. Because of the apparent conflicting information, consumption of this sector was not included anymore. Further validation will have to be undertaken yet.

### Airconditioning

The country produces its own compressors for room airconditioners. According to manufacturers, around 60,000 units of window-type airconditioners were produced in 1989. Split-type airconditioners with a cooling capacity of up to 10 TR (tons of refrigeration) are produced locally or imported. In 1989, a total of 35,000 units were sold; all were charged with HCFC-22. On the other hand, central-type airconditioning systems with cooling capacities of 100 to 1,000 TR are all imported and are used mainly for big infrastructures such as department stores, hotels, and industries. For 1989 alone, the total cooling capacity of installed central-type airconditioners in Metro Manila totalled 40,000 to 60,000 TR.

Manufacturing of room airconditioners is dominated by Concepcion Industries which is 100 percent Filipino owned. Concepcion Industries' share of the market is about 60 to 70 percent.

#### Mobile Air Conditioners (MACs)

Air conditioners have become a standard accessory in cars in recent years. From 1988 to present, there has been a perceptible preference for the inclusion of air conditioners in vehicles particularly in private passenger cars. Contributing factors to the shift in preference are Philippine weather condition, deteriorating environment especially within the Metro Manila Area, relatively low cost of this mass-produced accessory, and for health purposes. There is no car manufacturing in the Philippines all are merely assembled in the country. According to industry sources, all MACs are imported.

Table 2.2 shows the comparative total number of vehicles in 1988 and 1991 and the number of vehicles installed with airconditioners for said period.

Table 2.2  
Total Number and MAC-equipped Vehicles, 1988 and 1991

|                            | 1988<br>No. of<br>Vehicles | No. of<br>MACs | %   | 1991<br>No. of<br>Vehicles | No. of<br>MACs | %   |
|----------------------------|----------------------------|----------------|-----|----------------------------|----------------|-----|
| Existing Motor<br>Vehicles |                            |                |     |                            |                |     |
| Passenger Cars             | 373,527                    | 257,493        | 69% | 453,027                    | 332,359        | 73% |
| Private                    | 361,494                    | 253,046        | 70  | 430,943                    | 322,495        | 75  |
| For Hire                   | 7,092                      | 0              | 0   | 16,360                     | 4,634          | 28  |
| Gov't.                     | 4,941                      | 4,447          | 90  | 5,724                      | 5,230          | 91  |
| Utility Vehicles           | 475,099                    | 87,527         | 18  | 670,848                    | 174,877        | 26  |
| Private                    | 400,166                    | 80,033         | 20  | 560,831                    | 160,366        | 29  |
| For Hire                   | 55,895                     | 5,590          | 10  | 87,285                     | 11,868         | 14  |
| Gov't.                     | 19,038                     | 1,904          | 10  | 22,732                     | 2,643          | 12  |
| Buses                      | 15,083                     | 754            | 5   | 20,690                     | 1,595          | 8   |

Source: BOI, DTI

Mobile airconditioners use CFC-12 exclusively as refrigerant. In Metro Manila, there are more than 2,000 car repair shops offering airconditioning services. This sector, which used around 700 MT of CFC in mobile airconditioning in 1991, constituted the largest share of CFC use in the country. The total mobile airconditioners in the country is estimated at 508,500 units.

There is a large potential for reducing the use of CFC in this sector in the short term by adopting better maintenance practices and by introducing recovery and recycling machines at the service shops.

## Foams

CFC-11 is used as a blowing agent for flexible polyurethane (PU) foam products such as slabstock for furniture, bedding, safety pads, carpet underlay, or as individually-molded items used primarily as automotive seat cushions and seat backs. The total production of flexible foam totalled around 25 tons in 1991.

Although the demand for flexible foam products has been increasing at a rate of 10 to 15 percent per year over the last two years, much of the current production of PU foam products is based on methylene chloride which is almost 50 percent cheaper than CFC-11.

CFC-11 is also used as a rigid insulation foam for refrigerators and freezers. Total consumption for this chemical is estimated at 285 MT for 1991.

Today, besides having chemical and physical blowing agent substitutes, manufacturers have technical options such as modifications and technological alternatives.

The packaging industry in the Philippines can be subdivided into five groups based on type of raw materials used: glass, paper, metal, rigid plastics, and flexibles. Flexible packaging comprises a wide range of packaging types such as wrap, preformed bags, blister containers, and thermoformed containers.

The fast growth and wide acceptance of fastfood chains in the country and the possibility of using extruded polystyrene (XPS) containers as a marketing tool have contributed to the rapid growth of the product which is heavily dependent on imported raw materials. Contributing to the high cost of raw materials are the high import tariffs imposed on resins. Out of the 125 flexible packaging companies, only three use CFC-12 as a blowing agent in XPS packaging. Based on interviews with packaging firms, the consumption of CFC-12 for this sector is estimated at 17 MT in 1991.

Options available in the near term are HCFC-22, hydrocarbons such as pentane, blends of these two or with atmospheric gases, or product substitutes like paper bags and ceramic plates. It is worth mentioning that several big fastfood chains have actually shifted to non-plastics like paper bags.

Based on 90 percent industry profile prepared for the feasibility studies, about 30 percent of the firms engaged on the manufacturing of foams, except rigid insulation forms for refrigerators are Filipino owned.

## Solvents

The main users of CFC-113 and 1,1,1-trichloroethane solvents in the electronics industry are the semiconductors, telecommunications, and industrial electronics segments. About 85 percent of the firms falling under this category are foreign-owned.

The electronics industry accounts almost exclusively for the use of CFC-113 in the country and its application is mainly in flux removal and metal cleaning, for cleaning of disc drive bases, printed circuit boards, lead frames, radar parts, and electric condenser microphones.

As a flux removal, CFC-113 is blended with alcohol for more effectiveness. Vapor degreasing is used with dipping done in closed environment systems to limit the emission of fumes. For metal cleaning, cold process applications appear to be predominant.

The consultative meetings conducted by TWG on the industry, revealed that a number of multinational semi-conductor companies have significantly reduced their consumption of CFC-113 due to regulations imposed by their parent company. Companies jointly and/or wholly Filipino-owned, on the other hand, have started adopting measures to veer away from CFC-113. Expectedly, these companies are slower in shifting to non-ODS technologies. In many cases, their main source of information are the suppliers of the chemicals which tend to be biased.

Spent solvents are usually discharged into the sewers and flow into waterways such as streams, lakes, or rivers. However, most multinationals have their own waste treatment plant (WTP) and treatment takes place prior to discharge into the public sewage system.

1.1.1-trichloroethane is used in chemical compounds, metal cleaning, and in garment and textile applications. The chemical compounders subsector is the largest user of this chemical and it is used in some applications as a carrier of lubricants to reduce frictional damage. It is also used as a flammability reducer in metal cleaners and adhesives.

The garments and textile industries use TCA in cleaning sewing machine heads, and in oil and paint stains. TCA is also used in watch repair shops as soldering flux and as metal cleaner by a number of small service or repair shops.

For 1991, the Philippines imported 253 MT of CFC-113 and 1,459 MT of 1,1,1-trichloroethane.

Reduction of ozone-depleting solvents may be done by adopting the following options: waste minimization and recycling; using techniques that reduce/eliminate the need for chemical cleaning; using water-based cleaning; using nonchlorinated organic solvents; and using other chlorinated solvents.

Carbon tetrachloride is normally used in the Philippines as a cleaning agent. It is used in the cleaning of the refrigeration system of dirt and dust, cleaning of clock and watch parts, for electronic repair, and for cleaning of heat exchangers. Import statistics show a total import of 100 MT of CTC in 1991.

## Tobacco

CFC-11 is used in the Philippine cigarette industry. It reverts the dried tobacco leaves to its original size and at the same time reduces the tar and nicotine content. For this sector, it is estimated that about 350 MT of CFC-11 are used annually. The only company using the CFC technology is Fortune Tobacco which is 100 percent Filipino owned. There are other tobacco/cigarette manufacturers that are subsidiaries of MNCs. However, they use a different process in fluffing dried tobacco leaves.

It is possible to substitute CFC-11 with a carbon dioxide process, but this requires considerable investment in new production equipment.

## Aerosols

The aerosol industry is dominated by two major contract fillers and a vast number of small companies which are mostly Filipino owned. The use of controlled CFCs in the aerosol market is relatively small with a mere four million cans in aerosol production for all applications per year.

About 95 percent of the production make use of hydrocarbons, specifically propane and butane, as propellants. There has been a noticeable shift to mechanical pump sprays for hair sprays and personal hygiene/cosmetic preparations. Only 5 percent of the current aerosol production still use CFC-12 and CFC-11 and this is primarily for industrial chemical aerosols used for contact cleaners, where flammability is a major consideration. It is estimated that the total CFC consumption is about 5 MT for CFC-12 and 5 MT for CFC-11 per year.

The nonflammable alternatives available in the near term include HCFC-22, compressed gases such as carbon dioxide and nitrogen, and dimethyl ether (DME).

## Fire Protection

Around 1,400 units of halon-type extinguishers were imported in 1989. The units had a fire extinguishing capacity ranging from 1 kg. to 14 kg. More than half of the imported fire extinguishers contained a blend of halon-1211 and halon-1301 while the rest were of the pure halon-1211 type.

Halon-1211 is used mainly in portable fire extinguishers for local protection while halon-1301 is used primarily for total flooding systems and for the fire protection of large rooms, and critical applications such as computer rooms or military installations. Since the closure of the US bases, however, where much of the halons were used, the consumption of this chemical had declined dramatically.

As the use of halons is not prevalent in the Philippines, only limited imports have been recorded. Imports of halons is estimated to be about 25 MT in 1991. However, according to the Fire Protectors Federation, consumption of halon for 1992 had been much lower at around one metric ton only.

For halon-1211, a shift to alternative suppressants which are commercially available is possible. Furthermore, more are expected to shift to carbon dioxide and dry chemical owing not only to growing awareness of the problem of ozone-layer depletion but also to the high cost of halon-1211 relative to the alternative fire suppressants.

## Agriculture/Furniture Industry

Because of the recent inclusion of methyl bromide in the list of controlled substances, preliminary data were gathered to estimate the consumption and application of methyl bromide in the country. These estimates have not been verified and therefore, have not yet been included in Tables 2.3 and 2.4. Preliminary estimates reveal that for 1991, total consumption was about 95 MT or 67 MT was ODP-weighted. Of this, 20 percent was used in the exports of rattan furniture. The largest user was in the banana plantations at 71 percent while the remaining 9 percent is used in the cut-flowers industry and other users.

Table 2.3 presents the summary of ODS consumption by application and by substance for 1991. Figures 2.1 and 2.2 show the percentage distribution of ODS consumption by application and by ODS respectively. The projected consumption based on unconstrained demand until year 2010 is presented in Table 2.4.

## 2.3 Institutional Framework

### 2.3.1 Government Institutions

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

**Department of Environment and Natural Resources.** The DENR will act as the national central coordinator on programs related to Montreal Protocol implementation. This Department has the mandate to prepare policies and device administrative measures for the implementation of the Montreal Protocol. The DENR also has the needed network in the entire archipelago.

