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Implementation of the Montreal Protocol

Seventeenth Meeting
Montreal, 26-28 July 1995

COUNTRY PROGRAMME: ROMANIA

This document consists of:

- Transmittal Letter from the Government of Romania
- Country Programme Cover Sheet
- Country Programme Executive Summary



GOVERNMENT OF ROMANIA
MINISTRY OF WATERS, FORESTS AND ENVIRONMENTAL PROTECTION
Cabinet of the State Secretary

Nr. 13648/77
Data 15.06.1995

Dr. Omar E. El-Arini,
Chief Officer
Multilateral Fund for the Montreal Protocol
Montreal, Quebec, Canada
fax: +15 14/ 282 0068

Dear Mr. El-Arini,

We are pleased to transmit hereto the Romanian Country Programme for the phasing out of the Ozone Depleting Substance in Romania

This programme was prepared by a multi-sectorial group headed by the Ministry of Water, Forests and Environmental Protection with the assistance of UNIDO, the Implementing Agency and the CowiConsult, a Danish Consulting Company.

This Country Programme is to be presented for the favorable consideration for the Executive Committee of the Multilateral Fund at its Seventeenth session, scheduled for 25 July 1995.

We expressed our thanks to the Government of Denmark and to UNIDO for the assistance in the preparation of the Country Programme.

Your Sincerely,

Ioan JELEV
Secretary of State

**Ministry of Waters, Forests
and Environmental Protection, Romania**

UNIDO

Danish Environmental Protection Agency

Country Programme for the Phaseout of Ozone Depleting Substances in Romania

Final Report

June 1995

Report No.	: 2
Issue No.	: 1
Date of Issue	: 95-06-07
Prepared	: JKP, PGM
Checked	: CHJ
Approved	:

Executive Summary

Background

On 22 March 1985 the Vienna Convention for the Protection of the Ozone Layer (Vienna Convention) was adopted by concerned countries gathered to take measures to protect the Earth's Stratosphere. The Montreal Protocol on Substances that Deplete the Ozone Layer (ODS) was signed by 24 countries in 1987 and as of 1 January 1995 it is ratified by 146 countries. When the Montreal Protocol came into effect on 1 January 1989, it required that all parties to the Protocol freeze production and consumption of chlorofluorocarbons (CFC) at 1986 levels by 1 July 1989, and by 1998 a 50% reduction was demanded. As the scientific evidence of ozone depletion increased, the phaseout requirements were tightened in London (1990) and further in Copenhagen (1992) and new substances were included in the Protocol. The main ODS are CFC (used as refrigerants, foam blowing agents, aerosol propellants, and solvents), halon (used in fire fighting equipment), carbon tetrachloride and methyl chloroform (both used as solvents).

Of the 146 countries which have ratified, 65 have been categorized as operating under Article 5, paragraph 1 of the Montreal Protocol, ie they obtain a ten-year delay in the required ODS phaseout schedule to meet basic domestic needs. Romania belongs to this group. In addition, 34 countries have been temporarily categorized as operating under Article 5, paragraph 1 of the Montreal Protocol, ie the categorization is temporary pending receipt of complete data.

Romania and the ODS Country Programme

Romania ratified the Vienna Convention, the Montreal Protocol and the London Amendments in January 1993. It has as described above been categorized as an Article 5 country. Although Romania has not yet ratified the Copenhagen Amendments, it is aiming to do so before 1 January 1996, thereby emphasising the Government's strong commitment to take the necessary measures to protect the stratospheric ozone layer.

The ODS Country Programme for Romania has been prepared under guidance of the Ministry of Waters, Forest and Environmental Protection of Romania (MWFEP), which is the lead agency in ODS phaseout in Romania. The principles of the ODS phaseout strategy provided in the Country Programme was strongly endorsed by MWFEP on 22 May 1995 in a letter to UNIDO. In addition, Government Decision No 243 concerning the establishment, organisation and functioning of the National Committee for the Protection of the Ozone Layer (CNPSO) was approved 17 April 1995.

The ODS Country Programme for Romania has two objectives. Firstly, the provision of an overview of the current situation in Romania with respect to ODS production and consumption, ODS industry structure and significant actions already taken by the Romanian Government as well as responses to the Montreal Protocol by

ODS producing and consuming enterprises. Secondly, an outline of the ODS phaseout strategy, including the Action Plan endorsed by the Romanian Government.

The following two sections summarise the current situation regarding Romanian ODS production and consumption, respectively, while the latter two sections outline the Romanian Government's ODS phase-out strategy and identified key ODS phaseout projects at enterprise level.

ODS Production in Romania

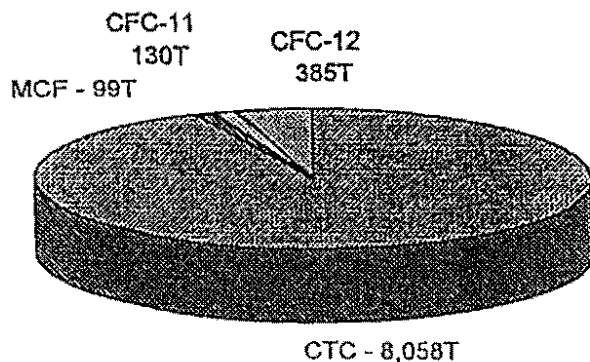
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There are only two ODS producers in Romania: BICAPA S.A., Tarnaveni, and S.C. OLTCHIM S.A., Ramnicu Valcea. The former produces the CFCs while the latter is engaged in CTC and MCF production. The two most plausible ODS phaseout options are: *a conversion to alternative production* and *a closing down of production lines*.

BICAPA considers a conversion to HFC-134a or HCFC-22. It is, however, unlikely that sufficient demand for the former exists, while the latter as a transitory substance is only a short-term solution. OLTCHIM contemplates an introduction of other chlorine-based solvents, but likely future restrictions in their use make this strategy uncertain. Increased production of PVC to absorb the chlorine is also considered as an option. A closing down of production lines will result in economic losses due to the connected nature of the chemical production process. Upstream as well as downstream problems exist. For OLTCHIM the caustic soda production will become loss-making, for example. Both BICAPA and OLTCHIM are large employers in their respective local economies, thus redundancies will have wider economic and social consequences.

At the fifteenth meeting of the Executive Committee of the Multilateral Fund, December 1994, a draft terms of reference for an expert group on the production of substitutes for ODS was presented (UNEP/OzL.Pro/ExCom./i 5/45). The functions of this expert group will be: advise on operational policies and guidelines on various technical and economic issues associated with the production of substitutes for ODS; draft the terms of reference for an audit of the ODS producing industries in each of the ODS producing Article 5 countries; and advise on any other issues in the production sector as may be requested by the Executive Committee.

Chart E1: ODS Production in Romania, 1993



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Aerosol, almost solely FARMEC in Cluj, is clearly the most important sector followed by foams. Within the foams sector, more than 70% of the CFC used is for the blowing of rigid foam for refrigeration insulation. METAPLAST in Buzau accounts for most of the remaining CFC use for rigid foam, mainly for the production of sandwich panels, while SPUMOTIM in Timisoara and CHIMICA in Orastie are the dominant producers of flexible foams based on CFC-blowing.

The 11% ODS use for refrigeration covers the CFC used as refrigerant. This was in 1993 almost evenly shared between domestic refrigeration (ARCTIC in Gaesti and U.M. SADU in Gorj), commercial refrigeration (TEHNOFRIG in Cluj and FRIGOCOM in Bucharest), and servicing of refrigeration (a few large state-owned companies including the refrigerator producers, the COMSERVICE network and the transport refrigeration company, TRANSFRIGOTREN in Bucharest, around 50 private authorised servicing shops and numerous servicing shops without authorization). In addition, a small amount of CFC is used for industrial refrigeration (TEHNOFRIG).

The solvents sector accounted for 10% of the ODS consumption in 1993, comprising several hundred companies most with a fairly small consumption. The sector is only covered scarcely in this report. This is mainly due to the variety of small companies using solvents and the diversity of applications. The main single application is for metal degreasing, and this sector is in Romania dominated by producers of ball bearings. The small use of halons for fire fighting is primarily by TAROM in Bucharest and NAVROM in Constanta.

Chart E2: ODS Consumption in Romania, 1993 (1,558 ODP-weighted tonnes)

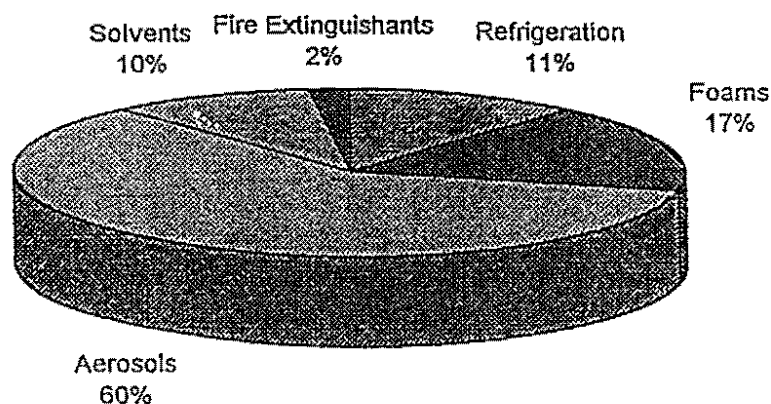
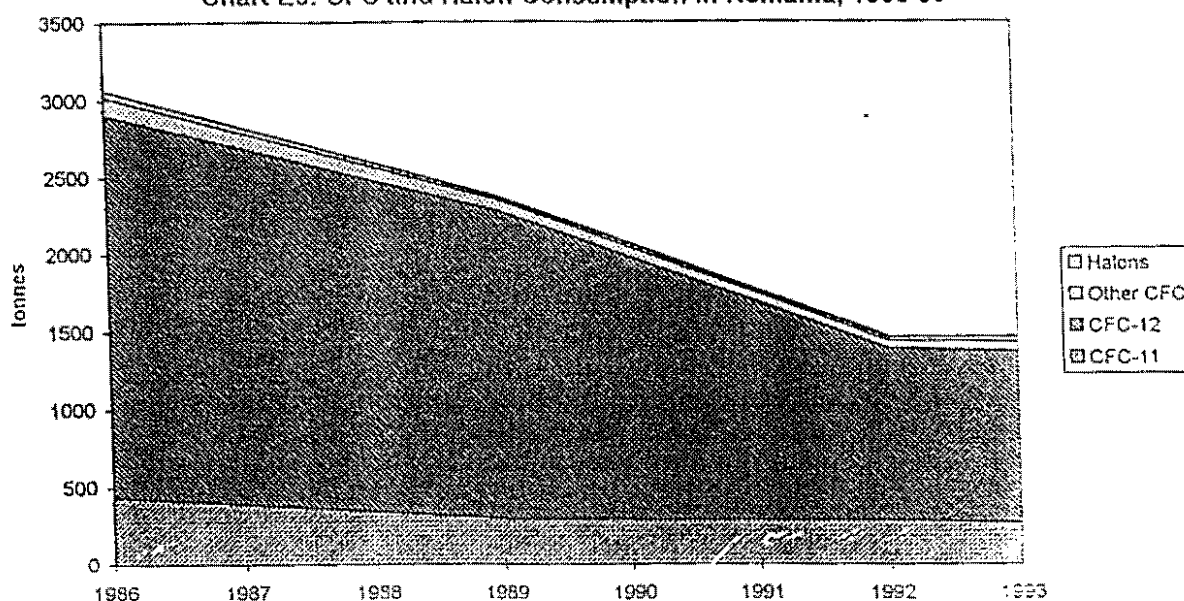


Chart E3 shows that CFC consumption has halved between 1986 and 1993. The main decline has been for CFC-12 which is primarily due to the cutbacks in aerosol production, but also because less CFC being used as refrigerant. The fairly constant foam production has meant that the use of CFC-11 has only declined little since 1986.

The options for phasing out the remaining ODS use in the different sectors varies. In aerosols the most suitable and cost-effective conversion is to propane-butane as propellant. This option is sought by FARMEC. For rigid foam-blowing conversions to either HCFC-141b or cyclopentane are feasible options, while the latter should be preferred. As refrigerant the most sought substitute for CFC-12 is HFC-134a. Various non-ODS options exist for the solvents sector, while CO₂ is the most likely substitute for halons in the fire extinguishant sector.

Chart E3: CFC and Halon Consumption in Romania, 1986-93



The Romanian Government's ODS Phaseout Strategy

The Romanian Government's point of view is that the key challenges of ODS phaseout in Romania are only partly of a technical nature. There are several non-technical factors which must be addressed and, in many cases, need more consideration than the technical issues. Technical substitution options exist or are under development in Romania though the technology in a few cases is not up-to-date compared with Western standards. Probably, the scarcity of capital and the deficiencies in the institutional set-up are the two most important challenges to completion of the necessary R&D and to successful implementation of the ODS phaseout strategy. In addition, MWFEP will implement a regulatory regime for ODS production, consumption and trade, making use of administrative and economic instruments.

The Romanian Government has urged MWFEP, which is the lead agency on issues related to the Montreal Protocol, to ensure an institutional strengthening of the ODS phaseout activities in close co-operation with the Ministry of Industries, which is responsible for the contacts to the individual enterprises on ODS phaseout related matters. This includes an inter-ministerial committee, titled the *National Committee for the Protection of the Ozone Layer* (CNPSO), having the role of promoting the measures and the actions necessary for the appli-

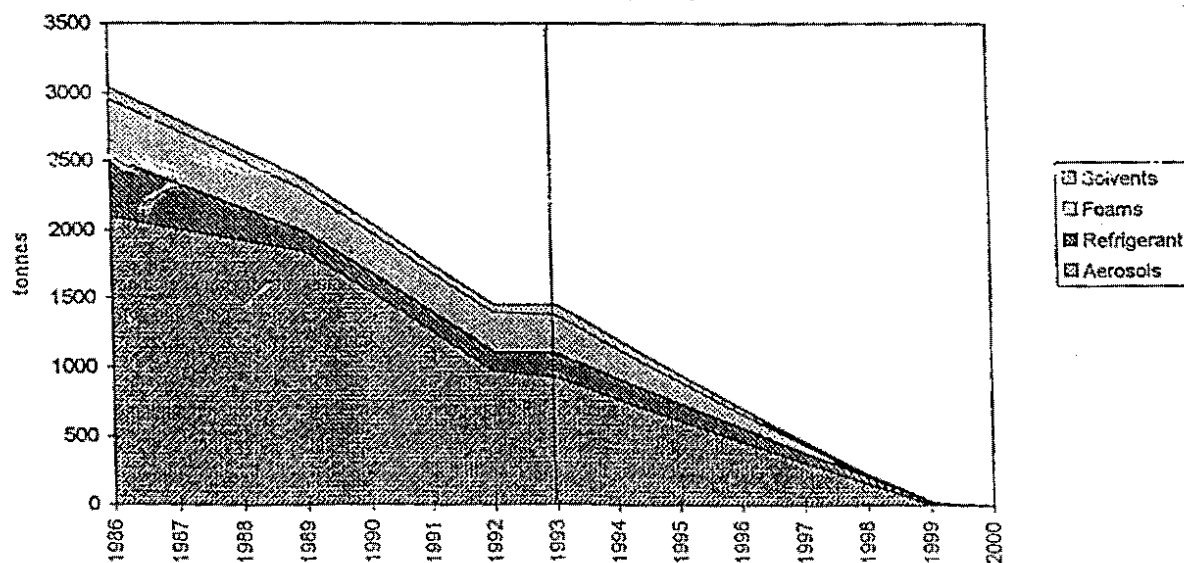
cation of the Montreal Protocol in Romania. Furthermore, two permanent bodies will be established under CNPSO: the *Ozone Secretariat* (STO) which will act as a national focal point, and the *Groups of Technical Experts* in which technical, economic and legal experts prepares proposals on ODS related matters.

The Romanian Government seeks financial assistance from the Multilateral Fund for such an institutional strengthening project as well as for conversion projects at enterprise level to non-ODS using applications. These projects are being developed by the enterprises themselves with assistance from consultants from UNIDO, ICPLAF and COWIconsult (see the following section for a list of the key projects ready for submission).

The instruments which the Romanian Government will implement to support ODS phaseout include *administrative instruments* such as improvements of customs subclassifications and ODS import licenses, introduction of ODS production licenses, bans on reexport of ODS, sector-specific bans on ODS consumption and bans on import of selected ODS based goods corresponding to the domestic sector-specific bans. It also covers *economic instruments* such as non-compliance measures and economic support for ODS phaseout activities, and *additional measures* such as monitoring arrangements, voluntary agreements with ODS import organisations and ODS producing and consuming enterprises, introduction of an accreditation system (certificates) for refrigeration servicing technicians, awareness campaign and a revision of industry norms and standards, including safety standards.

The Romanian Government's ODS Phaseout Strategy is expected to lead to a CFC consumption phaseout profile shown in Chart E4. Similar profiles are expected for halons, CTC and MCF.

Chart E4: CFC Consumption by Sector in Romania, 1986-93, and Planned Phaseout Schedule



Identified Key Projects

A preliminary list of 14 projects has been identified. This list covers seven projects in the refrigeration sector (ARCTIC, U.M. SADU, FRIGOCOM, TEHNOFRIG, COMSERVICE, ICPIAF and TRANSFRIGOTREN) three in the foam sector (METAPLAST, SPUMOTIM and CHIMICA), one in aerosols (FARMEC) and one in the solvents sector (RULMENTUL, Barlad). In addition to these, are the institutional strengthening project (MWPEF) and an information dissemination project (TERRA NOSTRA). These projects cover (almost) all the ODS used in aerosols, foams and new installations in refrigeration. The servicing of refrigeration is only partly covered, while solvents applications are very scarcely covered. There are no project for the fire extinguishant sector.

The five projects ready for submission to the Multilateral Fund at of mid-June are:

1. FARMEC S.A., Cluj, aerosols, conversion from CFC-12 to butane-propane as propellant. The project will phase out an annual consumption of 700 tonnes CFC as a cost-effectiveness of 0.52 USD/kg.
2. ARCTIC S.A., Gaesti, domestic refrigeration, conversion from CFC-12 to HFC-134a as refrigerant and CFC-11 to cyclopentane as foam-blowing agent. The project will phase out annual consumption of more than 200 tonnes of CFCs at a cost-effectiveness of 8.48 USD/kg.
3. SPUMOTIM S.A., Timisoara, flexible foam, conversion from CFC-11 to CO₂ foam-blowing. The project will phase out an annual consumption of around 30 tonnes of CFC.
4. S.C. TRANSFRIGOTREN INTERNATIONAL S.A., Oras-Buftea (Bucharest), transport refrigeration, conversion from CFC-12 to HFC-134a as refrigerant. The project will phase out an annual consumption of 10.4 tonnes of CFCs at a cost-effectiveness of 23.36 USD/kg.
5. The Institutional Strengthening project.

**Ministry of Waters, Forests
and Environmental Protection, Romania**

UNIDO

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Abbreviations and Acronyms

CEE	Central and Eastern Europe
CFC	ChloroFluoroCarbons
CIS	Commonwealth of Independent States
CMEA	Council for Mutual Economic Assistance
CTC	Carbon TetraChloride
DME	DiMethylEther
EBRD	European Bank for Reconstruction and Development
EC	European Community
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environment Facility
HCFC	HydroChloroFluoroCarbon
HFC	HydroFluoroCarbon
HP	High Pressure (foam blowing)
LPG	Liquified Petroleum Gas
MCF	MethylChloroForm
MF	Multilateral Fund
MT	Metric Tonnes
MWFEP	Ministry of Waters, Forests and Environmental Protection
NGO	Non-Government Organization
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
POF	Private Ownership Funds
PU	PolyUrethane
R&D	Research and Development
SA	Societate Anonima (Joint Stock Company)
SC	Societate Comerciale (Commercial Company)
SOF	State Ownership Fund
SRL	Societate cu Raspundere Limitata (Limited Liability Company)
TAG	Technical Advisory Group
TAGCO	TAG Coordination Office
UM	Uzina Mecanica (Mechanical Works)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
USD	US Dollar
UV	UltraViolet

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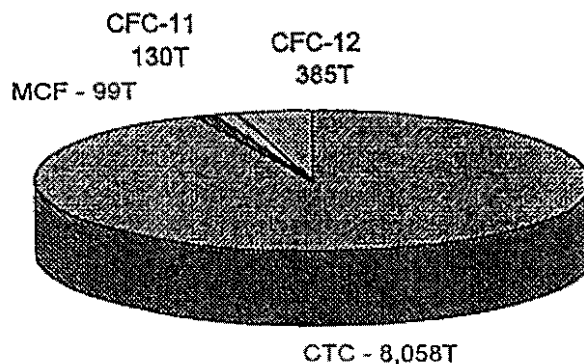
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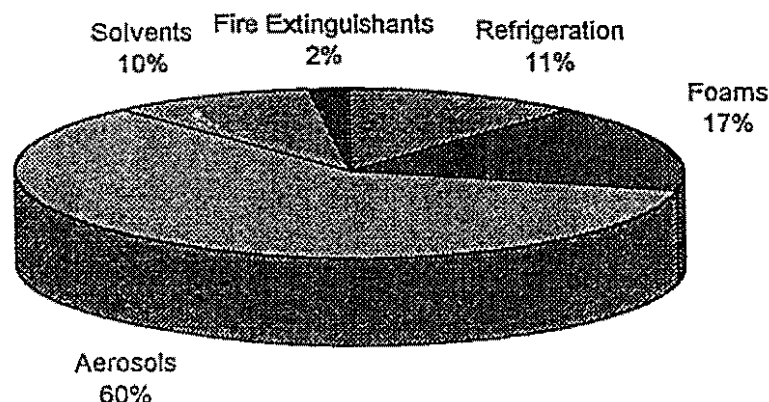
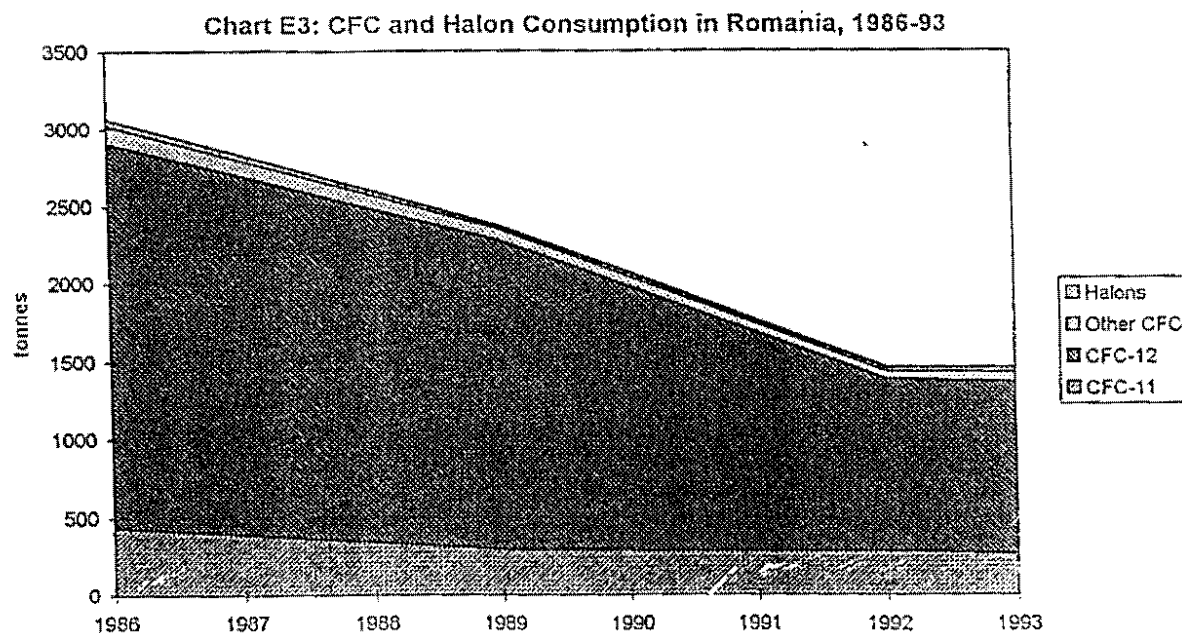


