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IMPLEMENTING THE MONTREAL PROTOCOL IN SMALL BUSINESSES:

Chemical Management Under a Multilateral Environmental Agreement

UNITED NATIONS ENVIRONMENT PROGRAMME

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United Nations Environment Programme

Division of Technology, Industry, and Economics

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Preface

The Secretary General of the United Nations has cited stratospheric ozone protection as an area where progress is being made towards achieving environmental sustainability, one of the Millennium Development Goals targets. A recent UN report on the implementation status of these targets notes that "through unprecedented global cooperation, use of chlorofluorocarbons, the most widespread ozone-depleting substances [ODS], has been reduced to one tenth of 1990 levels. This remarkable accomplishment shows that progress on the environment can be achieved with strong political will and with consensus on the problem and on how to solve it." The Montreal Protocol on Substances that Deplete the Ozone Layer is indeed working and on the path to success. “Every Action Counts” – this has been the motto behind the implementation of the Montreal Protocol, be it action by large or small countries, big enterprises or small companies.

While the global community is right to celebrate the many achievements already made under the Protocol, a major area that still requires global cooperation and political will is assisting small businesses in developing countries to adjust to the reality of an ODS-free future. Thanks to the Protocol’s Multilateral Fund, large enterprises are by and large already converted to ODS alternatives, but significant, dispersed ODS consumption remains to be addressed in many small and medium-scale enterprises (SMEs). Such enterprises are often the backbone of the economy and play vital social role through employment. We must provide assistance to help ensure that small companies can cope with the transition to an ODS-free economy. They should not be caught unaware.

Small businesses often pose big challenges for the environment, and this holds true for ozone protection. New ideas and approaches are needed on how to help this important category of enterprise. This global study presents an assessment of what approaches have worked to help SMEs under the Multilateral Fund and outside it, and provides recommendations for elements that Governments and intermediaries can use when designing national programmes to help SMEs convert to ODS alternatives.

The Montreal Protocol is a multilateral environmental agreement (MEA) that addresses the cradle-to-grave chemical management of ozone depleting chemicals. As such, it has elements in common with other MEAs that address chemicals. Helping SMEs manage chemicals in such a way that protects lives, livelihoods and the environment is a common issue for most treaties. Because the Montreal Protocol is already in an advanced stage of implementation, it may have lessons to share with other chemical MEAs and, in turn, learn from them.

Monique Barbut, Director, UNEP Division of Technology, Industry and Economics, OzonAction Programme

ACRONYMS

AC Air-conditioning
CFC Chlorofluorocarbon
GDP Gross Domestic Product
GWP Global Warming Potential
HC Hydrocarbon
HCFC Hydrochlorofluorocarbon
HFC Hydrofluorocarbon
HFE Hydrofluoroether
IA Implementing Agency
LVC countries Low volume-consuming countries
MAC Mobile Air-Conditioning
MLF Multilateral Fund
MFS Multilateral Fund Secretariat
NGO Non-governmental Organisation
NOU National Ozone Unit
OD ozone-depleting
ODP Ozone-depleting potential
ODS Ozone-depleting substance
RAC Refrigeration and Air-Conditioning
RMP Refrigerant Management Plan
R&R Recovery and Recycling
SMEs Small and Medium-Sized Enterprises
UNEP United Nations Environment Programme
UNEP DTIE UNEP Division of Technology, Industry and Economics

1. Executive Summary

1.1 Purpose of the Study

Developing countries are now working to meet ozone depleting substance (ODS) phaseout under the Montreal Protocol. Final phaseout dates for the consumption and production of ozone depleting substances are drawing near for Article 5 countries. By January 1, 2007, Article 5 countries will be required to have reduced their consumption of CFCs by 85 percent from 1995-1997 levels. The majority of developing country economies are comprised of small and medium-sized enterprises (SMEs).[1] Similarly, much of the remaining ODS use in Article 5 countries is tied to SMEs, particularly in the refrigeration and air-conditioning service sectors. Therefore phaseout of ozone depleting substances in the developing world will be based on the capacity for successful phaseout in SMEs.

Most of the remaining ODS is consumed primarily by SMEs and residual users in the refrigeration and air-conditioning, solvents, foams, and aerosols sectors. While each enterprise in these sectors may use a small amount of ODS compared to larger enterprises, these small enterprises are large in number and constitute the most significant remaining ODS use in most Article 5 countries. Not addressing these enterprises and residual users will impede the ability of many Article 5 countries to successfully complete their phaseout of ODS by the agreed schedule.

The goal of this study is to provide National Ozone Units (NOUs), owners/operators of SMEs, and other stakeholders engaged in ODS phaseout worldwide with an overview of approaches adopted to assist small businesses to phase out ODS. It provides an assessment of which approaches have been most effective in different countries and sectors and offers options and strategies that could be considered by NOUs to assist SMEs to comply with the Montreal Protocol. The study was not designed to be prescriptive but to provide an overview of the lessons learned from SME projects. Therefore it is up to the individual country to determine which of these findings are relevant to their country situation.