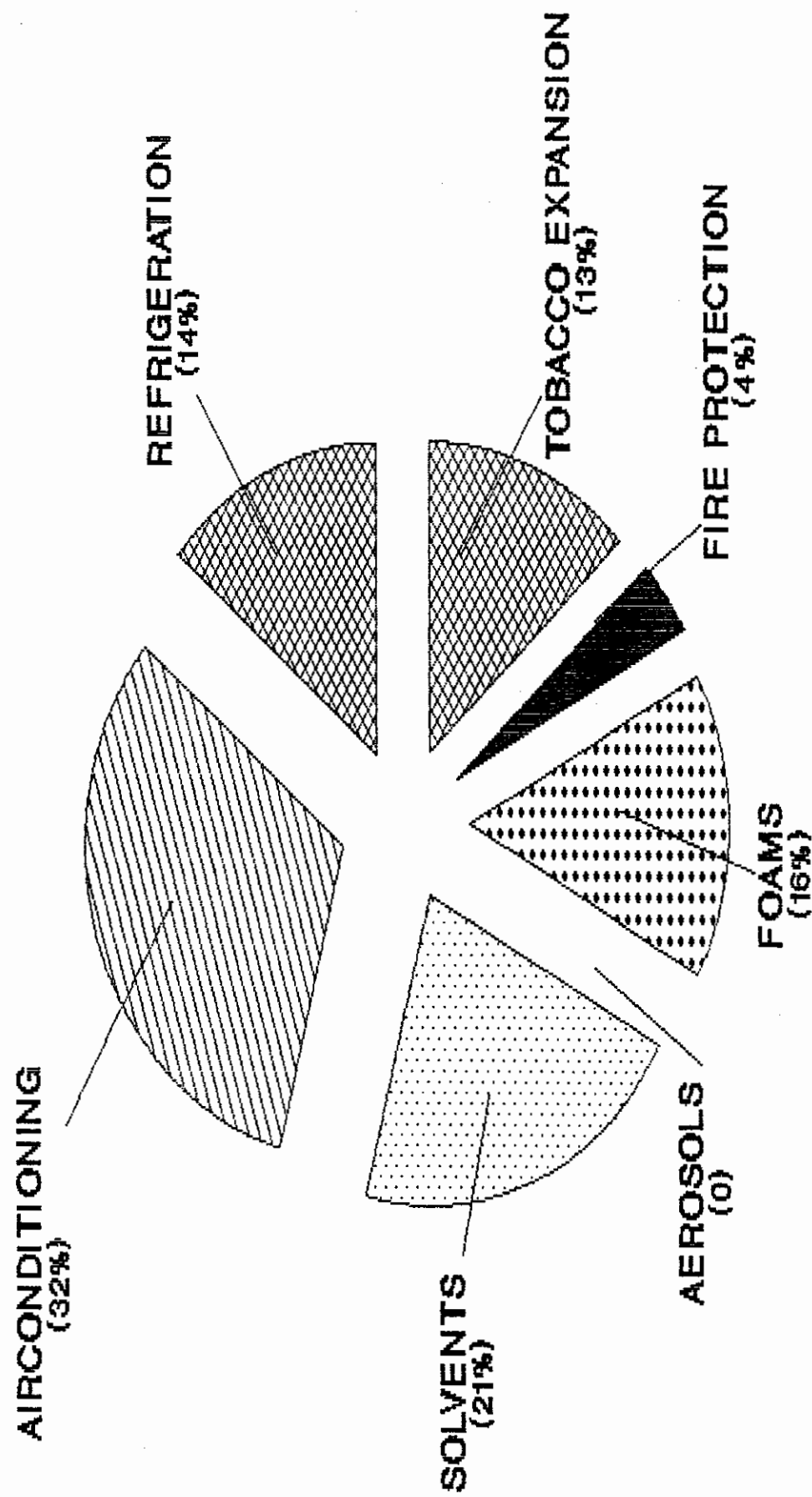
**National Economic Development Authority.** As the government's chief planning arm, the NEDA is responsible for the programming of official development assistance in the form of grants and concessional loans from foreign governments and multilateral agencies and organizations, and the monitoring and evaluation of identified projects and programs.

Table 2.3  
Consumption of ODS Per Estimated Application, 1991

| Application       | End-Use                        | Amount<br>(MT) | ODS     | Latest<br>ODP | ODP-Weighted<br>Metric Ton |
|-------------------|--------------------------------|----------------|---------|---------------|----------------------------|
| Refrigeration     | Household (New)                | 70             | CFC-12  | 1.0           | 70                         |
|                   | Household (Service)            | 65             | CFC-12  | 1.0           | 65                         |
|                   | Commercial (New)               | 3              | CFC-114 | 0.8           | 2.4                        |
|                   |                                | 34             | CFC-115 | 0.5           | 17                         |
|                   |                                | 95             | CFC-12  | 1.0           | 95                         |
|                   | Commercial (Service)           | 3              | CFC-114 | 0.8           | 2.4                        |
|                   |                                | 34             | CFC-115 | 0.5           | 17                         |
|                   |                                | 95             | CFC-12  | 1.0           | 95                         |
|                   |                                |                |         |               |                            |
| Air-Conditioning  | MACs (New)                     | 50             | CFC-12  | 1.0           | 50                         |
|                   | MACs (Service)                 | 650            | CFC-12  | 1.0           | 650                        |
|                   | Other (New)                    | 45             | CFC-11  | 1.0           | 45                         |
|                   |                                | 25             | CFC-12  | 1.0           | 25                         |
|                   | Other (Service)                | 45             | CFC-11  | 1.0           | 45                         |
|                   |                                | 25             | CFC-12  | 1.0           | 25                         |
| Solvents          | Electronics and Metal Cleaning | 253            | CFC-113 | 1.07          | 271                        |
|                   |                                | 1459           | TCA     | 0.12          | 175                        |
|                   |                                | 100            | CTC     | 1.08          | 108                        |
| Aerosols          | Contact Sprays                 | 5              | CFC-11  | 1.0           | 5                          |
|                   |                                | 5              | CFC-12  | 1.0           | 5                          |
| Foams             | Appliance Installation         | 285            | CFC-11  | 1.0           | 285                        |
|                   | Flex-PU                        | 25             | CFC-11  | 1.0           | 25                         |
|                   | Rigid                          | 90             | CFC-11  | 1.0           | 90                         |
|                   | Packaging (XPS)                | 17             | CFC-12  | 1.0           | 17                         |
| Fire Protection   | Portable                       | 23             | H-1211  | 4.0           | 92                         |
|                   | Total flooding                 | 2              | H-1301  | 12.0          | 24                         |
| Tobacco Expansion | Expansion                      | 350            | CFC-11  | 1.0           | 350                        |
| Total             |                                | 3853           |         |               | 2650.8                     |

Sources: Country Study Feasibility Studies

**FIGURE 2.1**  
**CONSUMPTION OF ODS PER ESTIMATED**  
**APPLICATION, 1991**



**FIGURE 2.2**  
**CONSUMPTION OF ODSS PER TYPE, 1991**

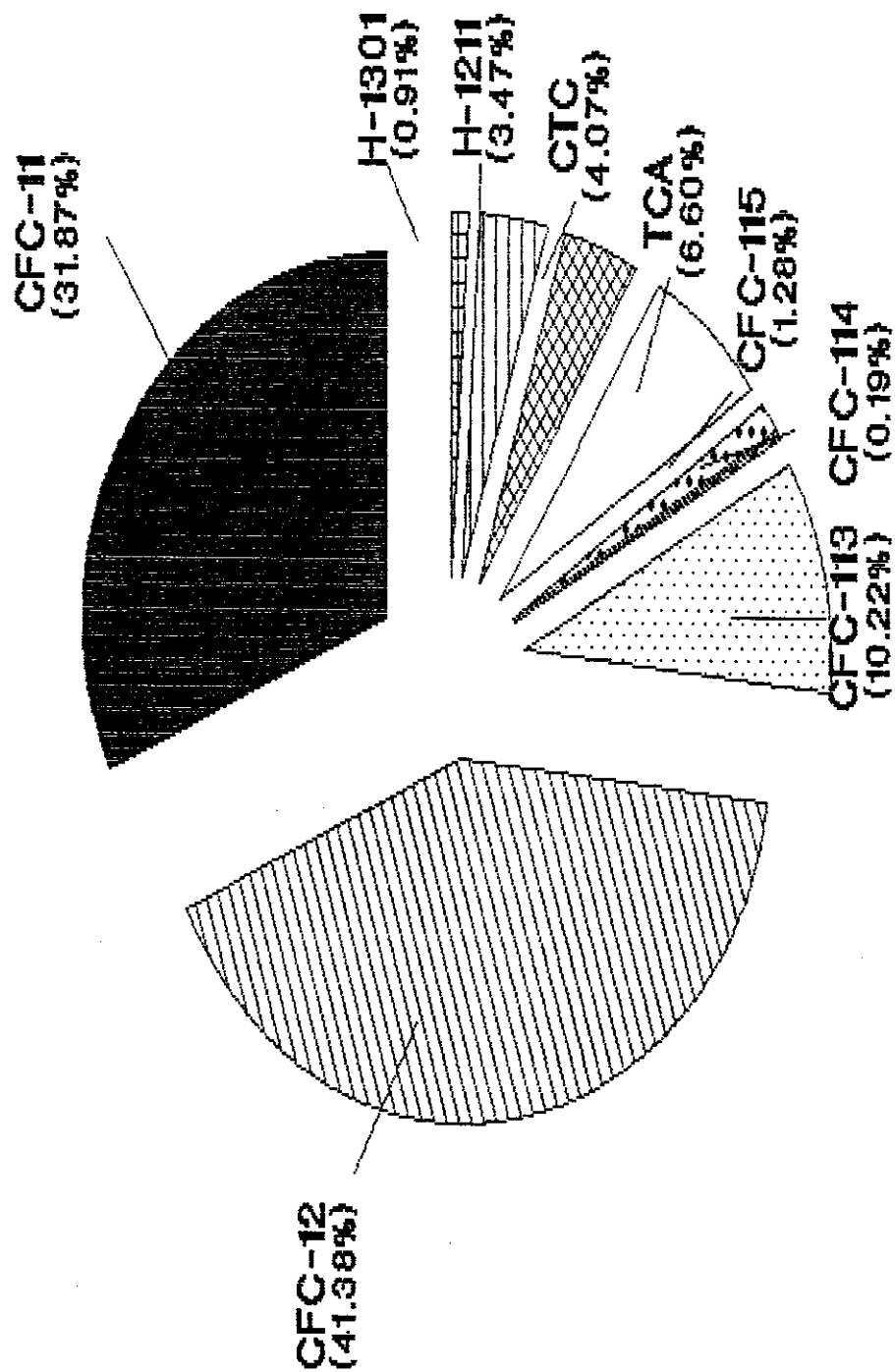


Table 2.4  
Unconstrained Demand for ODS Per Type, 1993-2010 (By Application)  
(In Metric Tons)