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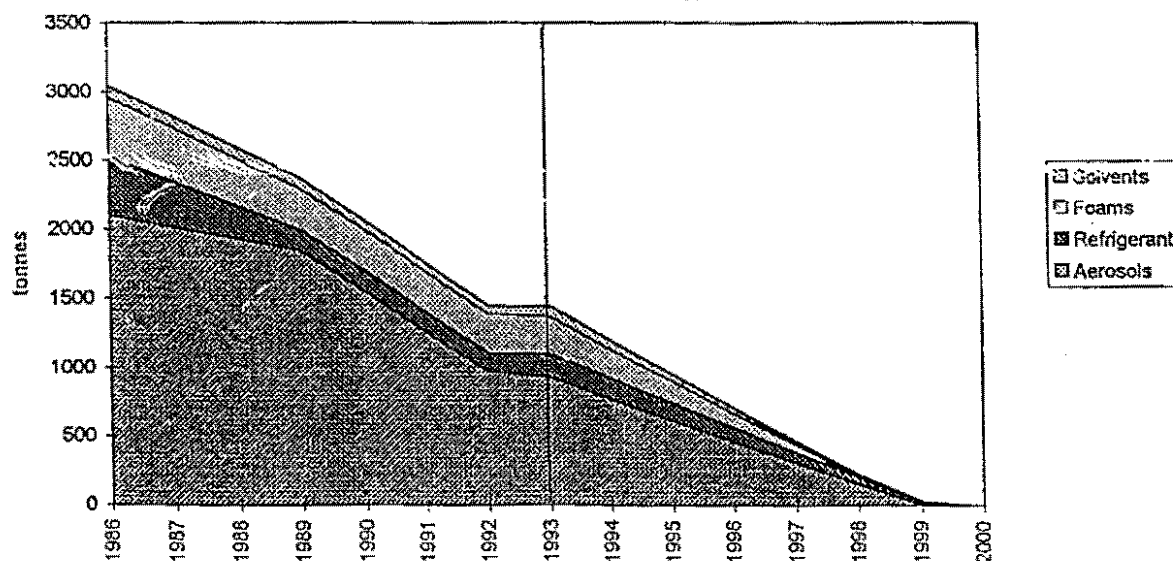
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3. SPUMOTIM S.A., Timisoara, flexible foam, conversion from CFC-11 to CO₂ foam-blowing. The project will phase out an annual consumption of around 30 tonnes of CFC.
4. S.C. TRANSFRIGOTREN INTERNATIONAL S.A., Oras-Buftea (Bucharest), transport refrigeration, conversion from CFC-12 to HFC-134a as refrigerant. The project will phase out an annual consumption of 10.4 tonnes of CFCs at a cost-effectiveness of 23.36 USD/kg.
5. The Institutional Strengthening project.

1 Introduction

1.1 The Montreal Protocol

On 22 March 1985 the Vienna Convention for the Protection of the Ozone Layer (Vienna Convention) was adopted by concerned countries gathered to take measures to protect the Earth's Stratosphere. The Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) was signed by 24 countries in 1987 and as of 1 January 1995 it is ratified by 146 countries (see Map 1).

When the Montreal Protocol came into effect on 1 January 1989, it required that all parties to the Protocol freeze production and consumption of chlorofluorocarbons (CFC) at 1986 levels by 1 July 1989, and by 1998 a 50% reduction was demanded. However, Article 2, paragraph 6 of the Protocol allows for the addition of ODS production to the 1986 base year production if new production facilities were contracted for before 16 September 1987, and completed before 31 December 1990. Thus, the base year may be different from 1986.

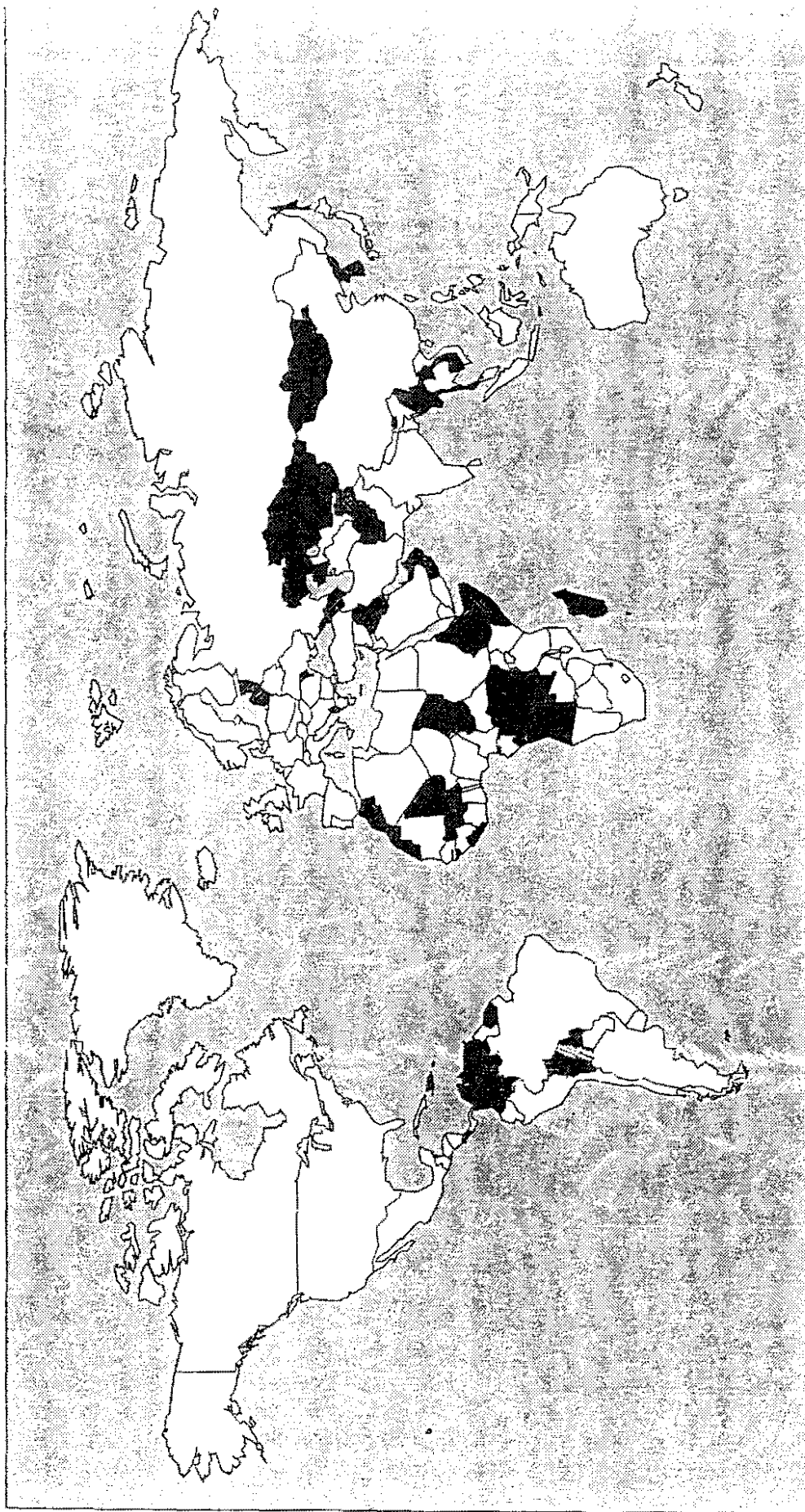
As the scientific evidence of ozone depletion increased and the potential impacts on humans and the earth's ecosystems were further defined, the phaseout requirements were tightened in London (1990) and further in Copenhagen (1992) and new substances were included in the Protocol. According to the latest adjustments, a complete phaseout of the major ozone depleting substances (ODS) must be achieved already by January 1996 (January 1994 in the case of halon, see Chart 1.1). The major ODS are CFC (used as refrigerants, foam blowing agents, aerosol propellants, and solvents), halon (used in fire fighting equipment), carbon tetrachloride and methyl chloroform (both used as solvents). A description of the main contents of the Montreal Protocol and its Amendments is provided in Appendix III.

As of 1 January 1995 the London Amendment is ratified by 100 countries. The Copenhagen Amendment entered into force on 14 June 1994 after having been ratified by 20 Parties to the Montreal Protocol, and as of 1 January 1995 it is ratified by 37 countries.

Of the 146 countries which have ratified, 65 have been categorized as operating under Article 5, paragraph 1 of the Montreal Protocol, ie they obtain a ten-year delay in the required ODS phaseout schedule to meet basic domestic needs. In addition, 34 countries have been temporarily categorized as operating under Article 5, paragraph 1 of the Montreal Protocol, ie the categorization is temporary pending receipt of complete data.

According to the Montreal Protocol (Article 5, para 1) a ten-year grace period in compliance with control measures is allowed developing country Parties whose annual calculated level of consumption of the controlled substances listed in Annex A is less than 0.3 kg per capita. These countries were hereafter referred to as Article 5 countries.

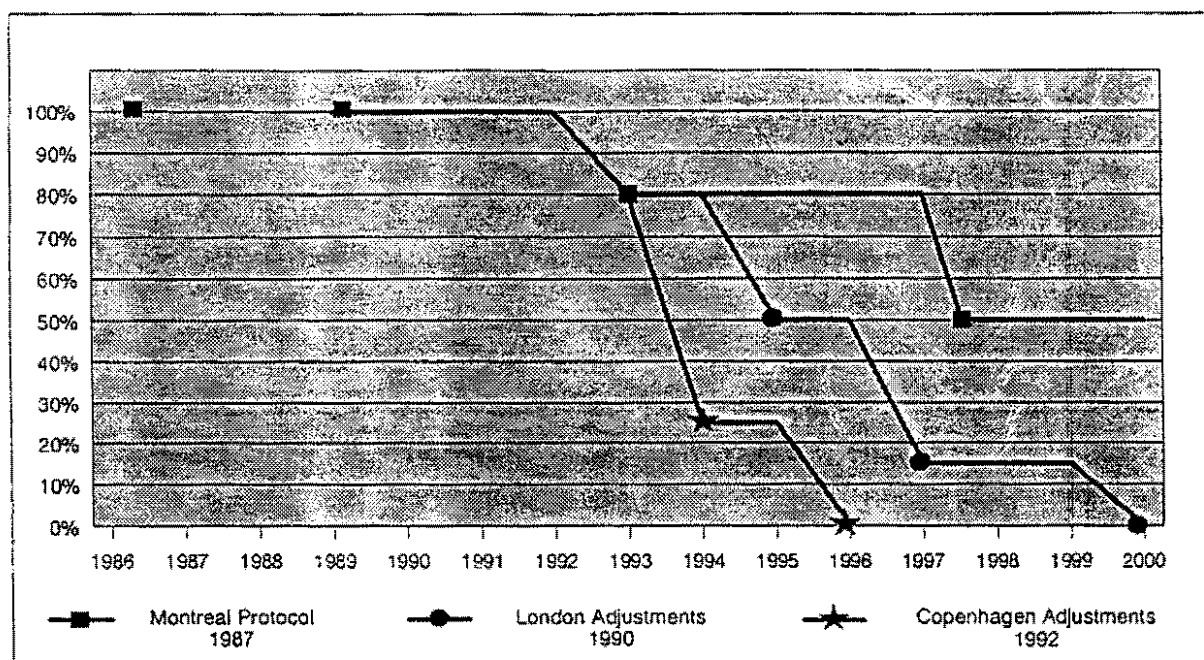
□ Countries that have ratified the Montreal Protocol as of January 1995
■ Non Parties to the Montreal Protocol



Map 1: Status of Ratification of the Montreal Protocol, January 1995

According to the London Amendments any Party operating under Article 5, para 1 shall exceed neither an annual calculated level of consumption of the controlled substances in Annex A of 0.3 kilograms per capita nor an annual calculated level of consumption of the controlled substances in Annex B of 0.2 kilograms per capita. That is, Article 5 countries, allowed a ten-year grace period in compliance with control measures, committed themselves to the additional requirement that the annual calculated level of consumption of additional CFCs, MCF and CTC combined does not exceed 0.2 kg per capita. Although, Article 5 has been further revised since then, this requirement still holds true.

Chart 1.1: Maximum Allowable CFC Consumption Relative to the 1986 Base Consumption under the Montreal Protocol (1987), London Adjustments (1990), and Copenhagen Adjustments (1992)



Note: Romania has a ten-year grace period for ODS use to meet basic domestic needs ie to 2006.

1.2 Romania and the Montreal Protocol

Romania ratified the Vienna Convention, the Montreal Protocol and the London Amendments in January 1993. It has been categorized as an Article 5 country. Although Romania has not yet ratified the Copenhagen Amendments, it is aiming to do so before 1 January 1996, thereby emphasising the Government's strong commitment to take the necessary measures to protect the stratospheric ozone layer.

The ODS Country Programme for Romania has been prepared under guidance of the Ministry of Waters, Forest and Environmental Protection of Romania (MWFEP), which is the lead agency in ODS phaseout in Romania. The principles of the ODS phaseout strategy provided in the Country Programme was strongly endorsed by Mr Ioan Jelev, Secretary of State, on 22 May 1995 in a fax to Mr Si Ahmed of UNIDO. In addition, Government Decision No 243 concerning the establishment, organisation and functioning of the National Committee for the Protection of the Ozone Layer (CNPSO) was approved 17 April 1995.

The country study for Romania (Chapter 2 of this Country Programme) provides an overview of the current situation, ODS replacement projects at enterprise level and available administrative and economic instruments supporting an ODS phaseout strategy for Romania. It may therefore be used as a comprehensive manual for Government officials when implementing the Action Plan.

1.3 Purpose of Country Programme

The ODS Country Programme for Romania has two objectives. Firstly, the provision of an overview of the current situation in Romania with respect to ODS production and consumption, ODS industry structure and significant actions already taken by the Romanian Government as well as responses to the Montreal Protocol by ODS producing and consuming enterprises. Secondly, an outline of the ODS phaseout strategy, including the Action Plan endorsed by the Romanian Government.

The Country Programme is a reflection of the commitment of the Romanian Government to comply with the obligations as a Party to the Montreal Protocol. It records and presents the information and analysis from which the Action Plan has been developed, it provides the framework within which financial assistance from the Multilateral Fund is requested, especially for implementation of ODS replacement projects at enterprise level, and it provides the basis for monitoring the extent to which the Action Plan is being followed and its effectiveness in reducing the ODS production and consumption in accordance with the ODS phaseout strategy chosen.

1.4 Assistance Received

The Country Programme and the investment projects contained herein have been prepared jointly by COWIconsult, UNIDO and ICPIAF¹ of Romania in close cooperation with the MWFEP and the Ministries of Industries and Commerce and the ODS producing and consuming enterprises in Romania. The technical assistance offered to Romania for Country Programme preparation and investment project identification and preparation has been provided by the Danish Environmental Protection Agency (USD 165,000) and the Multilateral Fund of the Montreal Protocol (USD 54,000). In addition to this technical assistance, the Romanian Government has through internal means provided a substantial input to the Country Programme preparation in terms of staff time and communication and transport costs (roughly estimated at USD 30,000).

The Romanian Government appreciates truly the technical assistance received.

Several Government departments and agencies in Romania have facilitated the development of the ODS Country Programme for Romania, foremost MWFEP in which State Secretary Mr Ioan Jeleu has managed the technical assistance received from abroad. Government officials from MWFEP and the Ministry of Industries have had regular meetings with the consultants, participated in enterprise visits and reviewed working papers.

¹ The consultants involved from COWIconsult and ICPIAF were: Claus Hvashøj Jørgensen (Project Manager), Jesper Karup Pedersen (COWIconsult Team Leader), Eugen Lemnian (ICPIAF Team Leader), Sabin Bobos, Tim Jeppesen, Sorin Macovescu, Peter G. Madsen, Anthony Smith, Nicolae Olteanu and Mihaela Veres. The ODS replacement projects in the refrigeration and foam sectors were developed by the following UNIDO staff: Tamas Grof, Siegfried Nowotny and Risto Ojala. Last, but not least Mr S.M. Si Ahmed, Coordinator, Montreal Protocol Operations in UNIDO, has acted as supervisor throughout the preparation of the Country Programme and the preliminary documentation for ODS replacement projects.

1.5 Organisation of the Country Programme

Section 2 of the Country Programme comprises a presentation of recent developments in ODS production and consumption as well as a crude forecast of consumption to 2010 if no attempt is made to comply with the Montreal Protocol. Section 2 also covers a description of the present Romanian institutional and policy framework regarding ODS issues and a discussion of Government and industry responses to the Montreal Protocol.

Section 3 then presents the Romanian Government's ODS phaseout strategy. This covers Government actions regarding administrative and economic instruments, for example, and a short description of the institutional strengthening needed. The identified projects at enterprise level are summarised, while more extensive descriptions will be provided in a separate document.

2 Current Situation

2.1 Current and Forecast Consumption of ODS

Prior to this Country Programme the amount of detailed data on ODS production and consumption in Romania was limited. The data originated from:

- reports by the Romanian Ministry of Water, Forestry and Environmental Protection to the Secretariat for the Ozone Layer in Nairobi;
- a national inventory of the ODS under construction by ICIM (research group funded by the Romanian Government's *Research Programme regarding the Changes in the Ozone Layer and the Protection of its Quality*; see Section 3.2.1).

The former data source suffers from the fact that data are available by substance only and not by user sector. Furthermore, the data are reported for a few years only. The latter data source is still at an initial stage and thus not sufficient for a comprehensive picture of the current situation. This Country Programme will therefore also constitute an input to this inventory.

The strategy adopted here has been to initiate an own data collection as the primary source; and then use the above existing sources as complements when applicable. This procedure contained several elements:

- an industrial seminar was held 22 November 1994 at the Ministry of Industries, Bucharest, where ODS producers and users were informed about the Montreal Protocol (see Appendices VI and VII);
- following the seminar eight enterprises were visited. In February 1995, during the Main Technical Mission, further seven enterprise visits were made. At both these missions, data were collected;
- through questionnaires survey and telephone follow-up, ICPIAF has gathered data from enterprises and other organisations which were not visited as well as possible additional data from those visited;
- all the information collected by ICPIAF was entered into sector-specific reviews produced by COWI-consult;
- while the survey data only covers the main ODS producers and users, an estimate of the size of the remaining ODS use was carried out to reach a figure for total ODS consumption in Romania.

The data presented in the following section must therefore be seen as best estimates rather than actual data. While both the refrigeration, foam and aerosol sectors are adequately covered, the data for the solvents, in particular the share of non-regulated CTC and MCF, and fire extinguishants sectors are rough estimates.

All data are presented with one decimal-point in Section 2.1.1. This is a matter of convenience rather than the preciseness of the figures. These uncertainties are also carried over into the projections of ODS production and use in the future (Section 2.1.2).

2.1.1 Current Consumption

This section shows through six tables the current production and consumption of ODS as well as the situation in recent years. Detailed descriptions of the different sectors are found in Section 2.2, hence the comments to the tables here are kept concise.

Table 2.1 shows that CFCs have only been produced in Romania from 1989 and has fallen since. The CTC and MCF productions are also in decline, a trend which is expected to continue.

Table 2.1: Production of ODS in Romania 1986-93 (Tonnes)

Substance	1986	1989	1992	1993
CFC-11	-	214.0	158.0	130.0
CFC-12	-	1,176.0	645.0	385.0
CFC-113	-	-	-	-
CFC-114	-	-	-	-
All CFCs	-	1,390.0	803.0	515.0
Halon-1211	-	-	-	-
Halon-1301	-	-	-	-
Halon-2402	-	-	-	-
All halons	-	-	-	-
Carbon tetrachloride, CTC	18,711.0	13,367.0	9,600.0	8,058.0
Methyl chloroform, MCF	274.0	240.0	120.0	99.0
HCFC-22	-	-	-	-
Methyl bromide, MBR	-	-	-	4.4

Sources: ICPIAF survey and enterprise visits.
MBR: Department of Chemical Industries, Ministry of Industries.

Trade in ODS is very important. Table 2.2 reveals that almost two-thirds of CFC used in 1993 was imports. In contrast more than 80% of the CTC produced went to export markets, and of the CTC sold on the domestic market, most was as an intermediate product and thus not subject to regulation.

Of the consumption, CFC-12 is by far the most important, predominantly due to the large refrigeration and aerosol sectors.

Table 2.2: ODS Balances 1993 in Romania, by Substance (Tonnes)

Substance	Tonnes	Production	Imports ¹	Exports	Non-regulated ODS consumption ²	Regulated ODS consumption ³	Ozone depleting potential	Consumption in ODP tonnes
Annex A Group I								
CFC-11		130.0	138.7	1.5	-	267.2	1.0	267.2
CFC-12		385.0	717.5	-	-	1,102.5	1.0	1,102.5
CFC-113		-	76.0	-	-	76.0	0.8	60.8
CFC-114		-	0.5	-	-	0.5	1.0	0.5
All CFCs		515.0	932.7	1.5	-	1,446.2	-	1,431.0
Annex A Group II								
Halon-1211		-	1.2	-	-	1.2	3.0	3.6
Halon-1301		-	2.6	-	-	2.6	10.0	26.0
Halon-2402		-	0.3	-	-	0.3	6.0	1.8
All Halons		-	4.1	-	-	4.1	-	31.4
Annex B Group II								
Carbon tetrachloride, CTC		8,058.0	48.0	6,361.0	1,678.6	66.4	1.1	73.0
Annex B Group III								
Methyl chloroform, MCF		99.0	454.0	-	328.0	225.0	0.1	22.5
Annex C, Group I								
HCFC-22		-	7.6	-	-	7.6	0.05	0.4
Annex E, Group I								
Methyl bromide, MBR		4.4	-	-	4.4	-	0.7	0.0
Total								1,558.3

Sources: ICPLAF survey and enterprise visits.