[1] For example, in the Philippines, SMEs represent 99.6 percent of all businesses registered in the country and employ 69.9 percent of the total labor force. They also account for 32 percent of the country's gross domestic product (GDP).

Over 100 individuals and 50 institutions provided input to this study. The study was conducted in close co-operation with international and national institutions that work with SMEs on technology transfer and Montreal Protocol issues. Implementing Agencies and selected NOUs in countries that have garnered experience with SME projects were also consulted, as were the managers of several SMEs (see Appendix A). The methodology of the study was largely based on participatory stakeholder consultations to draw on the knowledge and experience of those who have been most directly involved in various SME-focused efforts over the years (see Appendices B and C).

1.2 Barriers and Challenges to SME Participation

National Ozone Units and other implementers of the Montreal Protocol are faced with unique challenges when working to promote ODS phaseout among SMEs. The study found that these barriers clearly need to be recognized in order for stakeholders to work effectively with SMEs. Section 5 of this study outlines these barriers in detail. They cover a range of issues related to the SME perspective, the small business operating environment, internal capacity issues, and SMEs' lack of information.

The study found that the key operational challenge facing organizations working with SMEs is understanding the SME's perspective, so that they can make a compelling case to SMEs that they should take part in ODS phaseout efforts. Project designers must constantly ask the question from the SME's perspective, "What is in it for me? Why should I want to phase out ODS?" It is important that this be considered from the perspective of a small business struggling to survive in what may be a difficult economy.

The results of the study suggest that the most successful SME-focused programmes for ODS phaseout were able to address this challenge through three key steps of engagement:

> **Deliver the message to SMEs**. Getting the message to SMEs can be very difficult. SMEs often don't participate in traditional industry or trade organizations, which are usually the primary avenue for disseminating information. Finding and engaging directly with SMEs is a foundation for success.
>
> **Get SMEs to agree with the message.** Convincing SMEs to agree that it is important for them to phase out ODS use is equally critical. They need to know what they should be doing, and why. In many cases, the benefits to the SME associated with phasing out ODS use will not be clear unless efforts are undertaken to educate SMEs on a one-to-one basis through direct programmatic action or through trusted local market players/stakeholders on whom SMEs depend for reliable sources of business information.
>
> **Assist SMEs to act on the message**. Providing appropriate and effective technical and financial assistance for SMEs that do express an interest in phasing out ODS use is critical. The study found that SME projects/programmes

that engage SMEs with a useful and well-integrated package of awareness-raising, training, and technical assistance can be successful.

Strategies for Successful Implementation

Over the past fifteen years, approaches to controlling environmental pollutants in SMEs have shifted from a heavily regulated pollutant-by-pollutant approach to a more systems- or market-based approach. Regulatory approaches have proven to be particularly ineffective when working with SMEs, and by necessity, much of the phaseout work done at SMEs must be voluntary on the part of the SME.

Accordingly, the study sought to capture the learning generated by previous voluntary SME-focused efforts under the Montreal Protocol. What emerged were a handful of specific operational strategies that have worked successfully, or those that evidence suggests could work successfully in the context of a well-structured programme. These strategies include:

Deliver messages to SMEs through supply chains. One of the most effective strategies for delivering ODS reduction messages to SMEs is using the SME's existing supply chain. SMEs are often hard to reach and their local chemical and equipment suppliers are often the best avenue by which to reach them.

Focus the message on benefits for the SME. Most SMEs are concerned with only two things: making more money and getting new customers. Evidence suggests that if an action (phasing out ODS) can be expressed in these terms, it will have a greater chance of getting their attention.

Rely on local networks. SMEs often have a local outlook on most issues affecting their business. Soliciting their cooperation/action through trusted or known local partners can be effective if local leaders are cooperative. For example, to have local leaders start a campaign in which SMEs get recognition on a local level for participation and action can be attractive to SMEs. In addition to reaching SMEs through their existing supply chain, there are other local intermediaries/partners that can be relied on to assist in both finding SMEs, and communicating with SMEs. These may include 1) trade associations; 2) refrigeration technician or industrial associations; 3) small business associations; and 4) technical or vocational schools. These stakeholders usually have a very local perspective, and are interested in engaging local businesses. A dialogue with these stakeholders may reveal how phaseout should be achieved, what training should be provided, and what alternative technology might be found

Utilize capacity building as a key element of success. Interviews and surveys of personnel working on SME-focused ODS projects revealed that SME technicians and owners want training and information. In fact, SME owners and technicians can be more open to formal training than those in medium and large-sized enterprises. This is primarily due to the fact that most SME staff have received very little formal education. There is a general desire to improve one's

business and learn from experts. When ODS-reduction training programmes are explained as general opportunities to learn superior techniques, save money through efficiency, and gain new customers by becoming a recognized source of expertise, SMEs have shown increased interest.

Raise awareness through communications and outreach to the general public to supports SME efforts to reduce ODS. Awareness building in the general public is an important component to successful ODS use reduction among SMEs. When the end user or consumer is aware of the ozone layer and what causes ozone layer depletion, they will be more equipped to ask if the SME has an ODS reduction strategy. Furthermore, they will be able to choose between the 'ozone friendly' SME and the one that does not advertise itself as 'ozone friendly.' SMEs can also be very open to learning how to effectively engage their customers to raise awareness at the level of everyday business exchange.