| ODS                      | 1993   | 1995   | 1997   | 1999   | 2001   | 2003    | 2005    | 2007  | 2009    | 2010    |
|--------------------------|--------|--------|--------|--------|--------|---------|---------|-------|---------|---------|
| <b>Refrigeration</b>     |        |        |        |        |        |         |         |       |         |         |
| CFC-12                   | 392    | 473    | 577    | 711    | 858    | 1009    | 1169    | 1371  | 1620    | 1762    |
| CFC-114                  | 7      | 8      | 9      | 10     | 11     | 12      | 14      | 15    | 17      | 18      |
| CFC-115                  | 76     | 86     | 96     | 108    | 121    | 136     | 153     | 181   | 203     | 215     |
| Total Metric Tons        | 475    | 567    | 682    | 829    | 990    | 1157    | 1336    | 1567  | 1840    | 1995    |
| <b>Air-Conditioning</b>  |        |        |        |        |        |         |         |       |         |         |
| CFC-11                   | 101    | 113    | 127    | 143    | 161    | 181     | 203     | 228   | 257     | 272     |
| CFC-12                   | 903    | 1088   | 1311   | 1580   | 1904   | 2194    | 2767    | 2969  | 3072    | 3128    |
| Total Metric Tons        | 1004   | 1201   | 1438   | 1723   | 2065   | 2375    | 2970    | 3197  | 3329    | 3400    |
| <b>Solvents</b>          |        |        |        |        |        |         |         |       |         |         |
| CFC-113                  | 306    | 370    | 448    | 542    | 656    | 794     | 960     | 1161  | 1405    | 1545    |
| 1,1,1 TCE                | 1765   | 2135   | 2583   | 3125   | 3782   | 4576    | 5537    | 6700  | 8107    | 8917    |
| CTC                      | 112    | 126    | 142    | 159    | 178    | 200     | 225     | 252   | 283     | 300     |
| Total Metric Tons        | 2183   | 2631   | 3173   | 3826   | 4616   | 5570    | 6722    | 8113  | 9795    | 10762   |
| <b>Foams</b>             |        |        |        |        |        |         |         |       |         |         |
| CFC-11                   | 503    | 637    | 812    | 1040   | 1289   | 1540    | 1842    | 2206  | 2645    | 2866    |
| CFC-12                   | 22     | 29     | 38     | 51     | 59     | 89      | 117     | 155   | 205     | 236     |
| Total Metric Tons        | 525    | 666    | 850    | 1091   | 1348   | 1629    | 1959    | 2361  | 2850    | 3102    |
| <b>Tobacco Expansion</b> |        |        |        |        |        |         |         |       |         |         |
| CFC-11                   | 386    | 425    | 468    | 516    | 569    | 629     | 693     | 764   | 842     | 882     |
| <b>Aerosols</b>          |        |        |        |        |        |         |         |       |         |         |
| CFC-11                   | 5      | 5      | 5      | 5      | 5      | 5       | 5       | 5     | 5       | 5       |
| CFC-12                   | 5      | 5      | 5      | 5      | 5      | 5       | 5       | 5     | 5       | 5       |
| Total Metric Tons        | 10     | 10     | 10     | 10     | 10     | 10      | 10      | 10    | 10      | 10      |
| <b>Halons</b>            |        |        |        |        |        |         |         |       |         |         |
| H-1211                   | 26     | 28     | 30     | 32     | 34     | 36      | 38      | 40    | 42      | 44      |
| H-1301                   | 2.2    | 2.3    | 2.4    | 2.5    | 2.6    | 2.7     | 2.9     | 3.0   | 3.2     | 3.4     |
| Total Metric Tons        | 28.2   | 30.3   | 32.4   | 34.5   | 36.6   | 38.7    | 40.9    | 43.0  | 45.2    | 47.4    |
| Total ODP-Weighted MT    | 130.2  | 140    | 149    | 158    | 167    | 176     | 187     | 196   | 206     | 217     |
| Total CFC's and Halons   |        |        |        |        |        |         |         |       |         |         |
| Total Metric Tons        | 4611.2 | 5530.3 | 6653.4 | 8029.5 | 9634.6 | 11408.7 | 13730.9 | 16055 | 18711.2 | 20198.4 |
| Total ODP Metric Tons    | 3150   | 3796   | 4475   | 5396   | 6443   | 7521    | 9010    | 10330 | 11754   | 12542   |

Based on the projected growth rates provided by NEDA for the different sectors.

Department of Trade and Industry. The DTI is the primary coordinative and regulatory arm of government for the country's trade and investment activities. The DTI will be responsible in providing technical advice and information on matters pertaining to trade policies on ODS. The Board of Investments (BOI) under the DTI provides incentives for investments including those for environmental projects.

Department of Foreign Affairs. This agency is the official channel for matters involving foreign relations including official communications to and from the Republic of the Philippines. The DFA will maintain effective linkages with scientific organizations abroad and promote the exchange of information and cooperation among personnel engaged with the ozone issue. This Department will ensure the country's commitment to the Montreal Protocol and relay to international agencies about the Philippines' compliance to the MP.

Philippine Atmospheric, Geophysical and Astronomical Services Administration. PAG-ASA is responsible regarding the observation, collection, and assessment of ozone-related data. This agency will undertake research activities of geophysical and atmospheric phenomena essential to the safety and welfare of the people. PAG-ASA, in collaboration with the World Meteorological Organization (WMO) and the United Nations Environmental Programme, had established an ozone monitoring station equipped with the Dobson Spectrophotometer in 1978. The station regularly makes daily measurements of total column ozone which are sent to the World Ozone Data Center in Canada for analysis.

Department of Science and Technology. The DOST provides central direction on scientific and technological research and development in areas determined vital to the country's development. It conducts research activities on the development of alternative substances and indigenous technologies suitable for domestic applications, and assist in the transfer of the result of scientific research to their end-users.

Department of Health. This institution undertakes health and medical researches including ODS-related disease and environmental epidemiological studies. The DOH will be responsible for the evaluation of toxicity and carcinogenicity tests on available ODS substitutes.

Department of Finance. This office is responsible for the generation and management of financial resources. The DOF will decide whether loans or other forms of assistance from foreign governments will be used in the implementation of such projects.

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

Philippine Senate. The Senate of the Philippines is in charge of ratifications of international treaties while it is the House of Representatives which is in charge with the appropriation of the budget. Both concur in matters of legislation.

### 2.3.2 Industrial and Nongovernment Organizations

Various manufacturers, environmental-conscious groups, and NGOs are going to have an active role in the Protocol compliance. One of the more important role is the dissemination of information to their members about the ODS issue including options to reduce or to regulate the use of ODSs, conduct of seminars, and other such activities. The trade and professional associations will undertake extensive information campaign on ODSs to increase public awareness by conducting continuing seminars on ozone-friendly technology. NGOs will be an important partner in the monitoring aspect of the CP.

## 2.4 GOVERNMENT RESPONSE TO THE MONTREAL PROTOCOL

### 2.4.1 The Philippine Stand

The Philippines became a signatory to the Montreal Protocol on September 14, 1988. The country ratified the Protocol on March 21, 1991.

On 1992, Senate Resolution entitled "A Resolution for the Ratification of the Amendments to the Montreal Protocol", was approved. Senate Resolution No. 108 (Annex D) directed the Committees of Energy and Environment and Foreign Affairs to conduct an immediate inquiry for the ratification on the 1990 London Amendments to the MP.

### 2.4.2 The Country Study on ODS

The DENR, with the assistance of the Commission of the European Communities (CEC), conducted the "Study on Ozone-Depleting Substances in the Philippines". The Country Study was completed in May 1991.

The country study 1) provided baseline information on ODS and analyzed the current and expected demand for CFCs and other ozone-depleting substances in the Philippines; 2) identified short- and long-term options for phaseout and costs of CFC reduction; and 3) formulated policies and strategies to meet the objectives of the Montreal Protocol.

### 2.4.3 Implementation of UNDP-Assisted Information Campaign Program on Ozone-Depleting Substances

A special committee composed of an NGO, the Likhaan Foundation, the UNDP and DENR represented by EMB was created to implement this program. The Program conducted a series of conferences/workshops on ozone-depleting substances and on alternative chemicals. Participants to the workshops were from the industry and trade organizations, technical and engineering associations, and scientific technological engineers. Emphasis was given in providing new knowledge and skills to service technicians in the refrigeration and airconditioning sectors.

#### 2.4.4 Undertaking of Two Feasibility Studies

As a result of the country study and given the structure of ODS consumption in the Philippines, two feasibility studies were undertaken. Assistance was provided by the ExCom and coursed through the WB. One was on "Recycling of CFCs" and the other was on the "Use of Non-ODS Technology in Solvents, Foams, and Tobacco Applications".

On CFC recycling, two projects have been identified: the establishment of a reclamation center in Metro Manila and the MACs recycling scheme. Although a sound technical proposal was developed for these projects, detailed plans by the organizations that will manage the project are still being prepared.

For the first component, the Appliance Service Association of the Philippines (ASAP) will operate the center by providing users with recovery cylinders in the collection of refrigerants. The focus of the second component is on the purchase of 100 MAC refrigerant recovery machines and lease them at nominal rates to MAC service centers in the Philippines. In addition to Metro Manila, the cities of Cebu, Davao, Cagayan de Oro, and Iloilo will also be covered. Parts and Services Associations of the Philippines (PASAPI) which has a network of service and repair shops in Metro Manila and other selected cities is being tapped to implement the MACs project.

#### 2.4.5 Preparation of the Country Program

Corollarily, the government took the initiative in preparing its country program. It was a positive action taken towards fulfilling the MP commitments.

Two committees comprising different government agencies and industry representatives have also been created with the immediate task of preparing the Country Program and a long-term goal of overseeing the implementation of the ODS phaseout program.

The Program Steering Committee (PSC) was created to:

- 1) provide overall guidance and direction for the development of the Country Program;
- 2) serve as a forum for the discussion of policies and operational issues; and
- 3) facilitate the efficient programming of resources that will be implemented vis-a-vis the Montreal Protocol.

The PSC is composed of senior officials of the following government institutions: DTI, DOF, DOST, NEDA, DOH, DFA, and the Senate and Congress. The Committee is chaired by the DENR.

Under the PSC is the Technical Working Group (TWG) which is directly responsible for the formulation of the Country Program. It is composed of technical staff of the agencies represented in the PSC. The TWG is tasked to mobilize appropriate individuals and

relevant offices and to formulate strategic approaches to the formulation of the country program in pursuance of the directions and guidelines of the Steering Committee. Consultations were made with the NGOs and industry leaders.

#### 2.4.6 R. A. 6969: Regulation and Control of Chemicals and Hazardous Wastes

Government gave priority to legislations concerning ODSs by implementing Republic Act 6969 entitled "Toxic Substances, Hazardous and Nuclear Wastes Act of 1990". This law refers to the regulation and control of all unregulated chemicals and hazardous wastes. As a result, ODSs are now regulated through the issuance of importation clearance by the DENR through the Environmental Management Bureau (EMB).

#### 2.4.7 Creation of the DENR Ozone Desk at Foreign Assisted and Special Projects Office, DENR

In 1991, the DENR created an Ozone Desk which facilitated the coordination of activities related to MP implementation including Country Program Preparation.

### 2.5 INDUSTRY RESPONSE TO THE MONTREAL PROTOCOL

#### 2.5.1 Manufacturing

Indicated hereunder are the initial findings from the feasibility studies on the use of non-ozone depleting substances or technologies, and the recycling of CFCs.

- a. Flexible foams. There are six firms in the Philippines using CFCs to make flexible foams. Two of these, Foamcraft and Cathay Foam, no longer use CFCs. Polyfoam/Uratex (P/U) uses about 1 MT of CFC-11 per year for flexible foam but is in the process of switching its production to methylene chloride. P/U also consumes about 25 MT for spray-on insulation and is only applied during customized onsite projects; the use of CFCs in this application follows the same sporadic nature of the work itself. Everfoam Industrial Corporation has already switched to 95 percent methylene chloride and will eliminate the remaining 5 percent soon. Mandaue Foam uses only about 2 MT of CFC-11 per year.
- b. Extruded polystyrene (XPS) foam. There are only two XPS foam producers still using CFCs. Concept Packaging which uses 9 MT of XPS per year is in the process of switching to HCFC-22 perhaps mixed with pentane.
- c. Other insulating foams. There are still six firms using CFCs: Precision Electronics which is 80 percent foreign owned; Urethane Products which uses 3 MT/year on spray-on application; Concepcion Industries; Philacor; Federal Electrics; and Sanyo.