MBR: Department of Chemical Industries, Ministry of Industries.

Notes:

1. Apart from CTC and MCF, imports are calculated as residual.

2. For CTC, MCF and MBR non-regulated ODS is calculated as residual.

3. For CTC and MCF the shares of regulated ODS are estimated by ICPLAF using the data collected for the solvents sector.

The development in ODS consumption by substance (Table 2.3) signifies that the use of CFCs, HCFC-22 and CTC has fallen since 1986. The use of halons has been fairly constant while MCFs have grown in importance.

Table 2.3: Consumption of Regulated ODS in Romania 1986-93, by Substance (Tonnes)

Substance	1986	1989	1992	1993
CFC-11	436.5	300.0	286.3	267.2
CFC-12	2,470.0	1,981.5	1,106.8	1,102.5
CFC-113	82.5	75.0	55.0	76.0
CFC-114	52.0	10.0	2.0	0.5
All CFCs	3,041.0	2,366.4	1,450.2	1,446.2
Halon-1211	1.0	1.1	1.0	1.2
Halon-1301	3.0	1.8	2.1	2.6
Halon-2402	0.8	0.5	0.5	0.3
All halons	4.8	3.4	3.6	4.1
Carbon tetrachloride, CTC	535.0	270.0	51.6	66.4
Methyl chloroform, MCF	82.2	78.0	124.8	225.0
HCFC-22 ¹	200.0	10.8	8.7	7.6

Sources: 1986: The figures for CFCs and halons are based on import data 1984-85 from ICE DANUBIANA (now CHIMEXIM) and 1989 data.

1989-93: ICPIAF survey and enterprise visits.

Note: 1. Ministry of Industries letters 76246/30.07.93 and 100351/20.02.1995 claim the data to be 517 tonnes in 1989 and 53.9 tonnes in 1993. It is not indicated which sector uses the HCFC-22.

Table 2.4: CFC Consumption in Romania 1986-93, by Sector (Tonnes)

End-uses	1986	1989	1992	1993
Refrigerants	422.0	151.8	136.0	176.3
Aerosols ¹	2,100.0	1,839.7	972.8	926.7
Solvents	83.0	75.5	55.5	76.5
Foams	436.0	299.5	285.8	266.7
Fire Extinguishants	-	-	-	-
Total	3,041.0	2,366.4	1,450.2	1,446.2

Sources: 1986: The figures for CFCs and halons are based on import data 1984-85 from ICE DANUBIANA (now CHIMEXIM) and 1989 data.

1989-93: ICPIAF survey and enterprise visits.

Note: 1. The 1989 and 1992 figures include estimates for NORVEA's (became COLGATE-PALMOLIVE in 1992) use as they were not covered by the survey. The consumption has been assumed to follow FARMEC's trend.

Table 2.4 shows that the aerosol sector is by far the largest CFC user with around two-thirds of the total consumption in 1993; and within this sector FARMEC in Cluj accounted for more than 95% of the consumption. The uses of CFCs as refrigerant and for foams are closely correlated because most foam produced in Romania is for the refrigeration sector.

Tables 2.5 and 2.6 finally present the ODS consumption at a detailed level, ie by substance and by sector. The single largest figure is here the CFC-12 for personal care aerosols, followed by CFC-11 used for rigid foams in the refrigeration sector and CFC-12 as refrigerants.

Table 2.5: ODS Consumption in Romania 1989-93, by Substance and Sector: REFRIGERATION and FOAM (Tonnes)

Sector	Substance	Application	Consumption (tonnes)		
			1989	1992	1993
Refrigeration					
Domestic	CFC-12	Refrigerators and freezers	101.3	103.5	60.2
	HCFC-22		2.5	1.9	1.6
Commercial	CFC-12	Refrigerators and freezers	-	2.2	55.0
Industrial	CFC-12	New installations	12.6	13.6	5.0
	HCFC-22		3.8	4.8	2.8
Transport	CFC-12	New installations	9.0	-	-
Servicing	CFC-12	Domestic	10.5	10.7	11.1
	CFC-12	Commercial	8.0	4.8	6.0
	CFC-12	Industrial	10.0	4.0	3.0
	HCFC-22	Industrial	4.0	1.5	2.0
	CFC-12	Transport	13.0	10.8	10.8
	CFC-12	<i>not specified</i> ¹	28.6	29.1	30.2
	HCFC-22	<i>not specified</i>	0.5	0.5	1.2
Total	CFC-12	Refrigeration	151.8	136.0	176.3
	HCFC-22		10.8	8.7	7.6
Foams					
	CFC-11	Flexible foam ²	78.9	59.2	51.4
	CFC-11	Rigid foam for refrigeration	194.8	203.4	192.3
	CFC-11	Rigid foam	25.8	23.2	23.0
Total	CFC-11	Foams	299.5	285.8	266.7

Sources: ICPIAF survey and enterprise visits.

Notes: 1. The 1989 and 1992 figures are estimates based on the 1993 figure and the trend for servicing domestic refrigeration.
2. In the figures for 1989 and 1992, CHIMICA's, Orastie, contribution is estimated using the trend for SPUMOTIM, Timisoara.

Table 2.6: ODS Consumption in Romania 1989-93, by Substance and Sector: AEROSOLS, SOLVENTS, FIRE EXTINGUISHANTS, and Total ODS (Tonnes)

Sector	Substance	Application	Consumption (tonnes)		
			1989	1992	1993
Aerosols	CFC-12 ¹	Personal care	1,367.2	698.3	675.0
	CFC-114	Personal care	10.0	2.0	0.5
	CFC-12	Household products	347.5	177.5	171.3
	CFC-12	Industrial products	115.0	95.0	80.0
Total	CFC-12	Aerosols	1,829.7	970.8	926.2
	CFC-114		10.0	2.0	0.5
Solvents	CFC-11 ²	Dry cleaning	0.5	0.5	0.5
	CFC-113	Electronics	3.0	1.0	1.0
	CFC-113	Metal degreasing	72.0	54.0	75.0
	MCF	Metal degreasing	30.0	76.0	143.0
	MCF	Other solvent applications	48.0	48.8	82.0
	CTC	Other solvent applications	270.0	51.6	66.4
Total	CFC-11	Solvents	0.5	0.5	0.5
	CFC-113		75.0	55.0	76.0
	MCF		78.0	124.8	225.0
	CTC		270.0	51.6	66.4
Fire exting.	Halon-1211	Portable equipment	1.1	1.0	1.2
	Halon-1301	Portable equipment	1.7	2.0	2.5
	Halon-2402	Portable equipment	0.5	0.5	0.3
	Halon-1301	Small scale systems	0.1	0.1	0.1
Total	Halon-1211	Fire extinguishants	1.1	1.0	1.2
	Halon-1301		1.8	2.1	2.6
	Halon-2402		0.5	0.5	0.3
Total ODS	CFC-11		300.0	286.3	267.2
	CFC-12		1981.5	1106.8	1102.5
	CFC-113		75.0	55.0	76.0
	CFC-114		10.0	2.0	0.5
	HCFC-22 ³		10.8	8.7	7.6
	MCF		78.0	124.8	225.0
	CTC		-270.0	-51.6	-66.4
	Halon-1211		1.1	1.0	1.2
	Halon-1301		1.8	2.1	2.6
	Halon-2402		0.5	0.5	0.3
Total	All		2,728.6	1,638.9	1,749.3

Sources: ICPIAP survey and enterprise visits.

Notes:

1. The 1989 and 1992 figures include estimates for NORVEA's (became COLGATE-PALMOLIVE in 1992) use as they were not covered by the survey. The consumption has been assumed to follow FARMEC's trend.
2. The figures for 1989 and 1992 are assumed equal to the 1993 figure.
3. Ministry of Industries letters 76246/30.07.93 and 100351/20.02.1995 claim the data to be 517 tonnes in 1989 and 53.9 tonnes in 1993. It is not indicated which sector uses the HCFC-22.

2.1.2 Forecast Consumption

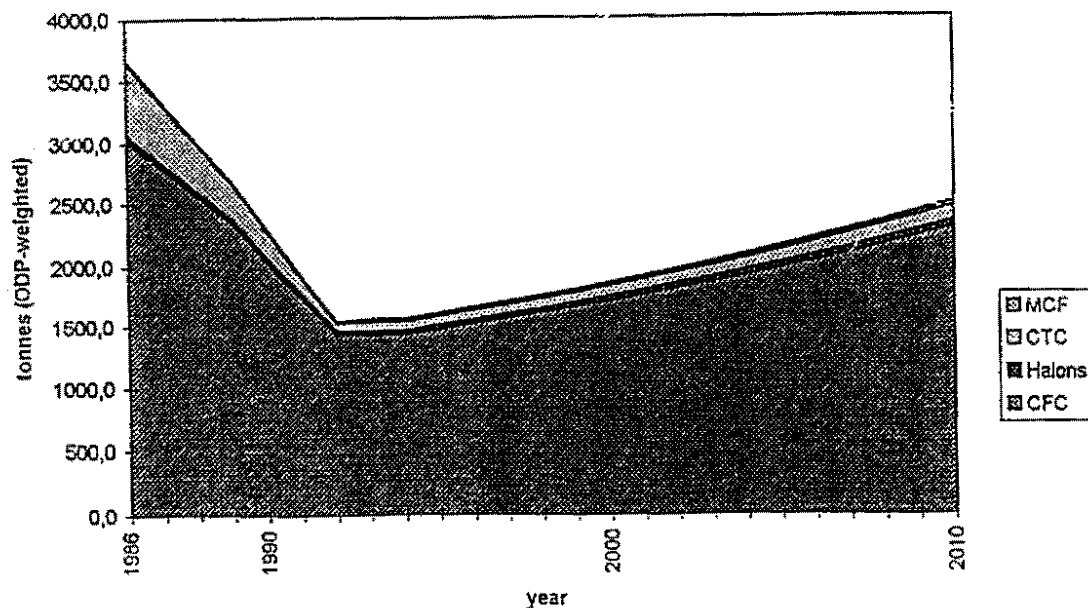
The Multilateral Fund's Country Programme Guidelines request forecasts of the use of each substance by user sector, assuming that *no attempt* is made to comply with the Montreal Protocol, and that ODS continue to be abundantly available from existing sources, at current prices. The purpose of this section is primarily to discuss the barriers faced in forecasting ODS consumption for Romania. A crude forecast to 2010 will, however, be provided.

Firstly, the assumption that ODS in the forecast are available in unconstrained quantities is very implausible whether compliance with the MP is pursued or not. Romanian ODS users have already been facing CFC delivery problems from external sources, and the quality of BICAPA's CFC is by several users considered to be too low. In addition, ODS prices are expected to increase with the decline in production levels throughout the World.

Secondly, the decline in the demand for ODS in recent years (see Section 2.1.1) is partly due to the economic recession in Romania in general. As described in Appendix VIII, this decline appears to have come to a halt and positive growth rates are expected in the future; the magnitude depending on the Government's reform programme, especially the speed of privatisation, and the growth in export markets. Forecasts based on extrapolations of data for the recent years will therefore not be suitable.

A crude forecast is shown in Chart 2.1 where the demand for ODS is assumed to followed economic growth of 0% in 1994 and to average 3% pa in 1995-2010. There is no distinguishing between sector and thus substances. The forecast is only an illustration of how the picture would be if the ODS use followed economic growth in general.

Chart 2.1: ODS Consumption Forecast for Romania to 2010

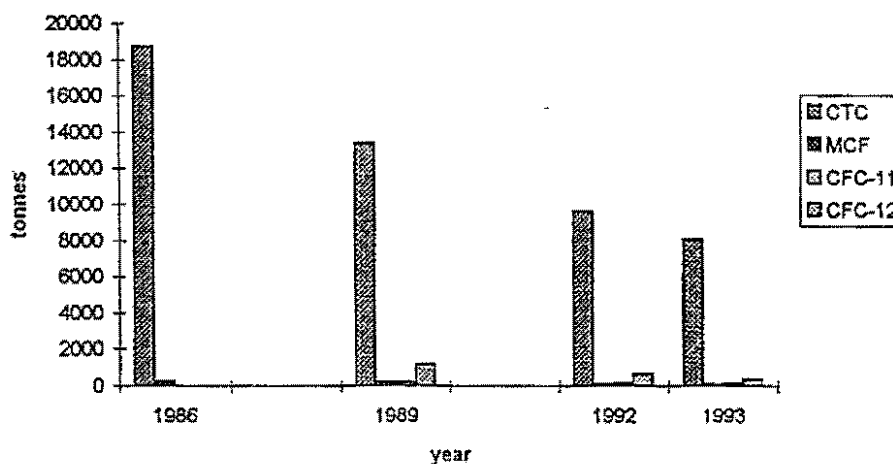


2.2 Industries Structure

2.2.1 ODS Producer Industries

CFCs have only been produced in Romania from 1989 and the production has fallen steeply since (see Chart 2.2). In 1994 the production was at a halt for ten months due to a lack of customers. Production re-started in November 1994 only. This production decline has meant increased imports. Chart 2.2 also shows that almost 95% of ODS produced in Romania in 1993 consisted of CTC. Table 2.2 in Section 2.1, however, clarifies that around 80% of the CTC was exported, and of the remaining part for the domestic market, most of it was used as an intermediate input and thus as non-regulated consumption.

Chart 2.2: ODS Production in Romania, 1986-93



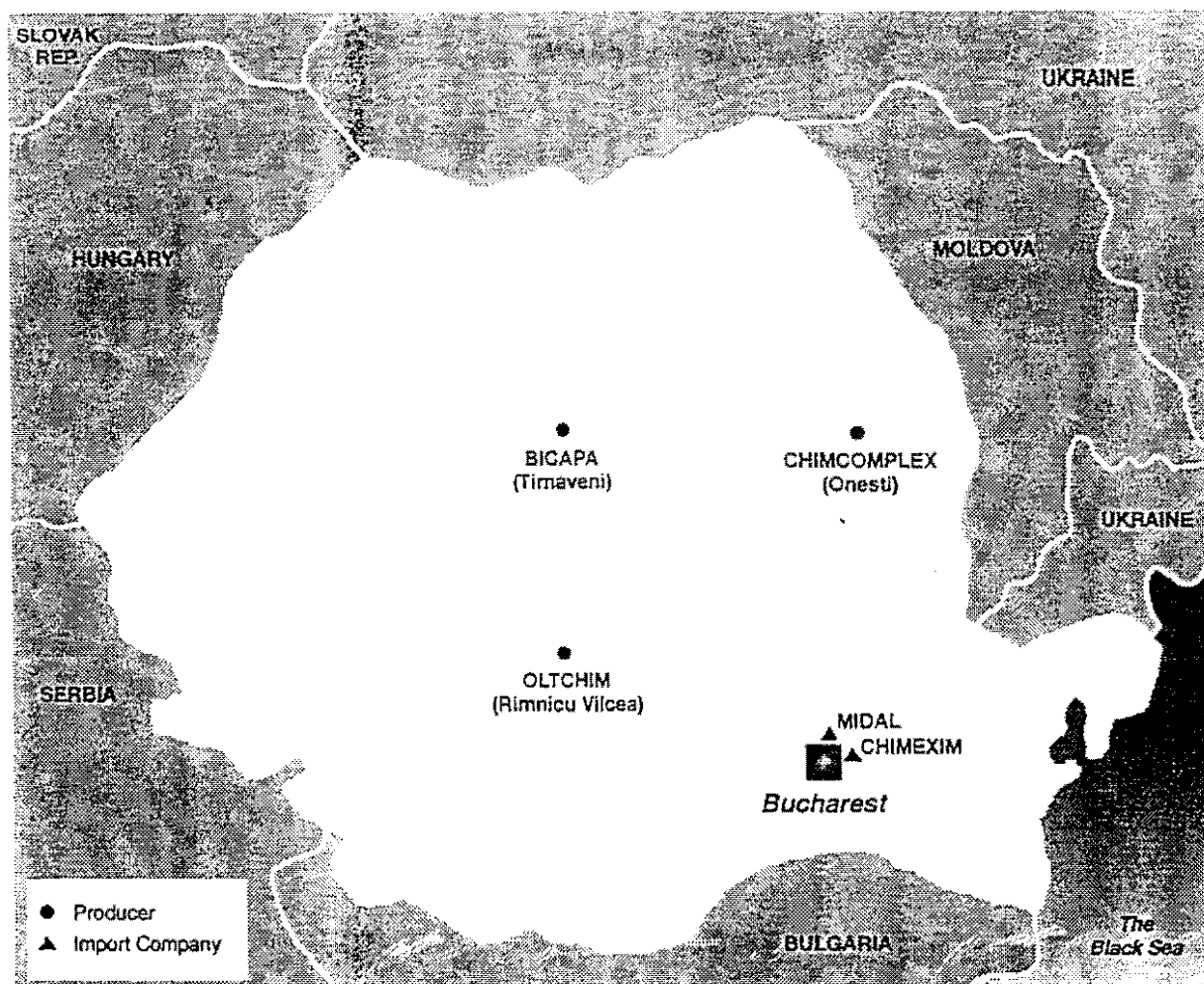
There are two main ODS producers in Romania (see Map 2):

- BICAPA S.A., Tarnaveni (Box 1)
- S.C. OLTCHIM S.A., Ramnicu Valcea (Box 2)

The former produces the CFCs while the latter is engaged in CTC and MCF production. In addition to these, CHIMCOMPLEX in Onesti has a small CTC production (around 18 tonnes in 1993).

Most of OLTCHIM's CTC production is exported, primarily to Greece. Of the CTC sold on the domestic market, BICAPA procured 63% (used as an intermediate substance), while the remaining part went to the solvents sector. All MCFs produced in 1993 went to the domestic sector.

Romanian CFC-users regard imported produce superior to the domestic CFC, because of the lower water content, for example. It is therefore unlikely that BICAPA will regain its market share and a change towards exports seems implausible.

Map 2: Romanian ODS Producers and Importers

According to the Copenhagen Adjustments to the Montreal Protocol the production of CFC, CTC and MCF need not be phased out before 2006 because of Romania's status as an Article 5 country. However from 1996, exports to non-Article 5 countries will be banned and exports of products using ODS will also not be allowed. ODS production is therefore set to decline further in line with the falling demand.

The most plausible ODS substitute options include (see Appendix X for a more detailed description):

- converting to alternative production
- closing down of production lines; and

BICAPA considers a conversion to HFC-134a or HCFC-22. It is, however, unlikely that a shortage in demand for the former exists, while the latter as a transitory substance is only a short-term solution. OLTCHIM contemplates an introduction of other chlorine-based solvents, but likely future restrictions in their use make this strategy uncertain. Increased production of PVC to absorb the chlorine is also considered as an option.

In so far as OLTCHIM's exports to non-Article 5 countries, especially Greece, exceed 70% of the production, an ODS replacement project prepared for/by OLTCHIM is not eligible for funding following the guidelines endorsed by the Executive Committee at its Fifteenth Meeting.

A closing down of production lines will result in significant economic losses due to the connected nature of the chemical production process. Upstream as well as downstream problems exist. For OLTCHIM the caustic soda production will become loss-making, for example. Both BICAPA and OLTCHIM are large employers in their respective local economies, thus redundancies will have wider economic and social consequences.

At the fifteenth meeting of the Executive Committee of the Multilateral Fund, December 1994, a draft terms of reference for an expert group on the production of substitutes for ODS was presented (UNEP/OzL.Pro/ExCom-/15/45). This functions of this expert group will be: advise on operational policies and guidelines on various technical and economic issues associated with the production of substitutes for ODS; draft the terms of reference for an audit of the ODS producing industries in each of the ODS producing Article 5 countries; and advise on any other issues in the production sector as may be requested by the Executive Committee.

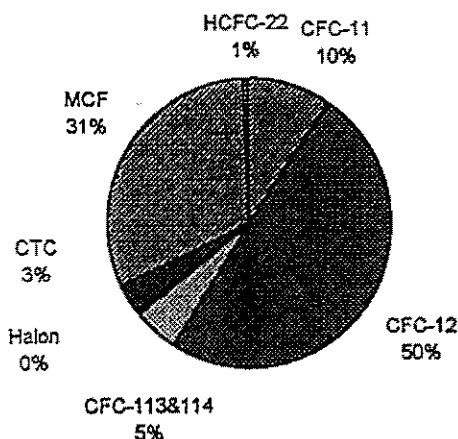
BOX 1: BICAPA S.A., Târnăveni	
Company profile	Founded in 1916, but the CFC and HF production lines did not come into operation before 1989. BICAPA has 3,000 employees of which around 400 are directly and indirectly dependent on the CFC and HF production. Turnover in 1993 was 14.8 bn Lei, of which CFC and HF accounted for around 0.9 bn Lei. The profit margin was in 1993 around 4%. It is a state-owned enterprise (70% SOF, 30% POF), but is on the list of enterprises targeted for privatisation.
Product range	The sole Romanian producer of most of its products, including CFC. Its main products are: 1) chrome salts, 2) barium salts, 3) fluorine products, including CFC-11, CFC-12 and HF, 4) inorganic salts, 5) sulphur antifungal and insecticide products, 6) ceramic products, and 7) miscellaneous chemical products.
ODS production	Around 80% of the ODS production is CFC-12 and 20% is CFC-11. Since 1989 the production has declined drastically from 1,176 tonnes of CFC-12 in 1989 (214 tonnes of CFC-11) to 385 tonnes in 1993 (130 tonnes of CFC-11). The production capacity is 3,900 tonnes of CFC-12 and 850 tonnes of CFC-11.
Market	BICAPA has no exports of CFCs, and one domestic customer, FARMEC in Cluj, accounts for more than 50% of its sales; none of the remaining customers account for more than 10% of sales.
Equipment	The CFC production line was installed in 1987-89; all equipment Romanian made. The company has also drying equipment, but this has not yet been installed. There are some leakage problems which will be solved by the installation of French-made valves.
Supply	The Chlorofluoride is imported from China and the CTC is purchased from OLTCHIM. BICAPA produces HF itself.
ODS phaseout	BICAPA wishes to convert to HFC-134a or HCFC-22.