SME Training Workshop in the Caribbean

Use market-based strategies as an effective strategy in reaching and assisting SMEs. Some SME programmes have been able to harness existing market players to assist in implementing market-based ODS phaseout actions among SMEs. While there is no single model that is appropriate to all sectors, the study identified several programmes that have found innovative ways to catalyze the existing market so that, for example, local equipment representatives are more able to locate and partner with interested SMEs, and SMEs are provided with additional business leverage to facilitate a transaction that provides maximum benefit to its business than would otherwise be possible.

Promote SME leadership. SMEs who have successfully completed some degree of ODS phaseout in their facilities can be highlighted as examples for other SMEs. The owners and technicians in these facilities can also serve as instructors at training events. Some of the most effective training courses have been held at the shop level with local SME trainers. Evidence also suggests that technicians and owners are able to learn effectively in a shop environment.

These strategies have proven to be effective methods for facilitating ODS phaseout in SMEs under the Montreal Protocol. Many have the added benefit of building capacity in SMEs to address other environmental issues, including chemical management under other multilateral environmental agreements.

2. Introduction

2.1 Goal of the Study

Small and medium-sized enterprises (SMEs) play a crucial role in the competitiveness of the developing world, not only because they represent the overwhelming majority of enterprises in those economies, but also because they are the source of dynamism and change in new markets. SMEs are confronted by increased competition resulting from the need to innovate constantly and accommodate advances in technology. One area of innovation for SMEs will be the successful transition to more environmentally friendly operations. The developing world is now trying to meet a major pollution reduction goal under the Montreal Protocol. As the international final phaseout of ozone depleting substances (ODS) grows near, the deadlines for phaseout have finally come to Article 5 countries.[2] By January 1, 2007, Article 5 countries will be required to have reduced their consumption of CFCs by 85 percent from 1995-1997 levels.

The goal of this study is to provide National Ozone Units (NOUs) and owners/operators of SMEs with an overview of approaches adopted in different countries and in different sectors (refrigeration and air-conditioning (AC), solvents, foams, aerosols) to address the phaseout of ODS in SMEs. This study provides an assessment of which approaches have been most effective in supporting SMEs' compliance with the Montreal Protocol and offers possible options that could be considered by NOUs to assist SMEs in their countries. It was conducted in close co-operation with international and/or national institutions that work with SMEs on technology transfer and/or Montreal Protocol issues. Implementing Agencies and selected NOUs in countries that have garnered experience with SME projects were also consulted.

2.2 Background to the Study

Following the establishment of the Vienna Convention in late 1985, governments recognized the need for stronger measures to reduce the production and consumption

[2] As of May 2005, 145 countries operate under Article 5, paragraph 1 of the Montreal Protocol. These Article 5 countries, which have an annual consumption of less than 0.3 kg of ODS per capita, are eligible for Multilateral Fund assistance to facilitate compliance with the Protocol's control measures. These measures call for a consumption and production freeze of Annex A CFCs at a reduction of 50 percent of 1995-1997 levels by January 2005, an 85 percent reduction by 2007, and a 100 percent phaseout by 2010.

of a number of CFCs (CFC-11, -12, -113, -114, and -115) and several Halons (Halon-1211, -1301, and -2402). The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in 1987 and went into effect when 29 countries ratified it in 1989. To date, the implementation of the Montreal Protocol has been largely successful in phasing out the production and consumption of ozone depleting substances.

The majority of the completed ODS phaseout projects have focused on enterprises which were large and easy to regulate. At its 13th Meeting, the Executive Committee of the Multilateral Fund agreed that projects that would result in the elimination of the maximum amount of ODS should be given priority in order to maximize the return in terms of tonnes of ODS phased out per dollar. Now that these types of projects are complete or entering into their final phases, the projects that will phase out the remaining ODS will become more prominent. Most of the remaining ODS is consumed primarily by SMEs and/or residual users in the refrigeration/air-conditioning, solvents, foams, and aerosols sectors. While each enterprise in these sectors may use a small amount of ODS compared to larger enterprises, these small enterprises are large in number. Therefore the total ODS consumed is substantial. Not addressing these enterprises and residual users could result in increased consumption, which would undermine the progress made in larger enterprises.

Small Refrigerator Repair Shop in Burkina Faso

In addition, SMEs play a crucial role in the economies of the developing world. For example, in the Philippines, SMEs represent 99.6 percent of all businesses registered in the country and employ 69.9 percent of the total labour force. They also account for 32 percent of the country's gross domestic product (GDP).[3] These enterprises need support in order to successfully achieve the transition from ODS to non-ODS alternatives. In absence of this support, these enterprises could be at risk when full phaseout occurs.