- d. Tobacco expansion. There is only one enterprise using CFCs, Fortune Tobacco, which uses about 350 MT/year and is the biggest single user of ODS in the Philippines. Fortune has indicated interest in cooperating and might be a candidate enterprise for a project proposal. Fortune is a recipient of the project.
- e. Solvents. In the electronics and semiconductors subsectors, those that are affiliated with multinational companies are well informed and some have started testing alternatives; while in the metal cleaning subsector, Asia Transmission Corp. is 90 percent foreign owned and usage of methyl chloroform represents about 10 percent of the Philippine total.
- f. Aerosols. The use of CFCs in aerosols in the Philippines is not widespread. About 90 percent of the production make use of hydrocarbons and the remaining 10 percent for industrial chemical uses.

#### 2.5.2 Importers/Traders

As expected, the major traders/importers of ODSs are well informed regarding Montreal Protocol, the phaseout schedules, and the alternative substances. A series of conferences were undertaken by the major importers to introduce substitutes to CFC and at the same time served as important fora to increase people's awareness about the problem of ozone depletion.

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CHAPTER III

**IMPLEMENTING  
PHASEOUT**

## INTRODUCTION

The phaseout strategy selected was based on the institutional and logistical situation specific to Filipino industry and government. The Philippines, for instance, could undertake a phaseout that is as rapid as technology permits. This implies adopting technology as soon as it becomes available and converting facilities as fast as possible.

Or, the Philippines can take the least possible action while meeting the Protocol's requirements for a phaseout. For example, converting the use of alternatives refrigerants in household refrigerators is expensive on a per unit of ODS use avoided relative to most other controls. Thus, conversion of refrigerator plants to alternative refrigerants as late as possible and relying on cheaper controls to meet the targets in earlier years will be undertaken.

Delaying as much as possible to minimize cost in each year without considering future consequences of actions taken in any year is not forward looking and may turn out to be equally, if not more costly, to the economy because of the impact of early retirements and retrofits.

### 3.1 STRATEGY STATEMENT BY GOVERNMENT

#### Preferred Strategy

In consideration of the length of time to set up a national program to phaseout ODSs, the time required for the industries to make conversions to alternative technologies, and the economic and social factors affecting consumer behavior, the preferred strategy for the Philippines is presented below:

| <u>Substances</u> | <u>Year of Phaseout</u> |
|-------------------|-------------------------|
| CFC-11 (new)      | 1998                    |
| CFC-11 (service)  | 2010                    |
| CFC-12 (new)      | 1998                    |
| CFC-12 (service)  | 2010                    |
| CFC-113           | 1996                    |
| CFC-114           | 1998                    |
| CFC-115           | 1998                    |
| Halon 1211        | 1998                    |
| Halon 1301        | 1998                    |
| CTC               | 1996                    |
| MC                | 1996                    |

With the exception of CFC-11 and CFC-12 intended for servicing, all ODS will be phaseout ahead of the schedule allowed for Article 5 countries. To minimize costs associated with early retirements and retrofits, imports of CFCs for servicing uses are permitted only until 2010. In many Article 5 countries like the

Philippines, household appliances especially refrigerators are costly acquisitions which ordinary households cannot easily replace. The selected strategy (sometimes referred to as a "servicing tail") takes maximum advantage of the phaseout date permitted Article 5 countries under the Montreal Protocol in consideration of such households.

The estimated total incremental social costs to the Philippines in complying with the Montreal Protocol under this preferred strategy is US\$220.1 million assuming constant prices for both ODS and ODS substitutes. If, as expected, ODS prices increase as supply is restricted due to the accelerated phaseout of ODS in developed countries and the prices of ODS substitutes decrease as production is stepped up, the total incremental costs will be \$89.3 million.

The cost incurred in the preferred phaseout strategy, and the incremental costs of the other two possible phaseout scenarios are presented in Table 3.1 for comparative purposes. For each of the three strategies, two sets of incremental costs are presented:

\* Incremental costs assuming constant prices for ODS and ODS substitutes. This relies on the interpretation that eligible incremental costs are to be paid by the Multilateral Fund based on an uncontrolled baseline (i.e., in the absence of the Montreal Protocol restrictions on supplies of ODS); and

\* Incremental costs assuming one scenario that includes rising prices for ODS (as ODS supply is restricted) and declining process for ODS substitutes (as ODS production of substitutes increases). Such a scenario is more likely than the constant prices scenario. A key interpretational issue, however, is whether incremental costs should be calculated in the context of rising and declining prices caused by the Montreal Protocol restrictions. The price assumptions for ODS and ODS substitutes have been provided by the World Bank.

Table 3.1  
Total Incremental Costs  
(In 1993 US\$ millions)

| Phaseout Strategy: Constant ODS Prices: Changing ODS Prices |       |   |       |
|-------------------------------------------------------------|-------|---|-------|
|                                                             | :     | : |       |
| Technology Driven:                                          | 242.1 | : | 104.5 |
| Delayed Action :                                            | 224.4 | : | 152.6 |
| Preferred :                                                 | 220.1 | : | 89.3  |

### 3.2 ODS Control Characteristics of the Preferred Strategy

To meet ODS reduction targets, Filipino enterprises must implement controls that decrease ODS consumption. A control can be a chemical substitute, an alternative technology or process, a recycling or retrofit program, or premature retirement. Table 3.2 lists the controls used for this analysis. These controls are characterized by the following set of variables used by the model:

- \* earliest estimated availability: the year in which the alternative option is expected to be commercially available. A start date of 1993 usually indicates that the alternative is currently available.
- \* years to reach maximum market penetration: the number of years it would take for a control, once it is introduced to reach its maximum possible use.
- \* maximum market penetration: the percentage by which total weighted-ODS consumption in a sector will be reduced by the control once it is fully implemented in the market.
- \* per kilogram cost to industry: incremental costs that producers will incur as a result of the control. These include changes in capital, operating, and chemical costs and are calculated on a basis of per kilogram of ODS use avoided so that they can be compared easily.
- \* per kilogram cost to consumers: incremental costs that consumers will incur as a result of the control. These include changes in the energy efficiency of ODS equipment, changes in the costs of maintenance and service, and a portion of the retooling costs in some sectors. As in the case of the per kilogram costs to industry, these costs are also calculated on a per kilogram basis to facilitate comparison.
- \* premature retirement/retrofit costs: incremental costs that are incurred as a result of retiring existing equipment because ODSs are no longer available for servicing this equipment. These costs are essentially the costs of having to pay for new equipment prior to the normal replacement schedule. In certain cases, for example in commercial air-conditioning equipment, 'drop-in' substitutes are available. These substitutes can be used in existing equipment by retrofitting such equipment to accept the new refrigerant.

Table 3.2 Characteristics of Control Technologies Used in the Model

| SECTOR           | APPLICATION                 | CONTROL TECHNOLOGY   | EARLIEST<br>ESTIM.<br>AVAIL. | YEARS TO<br>REACH<br>MAX. PEN. | MAX.<br>MARKET<br>PEN. | PER KG.<br>COST TO<br>IND.<br>US\$1 | PER KG.<br>COST TO<br>CONS.<br>US\$1 |
|------------------|-----------------------------|----------------------|------------------------------|--------------------------------|------------------------|-------------------------------------|--------------------------------------|
| Refrigeration    | Home Appliances             | HFC-134A             | 1993                         | 3                              | 100%                   | 16.95                               | 29.51                                |
|                  |                             | Early Retirements    |                              |                                |                        | 971.77                              | 0                                    |
|                  | Commercial                  | HCFC-22              | 1993                         | 3                              | 30%                    | (7.73)                              | 0                                    |
|                  |                             | HFC-134A             | 1993                         | 3                              | 70%                    | 6.04                                | 0                                    |
|                  |                             | Recovery             | 1993                         | 3                              | 50%                    | (0.59)                              | 0                                    |
|                  |                             | Early Retirements    |                              |                                |                        | 400.00                              | 0                                    |
| Air Conditioning | Mobile Air Conditioning     | HFC-134A             | 1993                         | 3                              | 100%                   | 3.65                                | 3.65                                 |
|                  |                             | Recycling            | 1993                         | 4                              | 50%                    | 0                                   | (3.03)                               |
|                  |                             | Retrofits (HFC-134A) | 1994                         | 1                              | 100%                   | 0                                   | 59.62                                |
|                  | Building Chillers           | HCFC-123             | 1993                         | 2                              | 90%                    | 14.99                               | 0                                    |
|                  |                             | HFC-134A             | 1993                         | 2                              | 10%                    | 26.25                               | 0                                    |
|                  |                             | Recovery             | 1993                         | 3                              | 100%                   | (4.69)                              | 0                                    |
|                  |                             | Retrofits            | 1993                         | 1                              | 90%                    | 119.09                              | 0                                    |
|                  |                             | (HCFC-123)           |                              |                                |                        |                                     |                                      |
|                  |                             | Retrofits (HFC-134A) | 1993                         | 1                              | 10%                    | 254.16                              | 0                                    |
|                  | CFC-113<br>Solvent Cleaning | Non-clean            | 1993                         | 4                              | 40%                    | (7.34)                              | 0                                    |
|                  |                             | Aqueous              | 1993                         | 4                              | 20%                    | (1.91)                              | 0                                    |
|                  |                             | Semi-Aqueous         | 1993                         | 4                              | 30%                    | (2.43)                              | 0                                    |
|                  |                             | HCFC-225             | 1993                         | 2                              | 10%                    | (0.53)                              | 0                                    |
|                  |                             | Recovery             | 1993                         | 2                              | 100%                   | (4.45)                              | 0                                    |
|                  |                             |                      |                              |                                |                        |                                     |                                      |
|                  | Metal Cleaning              | Aqueous              | 1993                         | 4                              | 40%                    | 1.18                                | 0                                    |
|                  |                             | Semi-Aqueous         | 1993                         | 4                              | 60%                    | (3.87)                              | 0                                    |
|                  |                             | Recovery             | 1993                         | 2                              | 100%                   | (4.17)                              | 0                                    |
| Tobacco          | Fluffing                    | Carbon Dioxide       | 1993                         | 2                              | 100%                   | 5.00                                | 0                                    |

1 Producer costs include retooling costs, costs of alternative chemicals, and operating costs.

2 Consumer costs include energy costs for operating consumer equipment, early retirement or retrofit costs for consumer equipment (where applicable), and half of the retooling costs in the MACs and domestic refrigerator sectors.