BOX 2: S.C. OLTCHIM S.A., Râmnicu Vâlcea	
Company profile	Founded in 1968; production of CTC and MCF commenced in 1974. Out of 6000 employees, around 1350 are dependent upon the CTC and MCF production. In 1993 the turnover amounted to 250 m USD. OLTCHIM is state-owned (70% SOP, 30% POF), but it expects that 30% of the shares will be sold in 1995 to private investors.
Product range	Main products: 1) organic chlorinated products (including CTC and MCF), 2) macromolecular products (including PVC), 3) chlorosodics, 4) organic synthesis products, 5) amines, and 6) pesticides.
ODS production	Capacity of 40,000 tonnes chlorinated solvents, of which around 50% is for CTC. In 1993 the CTC production amounted to 8,040 tonnes. MCF is produced on a discontinuous line, which in 1993 delivered 99 tonnes.
Market	OLTCHIM is the only producer of CTC in Romania. Around 80% of the CTC is exported, mainly to Greece and USA, while on the domestic market the produce is mainly for BICAPA (63%) and the solvents sector.
Equipment	The CTC line was installed in 1974 (French supplier), but the pipes and heat exchangers were revamped in 1989-1992.
ODS phaseout	OLTCHIM intends to base future production on chlorine. Two strategies have been developed: 1) introduction of other chlorine-based solvents; 2) an increase in the present PVC suspension capacity.

2.2.2 ODS Importers

Chart 2.3 illustrates the composition of ODS imports in 1993, where CFC-12 comprises the largest share, followed by MCF and CFC-11. Around two-thirds of the CFC used in 1993 was imported (see Table 2.2), all halons and HCFC-22 are imported and so is the main part of MCFs. CTC on the other hand is mainly domestically produced.

Chart 2.3: ODS Import in Romania, 1993



Imports arrive partly through import companies, which since 1989 have become numerous², and partly as direct imports by the ODS-using industries.

Two of the main import companies, which each imported around 100 tonnes of CFC in 1994, are (see Map 2):

- CHIMEXIM S.A., Bucharest (Box 3)
- MIDAL, Bucharest (Box 4)

Any importer of ODS in Romania must have a *Certificate of Ability*. This certificate ensures that the importer has personnel capable of handling chemical substances and that it has the necessary storing facilities. Any company, but not individuals, can apply for the certificate. Customers, however do not need a certificate to buy ODS from the importers. The importers must report monthly to the Central Statistical Office.

² The visited import companies did not consider themselves able to make a satisfactory guess.

BOX3: CHIMEXIM S.A., Bucharest	
Company profile	Founded in 1950. In 1994, CHIMEXIM employed 150, a decrease of 50 compared with 1989. It became a private company through an employee-buyout in November 1994. Profit in 1993: 1.7 bn Lei.
Product range	Import and export of a wide range chemical products, of which CFC has a diminutive share (less than 1%).
Market	The main customers of CFCs include SADU in Gorj, FARMEC in Cluj, and until last year MIDAL, Bucharest bought its CFC through CHIMEXIM.
ODS import	CHIMEXIM imported 100 tonnes of CFCs in 1994 (Romanian import of CFCs as a whole was 933 tonnes in 1993), mainly CFC-12. In 1995 there has so far (February 1995) been no requests from customers.
Supply	Mainly from Italy, but also from Greece and Ukraine.
ODS phaseout	CHIMEXIM expects the ODS phase-out to have little effect for the company because of CFCs relatively small part of the total turnover.

BOX4: MIDAL, Bucharest	
Company profile	Founded in 1991 as a privately-owned company. MIDAL employees 35 of which 12 are refrigeration servicing technicians. MIDAL comprises three sections: 1) Foreign trade, 2) Internal trade, 3) Refrigeration provisions.
Product range	The import of CFCs is an important part (40%) of MIDAL's business. Of importance is also the import of refrigeration equipment, condensing units, charging stations, leak detectors, tools and compressors. The company also specialises in servicing and retrofitting of refrigerators.
Market	All Romania.
ODS import	MIDAL imports around 100 tonnes of CFCs per year, mainly CFC-12, but the company has also a stock of 10 tonnes HFC-134a.
Supply	MIDAL has exclusive rights in Romania to DUPONT products, but buys from other companies as well.
ODS phaseout	The company is planning a seminar on ODS alternatives in Bucharest, autumn 1995. It expects to benefit from the ODS phase-out due to increased sales of alternative refrigerants and the need for retrofitting.

According to Government Decision No 340, 20 June 1992, some commodities require an import licence. These are commodities which are dangerous to the health and the environment. ODS is *not* included in this Decision at present, but the Ministry of Commerce intends to extend the Decision to include ODS or promote a new decision in 1995. A licence is issued by the Ministry of Commerce, but must in some cases be approved by, for example, the Ministry of Industry or the Ministry of health depending on the nature of the commodity in question. The Ministry of Commerce is obliged to respond within 5 days to an application. According the Ministry of Commerce Order No 10, the period of a licence is, since January 1995, four months. For some licences there are quotas, so that there exist competitions such as "first-come - first-get" or according to the quantity imported in the previous period.

The import tariff on chemicals averages 15% with 20% applicable for ODS. On top of this VAT of 18% applies.

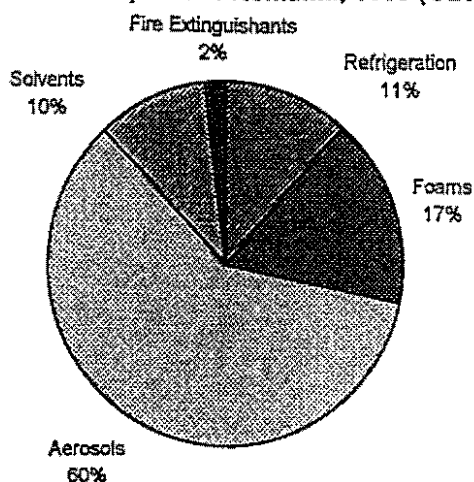
The Romanian importers and custom officials claim that an effective customs declaration system is in place. The procedure is that the importer declares the content of shipment when reaching the border. The customs officer compares the declaration with the bill and performs occasional checks.

In the past imports are were registered at a 6-digit level compared with a 8-level (EU compatible) generally. This means that imports of ODS which were possible at the 8-digit were included with other chemicals at the 6-digit-level, and therefore no data were immediately available. Since April 1993, however, customs declarations have been registered at the 8-digit level.

2.2.3 ODS Consumer Industries

The ODS consumption occurs in the five industrial sectors: refrigeration, foams, aerosols, solvents and fire extinguishants. Chart 2.4 shows the 1993 shares of total tonnes (ODP-weighted) ODS consumption. Aerosols (FARMEC in Cluj) is clearly the most important sector followed by foams.

Chart 2.4: ODS Consumption in Romania, 1993 (ODP-weighted)



2.2.3.1 Refrigeration

Three types of refrigeration equipment are produced in Romania (see Map 3):

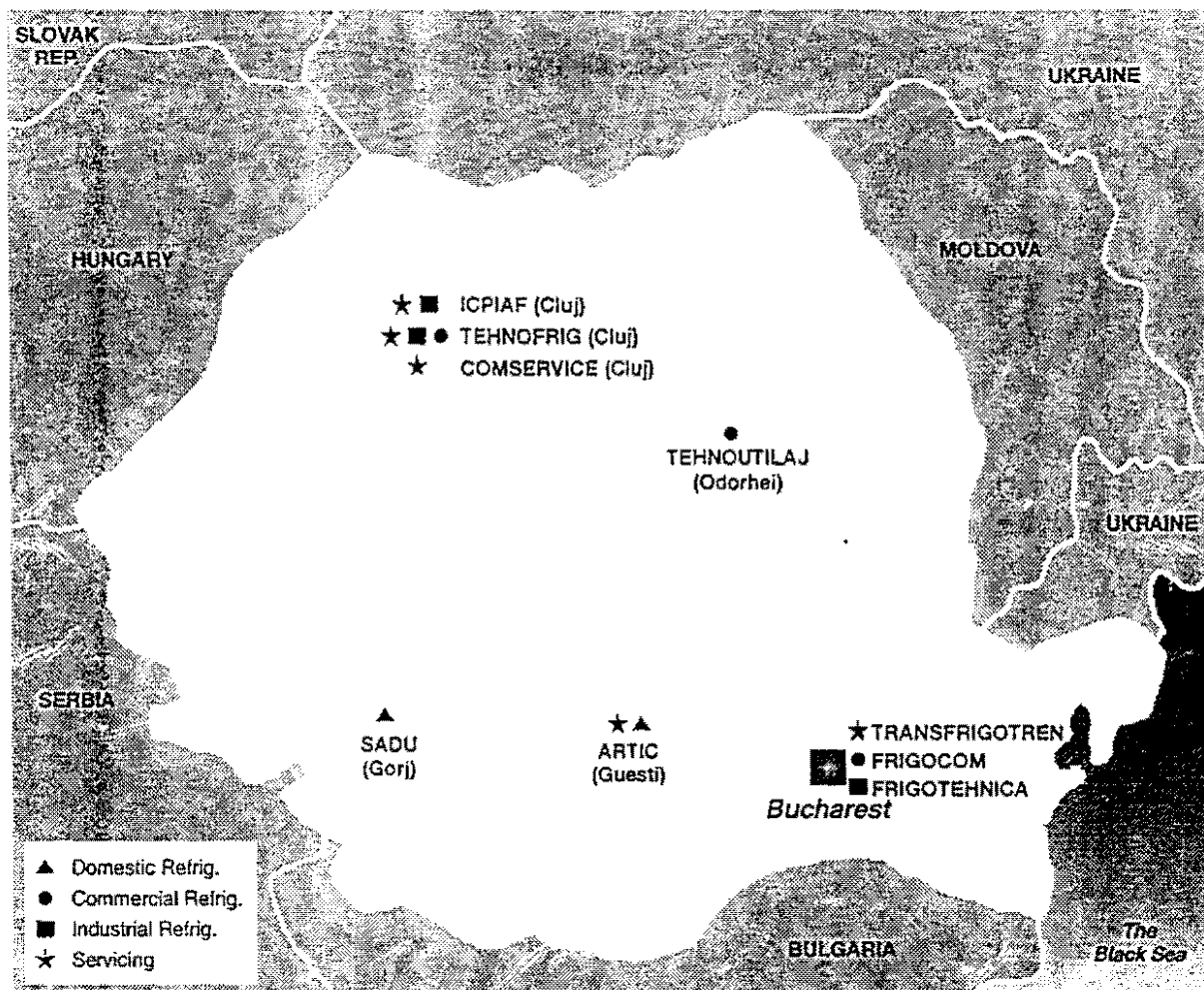
- domestic refrigeration
- commercial refrigeration
- industrial refrigeration

In addition to these, the sector:

- servicing of refrigeration

which covers the above three types of equipment as well as the servicing of rail transport refrigeration is described in the following.

Map 3: Romanian Refrigeration Enterprises



Note: COMSERVICE has many shop; on the map is only the shop in Cluj, which was visited in the Main Technical Mission, indicated.

Chart 2.5 shows the development in the CFC-12 consumption 1989-93 for the four refrigeration sectors. Apart from industrial refrigeration, the amounts were fairly even in 1993. This is, however, unlike recent years as the commercial refrigeration production has only just commenced as an attempt to offset the falling demand for domestic and industrial refrigeration.

Around a third of the production in domestic refrigeration was exported to western Europe in 1993, mainly to the UK, France and Greece. There are no exports of commercial and industrial refrigeration.

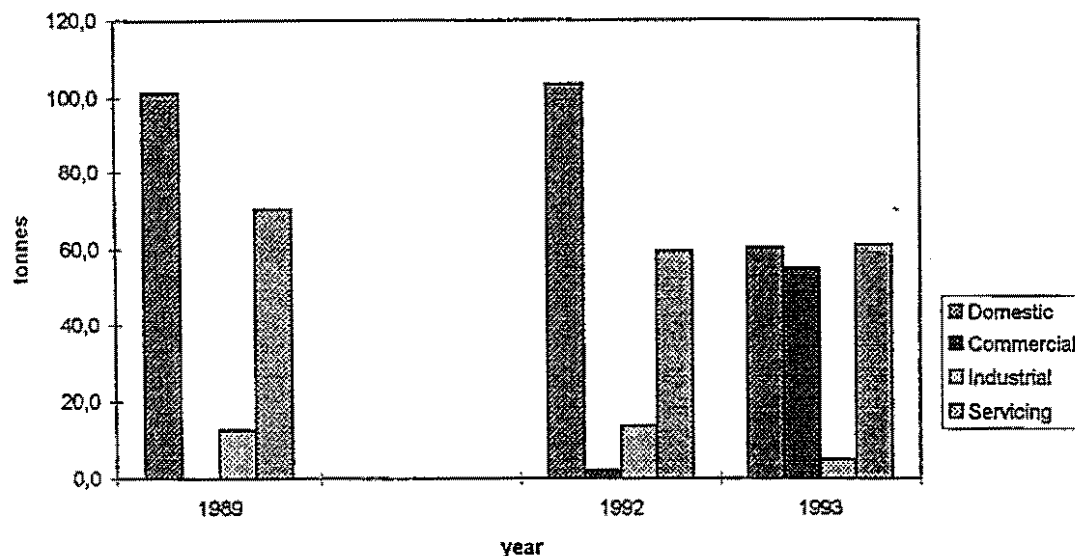
There is no formal sector organization for refrigeration producers in Romania, but the companies are in a continuous dialogue with the Ministry of Industry, department of machine building. This department acts as an advisor to the individual enterprises without organising cooperation between the companies. Cooperation is organised directly by the companies themselves.

The General Association of Refrigeration Technicians (AGFR), affiliated to the International Refrigeration Institute (IIR), is a professional organisation covering technicians from technical universities, research institutes,

producers and users of refrigeration plants. AGFR organises the professional contact between technicians only, hence not between companies.

Designs of refrigeration plants and equipment are mainly performed by: ICPIAF, Cluj (refrigeration equipment for enterprises belonging to the Engineering Construction Ministry); ISPCAIA, Bucharest (refrigeration plants for enterprises in the food industry); ICPROCHIM, Bucharest (for enterprises belonging to the Ministry of Chemical Industries).

Chart 2.5: CFC-12 Use in Refrigeration, 1989-93



Domestic Refrigeration

There are around 7.6 m domestic refrigeration units (70% refrigerators and 30% freezers) in Romania, a country with around 23 m inhabitants. Each unit contains 90-120 g CFC-12 as refrigerant (0.1 m units are, however, of the absorption type with a water/ammonia solution). The ordinary lifetime of a domestic refrigerator is around 10 years, but several repairs typically extend the lifetime to 20 years. This long lifetime is due to the present strain on personal incomes.

Before 1989, around 500,000 domestic refrigerators were imported from the former Soviet Union (ZIL and MINSK). Since 1989, some 500,000 units have been imported from ELECTROLUX, BOSCH, PHILIPS and ZANUSSI. High prices for foreign refrigerators limit the amount of imports notably.

There are two manufacturers of domestic refrigerators in Romania:

- ARCTIC S.A., Gaesti (Box 5)
- U.M. SADU, Gorj (Box 6)

ARCTIC and SADU have the agreement that SADU buys compressors from ARCTIC who in turn buys thermostats and plastic spare parts produced at SADU.

BOX 5: ARCTICSA, Găesti	
Company profile	ARCTIC was founded in 1968, and produced on a Thompson-Houston licence until 1975. Its products are of own design and are manufactured by its workforce of around 4300 (including servicing personnel). The ownership structure is 70% SOF and 30% POF.
Product range	Domestic refrigerators, larders, two-door refrigerators, upright freezers, chest freezers, fridge-freezers, compressors and spare parts.
Market	ARCTIC produces mainly for the domestic market. In 1993, 112,000 units (30% of the production) were exported to France, Greece, and the UK. The export is, however, decreasing due to a large growth in the domestic demand.
Equipment/production	ARCTIC has 32 production lines in operation of which more than half are 25 years old. Most of the foaming lines are 5-10 years old, but the line for chest freezers is from 1994. The production capacity is around 400,000 units.
ODS consumption	As refrigerant for new units, ARCTIC used in 1993 52.5 tonnes of CFC-12. In addition to this 9.6 tonnes of CFC-12 were used in servicing (see also Box 9) and 150 tonnes of CFC-11 were consumed in foam production.
Supply	Suppliers include BASF and ICI.
ODS phaseout	ARCTIC has as of 1st November 1994 converted from CFC-12 to HFC-134a, and from CFC-11 to HCFC-141b. It wishes to go further and use cyclopentane.

BOX 6: DIM-SADU, Gorj	
Company profile	SADU is part of the RATMIL corporation in Bucharest, a military industrial complex. SADU is located in Gorj, around 330 km west of Bucharest. SADU has 5,200 employees of which 800 are engaged in the production of domestic refrigerators. The ownership structure is 70% SOF and 30% POF.
Product range	Domestic compressor refrigerators, domestic absorption type refrigerators, thermostats and detonators.
Market	The domestic market only.
Equipment/production	SADU has a production capacity of 160,000 compressor refrigerators and 40,000 absorption type refrigerators. Production in 1993 was 61,000 and 35,000 units respectively. Additionally, SADU produced around 400,000 thermostats in 1993.
ODS consumption	In 1993, SADU used 9 tonnes of CFC-12 of which 3.2 tonnes were used in the production of thermostats. For foam production 30 tonnes of CFC-11 were consumed.
Supply	SADU acquired 14 tonnes of CFC-11 and all its CFC-12 from BICAPA in 1993. The remaining 16 tonnes of CFC-11 was imported from Greece.
ODS phaseout	SADU wishes to convert from CFC-12 to HFC-134a and CFC-11 to HCFC-141b.

Commercial Refrigeration

Commercial refrigeration covers cold chambers, display cases, sales cabinets and freezers. It is estimated that the stock in Romania amounts to 175.000 units, each unit containing around 2 kg CFC-12. Most of these are domestically produced but there exists also a small import of ZANUZZI and ELECTROLUX appliances.

The CFC-12 containing Romanian commercial refrigerators are primarily produced by:

- S.C. TEHNOFRIG S.A., Cluj (Box 7)
- S.C. FRIGOCOM S.A., Bucharest (Box 8)

TEHNOUTILAJ, Odorhei, is also a noteworthy producer of commercial refrigerators.

BOX 7: S.C. TEHNOFRIG S.A., Cluj	
Company profile	Founded in 1949 to manufacture industrial refrigeration equipment and machinery for the food industries. It has since 1992 also been engaged in commercial refrigeration. It has 1,800 employees of which 350 are employed in refrigeration. The turnover in 1993 reached 7.5 bn Lei with 30% derived from refrigeration.
Product range	For the food industry: plants for bottling, breweries, dairies. For refrigeration: compressors, marine refrigeration units, cooling boxes, freezers, and display cabinets.
Market	TEHNOFRIG has almost a 100% domestic market share regarding commercial refrigeration. The market has, however, deteriorated since 1990 and TEHNOFRIG started its production of commercial refrigeration. In commercial refrigeration there are around 20 competitors (15 foreign and 5 Romanian; 2 of these very small). It has no exports.
Equipment/Production	In 1993, TEHNOFRIG produced 5,000 units of commercial refrigerators and about 200 industrial refrigeration units.
ODS consumption	It consumed 3.4 tonnes of CFC-12 and 2.5 tonnes of HCFC-22 as refrigerants and 1.4 tonnes of CFC-11 for foaming in 1994.
Supply	The CFCs are imported from Greece through MIDAL in Bucharest (see Box 4).
ODS phaseout	TEHNOFRIG intends to convert from CFC-12 to HFC-134a and from CFC-11 to HCFC-141b as soon as possible.

BOX8: S.C. FRIGOCOM S.A., Bucharest	
Company profile	Founded in 1950. The number of employees has decreased from 900 in 1989 to 550 in 1993, of which around 200 were engaged in refrigeration. The turnover in 1994 amounted to 800 bn Lei, with a profit of 800 m Lei. Around 75% of the profit stems from refrigeration. The ownership structure is 70% SOF and 30% POF.
Product range	Display cases, condensing units, soft-ice machines, isothermal cases, cold-chambers, freezers and hermetic compressors (started in 1994). The company produces also commercial furniture and kitchens.
Market	All units are sold on the domestic market. Before 1989 it cooperated with TEHNOFRIG and ARCTIC, but these are now competitors. FRIGOCOM is at present (February 1995) in severe need for new contracts.
Equipment/production	The production capacity on the refrigeration lines is 20,000 units per year, but the production in 1993 only amounted to 6,000 units. The company has its own foam production line with two HENEKE high-pressure injection machines.
ODS consumption	FRIGOCOM used 50 tonnes of CFC-12 and 9 tonnes of CFC-11 in 1993
Supply	The CFC is imported from Greece and Russia through CHIMEXIM (see Box 3). The iso-cyanid is bought in Italy and the Netherlands. Regarding servicing, before 1989 FRIGOCOM had a contract with IRUC, the state-owned servicing company, but now the company has a service contract with COM-SERVICE (see Box 10).
ODS phaseout	The company intends to convert to HCFC-22 as refrigerant and HCFC-141b as the foam-blowing agent.

Industrial Refrigeration

The main producer of industrial refrigeration equipment in Romania is:

- S.C. TEHNOFRIG S.A., Cluj (Box 7)

ICPIAF, Cluj, (see Box 12) is mainly a design institute (all TEHNOFRIG's equipment has been designed by ICPIAF), but it has also some special refrigeration equipment production of its own: weather-testing chambers, freeze-drying plants, cryogenics plants, and CO₂ plants.

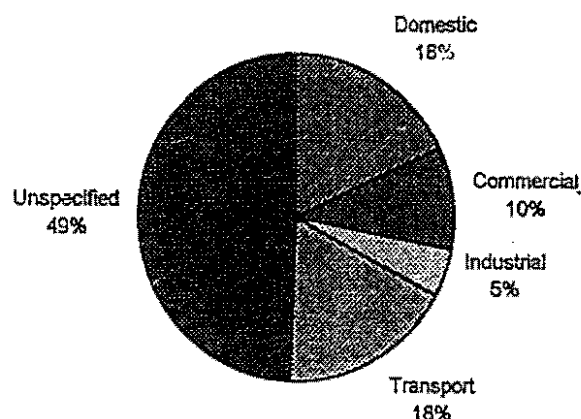
FRIGOTEHNICA, Bucharest, produces also components for industrial refrigeration: condensers, air-cooling units; all based on ammonia.