The ODS phaseout strategies that worked on large enterprises do not effectively address ODS phaseout in SMEs. In particular, regulations make little difference when working with SMEs due to the basic challenges of enforcement. Although SMEs are in practice difficult to regulate, the existence of some market-based regulations, such as an ODS tax, does create a clear incentive for alternatives, and the establishment of a firm deadline for ODS phaseout does create industry-wide regulatory assurance. However, these efforts alone cannot change behaviour in SMEs, so many new

[3] Leano, Rhodora M. "SMEs in the Philippines: A development agenda to sustain their growth." APCCT Techmonitor, Special Feature: Sustainable Growth of SMEs, December 2004.

strategies have been developed as the focus of ODS phaseout has turned to SMEs. New SME ODS phaseout strategies should take into account the challenging aspects of capacity building and technology transfer and should rely on different incentives and barriers that are specific to SMEs.

In the decade and a half since the Montreal Protocol was ratified, there have been many projects to assist SMEs in the reduction and phaseout of ODS. The Multilateral Fund has assisted SMEs through a number of national, regional, and global projects. Developed countries, international financial institutions, and development agencies have also supported SMEs in the context of the Montreal Protocol and in other environmental issue areas. As the deadlines for the final phaseout of ODS grow closer, the lessons learned from these SME projects need to be documented, analyzed, and shared with National Ozone Units (NOUs) and other stakeholders in developing countries.

2.3 Organization of the Study

The following details the contents of each section of the report:

Section 2 presents an executive summary of the study.

Section 3 provides a general overview of SMEs and SMEs in ODS sectors focusing on refrigeration and air-conditioning, solvents (including coatings and adhesives), aerosols, and foams.

Section 4 presents the basic methodology used to undertake the study.

Section 5 discusses the SME ODS compliance challenge in the developing world.

Section 6 presents the general approaches and experiences with SMEs in the developing world. This section contains lessons learned from ODS phaseout projects with SMEs in the developing world.

3. Overview of SMEs

3.1 What is an SME?

SME Workers Examine New Equipment

In many developing countries, SMEs account for 80 to 90 percent of economic activity and 50 to 60 percent of employment opportunities.[4] A large proportion of those small businesses consume ODS and therefore will be impacted by the phaseout taking place under the Montreal Protocol.

The definition of an SME varies greatly between institutions and countries. SMEs may be defined based on the "number of employees, annual sales, total enterprise assets or a combination of these factors."[5] SMEs can range in size from larger, more established organizations that operate in the formal economy to smaller, sometimes one-person operations that are not legally recognized.[6] Currently, the SME Department of the World Bank works with the following definitions, as presented in Table 1.

Table 1. Definition of Small and Medium-Sized Enterprises[7]

Type of Enterprise	Definition
Micro Enterprise	Up to 10 employees, total assets of up to $10,000 and total annual sales of up to $100,000
Small Enterprise	Up to 50 employees, total assets and total sales of up to $3 million
Medium Enterprise	Up to 250 employees, total assets and total sales of up to $15 million

For the purpose of this report, the term SME will be inclusive of the terms micro enterprise, which is defined as an enterprise with less than 10 people, and small and medium enterprises. According to many individuals interviewed, most of the ODS-consuming SMEs employ less than 10 people.

[4] UNEP (a), "How small and medium-sized enterprises in developing countries can protect the ozone layer." p 2.

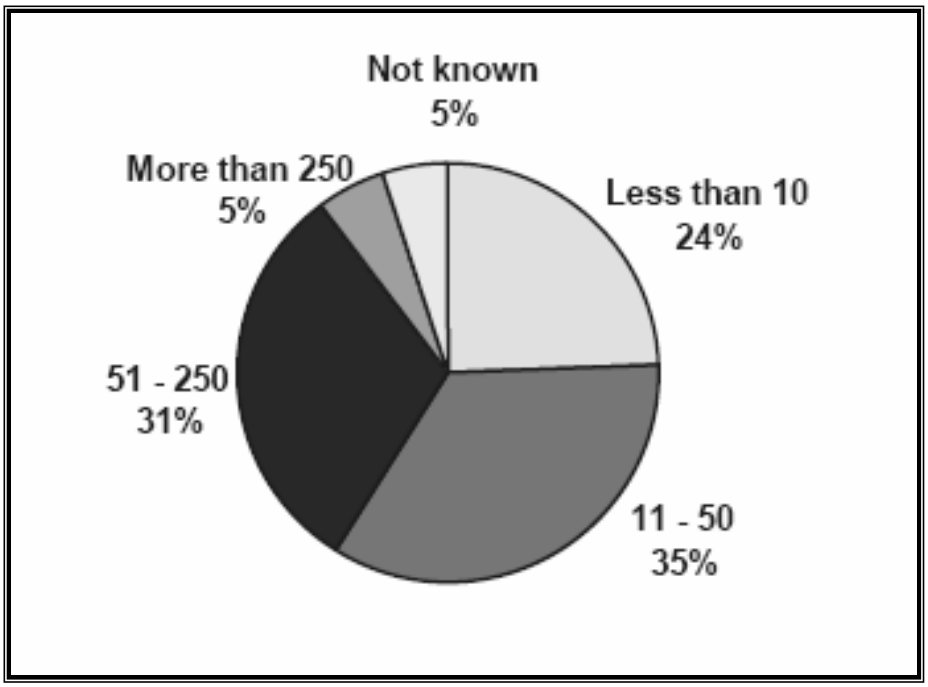
[5] UNEP (a), p 9.