Table 3.2 (Cont.)

| SECTOR                           | APPLICATION                    | CONTROL TECHNOLOGY       | EARLIEST<br>ESTIM.<br>AVAIL. | YEARS TO<br>REACH<br>MAX. PEN. | MAX.<br>MARKET<br>PEN. | PER KG.<br>COST TO<br>IND.<br>US\$1 | PER KG.<br>COST TO<br>CONS.<br>US\$ 2 |   |
|----------------------------------|--------------------------------|--------------------------|------------------------------|--------------------------------|------------------------|-------------------------------------|---------------------------------------|---|
| 1.1.1-TCA<br>Solvent<br>Cleaning | Electronics<br>Cleaning        | No-clean                 | 1993                         | 4                              | 40%                    | (5.64)                              | 0                                     |   |
|                                  |                                | Aqueous                  | 1993                         | 4                              | 20%                    | (6.74)                              | 0                                     |   |
|                                  |                                | Semi-aqueous             | 1993                         | 4                              | 30%                    | (8.10)                              | 0                                     |   |
|                                  |                                | HCFC-225                 | 1995                         | 2                              | 10%                    | (0.53)                              | 0                                     |   |
|                                  |                                | Recovery                 | 1993                         | 2                              | 100%                   | (4.57)                              | 0                                     |   |
|                                  | Metal Cleaning                 | Aqueous                  | 1993                         | 4                              | 40%                    | (1.44)                              | 0                                     |   |
|                                  |                                | Semi-aqueous             | 1993                         | 4                              | 60%                    | (5.36)                              | 0                                     |   |
|                                  |                                | Recovery                 | 1993                         | 2                              | 100%                   | (8.07)                              | 0                                     |   |
|                                  | Aerosols                       | Cleaners                 | Hydrocarbons                 | 1993                           | 1                      | 100%                                | (5.70)                                | 0 |
|                                  | Foams                          | Appliances               | HCFCs                        | 1994                           | 2                      | 20%                                 | 3.40                                  | 0 |
| Other                            |                                |                          | 1994                         | 2                              | 80%                    | 3.40                                | 0                                     |   |
| Flexible                         |                                | Methylene<br>Chloride    | 1993                         | 2                              | 100%                   | (2.96)                              | 0                                     |   |
| Rigid                            |                                | HCFC Blend               | 1994                         | 2                              | 100%                   | 3.40                                | 0                                     |   |
| Polystyrene<br>Packaging         |                                | HCFC-22                  | 1993                         | 2                              | 30%                    | 2.09                                | 0                                     |   |
|                                  |                                | Pentane                  | 1993                         | 2                              | 70%                    | 1.25                                | 0                                     |   |
| Fire<br>Protect                  |                                | Portable<br>(halon 1211) | Carbon                       | 1993                           | 4                      | 20%                                 | 5.38                                  | 0 |
|                                  | Dioxide                        |                          | 1995                         | 2                              | 80%                    | 0.90                                | 0                                     |   |
|                                  | Alt. Chemical                  |                          |                              |                                |                        |                                     |                                       |   |
|                                  | Total Flooding<br>(halon 1301) | Carbon                   | 1993                         | 4                              | 10%                    | 40.74                               | 0                                     |   |
|                                  |                                | Dioxide                  | 1995                         | 2                              | 90%                    | (9.55)                              | 0                                     |   |
|                                  | Alt. Chemical                  |                          |                              |                                |                        |                                     |                                       |   |

1 Producer costs include retooling costs, costs of alternative chemicals, and operating cost.

2 Consumer costs include energy cost for operating consumer equipment, early retirement or reprofit costs for consumer equipment (where applicable), and half of the retooling costs in the MACs and domestic refrigerator sectors.

In calculating the costs of the above phaseout scenarios, five elements were taken into account, namely:

- (1) ODS reduction schedules imposed by the Protocol;
- (2) forecasts of unconstrained demand for ODSs;
- (3) ODS control characteristics;
- (4) a phaseout strategy; and
- (5) a discount rate.

The model used these elements to develop a sequence of actions to be undertaken and calculated the costs of achieving a phaseout for a particular strategy. The current phaseout schedules applicable to developing nations for the relevant Annex A and Annex B ODSs in the Montreal Protocol were applied. In accordance with the recommendation of NEDA, a real discount rate of 15 percent was used.

For each of the three strategies described above, the ODS reductions in each year that result from control actions undertaken were determined. Each action's reductions were then multiplied by the per-kilogram cost of that control (discussed below). The total costs of a strategy was the discounted stream of costs for all the individual control actions that make up the strategy.

#### Key Methodological Assumptions

A number of assumptions underlie the analysis and were built into the computer model used to estimate phaseout costs. Among the most important are the following:

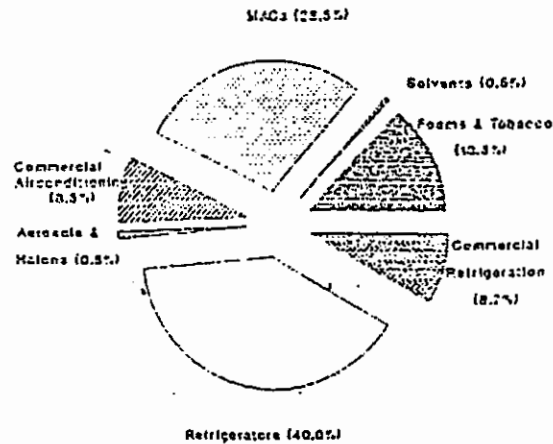
- \* Cost-saving ODS alternatives or controls do not offset total costs. Rather, these alternatives are assumed to occur at zero cost. The reason for this is that cost-saving controls should occur regardless of the Montreal Protocol because of the economic incentives to implement cost-saving options. It could be argued that various market failures hinder the adoption of cost-saving ODS alternatives, and that because the Montreal Protocol effectively overcomes these barriers the benefits of these alternatives should be attributed to the Protocol. Such an approach will reduce the costs of a phaseout. This approach, however, is not followed here.
- \* Cost-saving (or no-cost) ODS alternatives and controls are implemented as soon as they are available. Again, it is assumed that economic incentives would lead firms and individuals to take advantage of these savings as soon as they could. For purposes of this study, the earliest possible actions are assumed to occur in 1993.

- \* Both domestic and export-related ODS solvent cleaning are assumed to phaseout the use of ODSS simultaneously - in the slowest phaseout scenarios not later than the year 2000 for CFCs and 2005 for 1,1,1-trichloroethane. The year 2005 is when developed country signatories to the Protocol can no longer import products manufacturing processes for domestic and export products (especially where domestic use is a fraction of total use), and thus would find it advantageous to switch all operations to non-ODS alternatives. This assumption is made only in the solvent cleaning sector because it is the only sector in which exports dominate manufacturing activity, and applies to all phaseout scenarios evaluated in this report. The constraint is also applied to other export sectors in the calculation of costs through implementation of a preferred strategy.
- \* All recycling and recovery controls are assumed to start at least as early, if not prior to, of the conversion to alternatives in the relevant end uses. In addition, it is assumed for purposes of calculating the incremental cost per kilogram of ODS use avoided, that these recycling and recovery controls will continue to be used for equipment using the alternatives to ODSS.<sup>4</sup>
- \* ODSS recovered or recycled are assumed to offset use, and therefore, offset imports of ODSS.
- \* The analysis is carried out until the year 2015. However, only costs incurred through the year 2010 are considered for phasing out CFCs and halons with the exception of any premature retirement or retrofit costs. The costs of phasing out 1,1,1-trichloroethane, as well as premature retirement and retrofit costs are considered through to 2015. These costs are added to determine the total cost under each scenario. In some cases, adopting an alternative results in permanent recurring costs. Calculation data as when a chemical substitute is less energy efficient or if an alternative costs more. Theoretically, such costs continue indefinitely; they were assumed to stop by 2015 to provide some bound on the analysis.

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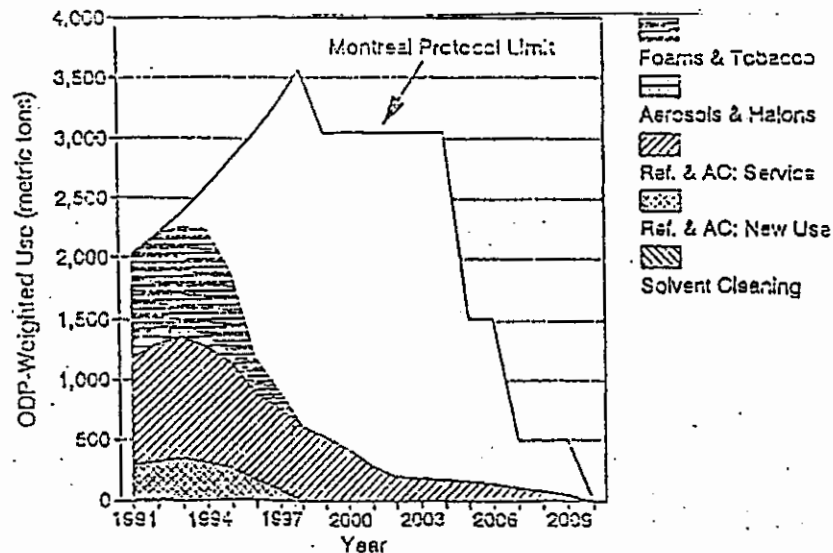
4 As shown in Appendix B, Section 3.2 there are no incremental costs for all recovery and recycling controls, and therefore, these controls are assumed to start in 1993 itself for all scenarios.

Figure 3.1  
Domestic Phaseout Costs  
by End Use



Most of the costs, occur in the refrigeration and air conditioning sectors because of the high per kilogram cost of converting to alternatives as well as the large amount of ODP weighted use of these sectors.

Figure 3.2  
Remaining ODS Use under Preferred Strategy  
vs. Montreal Protocol



As illustrated by the phaseout exhibit, with the exception of servicing existing refrigeration and air conditioning equipment, all ODS use in the Philippines is phase out by 1998. ODS use for servicing such equipment continues until 2010.

### 3.3 ACTION PLAN

The Philippines is in an entirely unique situation: many of its program proposals have been approved for funding and ODS phaseout activities undertaken even before it had completed and submitted its Country Program.

Furthermore, certain activities have already been put in place which laid the foundation for a coordinated activities supporting Country Program implementation.

#### 3.3.1 Government Actions

##### 3.3.1.1 Institutional Measures

##### (a) Institutional Strengthening for Ozone Desk Operations

The Department of Environment and Natural Resources has already created an Ozone Desk and two supporting advisory groups: the Technical Working Group and the Program Steering Committee. The former is made up of technical persons from relevant government agencies while the latter consists of senior level members of government agencies. At the subnational level, the Ozone Desk will be supported through a network of ODS officers designated in each of the 14 regions of the country. As the lead institution, the Philippine Ozone Desk (POD) is tasked to provide the policy framework for the Montreal Protocol implementation in the Philippines and oversee the preparation of the CP. Its additional responsibilities are as follows:

- ensure compliance of timetables set for reducing emission and consumption of ODSs;
- strengthen procedures for restricting imports of ODSs;
- report to the Montreal Protocol Ozone Secretariat in Nairobi, Kenya;
- participate in international fora and contributing to UNEP technical assessments;
- coordinate with relevant government agencies;
- work on projects to phaseout ODSs, perhaps with the assistance of multilateral and bilateral agencies;
- evaluate the effectiveness of phaseout-related activities;

- make recommendations to the Senate for any amendments to the Protocol; and
- collect national data on ODS consumption.

US\$225,000 was approved by the MF Executive Committee in March 1993 to strengthen Ozone Desk Operation. The assistance will cover acquisition for office equipment and supplies, salaries and wages for dedicated staff for a period of three years, and travel expenses.

(b) Technical Assistance (TA) for the Government Financial Intermediary (FI)

The main objective of the TA is to strengthen the technical capability of the selected FI to undertake the following:

- a. appraisal of proposals,
- b. disbursement of OTF grants, and
- c. supervision of project implementation.

The FI will have an important role in the implementation of the subproject components.

Emphasis of the TA for the FI will be on training through seminars, participation in local and international conferences, and on-the-job trainings. In March 1993, the MF Executive Committee approved US\$100,000 for technical assistance for the GFI.

Execution of Memorandum of Agreement between DENR and the GFI (Refer to Annex E)

The MOA which defines the areas of responsibilities between the Ozone Desk, DENR, and the GFI, provides the framework for the FI role in development and implementation of projects financed from the Multilateral Fund. In brief, while the FI has the main responsibility of project appraisal, disbursement of funds, and project implementation, the Ozone Desk has the right to monitor the progress of project implementation in fulfillment of its overall responsibility in implementing the country program.