There is at present no production of transport refrigeration in Romania. Before 1989 there existed only one refrigerated transport company, which since has been separated into one for rail transport, TRANSFRIGOTREN (see Box 13) and several for road transport. The refrigeration units in the trains were all imported mainly from the former East Germany.

Servicing of Refrigeration

The servicing sector comprises a few relative large state-owned companies, around 50 private authorized servicing shops and numerous servicing shops without authorization. Chart 2.6 shows the 1993 shares of CFC-12 by application. The large category *unspecified* is expected to relate mainly to domestic refrigeration, and so this is the largest user.

Chart 2.6: CFC-12 Use for Servicing of Refrigeration, 1993



Legal requirements exist for operating a servicing point; they comprise:

- a technical certificate from the Ministry of Health and the police
- an authorization from the Ministry for the Protection of Working and Social Conditions

Due to a lack of knowledge about the number of unauthorized refrigeration service shops, it is difficult to estimate the amount of service jobs performed by uneducated technicians. The *educational background* of the authorized service technicians is one of the three following:

- superior studies at a technical university
- medium studies at an industry high-school
- refrigeration course at an industry high-school

The bulk of Romania's refrigeration systems are CFC-12 based and the three *ODS phaseout options* exist:

- Keep servicing the refrigeration equipment with CFCs until scrapping. This is likely to be the cheapest solution but it would mean continued use of CFCs for 10-15 years which is unacceptable.
- Retrofit with HFC-134a. This is time consuming and quite expensive as HFC-134a is not compatible with the mineral oil and five successive changes of the expensive Polyol Ester oil are required.
- Use a HCFC-22 based drop-in blend until the equipment is scrapped.

• *Servicing of domestic refrigeration*

Servicing of the around 7.5 m domestic refrigerators is done by the two producer ARCTIC (see Box 9) and SADU (see Box 10), and a large number of small shops, but also some by the commercial refrigeration servicer, COMSERVICE (see Box 11).

BOX 9: ARCTIC S.A., (Servicing Shops)	
Company profile	ARCTIC has 86 servicing shops spread all over Romania. Of these, 37 are owned by ARCTIC, whereas the remaining 49 work on a contract with ARCTIC. Only 2% of the servicing jobs concern appliances from other manufacturers. In total, 300 people are engaged in the servicing.
Servicing procedure	ARCTIC offers a warranty period of one year. In 1993, 18.9% of its appliances were serviced during the warranty period. The lifetime of its appliances is normally 10 years. However, due to the ongoing economic recession refrigerators are replaced rather overdue.
Equipment/production	In 1993, 74,282 appliances (68% refrigerators and 32% freezers) were serviced by ARCTIC, of which 54,929 (74%) appliances were serviced in the warranty period. Approximately 90% of the servicing jobs include refrigerant top-up or recharge. ARCTIC has 5 filling stations, established in 1978, 1985, 1990, 1992 and 1993, respectively. The equipment used for recharging includes P.S.N. 201, manufactured in Poland, and ROBINAIR, manufactured in Switzerland. The bulk of the service jobs are carried out at the servicing points (85%).
ODS consumption	ARCTIC used 9.6 tonnes CFC-12 for servicing in 1993, which amounts to around 130 g per servicing job.
ODS phaseout	ARCTIC service-men need training to handle non-CFC refrigerants. Investments are needed for recovery/recycling equipment.

BOX 10: U.M. SADU, (Servicing Shops)	
Company profile	SADU has 40 servicing shops spread all over Romania typically with only one refrigeration technician employed.
Servicing procedure	The bulk of the servicing jobs are carried out at the servicing points and within the warranty-period of one year.
Equipment/production	The equipment used for recharging during servicing is similar to ARCTIC's ie P.S.N. 201 from Poland, usually 5 years old.
ODS consumption	The CFC-12 consumption of SADU's shops was in 1993 around 1.5 tonnes.
ODS phaseout	SADU service-men need training to handle non-CFC refrigerants. Investments are needed for recovery/recycling equipment.

Since 1989, a vast number of small private servicing shops have been established. These small shops, typically with one employee, are serious competitors to ARCTIC and SADU. Usually they have no authorization, and many of their technicians have not received any education or training in servicing. Their price of a service is on

average 15% lower than that of ARCTIC and SADU, and they mostly service *on location*, that is in the homes. There appears to exist an informal network between the technicians from the unauthorized shops, and they seem often to get a large proportion of their CFC-12 from ARCTIC's and SADU's servicing shops. In Cluj, the second largest city in Romania with 300.000 inhabitants, there are 10 small servicing shops with authorization and around 30 without an authorization. The total number of these small servicing shops in Romania is unknown.

• *Servicing of commercial refrigeration*

Before 1989, IRUC was the sole servicing company for commercial refrigeration, having shops in most counties. It was then divided into around 50 small service shops organized under the network COMSERVICE of which five shops are named COMSERVICE (see Box 11 for the Cluj-based shop). The remaining part of the COMSERVICE network consists of smaller authorized private shops. The situation regarding unauthorized servicing shops is similar to the one for domestic refrigeration. A large, but unknown, number of unauthorized servicing shops has been established since 1989. These shops have typically 2-3 employees, but some are larger. In Timisoara, for example, there is claimed to be an unauthorized commercial refrigeration servicing shop with 8 employees.

BOX 11: COMSERVICE S.A., Cluj	
Company profile	Founded in 1965. It has 70 employees of which 45 are employed in servicing of refrigerators. Owned 70% by SOF and 30% by POP.
Servicing procedure	Servicing of commercial refrigeration units; in the company as well as <i>on location</i> .
Equipment/production	There are around 3,000 commercial refrigeration installations in Cluj, of which the 2,000 are serviced by COMSERVICE. It covers also the seven neighbouring municipalities. Its equipment, which includes leak detectors, is of high quality compared with the private servicing shops.
ODS consumption	COMSERVICE used 1.2 tonnes of CFC-12 in 1993.
Supply	The CFC is bought from MIDAL, Bucharest (see Box 4).
ODS phaseout	COMSERVICE technicians need to learn to deal with non-ODS commercial refrigerators. Investments are needed regarding recovery/recycling equipment. It has already invested in leak detectors for HFC-134a.

• *Servicing of industrial refrigeration*

The servicing of the around 70,000 industrial refrigeration units is performed by TEHNOFRIG (see Box 7) and ICPIAF, Cluj (see Box 12). TEHNOFRIG has a servicing department with ten employees, which collaborates, on a contract basis, with technicians in all of Transylvania. It is estimated that 5-6 similar companies exist in Romania.

BOX 12: ICPIAF S.A., Cluj	
Company profile	Founded in 1974. It employs 427 people of which 70 are employed in refrigeration. It has one servicing shop employing 4 technicians. Owned 70% by SOF and 30% by POP.
Servicing procedure	ICPIAF services imported refrigeration units as well as the units it has assisted installing. Around 25 installations were serviced in 1993. It has also some special refrigeration equipment production of its own: weather-testing chambers, freeze-drying plants, cryogenics plants, and CO ₂ plants.
Equipment/production	ICPIAF produces per year around 50 units cryogenics plants, 80 heat exchangers, 10 CO ₂ plants and 60 other refrigeration plants.
ODS consumption	ICPIAF used 0.5 tonnes of CFC-12 in 1993 for servicing (around 1 tonnes of CFC-12 was used in new installations).
Supply	The CFC is bought from Greece through MIDAL in Bucharest.
ODS phaseout	ICPIAF proposes a project to carry out training for refrigeration technicians regarding recovery and recycling, and conversion to non-ODS servicing.

Some companies with industrial refrigeration units also perform the servicing themselves. This is done partly by their own employees and partly by external, often unauthorized, private servicing shops. It is not possible to estimate the size of this activity.

- *Servicing of transport refrigeration*

In 1989, the sole Romanian transport refrigeration company, ETI, was split into one rail transport refrigeration company, TRANSFRIGOTREN (Box 13) and numerous county-based road transport refrigeration companies. In 1989, ETI possessed 400 refrigerated trucks.

BOX 13: TRANSFRIGOTREN, Bucharest	
Company profile	Founded in 1990 as the rail transport refrigeration section of ETL. The turnover in 1993 amounted to 1.3 bn Lei in 1993, and it employs 160 people (around 1/3 refrigeration engineers, 1/3 electricians, 1/3 mechanical engineers, and 20 administrative staff). Owned 70% by SOF, 30% by POP.
Product range	Rail transport refrigeration transport services, mainly internationally but also for domestic transport. On average 15 trains per months are occupied, each with 8 wagons each (see below).
Market	Through the participation in the INTERFRIGO network, based in Basel, Switzerland, the market is European-wide (both east and west). Around 60% of the transport is abroad and 40% domestic.
Equipment/production	TRANSFRIGOTREN possesses 30 trains consisting of 8 wagons (+ 1 technical wagon partly for electricity generation and partly as accommodation for the travelling technicians). Each wagon has two compressors with a cooling capacity of 4,500 Kcal/hour (5,850 Kcal/hour warming capacity). The equipment dates back to 1978-82 and is bought in Dresden, Germany. It transports 4,000-4,500 tonnes per month.
ODS consumption	The ODS stock in the compressors amounts to 10.6 tonnes CFC-12 and 10.8 tonnes per year are used for servicing. The large amount is due to leakages, which is considered normal in rail transport refrigeration because of the vibrations during the transport.
Supply	In 1994, around 50% of the CFC-12 was acquired from Ukraine. The remaining 50% was bought from BICAPA.
ODS phaseout	TRANSFRIGOTREN intends to phaseout ODS as soon as possible. The present proposal is a conversion to HFC-134a.

2.2.3.2 Foams

In Table 2.5 (Section 2.1) data for three categories of foams are shown:

- rigid foam for refrigeration
- rigid foam (other)
- flexible foam

Their shares of CFC-11 use in 1993 are illustrated in Chart 2.7. Rigid foam for refrigeration is clearly the most important use, but the companies belonging to this category have previously been described: ARCTIC (Box 5), SADU (Box 6), TEHNOFRIG (Box 7) and FRIGOCOM (Box 8). In the following there will thus only be focused on the two latter categories (the companies are shown on Map 4).

Before 1989, the Ministry of Commerce and the Ministry of Industry coordinated the activities of the foam producers. After 1989, the companies became competitors, but in 1994, only a few foam producers remain in existence.

Map 4: Romanian Foam Producers

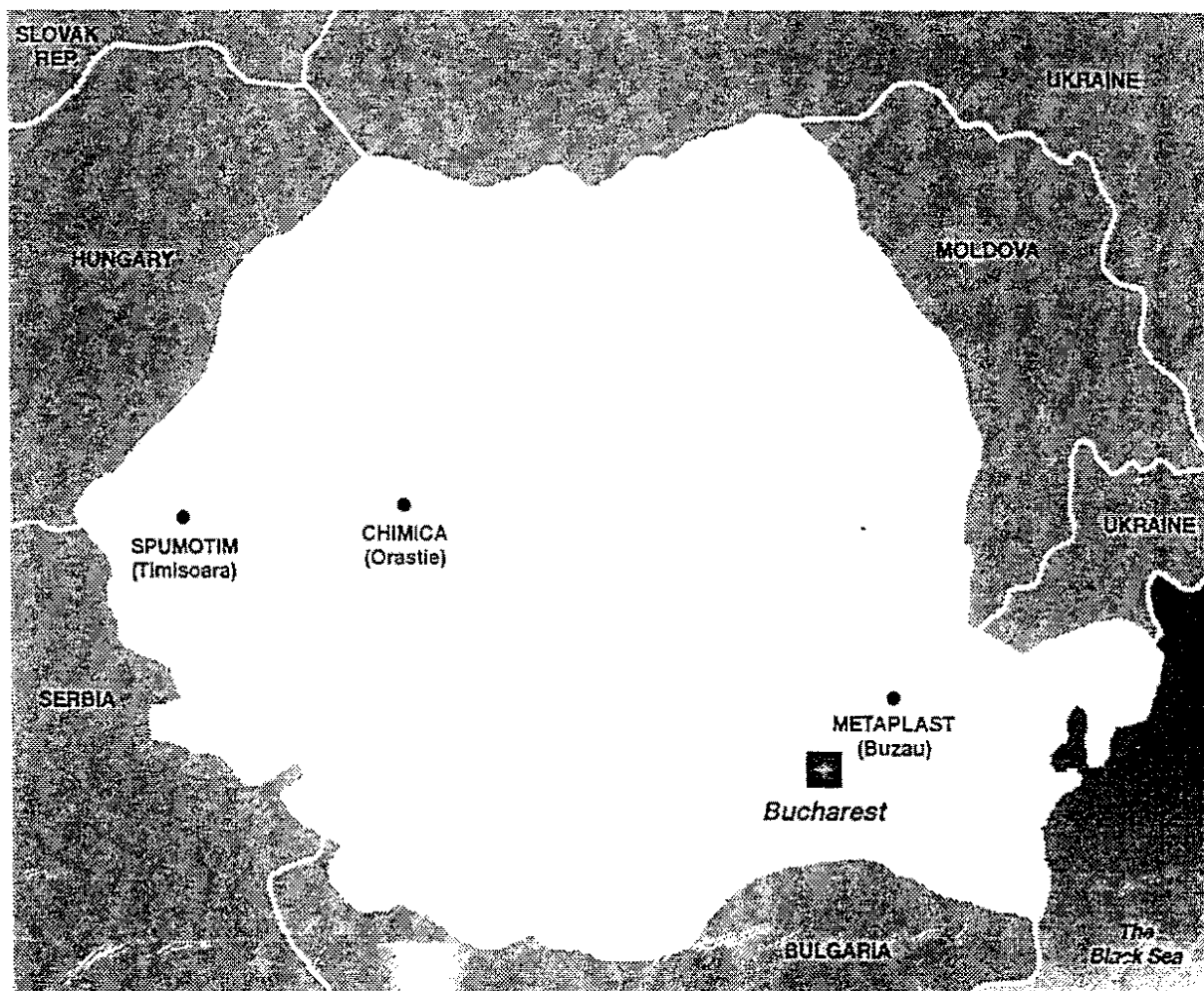
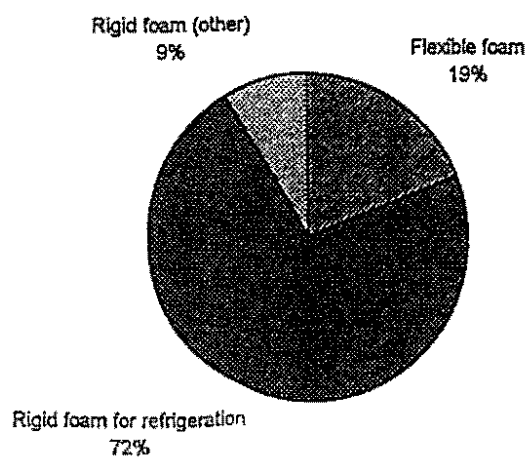


Chart 2.7: CFC-11 Use for Foams



Rigid Foam (Other)

The main enterprise engaged in this production is:

- METAPLAST S.A., Buzau (Box 14)

A small production was also provided by CHIMICA (see Box 16) in 1994.

BOX 14: METAPLAST S.A., Buzau	
Company profile	Founded in 1973. It has 700 employees of which 16 work directly on the continuous rigid foam production line.
Product range	Materials for construction: plastic pipes and tubes, profiles for walls, doors, windows, ROMPAN panels for roofs and walls, metallic profiles for various uses, products of rigid foam: sandwich panels (started in 1980) and flexible foam: furniture and camping equipment (discontinuous line commenced in 1994).
Market	All rigid foam products are sold on the domestic market, while all the products of flexible foam are exported to Germany
Equipment/production	The machinery for the sandwich panel production was acquired in 1979 from BROLA, Italy. It has a capacity of 300,000 m ² sandwich panels in one shift (only one shift per day). The capacity utilisation was around 50% 1994.
ODS consumption	For rigid foam, 21.5 tonnes of CFC-11 was consumed in 1993 and just 0.4 tonnes for the flexible foam. The company uses only pre-mixed polyols.
Supply	METAPLAST's suppliers include BEYER, BASF and ICI.
ODS phaseout	In 1995 the CFC-11 will be replaced by HCFC-141b.

Flexible Foam

Two main companies are engaged in this production:

- SPUMOTIM S.A., Timisoara (Box 15)
- CHIMICA S.A., Orastie (Box 16)

The production of CHIMICA is in principle named semi-rigid foam.

METAPLAST (see Box 14) has also a small production of flexible foam, comprising of cushions for furniture and camping equipment.

MIZIL, Prahova, is a small furniture producer, who before 1989 bought its foam from SPUMOTIM. It produces now its own flexible foam, but consumes less than one tonnes of CFC-11 per year.

BOX 15: SPUMOTIM S.A., Timisoara	
Company profile	In 1994, 638 people were employed at SPUMOTIM, 31 directly on the foam production line, while almost 500 people are dependent on the foam production (in the camping equipment section etc). The turnover was 12.55 bn Lei in 1994 (7.929 bn Lei in 1993). The foam production's share was 40-45%. Owned 70% by SOF and 30% by POP.
Product range	Apart from the foam for furniture and camping equipment, SPUMOTIM produces goods such as flexible moulding and shoe soles. Around 10 years ago the export of the shoe soles to the USSR was its primary business.
Market	Of the foam produced, 27% goes to export markets, much of it through a dealer in Sweden. IKEA is an important customer. It experiences increased competition from GEINER in Austria who has bought a factory in Hungary and who, together with RECTICEL, Belgium, has created the joint-venture: EURO-FOAM.
Equipment/production	The company has equipment which produces the foam using Polyol, TDI and CFC-11. The capacity was in 1993 around 12,000 tonnes while the production only amounted to 2,525 tonnes.
ODS consumption	The consumption of CFC-11 has decreased from 45 tonnes in 1989 to 29.4 tonnes in 1993.
Supply	All CFCs are bought from BICAPA
ODS phaseout	SPUMOTIM wants to convert to 100% CO ₂ foam-blowing.

BOX 16: CHIMICA S.A., Orastie	
Company profile	Founded in 1965. It employs 2,000 of which 77 are directly engaged in the foam production. The turnover in 1993 amounted to 80 bn Lei; around 15% arose in the foam production.
Product range	Plastic products accounts for 65% of the production and foams the remaining part. The plastic products include: flowers, camping furniture, household products, barrels, bathroom products etc. The foam production (semi-rigid) comprises: spare parts for cars and busses: seats, panels, door handles etc. In December 1994 the company started a production of insulating pipelines with rigid foam, but it has not yet succeeded to sell the produce.
Market	All produce is sold on the domestic market.
Equipment/production	The foam is produced using five HENEKE high pressure machines and one from TRUSINIA (former GDR). The HENEKE machines are 4-5 years old but are in a bad condition due a lack of maintenance.
ODS consumption	In 1993, 18.6 tonnes of CFC-11 were consumed. In 1994, the consumption is estimated to have fallen to 12 tonnes, of which a small part was for rigid foams.
Supply	SPUMOTIM bought in 1993, 70% of its CFC from BICAPA and the rest from Greece through CHIM-EXIM, Bucharest.
ODS phaseout	The company wants to convert to foam-blowing based on HCFC-141b. The possibility for CO ₂ will also be considered.

2.2.3.3 Aerosols

Romania has one dominant aerosol producers:

- FARMEC S.A., Cluj (Box 17)

Some aerosols are produced by COLGATE-PALMOLIVE (formerly NORVEA), Brasov, and BIOFARM, Bucharest (see Map 5)

Most of the CFC used is for personal care products, followed by household products, while around 10% is used for industrial purposes such as the production of silicon (see Table 2.6 in Section 2.1).

Until 1989, the entire range of cosmetics and pharmaceutical products was from domestic sources. From the beginning of 1990, however, foreign products entered the market in Romania. Consequently, the production and the sale of home products diminished, and so did the CFC use (see Chart 2.8).