[6] UNEP (a), p 9.

[7] Ayyagari, Meghana etc. 2003, p 12.

Although many SMEs have fewer than 50 employees,[8] these businesses represent an important socioeconomic sector because they provide a significant source of employment. More specifically, in the Asia-Pacific Economic Cooperation (APEC) region, SMEs constitute over 90 percent of all enterprises and 32 to 84 percent of employment in individual APEC economies.[9] As shown in Figure 1, according to a recent UNIDO survey, 50 percent of SMEs are run by single owners or families. This survey also found that 24 percent of SMEs have fewer than 10 employees and 35 percent have between 11 and 50 employees.

Figure 1. Number of Employees per SME in Article 5 Countries[10]



While the exact definition for SMEs is not agreed upon world-wide, there are a number of general characteristics common to SMEs, including:

- Small production capacity;
- Limited financial and human capital and technical capabilities; in addition, the number of employees per unit of production is disproportionately high compared to larger companies;
- Generally low level of health and safety standards;[11]

[8] UNEP (a), p 9.

[9] http://www.actetsme.org/archive/smesurvey.html

[10] UNIDO 2004, *A Survey of Small and Medium-Sized Enterprises in the Global Compact,* a report based on initiative by the Secretary-General of the United Nations at the Davos World Economic Forum in January 1999.

[11] Shende and Murphy, p 228.

- Dependence on outside sources for supply of products, raw materials, and technologies; and
- Operation in competitive markets.

3.2 SMEs in ODS Sectors

The refrigeration and air-conditioning sector is the most important ODS-consuming sector in almost all developing countries. CFCs represent the largest remaining challenge to the global ODS phaseout, with the refrigeration and air-conditioning (RAC) sector being the highest consumer.[12] It is important to note that because the majority of the remaining ODS use in SMEs is in the RAC sector most of the case studies and results in this study derive from RAC projects. This sector accounted for between one-third and two-thirds of total consumption in 78 developing countries, as the countries with less overall consumption utilized larger proportions for refrigeration and air-conditioning end-uses. Table 2 presents the percentage of CFCs consumed in 2000 in the major ODS sectors discussed in this report.

Table 2: Percentage of ODS Consumption by Sector[13]

Tonnes of ODS Consumption	Number of Countries	Ref. and AC	Aerosol	Foam	Solvents
≥ 1000	18	33%	12%	26%	12%
360 < x < 1000	9	54%	23%	13%	1%
≤ 360	51	69%	12%	8%	4%

The remaining 10-15% is from smaller ODS sectors such as Halons

In terms of geographical distribution of ODS consumption in the Article 5 countries, CFC consumption is often used as an indicator. In 2005, it was estimated that China consumed half of the world's CFCs, followed by India, Brazil, and Indonesia.[14]

3.2.1 Refrigeration and Air-Conditioning

The refrigeration and air-conditioning sector includes two important sub-sectors – manufacturing and servicing. Hundreds of thousands of SMEs are involved in refrigeration and air-conditioning servicing worldwide, including servicing firms and technicians who install and service refrigeration and AC systems of all sizes in offices, factories, hotels, businesses, homes, and cars. In mid-2000, over half of the developing countries which were Parties to the Montreal Protocol reported that of the total refrigeration-related CFC consumption, nearly 85 percent was occurring in the servicing

[12] Rasmussen et al., p 5.

[13] Rasmussen et al. p 4.

[14] Article 7 data from the UNEP Ozone Secretariat, May 24, 2005.

sector and about 15 percent was occurring in the manufacturing sector.[15] According to this report, most service companies are SMEs which consume less than ten tonnes of ODS annually. In addition, the largest share of ODS consumption in developing countries, ranging from 50 to 90 percent of national consumption, occurs in the refrigeration and air-conditioning sector. Mobile air-conditioning, commercial refrigeration, cold storage, and food processing are the sub-sectors with the largest ODS use.[16] The mobile air-conditioning (MAC) sub-sector is difficult to estimate but is clearly an especially large source and potentially the largest source of ODS leakage. The three general sources of ODS loss for all refrigeration and AC sub-sectors are: losses from leaks during operation, venting and disposal during servicing, and disposal of obsolete equipment and refrigerant.[17] Because many SMEs lack the technical capability to capture ODS when servicing or disposing of equipment, ODS is often released into the environment.

Chile: Refrigerant Recovery and Recycling System

3.2.2 Solvents, Coatings and Adhesives

SMEs consume a significant proportion of ozone-depleting (OD) solvents in some developing countries, but the phase out is far from complete worldwide. The UNEP Solvents Technical Options Committee (STOC) has noted that "Subsidiaries and suppliers of multinational companies in Article 5(1) countries have long ago finished their phase-out and the MLF has completed a few major solvents projects. However, very few projects have been completed with small and medium enterprises (SMEs) and users (SMUs) consuming less than 5 ODP tonnes of solvents. There are many thousands of such users, consuming a major part of the remaining usage."[18]

It is estimated that two-thirds of OD solvent consumption is by SME enterprises, which have individual annual consumptions of less than 2.5 tonnes of CFC-113 or 10 tonnes of 1,1,1-trichloroethane (also known as methyl chloroform). In China, 63 percent of users in the solvent sector are SMEs; in India, it is estimated that about 70 percent of solvent consumers are SMEs. According to UNEP (2000), "[i]n India and some other developing nations, a large quantity of carbon tetrachloride is used by very small

[15] Rasmussen et al., p 6.