### 3.3.1.2 Regulatory Measures

#### Chemical Control Order

The Philippine Government has enacted several policy measures to regulate the consumption of ODS in industry. One such measure is Republic Act 6969 entitled "Toxic Substances, Hazardous and Nuclear Wastes Act of 1990" which pertains to the regulation and control of all unregulated chemicals, hazardous wastes, and nuclear wastes. The DENR has also issued Administrative Order No. 29 which took effect September 5, 1992. This order stipulates that from the Philippine Inventory of Chemicals and Chemical Substances (PICCS), priority chemicals will be identified and for each of these chemicals, a chemical control order (CCO) will be issued.

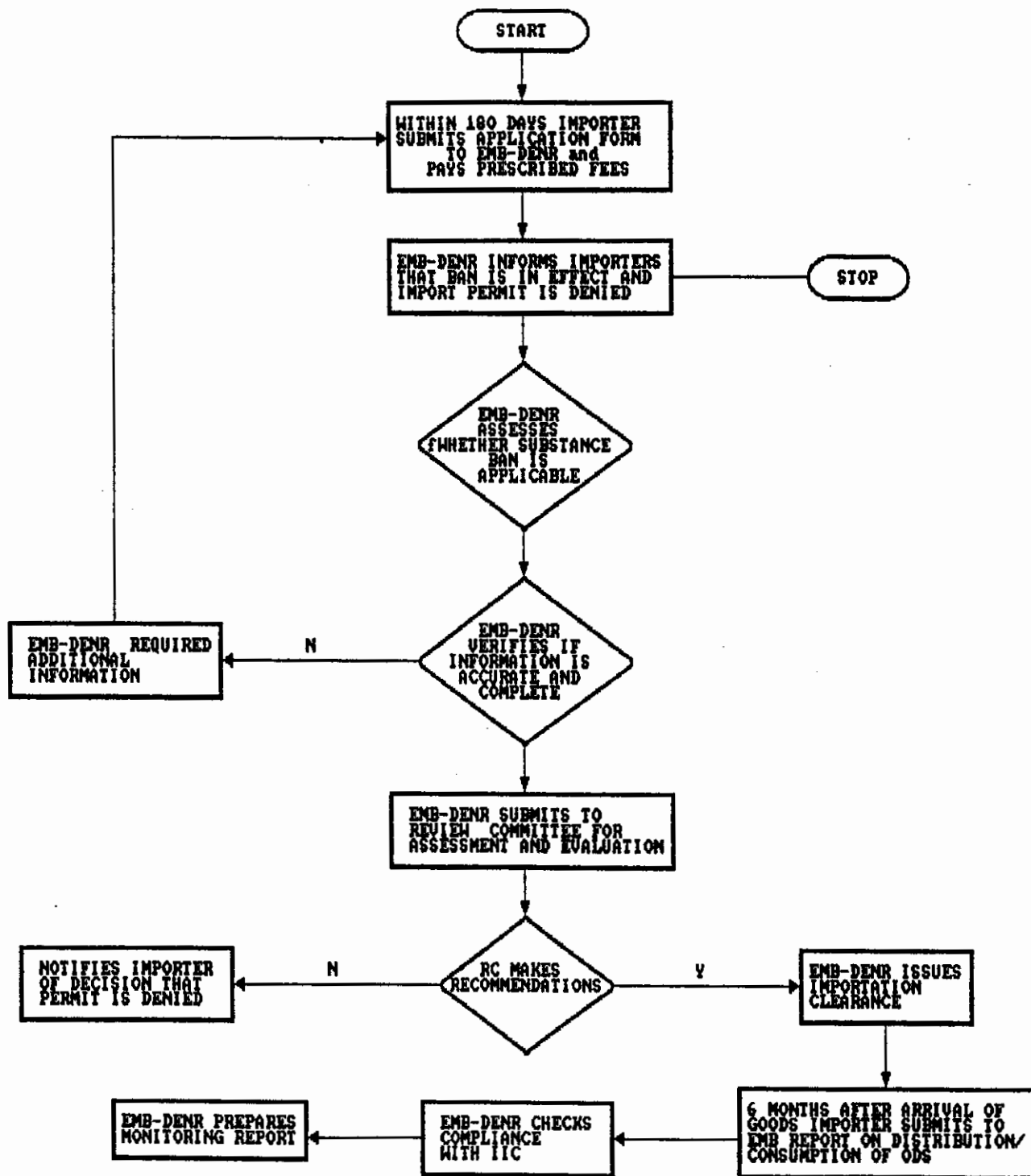
Among the first priority chemicals and in conjunction with global priorities and concerns, ODSs are now regulated through the issuance of importation clearance by the Environmental Management Bureau of the DENR. The regulatory and monitoring system will cover the controlled substances under the Montreal Protocol and the London Amendment as well as HCFC-22 and other transitional and potential substitute chemicals. Furthermore, new infrastructures have to get an environmental clearance certificate (ECC) which, among others, states the use of non-ODS in its construction materials.

In essence, the CCO applies both to ODSs and to equipment that contain and use these substances. This covers the import, sale, consumption, use, distribution, waste management, handling, storage, reclamation, recycling, reprocessing, and transport of ODSs. The proposed approach for addressing ODS outlined in Figure 3.3 illustrates the step by step procedure of importers, ODS handlers, and the DENR as regulatory agency.

To help guide the overall phaseout efforts, EMB-DENR will also propose chemical and equipment specific bans.

Proposed ODS and equipment specific bans are summarized in Table 3.3. Periodical assessment will be made by the TWG and the Montreal Protocol Steering Committee as consumption patterns, prices, possible substitutes, and new technologies change over time. If necessary, EMB-DENR will implement an import quota system to ensure that interim phaseout targets for each ODS are met.

Figure 3.3  
Flowchart/Procedure for ODS Regulation



In addition, an accreditation system will be issued to technicians and ODS handlers to ensure that people dealing with or directly involved in the use of CFCs, halons, and other ODSs possess an adequate understanding of : (1) the role of ODS in depleting the stratospheric ozone and the consequences of the depletion; and (2) a proven ability to take effective measures to minimize emissions of ODS. The accreditation system can be incorporated in the existing program of DTI which accredits repair/service shops based on the type and quality of service offered. A training program for ODS handlers will be instituted by the DENR Ozone Desk in collaboration with the National Manpower and Youth Council (NMYC) to address these concerns.

Table 3.3  
ODS Phaseout Schedule  
ODS and Equipment - Specific Bans

|               |                                                                                    | Phaseout Year<br>----- |
|---------------|------------------------------------------------------------------------------------|------------------------|
| Refrigerators | Ban on imports of chiller unable to be retrofitted from CFC-11 or CFC-12           | Immediately            |
| MACs          | Ban on imports of new CFC-12 MACs                                                  | 1996                   |
|               | Ban on Second Hand CFC-12 MACs                                                     | 1996                   |
| Halon         | Ban on new halon 1211 portable extinguishers                                       | Immediately            |
|               | Voluntary requirement to stop testing on halon 1301 system where halon is released | Immediately            |
| Foams         | Ban on use of CFC-11 in flexible foams (PUR)                                       | 1994                   |
| Solvents      | Ban on imports of carbon tetrachloride and 1,1,1-trichloroethane                   | 1996                   |

#### 3.3.1.3 Incentives/Disincentives

The Philippine Government proposes several incentives to help ensure that ODS will be phased out according to proposed timetable. Specifically, BOI will provide incentives to promote appropriate ODS-free technologies such as: (a) recycling equipment; (b) compressor for 134a; (c) non-ODS cleaning process for electronics and metal cleaning; and (d) non-ODS for foam blowing.

### Incentives for ODS-free technologies

Concomitant with the government's goal to accelerate ODS phaseout in the country. Appropriate VAT and tariff arrangements will be designed to make non-ODS technologies more available to the sectors affected. Representations shall be made to the Fiscal Incentives Review Board under Department of Finance to determine the best option given current government policy to discourage the expansion of the use of fiscal incentives.

At present, firms shifting to ODS-free technologies are not eligible for incentives since such an activity is not listed in the Investment Priorities Plan (IPP). The incentives mentioned above however can be incorporated in the succeeding revision of the IPP by virtue of Executive Order No. 226 otherwise known as the 1987 Omnibus Investment Code. This code mandates BOI to regularly update the IPP.

In addition, firms seeking registration with the BOI will be required to install only ODS-free technology. Firms in foam-making (packaging), semi-conductors, refrigeration (air conditioning, refrigerators, and freezers), and metal cleaning are most likely to be affected.

Under RA 6939 known as "Cooperative Code" the government provides duty-free importation of equipment, product process of equipment not available locally, no sales tax on intra and inter-cooperative transactions, and income tax vacation on cooperatives with capital less than P12 million.

#### 3.3.1.4 Information Awareness Campaign

News on environmental issues and its effects on the lives and surroundings of the Filipino people are scarce, and more scarcer information on the issue of ozone-depleting substances. There is an urgent and immediate need for an intensive and sustained information and communication campaign to be launched using all forms of media - print, broadcast, film, theater, and the interpersonal approach.

In 1992, a series of conferences/workshops funded by UNDP were held in selected cities regarding ODSs and alternative chemicals and systems. These were done in coordination with an NGO, The Likhaan Foundation and EMB- DENR. The main target audience in these conferences were the service technicians in the refrigeration and air conditioning sectors who were provided new knowledge and skills. In the same year, the Philippines became a member of the ODS officers network in the ASEAN and the Pacific Region where the ongoing concern is on information exchange regarding appropriate technologies and identification of common projects to be undertaken in complying with the MP.

For the second quarter of 1993, regional consultation have been lined up for implementation. The Regional Development Council members including NGOs, and members of the industry are the target participants. The RDC is the policy making body in the region hence, it is an important forum for introduction of the Country Program. The regional consultations will include a briefing on ODSs, the Montreal Protocol, and the country program on the phasing out of ODS.

Table 3.4 shows the multimedia plan of the Philippines on the of ODS phaseout. A budget of US\$ 200,000 is approved by the Executive Committee of the Multilateral Fund to help the Philippine Government implement this plan. The Philippine Information Agency is proposed to be the implementing agency for the information campaign.

#### 3.3.1.5 Monitoring

Monitoring will be of two types: (1) monitoring of ODS consumption to ensure that the phaseout targets are met and reporting the same to the MP Secretariat as part of the commitment and (2) monitoring program effectiveness. The monitoring of consumption will be undertaken through the following:

- a. collection of data from BOC;
- b. EMB's issuance of import clearances and chemical control orders;
- c. collection of data from the importers and importer/users; and
- d. enterprises.

To systematize data collection, analysis and tracking a computerized data base will be set up at EMB-DENR.

The compliance monitoring envisioned will not only function as a regulatory procedure but will also assist in developing efficient and realistic policy actions. In effect, it will also serve as a vehicle for monitoring effectiveness of phaseout program. Quantifiable indicators and milestones will be established for program effectiveness.