Map 5: Romanian Aerosol Producers

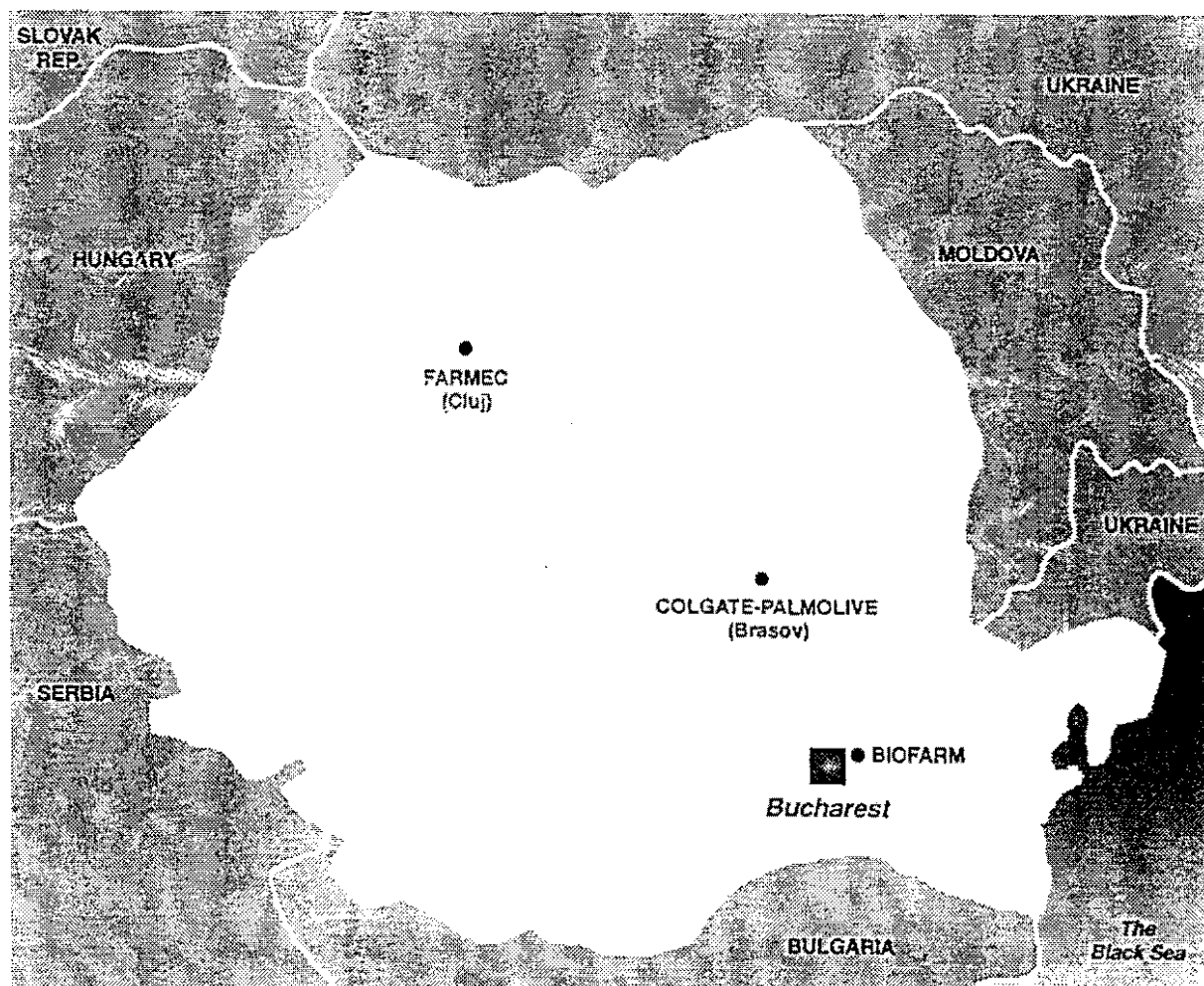
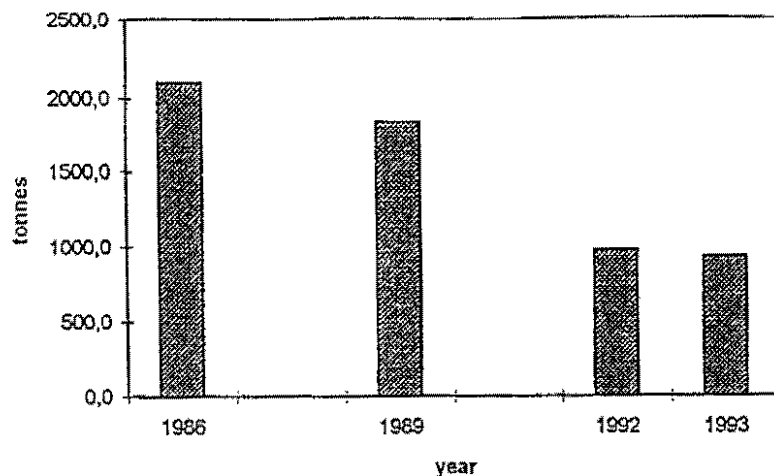


Chart 2.8: CFCs Used for Aerosols



BOX 17: FARMEC S.A., Cluj	
Company profile	Founded in 1949, but the aerosol production did not begin until 1968. In 1994, 1,100 were employed at FARMEC, of which around 275 were engaged in the aerosol production. In 1993, the turnover was 17-20 bn Lei; profit margin was 15%. Around 60% of the turnover came from the aerosol production. Owned 70% by SOF, 30% by POF. FARMEC aspires to be privatised.
Product range	The main products are: 1) for personal care: creams and hand lotions, deodorants, perfumes and shaving foams; 2) household products: insecticides, detergents. FARMEC produces its own aluminium cans and plastic jars.
Market	FARMEC is the main producer of sprays in Romania. It accounts for around 97% of the aerosol production. COLGATE-PALMOLIVE (formerly NORVEA) accounts for the remaining 3%. At present, FARMEC has no export (before 1990 it produced some goods for Schwarzkopf). FARMEC has a market share of around 40 % in Romania, the rest is imported. FARMEC experiences an increasing competition from abroad.
Equipment/production	For aerosols, the production capacity is above 15 m cans per year (= 1992 production). In 1993 and 1994 the production fell to 10 m and 8 m cans, respectively. Of these, around 2 m cans per year contained compressed air. The aerosols are produced on PAMASOL and AER-ATOM lines; all are around 20 years old.
ODS consumption	The consumption of CFC-12 dropped from 1,390 tonnes in 1989 to 700 tonnes in 1994. The consumption of CFC-114 dropped in the same period from 10 tonnes to 1 tonnes. Delivery problems were experienced in 1994 but these appears to have vanished.
Supply	Today, FARMEC receives most of its ODS supplies from Ukraine through CHIMEXIM (see Box 3). It receives only a little from BICAPA because of the price (higher) and the quality (lower).
ODS phaseout	FARMEC intends to convert its production lines from CFC-12 to butane-propane, but wishes to retain its compressed air production line.

Personal Care Products

While FARMEC produced 7-8 m cans for personal care in 1993, the contribution of COLGATE-PALMOLIVE amounted to around 1 m cans. The product range include creams and hand lotions, deodorants, perfumes and shaving foams.

BIOFARM produced in 1993 around 21,000 aerosols for pharmaceutical use, using 1.2 tonnes CFC-12. The enterprise employs 10 people in the aerosol sector. Its products were sold solely on the domestic market.

Household Products

FARMEC is the only Romanian producer of household aerosols, which include insecticides and detergents.

Industrial Products

The aerosol production for industrial application is limited in Romania with an consumption of 80 tonnes CFC-12 in 1993, mainly for silicon.

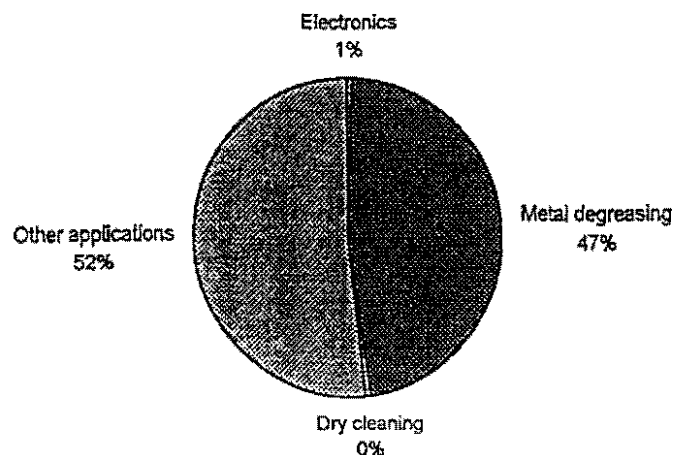
2.2.3.4 Solvents

The solvents sector in Romania comprises the following applications (see Chart 2.9):

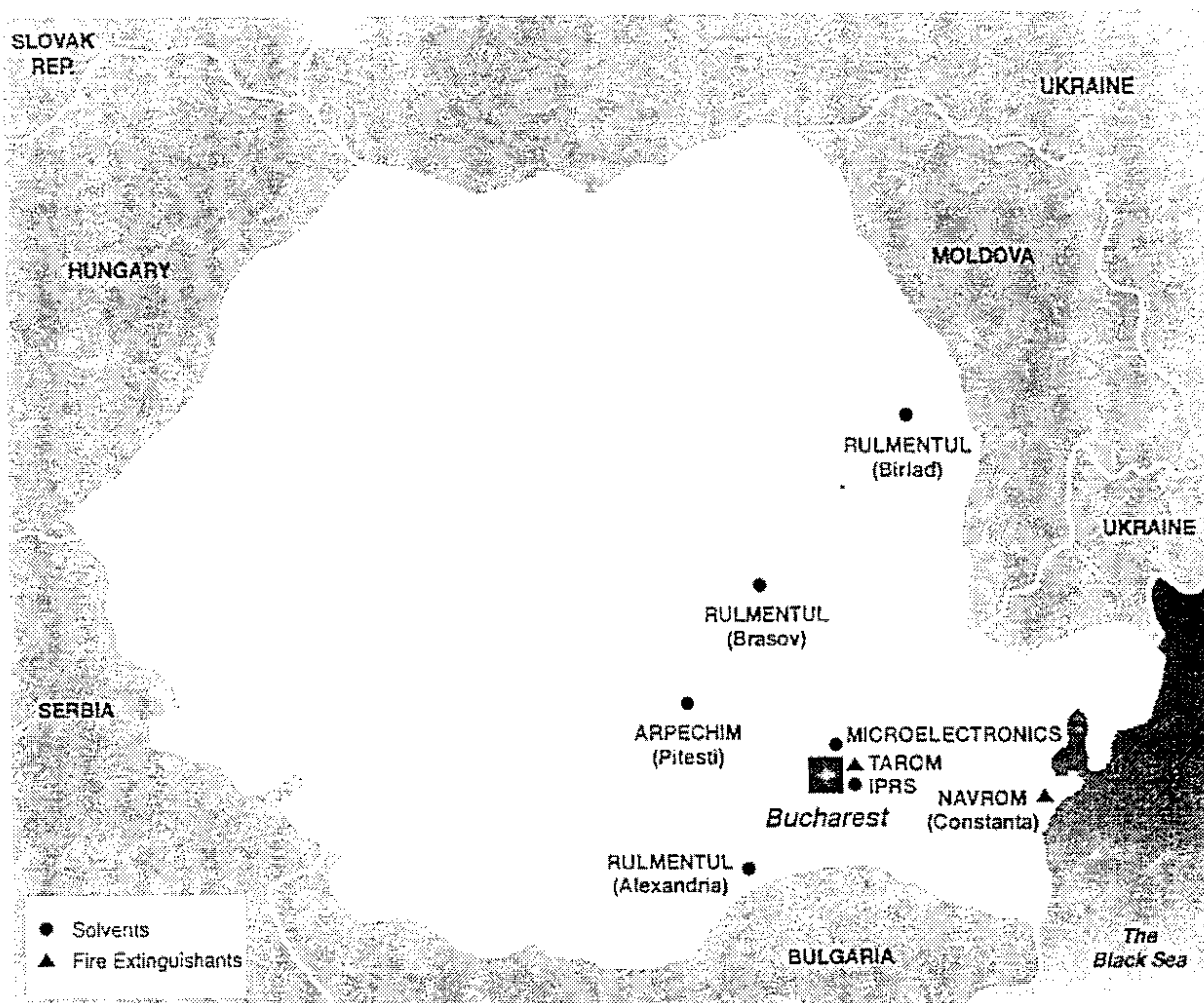
- Metal degreasing
- Dry cleaning
- Electronics

OLTCHIM (see Box 2) and CHIMCOMPLEX, Onesti, manufacture around 97% of the CTC and 18% of the MCF used in these sectors; the remainder is imported.

Chart 2.9: ODS Used as Solvent, 1993 (ODP-weighted)



Map 6: Romanian Solvents and Fire Extinguishant Users



Metal Degreasing

The metal degreasing sector in Romania is dominated by producers of ball bearings. After 1989 the cooperation between the companies stopped and they are now competitors in the Romanian market.

The main companies using solvents in the metal degreasing process are (see Map 6):

- S.C. RULMENTUL, Barlad (see Box 18)
- S.C. RULMENTUL, Alexandria
- S.C. RULMENTUL, Brasov
- S.C. ARPECHIM, Pitesti

BOX 18: S.C. RULMENTUL ¹ , Baneş	
Company profile	Founded in 1980 but restructured in 1990. In 1993, it employed 5000 of which 950 were engaged in the solvent-using production. The turnover in 1993 amounted to 86 bn Lei; with a profit margin of 9%. The ownership structure is 70% SOF and 30% POP.
Product range	Design and production of ball bearings.
Market	More than 80% of the production is exported. In the domestic market it has three large competitors.
Equipment/ production	The capacity of the ODS consuming production was 23 m pieces in 1993, while the production reached 20 m pieces.
ODS consumption	RULMENTUL consumed 50 tonnes of CFC-113 and 3 tonnes of MCF in 1993.
Supply	OLTCHIM supplies the MCF, while the CFC-113 is imports.
ODS phaseout	Conversion from 113 to alcohol-based metal degreasing.

Note 1. Rulmentul means *ball bearing* in Romanian.

Of the other large enterprises, S.C. RULMENTUL in Alexandria has 800 employees and manufactures annually about 24 m bearings of which 22 m are exported. The main solvent used is MCF. S.C. RULMENTUL in Brasov employs 600 people and produces annually about 22 m bearings of which 17 m are exported. The main solvent used is CTC. Finally, S.C. ALPECHIM Pitesti employs 75 people in an oxygen and nitrogen production and bottling sector. The main solvent used as a metal degreasing element is CTC.

Dry Cleaning

The sector comprises around 450 small and medium-sized dry cleaning plants, the majority being state-owned. Until 1989 the dry cleaning shops used CTC. Since 1990, most CTC was replaced by perchlorethylene.

Electronics

In the electronics sector the main solvent used is CFC-113. It is utilized for the cleaning of electronic components and metallic parts. The consumption of CFC-113 was in 1993, however, only around one tonnes.

In Romania the main manufacturers of electronic components are IPRS in Baneasa (Bucharest) and MICRO-ELECTRONICS, Bucharest (see Map 5) and they satisfy almost all of the demand in Romania.

2.2.3.5 Fire Extinguishants

The main enterprises that use halons are (see Map 6):

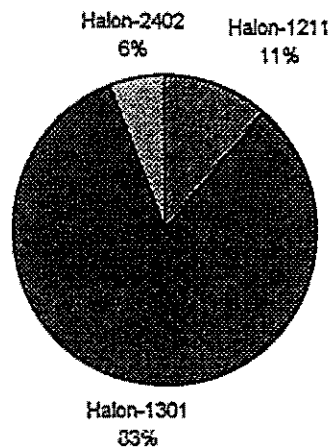
- TAROM S.A., Bucharest
- NAVROM S.A., Constanta

Halon-1301 is the most used followed by Halon-1211 (see Chart 2.10).

TAROM, the Romanian airline, has 10 employees in the fire fighting sector who ensure maintenance and loading of fire extinguishing equipment. Around 65% of the fire extinguishers are installed in the motor area of the aircrafts while the remaining is found in the passenger and crew cabins.

NAVROM, S.A., the Romanian sea transport operator, has 25 employees engaged in the fighting sector.

Chart 2.10: Halons Use, 1993 (ODP-weighted)



2.3 Institutional Framework

Till now, two ministries have played a key role in designing, implementing and monitoring a realistic and cost-effective ODS phaseout strategy in Romania. The two ministries are: MWFEP and the Ministry of Industries.

Other Government agencies, NGO's and consumer groups have played only a marginal role, if any. ODS producing and consuming enterprises have been involved indirectly through the Ministry of Industries.

However, numerous other Government agencies will have to contribute to ODS phaseout. They comprise foremost the Ministry of Commerce, the Ministry of Agriculture and Food, the Ministry of National Defence, the Ministry of Internal Affairs, the Ministry of Research and Technology and the Ministry of Foreign Affairs.

Below follows a brief description of MWFEP and the Ministry of Industries with the emphasis laid on the role and responsibilities of each in ODS phaseout since January 1993 when Romania ratified the Montreal Protocol.

2.3.1 MWFEP

MWFEP was established in 1989 on the basis of the Department of Environmental Problems. Today, it operates in accordance with Government Decision No. 457 of July 1994. It comprises four functional departments and the State Environmental Inspection. The four functional departments are: General Department for Development, Resources and Public and International Relations, Department of Environmental Protection Strategy and Regulation, Monitoring Department and Department of Programmes for Ecological Re-generation. The State Environmental Inspection has an office in each county which, among others, takes part in customs clearance.

According to Government Decision No. 457 the number of employees in MWFEP at a national level may not exceed 200 (Article 4, paragraph 3). This is a consequence of the attempt to keep public expenditure down.

MWFEP is overall responsible for implementing legislation in the field of water, forests and environment.

According to Government Decision No. 457 MWFEP has the following responsibilities of particular relevance to the development of an institutional framework capable of supporting the ODS phaseout strategy selected:

- MWFEP is overall responsible for negotiating, implementing and monitoring international agreements, conventions and protocols concerning the environment. MWFEP will negotiate all international environmental agreements (Article 2, paragraph 4), be held responsible for the development of the legal framework following international environmental agreements ratified by the Romanian Government (Article 2, paragraph 5) and ensure that international environmental agreements ratified by the Romanian Government will be implemented (Article 3, paragraph 22).
- MWFEP is overall responsible for the coordination of Government actions aimed at pollution prevention and abatement and clean-up of past contamination. MWFEP is responsible for developing "all sort of cooperation" between Government agencies and other agencies (Article 2, paragraph 7).
- MWFEP has a general veto right within its sphere of competence. MWFEP has to approve all import licences, manufacturing technologies, equipment and technical assistance programmes within its sphere of competence (Article 2, paragraph 10).

According to Government Decision No. 437 of August 1992 MWFEP is the lead agency in ODS Phaseout in Romania. Thus, MWFEP is accountable for phaseout of each group of controlled substances in accordance with the maximum levels allowed by the Montreal Protocol, control of trade in controlled substances and collection of production and consumption data and reporting to the United Nations Environment Programme (UNEP).

MWFEP is also the main originator of legislative initiatives concerning the Montreal Protocol.

2.3.2 Ministry of Industries

The Ministry of Industries is undergoing a turbulent period of restructuring. Since 1989, it has been subject to 12 major reorganizations. Today, it operates on the basis of Government Decision No. 794 of December 1992. It comprises three functional departments, eight sectoral departments and four attached agencies. The three functional departments are: Department of Restructuring, Development and Economic Reform, Department of Material and Financial Resources Correlation and Department of Management, Legislation and Human Resources. Among the eight sectoral departments are: Department for Chemical and Petrochemical Industry and Department for Electronics, Electrotechnics and Fine Mechanics.

Prior to 1989, more than 10 branch ministries existed, employing a total of 10,000 employees. In addition, the branch ministries employed 26,000 civil servants, researchers and scientists in 250 so-called sub-centres, mostly in Bucharest. Immediately after the revolution, the branch ministries were merged to form a single Ministry of Industry and Resources (later renamed the Ministry of Industries) with 3,000 employees. At the same time the sub-centres were liquidated or converted into commercial companies. Staff reductions have continued and, today, the Ministry has approximately 700 employees.

The Ministry of Industries is in charge of elaboration of industrial development policies, strategies and programmes and implementation of the Government strategy in the various industrial sectors within its field of competence, including electronics, electrotechnics and fine mechanics and chemistry and petrochemistry.

The Ministry of Industries has been made responsible for the contacts to the individual enterprises on ODS phaseout related matters. All the large ODS producing and consuming enterprises are still state-owned, though they belong to state holding companies. Thus, the Ministry of Industries plays a role in their development.

The establishment of the State Ownership Fund (SOF) and the Private Ownership Funds (POF) has, however, reduced the influence of the Ministry on the enterprise sector. The funds have the direct control over the enterprises and execute the privatisation strategy formulated by the National Agency for Privatisation.

2.4 Policy Framework

The policy framework within which ODS phaseout will be managed is characterized by the ongoing transition to market economy. The old policy framework built on command and control methods has more or less collapsed, whereas the new policy framework build on a combination of administrative instruments, economic instruments and voluntary agreements are not yet in place. No doubt, the transition will continue into the next century.

With regard to ODS phaseout, it is considered necessary to maintain consistent with the achievements made during the last couple of years in establishing a new policy framework. The achievements made concern foremost the development of new administrative instruments regulating the behaviour of the economic agents and the

start-up of a dialogue between the Government agencies on one side and the enterprise sector on the other side. Unsurprisingly, economic methods do not yet play a significant role in the existing policy framework in Romania.

2.5 Government and Industry Response to the Protocol

Romania became a Party to the Montreal Protocol on 27 January 1993, when the country simultaneously ratified the Vienna Convention, the Montreal Protocol and the London Amendments. The ratification did entry into force on 27 April 1993. The country classifies under the Montreal Protocol as an Article 5 country.

Today, almost all Central and Eastern European countries are Parties to the Protocol. An overview of the status of ratification by Central and Eastern European countries, including the CIS countries, is provided in Table 2.7.

Although Romania has not yet ratified the Copenhagen Amendments, the Romanian Government intends to do so before 1 January 1996, thereby emphasising its strong commitment to protect the stratospheric ozone layer.

The Romanian Government fully acknowledges that the main obligations under the Montreal Protocol are:

- to phase out production and consumption of each group of controlled substances (CFC, halon, CTC, MCF, etc) according to the maximum levels allowed by the Montreal Protocol;
- to cease trade in controlled ODS with countries that are not Parties to the Protocol (this obligation entered into force from 1 January 1993); and
- to collect and report production and consumption data on a regular basis to the United Nations Environment Programme (UNEP).

As a Party to the Montreal Protocol, and having ratified the London Amendments, Romania is obliged to meet the time schedules that were agreed for CFC, halon, CTC and MCF in Copenhagen in 1992, whether or not the country ratifies the Copenhagen Amendments. However, having obtained status of an Article 5 country Romania is allowed a ten-year grace period with regard to ODS used to meet basic domestic needs. Romania is obliged to meet the tight requirements of the Copenhagen Amendments with regard to ODS used in export products.

When Romania ratifies the Copenhagen Amendments it will be obliged to limit its use of HCFC and methyl bromide (a disinfectant used mainly in the agricultural sector). The reduction schedule for HCFC compared to the base level is a freeze by 1996, a 35% reduction by 2004, 65% reduction by 2010, 90% reduction by 2015, 99% reduction by 2020 and 100% phaseout by 2030. The base level is calculated as 3% of the ODP weighted CFC consumption plus the ODP weighted consumption of HCFC in 1989.

Further details on the obligations following the Montreal Protocol are provided in Appendix III.

The Romanian Government has taken firm actions to fulfil its obligations following the Montreal Protocol. Furthermore, at all ODS producing and consuming enterprises there is a great knowledge of the implications of the Montreal Protocol. They fully understand the necessity of implementing ODS replacement projects.

Table 2.7: Status of Ratification in Central and Eastern Europe as of January 1, 1995 of the Montreal Protocol, the London Amendment and the Copenhagen Amendment

	Montreal Protocol (1987)	London Amendment (1990)	Copenhagen Amendment (1992)
Belarus	October 31, 1988	-	-
Bosnia and Herzegovina	March 6, 1992	-	-
Bulgaria	November 20, 1990	-	-
Croatia	October 8, 1991	-	-
Czech Republic	January 1, 1993	-	-
Hungary	April 20, 1989	June 16, 1993	May 17, 1994
Poland	July 13, 1990	-	-
Romania	January 27, 1993	January 27, 1993	-
Russian Federation	November 10, 1988	January 13, 1992	-
Slovakia	May 28, 1993	April 15, 1994	-
Slovenia	July 6, 1992	December 8, 1992	-
The former Yugoslav Republic of Macedonia	March 10, 1994	-	-
Turkmenistan	November 11, 1993	March 15, 1994	-
Ukraine	September 20, 1988	-	-
Uzbekistan	May 18, 1993	-	-
Yugoslavia	January 3, 1991	-	-
Czechoslovakia	June 21, 1990	-	-
USSR	November 10, 1988	-	

Source: UNEP.