[16] UNEP (a), p 21.

[17] UNEP, p 22.

[18] UNEP Technology and Economic Assessment Panel, 2002 Assessment Report, March 2003 (UNEP Ozone Secretariat, Nairobi, ISNB 92-807-2283-2) pg. 10.

enterprises for metal degreasing and dry cleaning, often under uncontrolled conditions."[19]

The FTOC cautions that "There is much left to be achieved in the Solvents Sector. Effort is still required to phase out ODS solvents in Article 5(1) countries, and especially the small- and medium-sized users (SMUs). In particular, there is concern about the use of carbon tetrachloride (CTC) for solvent applications by both large and small enterprises in some countries. A few important CTC projects are currently being developed by the Implementing Agencies, but these represent only a fraction of the total consumption."[20]

Many challenges to the phase out of OD solvents remain, including[21]:

- Identifying manufacturers, importers and vendors of OD solvents and/or OD solvent products;
- Identifying products that contain OD solvents;
- Identifying SME users and providing assistance in selecting and converting to the most appropriate alternative, which is particularly difficult in the solvent sectors
- Obtaining affordable alternatives, including new or retrofitted equipment, and in some cases, mitigating higher operating expenses for the converted process.

The multitude of applications in a number of diverse industries has slowed the phase-out in the solvent sector in Article 5 countries.

3.2.3 Aerosols

The aerosol product sector includes many SMEs, with production facility sizes ranging from large plants to small facilities that fill fewer than one million cans annually. Medium and large companies have been able to use readily available aerosol substitutes. Final phase-out of the use of CFCs in aerosols will also require conversion of small users, overcoming any potential public safety issues for small aerosol fillers operating in congested areas. However, the costs of substitutes are still generally too high for SMEs.[22]

The UNEP Aerosols, Sterilants, Miscellaneous Uses and CTC Technical Options Committee (ATOC) has identified "HAPs availability [and] conversion of small and very small CFC users" as remaining "problem areas" for the global phase out of ODS in the aerosol sector.[23]

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[19] UNEP, p 47.

[20] UNEP Technology and Economic Assessment Panel, 2002 Assessment Report, March 2003, ibid., pg. 10.

[21] UNEP Publication, Protecting the Ozone Layer: Vol. 2 Solvents, Coatings, and Adhesives.

[22] UNEP, p 41.

[23] UNEP Technology and Economic Assessment Panel, 2002 Assessment Report, March 2003, ibid., pg. 16.

While costs are generally higher for SMEs, the experience gained and the expertise developed by larger firms provide a good basis for developing appropriate and cost effective conversion plans. SMEs in this sector include both users and manufacturers of aerosol products. In most countries they include a large number of small-scale operations that function both in formal and informal economies. They frequently serve as an important source of employment. Production facilities range from modern plants to small, simple filling facilities filling fewer than one million cans a year. At this level of activity, the amount of CFCs used per year is less than 100 tonnes.

3.2.4 Foams: Production of Foam Plastics

SMEs are important producers of foam in both developed and Article 5 countries. CFC release prevention, product reformulation and the use of alternative blowing agents and new manufacturing technologies helped phase out ODS, especially CFCs, which must be phased out completely by January 2010. In 1999, 84 percent of the total CFC consumption in the foam sector was utilized for polyurethane foam production.[24] In India, SMEs made up 80 percent of the foam sector in 2000.[25] Many larger companies have switched to hydrocarbons, but SMEs have had difficulties with this transition because of safety concerns and higher manufacturing costs.[26]

The most recent assessment report of the UNEP Flexible and Rigid Foams Technical Options Committee (FTOC) identifies SMEs as one a significant area where ODS phase out is left to be achieved: "The plight of the SMEs also remains to be addressed. This is most severe in non-Article 5(1) countries where no transitional assistance exists. However, even in Article 5(1) countries, there is continuing concern that uncertainty over the future supply of alternatives is delaying phase-out of CFCs. This is particularly an issue for plants where cost-effectiveness considerations dictate the use of transitional technologies…For SMEs and particularly low volume users, there is no economically feasible solution unless the financial implications of investments are overcome. In many foam sectors, the alternative blowing agents are hydrocarbons, which are less expensive than HFC blowing agents but require expensive investments to satisfy safety requirements. A solution might be interest-free loan schemes, even in non Article 5(1) countries, where the investment cost is repaid from savings in blowing agent expense. However, no such schemes are yet being considered."[27]

Foams are produced by using gas or volatile liquid 'blowing agents' to create bubbles or 'cells' in the plastic structure. In some foams, the cells are closed, trapping the blowing agent inside, while in others the cells are open and the blowing agent escapes. A number of materials have been used as blowing agents, including CFCs (mainly CFC-11, with some CFC-12 and CFC-113 in phenolic foams and CFC-114), HCFCs, hydrocarbons and carbon dioxide. CFCs are used as a blowing agent (non-insulating

[24] UNEP (a), p 33.