**Table 3.4**  
**Multimedia Communication Plan for Phaseout of ODSs**

| Communication Problem                                                                                                                                                        | Objective                                                                                                                                                    | Target Audience                                                                               | Activity/Output                                                                                                                                                                                                                                                                                                                                                                                                                                      | Message                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Ignorance of the industry and general public regarding the hazardous effects of ODSs on the environment and on people's health                                            | 1. To launch a multimedia communication plan to make people aware and understand the ill-effects of ODS.                                                     | - industry leaders<br>- NGOs<br>- consumers<br>- general public                               | 1.1 brochure, 1 primer (4 kinds, two languages) (50,000 copies each)<br>1.2 posters (2 kinds, 30,000 each)<br>1.3 column feeds<br>1.4 radio plug (1 minuter) (20 copies, nationwide)<br>1.5 kapihan (broadcast)<br>1.6 broadcast feeds<br>1.7 film plug (1 minuter)<br>1.8 komiks centerspreads (two kinds, four komik titles)<br>1.9 television plug (1 minuter) (6 copies, nationwide TV stations)<br>1.10 photo exhibit (colored photos) students | - will contain general information about the dangers of ODS nationwide, its ill-effects on the environment and on the health of living things, and the immediate need to phaseout ODS |
| 2. Lack of understanding of policymakers, industrialists, and consumers regarding the immediate need to replace ODS with safe/environment-friendly chemicals or substitutes. | 2. To heighten understanding of policymakers/industrialists/capitalists re: ODSs; to enable them to draw up positive plans for their constituents/consumers. | - policymakers<br>- industrialists<br>- capitalists<br>- consumers<br>- car/appliance dealers | 2.1 slide-tape presentations (one-carousal STP; 5 minuter)<br>2.2 brochure/primer (10,000 copies, full color)<br>2.3 talk shows (Probe, Viewpoint, Mel & Jay)                                                                                                                                                                                                                                                                                        | - will contain technical information about ODS; about the Montreal Protocol and the Philippine commitment to the MP                                                                   |
| 3. Lack of technical knowhow and resources regarding the substitution of ODS                                                                                                 | 3. To inform people particularly those involved in the use of ODS about alternate technologies/ chemicals in the event of total ODS phaseout                 | - industrialists<br>- automotive dealers, repair shops<br>- consumers                         | 3.1 Seminars/Workshops<br>3.2 Brochures on technological transfer (2 kinds/ 10,000 copies each, 2 colors)<br>3.3 CTR featurette (2 minuter)                                                                                                                                                                                                                                                                                                          | - will contain technical knowhow in the adoption of alternate approaches                                                                                                              |

### 3.4 INVESTMENT AND TECHNICAL ASSISTANCE PROJECTS

The Philippines submitted its first tranche of investment projects at the Ninth Meeting of the Multilateral Fund Executive Committee in March 1993. Of the 16 projects submitted, 10 were officially approved by the Executive Committee while six were categorized as "identified". The funds for the approved projects total US\$ 11.42 million. The funds for the identified projects total US\$ 3.32 million.

This section summarizes the projects that have already been approved and identified and also suggests several potential investment and technical assistance projects that could be proposed by the Government of the Philippines for financing by the Multilateral Fund.

#### Projects Categorized as "Approved"

##### FOAMS

Project A-1: "Conversion of Appliances from Current CFC-11 Blowing Agent to low-CFC foam and to HFC-134a"

**Project Description.** These projects will phaseout the consumption of CFC-11 at four majority Filipino-owned appliance manufacturers: Philacor, Concepcion, Sanyo, and Federal Electric. Each of these companies uses CFC-11 as a blowing agent in the manufacture of rigid polyurethane foam, which is used to insulate the refrigerators they assemble. The project will comprise two phases. The first phase will convert the facilities in the short term from the current CFC-11/isocyanate/polyol mix to a low-CFC foaming agent formulation. It will also convert the facility from low to high pressure foam mixture handling equipment. Depending upon technological availability and other factors such as the price of CFC-11 and emerging chemical substitutes, the first phase may also involve a conversion from low-CFC foam to HCFC-22 or a blend of HCFC-22/HCFC-142b or HCFC-141b. The second phase will result in conversion of blowing agent to HFC-134a.

The following are the approved projects falling under this category:

1. Application of a Reduced CFC Blowing Agent and non-CFC Application preparation at Philippine Appliance Corp. (Phase I)
2. Application of Reduced CFC Blowing Agent and Non-CFC Application preparation at Concepcion Industries (Phase I)

3. Application of Reduced CFC Blowing Agent and Non-CFC Application preparation at Sanyo Philippines (Phase I)
4. Application of Reduced CFC Blowing Agent and Non-CFC Application Preparation at Federal Electric Company (Phase I)

## SOLVENTS

Project A-2: "Substitution of Non-ODS Technologies for CFC-114 and 1,1,1-Trichloroethane in the Electronics Industry"

**Project Description.** These projects will involve converting five majority-owned Filipino electronics manufacturers from CFC-113 and 1,1,1-trichloroethane to non-ODS alternatives in their cleaning processes. Companies with project proposals already approved by the Multilateral Fund are Ionic Circuits, Pacific Semi-Conductors, Electronic Assemblies, Integrated Microelectronics, and Solid Circuits.

The approved projects are listed below:

1. Conversion to Semi-Aqueous and Aqueous Cleaning Solvents at Ionic Circuits, Inc.
2. Conversion to Low-Emission Processing and Organic Solvents at Pacific Semi Conductors, Inc.
3. Conversion to Semi-Aqueous and Aqueous Cleaning Solvents at Electronic Assemblies, Inc.
4. Conversion to High-Purity Water Cleaning at Integrated Microelectronics
5. Conversion to Semi-Aqueous Cleaning Solvents at Solid Circuits.

## TOBACCO EXPANSION

Project A-3: "Conversion of Tobacco Expansion Process from CFC- 11 to Carbon Dioxide"

**Project Description.** This project will eliminate the consumption of CFC-11 for tobacco expansion at Fortune Tobacco Corporation and replace it with a carbon dioxide-based system. Since Fortune Tobacco is the only company in the Philippine that uses CFCs to expand tobacco, eliminating its use of CFC-11 will simultaneously eliminate all CFC use in the Philippine tobacco puffing sector. The proposed project addresses only the phaseout of CFC-11 in Fortune's tobacco expansion process and does not provide assistance to other parts of Fortune's cigarette manufacturing operations.

## Projects Categorized as "Identified"

### Refrigeration and Air Conditioning

#### Project I-1: "Centralized CFC Refrigerant Recycling Plant and Training Program"

**Project Description.** The implementation of a centralized refrigerant recycling network in Metro Manila will be an effective means of increasing participation in refrigerant recycling. The central recycling plant will have the equipment to carry out the following functions:

- analyze incoming refrigerant to ensure it is a pure refrigerant (i.e., not a mixture of refrigerants);
- transfer the incoming refrigerant from the recovery cylinders into bulk storage tanks;
- clean the incoming refrigerant to the purity of new refrigerant;
- analyze the reclaimed refrigerant to ensure it is of the purity required; and
- transfer the recycled refrigerant from bulk storage tanks to smaller cylinders.

It has been proposed that such a facility be situated in Makati to be easily accessible to Metro Manila users of refrigerants. It has also been proposed that the Appliance Service Association of the Philippines (ASAP) be in charge of running the facility. The project will also include a training program for refrigeration equipment and service technicians. Representatives from refrigerant distributors, service companies for commercial and industrial refrigeration and air conditioning equipment, mobile air conditioner, repair shops, and equipment owner will be trained for improved refrigeration conservation and handling.

#### Project I-2: "Demonstration Program for Recycling of CFC-12 in MACs"

**Project Description.** The MACs service and repair sector is the largest consumer of ODSs in the Philippines. The purpose of this project is to demonstrate the cost effectiveness for Filipino companies to purchase and use refrigerant recycling equipment. A selection of 100 MACs service and repair companies of varying sizes will participate in the project.

It has been recommended that 75 of the companies be located in Metro Manila with the remaining 25 companies be established in Cebu and Davao. It has been recommended that the project be managed by the Department of Trade and Industry. The proposed project will last for two years during which time an administrative body will collect and review data supplied by the participants and submit summaries regularly to DENR.

Project I-3: "Conversion of Household Appliance Manufacturers from CFC-12 to HFC-134a

**Project Description.** This two-phase project will fund engineering and design assistance to determine how best to replace the use of CFC-12 with HFC-134a in household refrigerators manufactured by four majority-owned Filipino companies: Philacor, Concepcion, Sanyo, and Federal Electric.

Phase I will provide assistance to design, test, and introduce HFC-134a refrigeration systems. In addition, Phase I will implement refrigerant recovery and reclamation practices for refrigerators that are being serviced or repaired at the plant.

Phase II will fully convert the product lines from CFC-12 to HFC-134a by installing new oil and refrigerant charging equipment, and cylinders, piping, and oil preparation equipment that are HFC-134a exclusive.

#### Proposed Projects and Technical Assistance Activities

##### Monitoring

Project P-1: "Establishment of Computerized DataBase to Track Imports and Consumption of ODS"

As discussed in Section 3.2.1.2, the Chemical Control Orders permitted under Republic Act 6969 are some of the most critical of the policy measures proposed to reduce and eventually eliminate ODSs in the Philippines. It will be essential for EMB-DENR to have a reliable means of monitoring data on the importation and consumption of ODSs. It is proposed, therefore, that a computerized database system be set up. This database would reside with EMB-DENR. Such a system could be developed at low cost with funding provided by the Multilateral Fund.

## Refrigeration and Air Conditioning

### Project P-2: "Feasibility Study and Technical Assistance for the Commercial Refrigeration and Air Conditioning Sectors"

Much of the equipment used in commercial refrigeration and air conditioning applications in the Philippines have lifetimes extending beyond the phaseout date for CFC imports (for servicing). A feasibility study is proposed to assist owners of such equipment by examining the various options to reduce and eliminate consumption of CFCs. The study will involve four parts:

first, an inventory of equipment and CFC consumption in the sector will be undertaken;

second, options for specific users will be assessed. Options include recovery, recycling, retrofits, and purchase of new equipment;

third, technical assistance will be provided as needed to owners of chillers; and

fourth, project proposals for specific users will be prepared for submission to the Multilateral Fund.

### Project P-3: "Feasibility Study for the Local Manufacture of MACs Recycling Equipment"

Since the MACs sector in the Philippines is one of the largest consumers of CFC-12, the Philippine government is committed to reduce CFC-12 in this growing sector. Moreover, the government is interested in promoting the local manufacture of technologies such as recycling equipment to help reduce the cost to enterprises of engaging in ODS reduction activities. A study is proposed therefore, to examine feasibility of fabricating CFC-12 recovery and/or recycling equipment in the Philippines.

## Methyl Bromide

### Project P-4: "Feasibility Study for Users of Methyl Bromide"

Methyl Bromide is used in the Philippines as a soil and crop fumigant and in the rattan furniture manufacturing sector (a US\$260 million a year industry). A feasibility study is proposed to assist users of methyl bromide identify suitable alternatives. The study will involve three parts:

- first, an inventory of methyl bromide consumption in the sector will be undertaken;
- second, options for specific users in the agricultural and furniture making industry will be assessed; and
- third, project proposals for specific users will be prepared for submission to the Multilateral Fund.

#### Fire Protection

##### Project P-5: "Feasibility Study for Halons Conservation, Training, and Recycling"

Increased training of personnel working in areas protected by halon systems significantly reduces the amount of halons discharged from the system by 30 percent at essentially no extra cost. In addition, implementing alternative training and testing systems will eliminate unnecessary halon discharges. Commercial users of halon systems will be provided with educational materials to raise awareness about the need for prudent use of halons and about improved maintenance of halon fire protection systems.