2.5.1 Government Responses

Deliberately, the Romanian Government has concentrated its efforts on institutional strengthening in order to develop an institutional framework capable of supporting the ODS phaseout strategy selected and the implementation of a regulatory framework ensuring compliance with Article 4 of the Montreal Protocol. Article 4 of the Montreal Protocol imposes trade restrictions on products containing or produced using controlled substances.

Furthermore, the Romanian Government has requested technical assistance from UNIDO and the Danish Environmental Protection Agency in developing the ODS Country Programme for Romania and in preparing ODS replacement projects at enterprise level. This technical assistance was received in 1994-95.

An overview of existing ODS regulations introduced by the Romanian Government is provided in Appendix IV.

Institutional Strengthening

The Romanian Government has urged MWFEP, which is the lead agency on issues related to the Montreal Protocol, to ensure an institutional strengthening of the ODS phaseout activities in close co-operation with the Ministry of Industries, which is responsible for the contacts to the individual enterprises on ODS phaseout related matters. This has proven to be most difficult, foremost due to lack of dedicated financial resources.

MWFEP has designated its Department of Environmental Protection Strategy and Regulation with overall responsibility for designing, monitoring and implementing the ODS phaseout strategy subject to guidelines from the Romanian Government and MWFEP. Moreover, the MWFEP has designated its Project Implementation Unit, which belongs to the Department of Programmes for Ecological Re-generation, to assist the Department of Environmental Protection Strategy and Regulation in its daily work with ODS phaseout.

The Ministry of Industry has designated its General Directorate for Research, Development and Ecology, which belongs to the Department of Restructuring, Development and Economic Reform, with responsibility for the contacts to the individual enterprises on ODS phaseout related matters.

In all, three civil servants are engaged with ODS phaseout. One in the Department of Environmental Protection Strategy and Regulation, MWFEP, one in the Project Implementation Unit, the Department of Programmes for Ecological Re-generation, MWFEP, and one in the General Directorate for Research, Development and Ecology, the Department of Restructuring, Development and Economic Reform, the Ministry of Industries. However, each of them are only engaged with ODS phaseout on a part time basis, which is insufficient.

Recently, the Romanian Government has approved a Government Order, titled *Proiect - Guvernul României - Hotărâre privind constituirea, organizarea și funcționarea Comitetului Național pentru Protecția Straturii de Ozon* (The Government of Romania - Decision concerning the establishment, organization and functioning of the National Committee for the Protection of the Ozone Layer), which is a first attempt to establish an institutional set-up ensuring effective ODS phaseout action at the country level. It envisages the creation of an inter-ministerial committee, titled "the National Committee for the Protection of the Ozone Layer" (CNPSO), having the role of promoting the measures and the actions necessary for the application of the Montreal Protocol in Romania.

It is conceived that the State Secretary in MWFEP in charge of the Department of Environmental Protection Strategy and Regulation and the Department of Programmes for Ecological Re-generation will become Chairman of CNPSO, thereby ensuring the status of CNPSO as a consultative body closely attached to MWFEP.

Furthermore, the Government Order envisages the establishment of two permanent bodies under CNPSO:

- the Ozone Secretariat (STO) which should act as a national focal point; and
- the Groups of Technical Experts in which technical, economic and legal experts prepares proposals on ODS related matters.

The Government Order is attached *in extenso* as Appendix V.

Compliance with Article 4

According to Article 4 of the Montreal Protocol, Romania is obliged to impose trade restrictions on countries that have not yet ratified the Montreal Protocol. These trade restrictions comprise restriction on trade with ODS, products containing ODS and, if feasible, products produced with, but not containing, ODS.

Consequently, the Romanian Government and MWFEP has promoted the implementation of a regulatory framework ensuring compliance with Article 4 of the Montreal Protocol through Government Decision No. 340 of June 1992, Government Decision No. 437 of August 1992 and Ministry Instruction No. 14570 of August 1992.

According to Government Decision No. 340 of June 1992 and Government Decision No. 437 of August 1992 import of goods which are dangerous for the health of the population and the environment will only be permitted if it respects the regulation for these goods. Annex 2 of Government Decision No. 437 of August 1992 entails a list of goods which are dangerous for the health of the population and the environment. On the list one finds "hydrocarbons and substances obtained from this". However, no specific reference to ODS is made.

MWFEP, the National Committee for Standards, the Ministry of Health, the Ministry of Industries and the Ministry of Agriculture and Food participate in the customs clearance of these goods. MWFEP participates through its offices at county level. There is a customs clearance office in each county. Permission to import these goods are granted to companies, not individuals, in the form of an import licence, titled "Certificate of Ability". Import licences are issued by the Ministry of Commerce. It is obliged to respond within 5 days to an application. The period of a certificate is, since January 1995, four months. For some licences there are quotas, so that there exist competitions such as "first-come - first-get" or according to the quantity imported in the previous period. MWFEP has to sanction the issue of import licences concerning goods mentioned in Government Decision No. 340 of June 1992 and Government Decision No. 437 of August 1992. Penalties for making an illegal import are severe. The importers must report monthly to the Central Statistical Office. If not, they lose their certificate.

According to Ministry Instruction No. 14570 MWFEPs offices at county level which are subordinated the State Environmental Inspection are mandated to implement Article 4 of the Montreal Protocol. They will stop import of ODS or products containing ODS, eg refrigerators, if it stems from countries which are non-Parties.

With regard to the import of ODS the issue of a "Certificate of Ability" is aimed at ensuring that the importer is capable of handling chemical substances and has the necessary storing facilities. As mentioned above, any company, but not individuals, can apply for a certificate. Customers, however, do not need a certificate to buy ODS from the importers. According to Romanian importers and custom officials an effective customs declaration system is in place. The procedure is that the importer declares the content of shipment when reaching the border. The customs officer compares the declaration with the bill and performs occasional checks. Nevertheless, it is Romanian Government's point of view that the system may be improved.

Industry Responses

ODS phase-out project preparation is currently ongoing in all ODS user and producer sectors. The enterprises are very motivated and the quality of the technical and scientific personnel is high.

The main barrier to a rapid conversion of the ODS producing and consuming enterprise is the lack of domestic funding. The difficult economic situation in Romania does not leave much funding for the many pressing investment needs neither in the state budget, nor in the enterprises. Furthermore, the lack of a fully fledged

capital market in Romania and the inaccessibility of the international capital markets for Romanian enterprises precludes enterprises from financing even projects which would be economically self-sustainable in most other countries.

Hence for the implementation of ODS phase-out projects in Romania to be economically feasible within the foreseeable future, it is of utmost importance for the country to receive international financial assistance in this area. Only with external financial support will further ODS phase-out project implementation occur.

3 Implementing Phase Out

This Chapter outlines the ODS phaseout strategy, which the Romanian Government has selected on the basis of an analysis of the current situation in Romania to ensure an ODS phaseout in compliance with the Montreal Protocol. Key features are the Action Plan, the indication of projects for which the Romanian Government is likely to seek assistance from the Multilateral Fund, including an institutional strengthening project aimed at increasing the management capabilities of the Romanian Government, and the monitoring arrangements.

3.1 Strategy Statement by Government

It is a strategic objective of the Romanian Government to ensure an ODS phaseout in compliance with the Montreal Protocol. Thus, the Romanian Government would like to confirm its strong commitment to the Montreal Protocol and the London Amendment, which the country ratified simultaneously on January 27, 1993.

This objective will be followed in such a way as to minimize economic costs to the country in ODS phaseout.

When the Montreal Protocol first came into effect, there was some concern that the cutback in production and use of the regulated ODS would reduce the quality and/or increase the price of goods and services produced with or containing/utilizing these substances, and lead to widespread chaos in those sectors dependant on these chemicals. There is now widespread agreement that, to date, innovations to substitute the regulated substances with non-ODS alternatives have been rapid, effective and, in many cases, economical. Nevertheless, only the easiest substitution has been completed, partly because replacement of the remaining ODS applications, especially refrigeration and some rigid foam and solvents applications, is much more difficult and expensive.

However, it is the Romanian Government's point of view that the key challenges of ODS phaseout in Romania are only partly of a technical nature. There are several non-technical factors which must be addressed and, in many cases, need more consideration than the technical issues. Technical substitution options exist or are under development in Romania though sometimes the technology is not up-to-date compared with Western standards.

Probably, the scarcity of capital and the deficiencies in the institutional set-up are the two most important challenges to completion of the necessary R&D and to successful implementation of the ODS phaseout strategy.

In the following, the technical and managerial feasible phase-out schedule is assessed for each of the ODS user sectors on the basis of the ongoing project preparation, sponsored by the Multilateral Fund and bilateral sources, and taking into account the international experience concerning the time required to implement ODS phase-out projects. Furthermore, the phaseout-schedule for each group of controlled substances is presented.

Refrigeration Sector

Total phase-out for the domestic and commercial refrigeration manufacturing sectors could be attained by January 1, 1998, taking into consideration the necessity to change all production lines. However, due to the substantial progress made within the domestic refrigeration sector, a substantial replacement of ODS consumption within the two sectors is envisaged to take place already in mid-1996. Likewise, total phase-out for industrial refrigeration sectors could be attained by 1 January 1998.

Within the refrigeration servicing sector the key problem is to develop and implement a well functioning scheme for recovery of refrigerants, and (depending on the feasibility of a drop-in replacement in the commercial refrigeration sector) recycling and reclaiming of refrigerants. Obviously, the refrigeration servicing sector will need a supply of CFC (new or recycled) for a longer period to avoid premature scrapping of the outstanding stock of refrigeration equipment. It is envisaged that a scheme for recovery will be in full operation by January 1, 2000. Till then, the refrigeration servicing sector will need a supply of new CFC. In the subsequent 10 years, the refrigeration servicing sector will need a supply of recycled CFC. This will mainly be for servicing of domestic refrigeration equipment as the outstanding stock of commercial refrigeration equipment is expected to be retrofitted with HFC-134a in the period 1995-2000.

Aerosol Sector

Total phase-out for the aerosol sector could be attained by 1 January 1998. The key problem within this sector seems to be the implementation of an adequate personnel training aimed to meet the new safety guidelines and flammability risks.

Foam Sector

The use of ODS in rigid foam production is primarily within the refrigeration insulation sector. Here, the alternative non-ODS technology is likely to be primarily cyclopentane based foam blowing. Where design considerations allow it, CO₂/water is a cheaper alternative, but this is expected mainly to be feasible within commercial refrigeration insulation. The flexible foam sector is characterized by the availability of proved and cost effective alternatives and a quick phase-out should be possible here. Flexible foam application of CFC can be phased out by 1996 whereas rigid foam could be converted during 1995-1997 and a total phase-out should be obtainable by 1 January 1998.

Solvent Sector

The feasible ODS phase-out date for the solvents sector is difficult to estimate, but it seems likely that a total phase-out within metal degreasing and dry cleaning could be attained by January 1, 1997 and within electronics by 1 January 1999. The reason for the expedite of total phase-out within metal degreasing and dry cleaning is that the technical constraints here are easy to overcome and that substantial already has been made. The reason for the delay of total phase-out within electronics is foremost the present inadequacy of practical indigenous experience in Romania with alternative substances such as xylene and benzene which are toxic and flammable.

Fire Extinguishing Sector

ODS consumption within fire extinguishing is very limited. Conversion of the production of portable fire extinguishers to ODS free extinguishants such as CO₂, dry chemicals or water typically takes about 2 years. The production of alternative fire fighting agents, such as blends of various inert gasses, for stationary equipment will also have to be planned. In parallel with this retrofit technologies should be developed, tested and implemented and a scheme for recovery and eventual recycling of halons should be implemented to secure a supply of halons in existing equipment that has not been retrofitted. It is estimated that a total phase-out within this sector could be attained by 1 January 1997.

ODS Production

The likely adverse effect on the major ODS consumers in Romania from quick closure of production facilities is significant. If ODS supplies are cut off before a user industry has had time to test and implement an alternative technology, this industry is forced to stop production of ODS based products until the alternative technology can be implemented. This may cause severe unemployment problems, losses in market shares, shortages on the market for end user products, etc. Hence, coordination between the ODS consumer sector phase-out projects, the alternative substance phase-in projects and ODS production capacity shut-down is crucial to the successful completion of the ODS phase-out effort in Romania.

Tables 3.1 and 3.2 below provides an overview of the achievable ODS phase-out strategy by sectors and substances, respectively, pursued by the Romanian Government. This strategy is based on the assumptions that fastest technically feasible phase-out is followed and that international funding for project implementation is made available to the enterprises in late 1995, at latest.

Table 3.1: Achievable ODS Phase-out Strategy in Romania by Sectors

	Consumption in 1993 (ODP Tonnes)	Date of 100% Phase-out ¹
Total	1,558.3	January 1, 2000
Refrigeration Sector	181.7	January 1, 1998
- Domestic Refrigeration	60.3	January 1, 1998 ³
- Commercial Refrigeration	55.0	January 1, 1998 ³
- Industrial Refrigeration	5.1	January 1, 1998
Refrigeration Servicing Sector	61.3	January 1, 2000
- Domestic Refrigeration ²	41.4	January 1, 2000 ⁴
- Commercial, Industrial and Transport Refrigeration	19.9	January 1, 2000 ⁴
Aerosol Sector	926.7	January 1, 1999
- Personal Care	675.5	January 1, 1998
- Others	251.3	January 1, 1998
Foam Sector	266.7	January 1, 1998
- Rigid Foam	243.7	January 1, 1998
- Flexible Foam	23.0	January 1, 1996
Solvents Sector	156.8	January 1, 1999
- Metal Decreasing and Electronics	75.1	January 1, 1999
- Others	76.7	January 1, 1997
Fire Extinguishants	31.4	January 1, 1997

Notes: 1) The ODS phase-out strategy is based on the assumptions that fastest technically feasible phase-out is followed and that international/MF funding of project implementation is made available to the enterprises in early 1996, at latest.

2) Including the category unspecified.

3) A substantial drop in ODS consumption is envisaged to take place in mid-1996.

4) Could possibly be reduced by one year. Note that recycled CFC will be used for servicing up to 2010.

Table 3.2: Achievable ODS Phase-out Strategy in Romania by Substances

Substances	Consumption in 1993 (ODP Tonnes)	Planned Consumption Till Complete Phaseout (ODP Tonnes)	Year of Complete Phaseout
CFC-11	267.2	534.4	1998
CFC-12	1,102.5	3,307.5	2000
CFC-113	60.8	152.0	1999
CFC-114	0.5	1.0	1998
Halon-1211	3.6	5.4	1997
Halon-1301	26.0	39.0	1997
Halon-2402	1.8	2.7	1997
CTC	73.0	182.5	1999
MCF	22.5	56.3	1998
HCFC-22	0.4	0.6	1997
Total	1,558.3	4,281.4	2000

3.2 Action Plan

3.2.1 Government Actions

To facilitate compliance with the Montreal Protocol, the Romanian Government will implement a regulatory regime for ODS production, consumption and trade, making use of administrative and economic instruments as well as additional measures, including institutional strengthening.

In the following the Government actions selected are described. The criteria for selecting the Government actions have been effectiveness and that the action can be implemented in a short period of time. Thus, the actions are based on existing legal framework, institutional structures and revenue raising instruments.

The instruments which the Romanian Government will implement to support ODS phaseout are as follows:

Administrative instruments

- Improvement of customs subclassifications
- Improvement of ODS import licenses
- Introduction of ODS production licenses
- Ban on reexport of ODS
- Sector specific bans on ODS consumption
- Bans on import of selected ODS based goods corresponding to the domestic sector specific bans on ODS consumption

- Compulsory ODS treatment

Economic instruments

- Non-compliance measures
- Economic support of ODS phaseout activities

Additional measures:

- Institutional strengthening (cf. Section 3.3)
- Monitoring arrangements
- Voluntary agreements with ODS import organisations and ODS producing and consuming enterprises
- Introduction of an accreditation system (certificates) for refrigeration servicing technicians
- Awareness campaign
- Revision of industry norms and standards, including safety standards

Deliberately, the Romanian Government has chosen, as a starting point, not to introduce taxes, charges and levies on imports, production or uses of specific substances to affect market preferences. The reason is, that the deficiencies in the institutional set-up, including the lack of experience in operating extra-budgetary funds such as environmental funds, will make it very difficult to implement these measures, at least in the near future.

It is important to stress that the proposed economic instruments complement the administrative instruments, and that they cannot stand alone. Furthermore, these administrative and economic instruments must be supported by a formalized reporting and enforcement system.

Below, the administrative and economic instruments as well as the additional measures, except institutional strengthening and monitoring arrangements which are dealt with in Sections 3.3 and 3.6, respectively, are described in more detail.

Improvement of customs subclassifications

In the official statistics, imports are at present registered at a 6-digit level compared with a 8-level (EU compatible) generally. This means that imports of ODS which is possible at the 8-digit are included with other chemicals at the 6-digit-level, and therefore no data are immediately available. This setup will, however, be changed in 1995 and so imports of ODS for 1995 (or 1996) will be distinctly represented.

Improvement of ODS import licenses

Import and production licences are the most efficient way of ensuring compliance with the country's phaseout strategy and hence achievement of the required environmental effect. Furthermore, they are easy to implement because they can be based on the existing legal framework for environmental policy. Finally, licences are expected to be acceptable to the enterprises as long as the allowed ODS production is enough to satisfy the demand for these substances according to a realistic and cost-effective phaseout plan.

Though Romanian importers and custom officials claim that an effective customs declaration system is in place, it is the Romanian Government's point of view that the system may be improved. Consequently, an

amendment will be made to Government Decision No. 340 of June 1992 and Government Decision No. 437 of August 1992. The amendment will ensure that a specific reference to ODS is made in the list of goods which are dangerous for the health of the population and the environment. Furthermore, the Ministry of Commerce will be mandated to design a licensing system for ODS to be approved by the MWFEF.

Introduction of ODS production licenses

In accordance with the achievable ODS phaseout strategy in Romania outlined in Section 3.1 above, the Romanian Government will issue ODS production licenses for the two ODS producing enterprises.

Ban on reexport of ODS

In accordance with the Montreal Protocol a ban on reexport of ODS will be introduced as soon as possible.

Sector specific bans on ODS consumption

Sector specific bans will be imposed on all ODS using sectors. The sector specific bans will promote cost-effectiveness in the phaseout strategy by banning the use of CFC in the non-pharmaceutical aerosol sector first, secondly in the non-refrigeration foam sector - allowing more CFC to be used in sectors that are regarded as essential and expensive to replace (such as refrigeration). Finally, the bans may be acceptable to enterprises, if they will be informed well in advance of the cut-off date so that they may use this information in the planning process. The schedule of bans on sector specific ODS use should follow the achievable ODS phaseout strategy in Romania outlined in Section 3.1 above.

Bans on import of selected ODS based goods

The introduction of sector specific bans on ODS consumption should be accompanied by an import ban for similar products containing ODS.

Compulsory ODS treatment

Compulsory recovery and recycling of CFC, HCFC, CTC and MCF should be implemented, and ODS sensors and other measures for reducing leakages should be introduced. Transport of recycled ODS should be controlled and an institutional framework for this should be set up.

Non-compliance measures

A non-compliance fee for imposition on enterprises which fail to comply with the import and production licenses and the sector specific bans on ODS consumption will be introduced. The non-compliance fee is easy to introduce because it follows the already existing practices.

It is probable that the enterprises will oppose the fee, but if the licences and bans are reasonable giving the enterprises enough time to convert their production to ODS free technology, there is no reason why they should not comply with the allowed levels.

Economic support of ODS phaseout activities

The Romanian Government is prepared, through the State budget, to offer substantial economic support for necessary R&D connected with ODS phaseout.

The Romanian Government has initiated a *Research Programme regarding the Changes in the Ozone Layer and the Protection of its Quality* which in 1994 received funds of 1.2 bn Lei. The total budget for environmental research was around 10 bn Lei. In 1995, however, it is expected that round 0.7 bn Lei only will be available for the ODS research. The main beneficiaries of the funds have been:

- under the MWFEP: ICIM, INMH and IRCM;
- under the Ministry of Industries: ICPIAF, ICPAO, ICCF and PROCHEMA; and
- under the Ministry of Agriculture: ICA and ICPP.

The themes of the 1995-96 research include:

- an inventory of sources of ODS and monitoring of the concentration of ODS in the atmosphere;
- ecological and socio-economic effects from a deteriorated ozone layer;
- policies and strategies for eliminating ODS; and
- a national database with information on research activities, regulations etc.

The research programme will be extended to include the fiscal years 1997 and 1998.

Furthermore, the Romanian Government will, through the issue of Government guarantees, assist enterprises in obtaining credits in the commercial banking sector for financing, partly or entirely, ODS replacement projects.

Monitoring arrangements

An important additional regulatory action is the development of an effective monitoring and enforcement system. This is required in order for Romania to meet its obligations under the Montreal Protocol, i.e. monitoring the annual ODS consumption, monitoring the effectiveness of the Action Plan and monitoring the implementation of projects identified in the Action Plan.

A formalized data collection system should be set up whereby ODS industries are required to report regularly (annually) to the ODS Secretariat (cf. below) or an independent body. Questionnaires should be prepared and sent to the enterprises and collected by the local offices subordinated the State Environmental Inspection. Regular inspections at the production sites should also be organised.

Voluntary agreements

Agreements between industries/enterprises and MWFEP are necessary documents for the levying of charges. However, they are not needed to impose sector bans and licences. Furthermore, they may promote a dialogue and exchange of information which is extremely important in order to achieve a cost-effective and realistic ODS phaseout strategy which takes into consideration the required adjustments needed at the level of the producer and user industries. As such, agreements are a useful tool in determining the level of production licences for each enterprise and the time schedule for the sector specific bans.

The agreements are in line with existing environmental regulation in Romania and as such they can be implemented immediately without further legislation. Furthermore, agreements have been practised with

success in other environmental fields and they are likely to be accepted by enterprises, because the obligations of the enterprise are clarified with the environmental authorities.

Furthermore, information dissemination and continuous dialogue especially with the ODS industries is proposed as a top priority action, in order to allow the industries to adjust their production plans to the ODS phaseout strategy and to avoid imposing restrictions or regulations that will have severe adverse effects on production, employment and human safety. Both before and after approval of a certain measure, it is most important that the affected enterprises are informed. To be effective, the regulations should be a help to the ODS industries, not a spoke in their wheel. Therefore, a good dialogue between the MWFEP and the ODS industries is essential.

Introduction of an accreditation system (certificates) for refrigeration servicing technicians

Accreditation of service technicians to ensure that refrigeration service personnel are aware of the ozone problems and methods to reduce ODS consumption at service by improving maintenance and service procedures and by recovery/recycling of refrigerants. The scheme may also be applied in the service sector for fire fighting equipment.