[25] UNEP (a), p 34.

[26] IPCC, 2001. "A3.7 Developing Countries and Countries with Economies in Transition." Available at <http://www.grida.no/climate/ipcc_tar/wg3/153.htm>.

[27] UNEP Technology and Economic Assessment Panel, 2002 Assessment Report, ibid., pgs. 4-5.,

foams) or as a combined blowing/thermal insulation agent (insulating foams). Other functions include acting as a softener, as a heat sink and as a viscosity reducer. Due to these different functions a universal replacement is not possible.

There are three potential methods of reducing CFCs in the production of foam products. They are:

- changing the production process or using an alternative technology;
- replacing the CFCs with alternative blowing agents; and
- replacing foam products with alternative products.

The recovery and recycling of CFCs from existing stocks of foam is impractical because of technical problems, so the best option is incineration combined with energy recovery. However, incineration is costly and should only be conducted when there is an appropriate incineration facility in the country and it should not lead to any emissions of other toxic chemicals.

4. Methodology

The methodology used to undertake this study was developed by ICF Consulting (ICF) in close consultation with a Terms of Reference provided by UNEP DTIE. The general framework consisted of the following steps:

MAC Shop in the Caribbean

Step 1: Obtain and review background documentation as part of an initial desk study.

Step 2: Draft preliminary questions and conduct first round interviews with key stakeholders (identified by UNEP DTIE).

Step 3: Draft additional, targeted research agenda and hold further interviews with stakeholders.

Step 4: Design and distribute an NOU Survey on Projects with SMEs.

Step 5: Conduct field research with the Centre for Environmental Education in India.

Step 6: Analyze lessons learned from interviews, surveys and research.

Step 7: Prepare Draft Report for review by the QRT.

Step 8: Finalize report based on comments from the QRT.

Under Step 1, ICF obtained and reviewed numerous articles and reports from the stakeholders mentioned below. In addition, ICF conducted a literature review to obtain external analyses of the Montreal Protocol and consulted known sources to acquire other internal studies. ICF also obtained audit reports produced by the Multilateral Fund Inventory from the Fund Secretariat, which provide detailed information regarding the projects that have been approved and implemented under the Fund. Based on the thorough review of available information, ICF drafted preliminary questions for

stakeholders including Bilateral, Multilateral and NGO organizations (Step 2). See Appendix B for a list of preliminary research questions.

Individual representatives of the following stakeholder groups were selected for interviews based on their experience with projects targeting SMEs and ODS phaseout:

A. Multilateral Fund Secretariat
B. Implementing Agencies of the Multilateral Fund: UNDP, UNEP, UNIDO, World Bank
C. GEF Secretariat
D. Bilateral agencies: USEPA, UK DEFRA, Environment Canada, German GTZ, Japanese Ministry of Foreign Affairs, French Government, Stockholm Environment Institute, Czech Republic Ministry of Environment, etc.
E. SME and Environment NGOs: India's National CFC Consumption Phaseout Plan (NCCoPP, formerly known as Human and Institutional Development in Ecological Refrigeration, or HIDECOR), Japanese Industrial Conference for Ozone Layer and Climate Protection (JICOP), Commonwealth Science Council, etc.
F. UNEP Regional Network Coordinators
G. Ozone Officers from NOUs in Article 5 countries
H. Managers of several SMEs

Appendix A contains a full list of those individuals interviewed.

During the interview process, ICF sought to consult widely with relevant persons and institutions in order to ensure the analysis took into account the perspectives of all key stakeholders. In total, ICF interviewed over 50 individuals and organizations. This process of participatory stakeholder consultations was designed so that the study could benefit from those most closely associated with efforts to phase out ODS in SMEs over the past decade.

In order to better understand the perspective of Ozone Officers and obtain their direct input for this study, ICF developed an NOU survey through interviews with relevant stakeholders. A copy of the survey instrument can be found in Appendix C. ICF staff distributed surveys to NOUs from Article 5 countries and also interviewed Ozone Officers from 15 countries on their experiences working with SMEs. ICF staff interviewed several representative SME owners in the refrigeration and air-conditioning industry in India.

ICF also conducted field research with their local partner, the Centre for Environmental Education. The study team was able to carry out a consultation process with SMEs through its presence in India, where significant SME ODS phaseout activities are currently being carried out. The team consulted directly with SMEs during training activities involving SMEs and also obtained the input of key experts currently directing

and advising ongoing SME training activities in India. In addition, field visits to SMEs were conducted in India to assess their response to various potential forms of additional training and assistance in ODS phaseout.

Based on the information gathered through interviews, surveys and research, a Draft Report was prepared and submitted to the Quality Review Team for review. In response to the comments provided by the Quality Review Team, a revised, Final Report was then developed.