The objective of this proposal project is to investigate more fully the use of halons in the Philippines and to implement a program that will conserve halons, train halon-using personnel, and to set up a halon recycling program with the assistance of halon suppliers in the country. This project will substantially reduce halon-1211 use where it is not essential by implementing appropriate training and testing procedures. The project will also develop a network for halon 1211 recycling. In the initial stages of this project, it is likely that a detailed survey will have to be carried out to assess halon usage.

#### Solvent Cleaning

##### Project P-6: "Technical Assistance for Implementing ODS Conversion Projects in the Semiconductor Industry"

The semiconductor industry is one of the fastest growing sectors in the Philippines. It is also one of the largest ODS consuming sectors. DENR requests technical assistance to help semiconductor manufacturers identify alternatives to CFC-113, 1,1,1 trichloroethane, and carbon tetrachloride and to implement conversion projects. Such assistance will help to ensure that transnational companies operating in the

Philippines phaseout ODSs at the same time as their parent companies. The experience of transnational companies in converting to non-ODS could be shared with Filipino-owned firms to help accelerate the conversion in such companies. DENR intends to work with DTI and BOI to plan a program of activities where technical assistance will be needed in the semiconductor industry.

Project P-7: "Workshop for Small Users of ODS Solvents"

In addition to the large users of ODS solvents in the semiconductor and electronics manufacturing industries, the Philippines has many small users of ODS solvents in industries such as garment manufacturing, textiles, watch making, and dry cleaning. While the individual consumption of ODSs in companies in these sectors may not be significant, the overall use of ODSs is significant. More importantly, awareness about ozone depletion, the Montreal Protocol, and alternatives to ODSs is severely lacking in these sectors. DENR proposes to undertake a series of technical workshops aimed at increasing awareness about the alternatives to ODSs.

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# **APPENDICES**

## APPENDIX C

Industrial and NGOs have taken an active role in the implementation of the phaseout of ODSs.

Several of these associations are:

- Refrigeration Engineer Association
- Pollution Control Association of the Philippines, Inc. (PCAPI)\*
- Voluntary Organization of Industries Concerning Environment (VOICE)\*
- Association of Home Appliance Manufacturers (AHAM)\*\*
- Consumer Electronic Products Manufacturer's Association (CEPMA)\*\*
- Philippine Society of Ventilating, Air-conditioning and Refrigeration Engineers (PSVARE)\*\*
- Appliance Service Association of the Philippines (ASAP)\*\*
- Semiconductor Electronics Industry Foundation, Inc. (SEIFI)\*\*

Other NGOs which have been taking aggressive and timely campaign regarding environmental issues include:

- Earth Saver Movement
- Haribon Foundation for the Conservation of Natural Resources\*
- Green Forum-Philippines\*
- Legal Rights and Natural Resources Center\*
- Lingkod-Tao Kalikasan\*
- Friends of the Biosphere\*
- Likhaan

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**APPENDIX D****Senate Resolution No. 108**

**Congress of the Philippines )**  
**First Regular Session ) S.S.**

**SENATE****P.S. No. 108**

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**RESOLUTION**

**DIRECTING THE COMMITTEES ON ENERGY AND ENVIRONMENT AND FOREIGN A CONDUCT AN IMMEDIATE INQUIRY FOR THE RATIFICATION OF THE 1990 LONDON AMENDMENTS TO THE 1987 MONTREAL PROTOCOL ON OZONE DEPLETING SUBSTANCES, THE 1989 BASEL CONVENTION ON HAZARDOUS AND TOXIC WASTES, AND THE 1992 BIODIVERSITY CONVENTION AND FRAMEWORK CLIMATE CHANGE CONVENTION**

**WHEREAS**, the 1987 Philippine Constitution mandates as a policy of the State, the protection and advancement of the right of the Filipino people to a balanced and healthful ecology in accordance with rhythm and harmony of nature;

**WHEREAS**, the 1990 London Amendments to the 1987 Montreal Protocol on Ozone Depleting Substances will qualify the Philippines for concessional funds and the technology transfer for substitution of ozone depleting substances like chlorofluorocarbon (CFC); and the conference of parties to the Montreal Protocol, which meets on November 21-28, 1992, will require formal ratification process initiated by the Philippine party to that Convention;

**WHEREAS**, the 1989 Basel Convention will establish global control of transboundary movements of hazardous and toxic wastes and their disposal;

**WHEREAS**, the 1992 Biodiversity Convention will help global conservation of biological diversity and allow biodiversity in developing countries like the Philippines, with its tropical rainforests and coral reefs, to share the benefits of biodiversity;

**WHEREAS**, the 1992 Framework Climate Change Convention will establish global control on the emission of greenhouse gases like carbon dioxide and other fossil-fuel pollutant gas which increase global warming;

**WHEREAS**, the Philippine Strategy for Sustainable Development, adopted in 1989 with the Executive Cabinet, takes a balanced and integrated approach to environment and development through incorporation of sustainable use concepts and practices in the national priorities of government;

**WHEREAS**, the Department of Environment and Natural Resources (DENR) and the Department of Foreign Affairs (DFA) have formally requested His Excellency, President Fidel V. Ramos, to request the Senate to ratify the aforementioned Conventions regarding environment, and President Ramos had done so; **NOW, THEREFORE**,

**BE IT RESOLVED**, as it is hereby resolved, to direct the Committees on Energy and Environment and Foreign Affairs to conduct an immediate inquiry into the ratification of the A) 1990 London Amendments to the 1987 Montreal Protocol on ozone depleting substances; B) the 1989 Basel Convention on hazardous and toxic wastes; C) the 1992 Biodiversity Convention; D) the Framework Climate Ozone Convention; and E) in aid of legislation, such other relevant matters as the Rio Declaration on Environment and Development, the Agenda 21 Plan of Action and the Forestry Principles which were also produced at the 1992 UN Conference on Environment and Development, within the context of National Sovereignty, the 1987 Constitution, the Philippine Strategy for Sustainable Development and our commitments as a party to the aforementioned Conventions, and as an original member and architect of the UN upon its founding in 1949, the Association of South East Asian Nations (ASEAN) and the Group of 77.

Adopted.

(ORIGINAL SIGNED)  
HEHERSON T. ALVAREZ

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## APPENDIX E

### MEMORANDUM OF AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

This Memorandum of Agreement entered into by and between:

The Department of Environment and Natural Resources (DENR), an agency of the Government of the Philippines, with office address at Visayas Avenue, Diliman, Quezon City, represented herein by its Secretary Angel C. Alcala, hereinafter referred to as DENR;

and

The Land Bank of the Philippines, a Government Financial Institution of the Philippines with office address at 319 Sen. Gil J. Puyat Avenue Extension, Makati, Metro Manila, represented herein by its President Mr. Jesli A. Lapus, hereinafter referred to as LBP.

#### WITNESSETH

WHEREAS, the Montreal Protocol (MP) on Substances that Deplete Ozone Layer is an International Agreement which binds signatories to stop the production and consumption of Ozone Depleting Substances (ODS) and set specific targets for their phase out;

WHEREAS, the Philippines recognizing the continued depletion of the earth's ozone layer has signed the Montreal Protocol, which is duly ratified by the Philippine Senate;

WHEREAS, the DENR is mandated to be the lead agency and is tasked among others, in the formulation and the implementation of a Country Program (CP) for the Phase out of the Ozone Depleting Substances, hereinafter, referred to as the Project;

WHEREAS, the DENR has created a multi-sectoral Steering Committee and the DENR Montreal Protocol Secretariat;

WHEREAS, in the implementation of the Project and in the provisions of the Multilateral Funds, the DENR shall engage the services of a Government Financial Intermediary;

WHEREAS, the DENR upon the recommendation of the multi-sectoral Steering Committee, and with the concurrence of the World Bank, has selected LBP as the Government Financial Intermediary;

WHEREAS, the DENR upon the recommendation of the multi-sectoral Steering Committee, and with the concurrence of the World Bank, has selected LBP as the Government Financial Intermediary for the Project;

NOW, THEREFORE, FOR AND IN CONSIDERATION of mutual covenants, hereinafter set forth, the parties hereto have agreed, as they hereby agree on the following:

## I GENERAL TERMS

All projects shall be in conformity with the Philippine Country Program on Ozone Depleting Substances Phase out which is the framework in which assistance from the Multilateral Fund shall be based.

The attached Executive Project Summary (EPS), including its Annexes, i.e., Annex 1 to 5, shall form part of this Agreement.

## II AREAS OF RESPONSIBILITY

The DENR shall:

1. Review each subproject prior to appraisal to ensure that cost effective and environmentally safe technologies will be applied in accordance with Philippine laws and regulations and that the subproject conform the CP priorities;
2. Endorse the LBP subprojects for funding from the Multilateral Fund, upon concurrence of World Bank;
3. Monitor progress of MP funded subprojects in fulfillment of its overall responsibility for the implementation of the CP.

The Land Bank shall:

1. Appraise all subprojects which have been endorsed by DENR and concurred to by the World Bank. Appraisal shall be based on the criteria as enumerated in the Annex 2 of the EPS;
2. Submit all subproject appraisal summaries and reports to World Bank (copy furnish DENR) for its review to ensure compliance with MP goals and procedures and approval of grant;
3. Disburse grant approved subprojects in accordance with the disbursement procedures enumerated in Annex 4 of the EPS;
4. Ensure that subprojects have an Environmental Clearance Certificate (ECC) prior to disbursements of the grant;

5. Formulate operating policy guidelines and procedures on the implementation of the Project subject to DENR/World Bank approval;
6. Prepare tripartite contract between each enterprise, LBP and DENR to spell out responsibilities of the enterprise and its commitment to undertake the necessary activities agreed upon in the subproject proposal in order to achieve the intended ODS reduction or phase out;
7. Open an ODS window expressly for the Project to offer a financing package to subprojects where total project costs exceeds the grant amount, subject to LBP credit policies and procedures;
8. Supervise subproject implementation through the review and approval of the enterprise progress reports and verify results;
9. Provide at least the following personnel:
  - a. One officer dedicated primarily to the management of the Project.
  - b. One full time Chemical Engineer with relevant industrial experience.
10. Submit unaudited quarterly and audited annual financial statement regarding the fund and quarterly progress reports to DENR and WB; and
11. Refer to DENR the firms which have expressed interest to apply under the Project.

### III FINANCING ARRANGEMENT

The intermediary fee equivalent to 3% of the grant fund to be released by World Bank will be utilized by the LBP to defray administrative costs, monitoring and other related activities in the implementation of the Project. The FI would receive one-third (=1%) upon approval of the subproject appraisal report by the Bank, the two-thirds (=2%) upon disbursement of the grants to the subprojects.

### IV GENERAL PROVISIONS

1. Both parties agree to closely coordinate and/or consult one another in the performance of their respective responsibilities.
2. Both parties further agree to formulate necessary joint circular and/or other issuances upon concurrence by WB for the effective implementation of the Project.

This Agreement shall take effect upon signing by both parties and shall continue unless terminated by mutual consent of the parties.

This Agreement reviewed by both parties on a year to year basis to determine amendment but not to exceed year 2000.

This Agreement with appendices contains the entire Agreement between the parties and supersedes all other understandings and negotiations, on, set forth with respect to the subject matter hereof and the contemplated herein.

IN WITNESS we have hereunto affixed our signatures this \_\_\_\_\_ day (\_\_\_\_\_ 1993 at Quezon City, Metro Manila, Philippines.

DEPARTMENT OF AGRICULTURE  
AND NATURAL RESOURCES

LAND BANK OF THE  
PHILIPPINES

ANGEL C. ALCAZAR  
Secretary

JESLI A. LAPUS  
President

Witnesses

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