Awareness campaign

Awareness building directed at the general public comprising information dissemination and product labelling. The purpose of this measure is first of all to influence the demand for ODS based products and to make people understand the necessity of phasing out ODS.

Revision of industry norms and standards, including safety standards

Modification of certain product standards and norms in support of the introduction of non-ODS alternatives in some applications should be considered if requested by involved enterprises, eg purity specifications in the solvents sector and for recycled/reclaimed refrigerants and occupational health standards. These norms and standards should only be introduced after careful consultation with the affected and involved industries and other relevant bodies.

The actions have been evaluated and selected on the basis of the following five criteria:

- Environmental efficiency
- Implementation in a short period of time
- Incentive/behaviourial effect on enterprises
- Mobilization of non-budget resources
- Acceptability for enterprises

Table 3.1 shows the role of each of the administrative and economic instruments in meeting the five criteria.

Table 3.3: Evaluation of Actions to be used in ODS Regulation

Instruments	Evaluation Criteria	Environmental efficiency (ODS reduction)	Implementation in a short period of time	Incentive effect	Mobilization of non-budgetary resources	Acceptability for enterprises
Improvement of customs subclassifications		+	++	-	-	+
Improvement of ODS import licenses		++	++	-	-	+
Introduction of ODS production licenses		++	+	-	-	+
Ban on reexport of ODS		+	++	-	-	+
Sector specific bans on ODS consumption		+	+	-	-	+
Bans on import of selected ODS based goods corresponding to the domestic sector specific bans on ODS consumption		+	+	-	-	+
Non-compliance measures		-	+	+	+	+
Economic support of ODS phaseout activities		++	+	+	-	+

Note: "+" signifies that evaluation criterion is met, "-" that evaluation criterion is not met or instrument does not influence the criterion and "++" that it is not possible to meet the criterion without implementing the instrument in question.

3.2.2 Projects

Table 3.4 summarises the 14 investment projects which have been identified by June 1995 for funding by the Multilateral Fund. Five of these are ready for submission to the Executive Committee of the Multilateral fund in July 1995.

The projects have to been developed by the enterprises with assistance from consultants from UNIDO, ICPIAF and COWiconsult.

Table 3.4: Status of Romanian ODS Phaseout Projects, June 1995

Sector	Enterprise	ODS consumption 1994 (1993) (tonnes)	ODS Phaseout Plan	Investment costs 1000 USD	NPV of 4 years Incr. Oper. Costs 1000 USD	Unit Aba- tement Costs USD/kg-yr	Grant Request 1000 USD	Status of Pro- gress
Refrigeration - domestic	1. ARCTIC S.A. Gaești	CFC-12 (52.5) CFC-11 (150.0)	CFC-12 to HFC-134a and CFC-11 to HCFC- 141b took place Nov 1994. Plans to use cyc- lohexane	2,369	(six months): 1,451	8.48	4,317	Ready for sub- mission, June 1995
Refrigeration - domestic	2. U.M. SADU Gorj	CFC-12 (9.0) CFC-11 (30.0)	CFC-12 -> HFC-134a (for thermostats not yet clear) CFC-11 -> HCFC-141b	CFC-12: Ref. 457	CFC-12 (life- time): 514		971	Preliminary propo- sal ready
Refrigeration - commercial	3. S.C. FRIGOCOM S.A. Bucharest	CFC-12 45.0 CFC-11 8.5	CFC-12 -> HCFC-22 CFC-11 -> HCFC-141b	475	(lifetime) 18		418	Preliminary propo- sal ready
Refrigeration - com. & ind.	4. S.C. TEHNOFRIG S.A. Cluj	CFC-12 3.4 CFC-11 1.4	CFC-12 -> HFC-134a CFC-11 -> HCFC-141b	1,283	1,064		1,878	Preliminary propo- sal ready
Refrigeration - servicing: com. & dom.	5. COMSERVICE S.A. Cluj	CFC-12 (7.2)	CFC-12 -> HFC-134a					to be developed
Refrigeration - servicing: Industrial	6. ICPIAF S.A. Cluj	CFC-12 (0.5)	training project for re- covery and recycling, and conversion to non- ODS servicing	1,360			1,360	Preliminary propo- sal ready
Refrigeration - servicing: transport	7. TRANSFRIGOTREN Bucharest	CFC-12 10.4	CFC-12 -> HFC-134a	162.8	38	23.36	274.5	Ready for sub- mission, June 1995

Table 3.4: *continued*

Sector	Enterprise	ODS consumption 1994 (1993) tonnes	ODS Phaseout Plan	Investment costs (USD)	NPV of 4 years Incr. Oper. Costs 1000 USD	Unit Aba- tement Costs USD/kg-yr	Grant Request 1000 USD	Status of Pro- gress
Foam - rigid	5. METAPLAST S.A. Buzau	CFC-11 (21.5)	CFC-11 -> HCFC-141b					no documents as yet
Foam - flexible	9. SPUMOTIM S.A. Timisoara	CFC-11 (29.4)	CFC-11 -> CO ₂ foam- blowing					Ready for sub- mission, June 1995
Foam - semi-rigid	10. CHIMICA S.A. Orastie	CFC-11 12.0	CFC-11 -> HCFC-141b (or possibly CO ₂)					Preliminary propo- sal ready
Aerosol	11. FARMEC S.A. Cluj	CFC-12 700.0 CFC-114 1.0	CFC -> Butane-propane	2,543		0.52	2,543	Ready for sub- mission, June 1995
Solvents - metal degr.	12. S.C. RULMENTUL Bariad	CFC-113 (50.0) MCF (3.0)	Conversion to alcohol- based metal degreasing					Preliminary propo- sal ready ?
Institutional strengthening	13. MINISTRY OF ENV. Bucharest	na						Ready for sub- mission, June 1995
Information dissemination	14. TERRA NOSTRA Bucharest	na						Preliminary propo- sal ready

3.3 Roles in Implementing the Strategy

The Romanian Government acknowledges that the current institutional set-up in support ODS phaseout is insufficient. In order to overcome this deficiency, the Romanian Government intends to establish a clear division of powers and responsibilities between various agencies involved in ODS phaseout and to implement a substantial institutional strengthening, partly with assistance from the Multilateral Fund.

In accordance with Government Decision No. 437 of August 4, 1992, the MWFEP is the lead agency in ODS Phaseout in Romania. However, numerous other Government agencies will have to contribute to ODS phaseout. Furthermore, the Romanian Government would like to emphasize the necessity of establishing an on-going dialogue with industries, research institutes and NGOs on issues connected with ODS phaseout.

In developing an institutional framework in Romania for supporting the ODS phaseout, emphasis has been placed on developing a structure which as much as possible builds on existing Government agencies and ensures the inclusion of ODS technical and economic expertise outside the Government agencies, especially at the Research and Development Institute for Food and Refrigeration Industries (ICPIAF), at the Research and Engineering Institute for Environment (ICIM) and at the industry level, in order to facilitate an expedite and efficient development of ODS replacement projects at industry level. Furthermore, emphasis has been placed on developing a structure which meets the criteria of acceptability for enterprises.

The Romanian Government will ensure the creation of an inter-ministerial committee, titled "the National Committee for the Protection of the Ozone Layer" (CNPSO), having the role of promoting the measures and the actions necessary for the application of the Montreal Protocol in Romania. It will be an advisory body to MWFEP comprising representatives of Government agencies involved in ODS phaseout. CNPSO will not comprise representatives of non-Government agencies.

CNPSO gives, inter alia, the possibility to discuss urgent problems and conflicts, to disseminate information on ODS phaseout, and to receive immediate response on economic and administrative measures just prepared. Thus, CNPSO should ensure an expedite approval by the Romanian Government of Draft Government Orders regarding ODS phaseout which are put forward by MWFEP following thoroughly discussions with relevant Government agencies involved in ODS phaseout.

The coordination of the work of the CNPSO will be ensured by the MWFEP through the State Secretary in charge of the Department of Environmental Protection Strategy and Regulation in his capacity of Chairman and through a Vice-Chairman elected for a two-year period among the ranks of the other members.

The tasks of the CNPSO follow from the Draft Government Order titled "Decision concerning the establishment, organization and functioning of the National Committee for the Protection of the Ozone Layer". It is attached as Appendix V.

Furthermore, the Romanian Government will ensure the creation of two permanent bodies:

- the Ozone Secretariat (STO) under guidance of MWFEP; and
- the Groups of Experts under guidance CNPSO.

STO will be responsible for designing, monitoring and implementing the ODS phaseout strategy subject to guidelines from the Romanian Government and MWFEP, including the issue of import/production licenses, the impose of sector specific bans and the administration and allocation of economic support of ODS

replacement projects at industry level from Romanian and international sources. Furthermore, it will act as a secretariat for CNPSO and the Groups of Experts. The tasks of STO follow from Box 3.1 below.

STOs major attention will be devoted to preparing and introducing legislative measures, information dissemination and open dialogue between government agencies, industries and others involved in ODS phaseout.

Taking into account the status of MWFEP as the lead agency in ODS phaseout in Romania, as well as the progress already made within MWFEP in establishing a know-how on problems facing the ODS producers and user industries, on collaboration with other Government agencies involved in ODS phaseout and on possible regulatory instruments, MWFEP will appoint the staff personnel of STO. The staff personnel who will work on a full time basis will comprise at least three Government officials and a secretary. They will be appointed by MWFEP. The majority of the staff personnel of STO will come from MWFEP. The Department of Environmental Protection Strategy and Regulation, MWFEP, will supervise the work of STO.

Taking into account the substantial knowledge present at ICPIAF on ODS phaseout, especially data collection and assistance to enterprises in preparing ODS replacement projects in collaboration with foreign ODS experts, monitoring and assistance to enterprises in preparing ODS replacement projects is envisaged to be delegated to ICPIAF on a contract basis. If necessary, the Romanian Government/MWFEP may decide to delegate other tasks from STO to Romanian ODS experts on a contract basis.

The Groups of Experts will work under guidance by CNPSO. They will comprise ODS experts from foremost ODS producing and consuming enterprise, research institutes and NGOs in Romania, they will work on an ad-hoc basis, and they will prepare material to be discussed at the regular meetings of CNPSO.

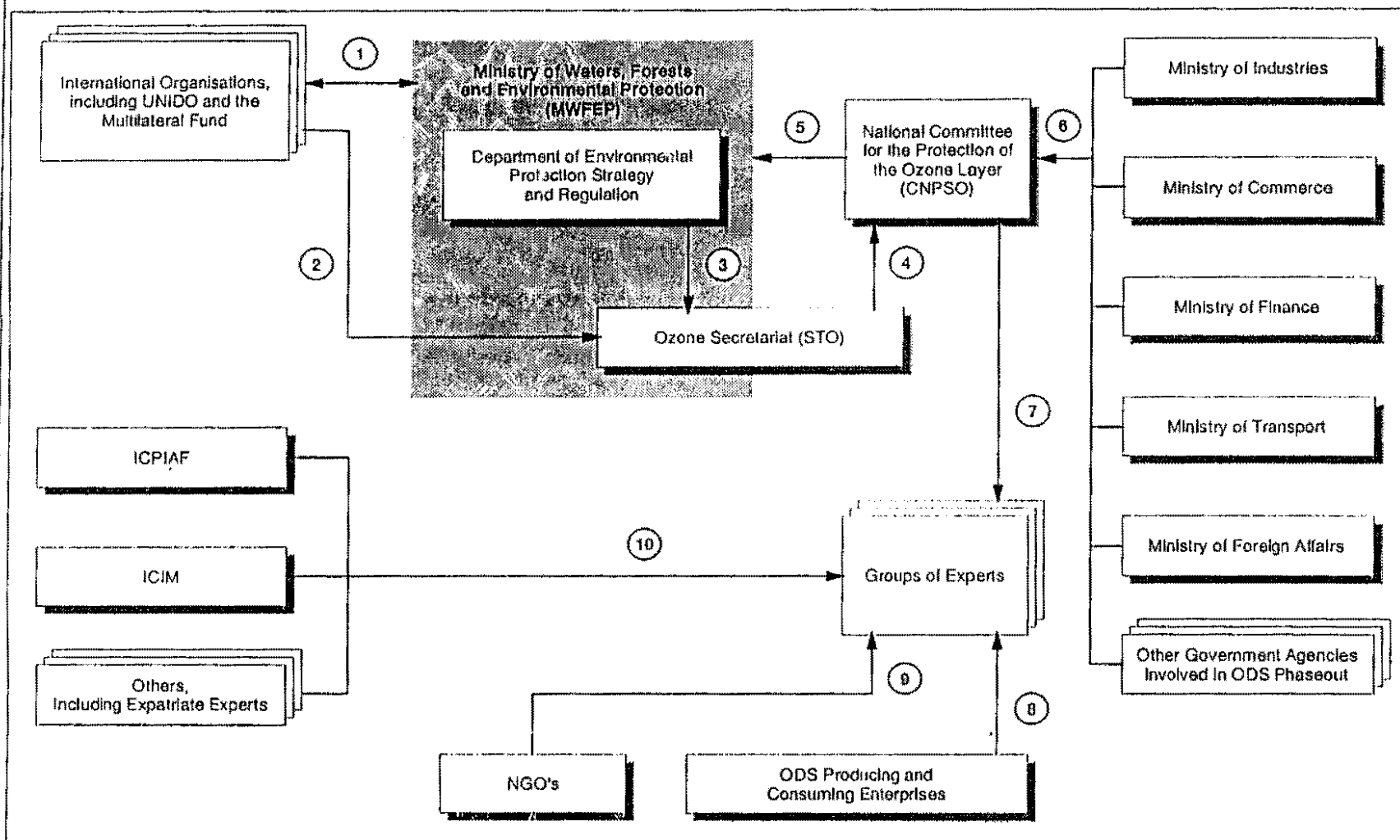
The institutional set-up is illustrated in Figure 3.1 below.

Box 3.1 Assignments of STO

STO will act as a national focal point in ODS phaseout having the following assignments:

- following and supervising the overall ODS phaseout activities and progress;
- updating the Romanian ODS Country Programme on a regular basis through the preparation of a Country Programme Amendment describing any relevant information on the development of ODS consumption patterns in Romania and the institutional set-up for ODS phaseout that has occurred subsequent to the preparation of the Country Programme;
- submitting the Romanian ODS Country Programme and any Amendment to the Montreal Protocol Executive Committee;
- submitting ODS replacement projects eligible for funding to the Multilateral Fund;
- acting as a secretariat for CNPSO;
- ensuring a liaison office for Government agencies involved in ODS phaseout;
- ensuring a dialogue framework for MWFEP, other Government agencies, including the Ministry of Industries, industries and NGOs;
- rising up public awareness for the importance of ozone layer preservation, including information dissemination concerning the progress of ODS phaseout, both worldwide and in Romania;
- communicating with the Montreal Protocol Executive Committee, the Secretariat and UNIDO;
- communicating with other Article 5 countries and other Central and Eastern European Countries on ODS phaseout activities;
- monitoring and collecting of ODS import/export data and local consumption by individual enterprises, possible through the regional environmental offices subordinated MWFEP;
- reviewing sub-projects to ensure that they are consistent with the national strategy defined in the Country Programme and meet eligibility criteria for projects financed by the Multilateral Fund;
- preparing and introducing legislative and administrative measures supporting ODS phaseout, including import licenses for ODS, sector specific bans on ODS use and sanctions upon enterprises not complying with the ODS phaseout schedules;
- handling environmental issues related to the implementation of the ODS replacement projects, in particular ensuring that Romanian requirements for Environmental Impact Assessment are observed, and monitoring implementation of mitigation activities;
- coordinating the provision of technical assistance to the enterprises;
- submitting quarterly reports to UNIDO on progress in project implementation, highlighting any problem areas, using formats to be provided in a Project Implementation Manual; and
- reporting to UNIDO any urgent implementation problem and all current and expected implementation bottlenecks.

Figure 3.1: Management Structure for the Romanian ODS Phaseout



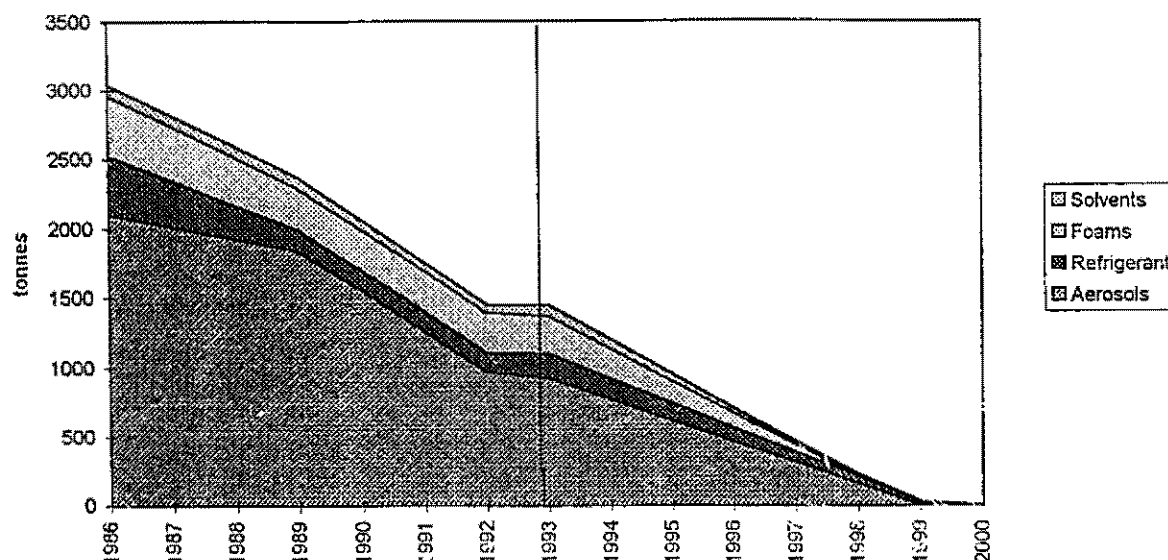
Notes: 1) Ongoing dialogue between international organisations and MWFEF on ODS phaseout issues. 2) Information flow from international organisations to STO et vice versa. 3) Guidance of STO. 4) Calling in meetings, preparing agenda's of the meetings, etc. 5) Recommendations to MWFEF. 6) Representatives of Government agencies involved in ODS phaseout. 7) Guidance of the Groups of Experts. 8) Representatives of ODS producing and consuming enterprises. 9) Representatives of NGO's. 10) ODS technical experts.

3.4 Timetable and Consumption Implications

Tables 3.1 and 3.2 in Section 3.1 provided an overview of the achievable ODS phase-out strategy by sectors and substances, respectively, pursued by the Romanian Government. This strategy is based on the assumptions that fastest technically feasible phase-out is followed and that international funding for project implementation is made available to the enterprises in late 1995, at latest.

The timetable and consumption profile of this strategy can be summarised by Chart 3.1. Similar profiles are expected for halons, CTC and MCF. The main single break in the curves (which in the chart are made smooth) is expected when the aerosol (FARMEC in Cluj) conversion takes place. The strategy therefore supposes that ODS in Romania will be phased out totally six years in advance of the ten-year grace period time limit which exists for Romania as an Article 5 country.

Chart 3.1: CFC Consumption by Sector in Romania, 1986-93, and Planned Phaseout Schedule



3.5 Budget and Financing Programme

Table 3.4 in Section 3.2 showed (where available) estimates of the absolute costs and unit abatement costs of Romanian ODS phaseout projects at enterprise level indicated as of June 1995.

Of the 14 projects indicated the following 5 are ready for submission for funding to the Multilateral Fund at of mid-June:

1. FARMEC S.A., Cluj, aerosols, conversion from CFC-12 to butane-propane as propellant. The project will phase out an annual consumption of 700 tonnes CFC as a cost-effectiveness of 0.52 USD/kg.

2. ARCTIC S.A., Gaesti, domestic refrigeration, conversion from CFC-12 to HFC-134a as refrigerant and CFC-11 to cyclopentane as foam-blowing agent. The project will phase out annual consumption of more than 200 tonnes of CFCs at a cost-effectiveness of 8.48 USD/kg.
3. SPUMOTIM S.A., Timisoara, flexible foam, conversion from CFC-11 to CO₂ foam-blowing. The project will phase out an annual consumption of around 30 tonnes of CFC.
4. S.C. TRANSFRIGOTREN INTERNATIONAL S.A., Oras-Buftea (Bucharest), transport refrigeration, conversion from CFC-12 to HFC-134a as refrigerant. The project will phase out an annual consumption of 10.4 tonnes of CFCs at a cost-effectiveness of 23.36 USD/kg.
5. The Institutional Strengthening project.

The four enterprise projects account for around 60% of total ODP-weighted ODS consumption in Romania more than 65% of the total CFC use.

Their cost-effectiveness varies, however, considerably, with the aerosol conversion having by far the lowest unit abatement costs.

List of ODS Regulations

Regulation	Authority	Date of Approval	Title
Decision No. 340	Government	20 June 1992	Decision concerning the imports of waste materials of all sorts and other environmentally dangerous goods
Decision No. 437	Government	4 August 1992	Decision for modification and completion of the Government Decision nr. 340/1992 concerning the imports of waste materials of all sorts and other environmentally dangerous goods
Instruction No. 14570	MWFEP	18 August 1992	Instructions concerning applications in Romania of the Vienna Convention concerning protection of the ozone layer and of other protocols and amendments following this Convention
Decree No. 140	President	26 July 1993	Decree concerning approval and ratification by the Parliament of the Vienna Convention concerning protection of the ozone layer, adopted on March 22, 1985, and the Montreal Protocol concerning substances that deplete the ozone layer, adopted on September 16, 1987, and the Amendment to the Protocol concerning substances that deplete the ozone layer, adopted in London on June 27-29, 1990
Decree No. 209	President	30 November 1993	Decree concerning approval of the Law according to which Romania becomes a Party to the Vienna Convention concerning protection of the ozone layer, adopted on March 22, 1985, and the Montreal Protocol concerning substances that deplete the ozone layer, adopted on September 16, 1987, and the Amendment to the Protocol concerning substances that deplete the ozone layer, adopted in London on June 27-29, 1990
Law No. 84	Parliament	3 December 1993	Law according to which Romania becomes a Party to the Vienna Convention concerning protection of the ozone layer, adopted on March 22, 1985, and the Montreal Protocol concerning substances that deplete the ozone layer, adopted on September 16, 1987, and the Amendment to the Protocol concerning substances that deplete the ozone layer, adopted in London on June 27-29, 1990
Decision No. 457	Government	29 July 1994	Decision concerning the organization and the functioning of the MWFEP