5. SME ODS Compliance Challenge

There are 145 developing countries operating under Article 5, paragraph 1 of the Montreal Protocol as of May 2005. These countries, which have an annual consumption of less than 0.3 kg of ODS per capita, are eligible for Multilateral Fund assistance to facilitate compliance with the Protocol's control measures. These measures call for a consumption and production freeze of Annex A CFCs at a reduction of 50 percent of 1995-1997 levels by January 2005, an 85 percent reduction by January 2007, and a 100 percent phaseout by 2010.[28]

Several barriers exist to the phaseout of ODS in Low Volume Countries (LVCs) including: "inadequately skilled manpower, institutional constraints, large and diverse informal sector, lack of information and training on ozone issues, low economies of scale of phaseout projects and lack of sufficient involvement by all stakeholders."[29]

Consequences of SMEs non-Compliance

As a whole, SMEs are not keeping pace with larger companies in terms of achieving a timely ODS phaseout. The consequences of SMEs not being in the mainstream include:

(1) The worldwide phaseout of ODS could be delayed;

(2) Many SMEs may be forced to close down, causing unemployment to rise, especially since SMEs employ proportionally more persons in total than larger companies;

(3) Consumer and user dependence on larger companies or multinationals will increase; and

(4) Consumption of ODS in SMEs may continue to grow so long as CFC technologies remain more cost-effective than replacement technologies, due to possible cost advantages.

(5) Illegal trade in ozone depleting chemicals may be stimulated by continued ODS consumption in SMEs, particularly in the informal sector.

Compliance with ODS regulations is more difficult for SMEs than for large companies. The general characteristics of SMEs, their limited or specialized technical capabilities, their participation in the informal economy and their dispersed

[28] Guidelines for the Development of Refrigerant Management Plans (RMPs) for Low-Volume ODS-Consuming Countries (LVCs), UNEP DTIE OzonAction Programme, OzonAction Information Clearinghouse, 2000, p 4.

[29] Paper presented by UNEP at the 20th Executive Committee meeting (1998), entitled "Proposed framework for overall approaching for addressing the needs of Low Volume ODS consuming countries" cited in UNEP's Guidelines for the Development of RMPs for LVCs, p 5.

geographical locations make delivery of compliance assistance to SMEs very difficult. Contacting SMEs can be difficult for several reasons. If the SME is in the informal economy and is not formally registered with the relevant government agencies, it is harder to provide ODS phaseout assistance.[30] SMEs are also often geographically dispersed throughout a country, making it more difficult to communicate with them and target them for assistance. "Investment projects, alone, are not likely to meet the new challenge of addressing ODS consumption in numerous and dispersed SMEs."[31]

Preventing and combating illegal ODS trade is already a global concern under the Protocol. Increased consumption in the informal sector where most SMEs operate could stimulate illegal trade in ODS and prolong the demand for these chemicals. For example, this has been noted by the UNEP Solvents Technical Options Committee: "One other obstacle that has been identified is illegal imports into, mostly, Article 5(1) countries that have already enacted restrictive legislation. These may represent a considerable proportion of baseline quantities, in some cases, and, of course, are not reported. This, and other factors, may mean that the total global OD solvents consumption is currently significantly higher than is reported."[32]

5.1 SME Challenges

As some SMEs accept the reality of the global ODS phase out, certain recurring concerns have been documented under various SME-focused ODS phaseout projects. In general, SME owners fear cost increases due to increased maintenance and product costs. They also worry that the alternative technology or substance available will produce an inferior product or service. They fear that the increased costs and reduced performance will compromise their competitive position in the market place. SME owners are generally reluctant to change. They have limited access to information on new technology due to their lack of industry organizations. Furthermore, in Article 5 countries where access to capital is limited, they do not have the ability to finance investments in new technologies. The following generalized barriers have been shown to prevent or slow the adoption of non-ODS technologies by SMEs:

> **Reluctance to Change**. Many SMEs are already "just barely surviving" and are fearful to change existing operating methods and technologies.
>
> **Lack of Industry Organizations**. SMEs in many countries do not have formal organizations or focal points to represent their interests. As a consequence, they have no focal point to assist with identifying, obtaining and channelling assistance for ODS phaseout projects.

[30] Shende and Murphy, p 228.

[31] Shende and Murphy, p 229.

[32] UNEP Technology and Economic Assessment Panel, 2002 Assessment Report, March 2003, ibid., pg 10.

Fewer Internal Resources. SMEs do not benefit from the "economies of scale" of larger companies, which due to their size have relatively greater internal human and financial resources to undertake ODS phaseout.

Lack of Information. Due to limited time and human and financial resources, SMEs have great difficulties identifying sources of information and assistance, both of which are essential elements in the technology transfer process. Information about the need for phaseout, the timing of the phase out, how to access assistance from their NOU and the Multilateral Fund, technical options and sources of technology, equipment, and chemicals, etc. has not yet reached the majority of SMEs.

Limited Technical Skills. The limited internal human resources available to SMEs usually mean that skills are focused on the narrow technical specialties required for immediate production needs. Little time is available to acquire the new skills required to undertake new activities such as phaseout projects. Examples of such missing needs include:

- technology assessment capabilities.
- need for technical assistance to design projects
- training in the safety of alternative technologies, equipment and substances; and
- training in recovery and recycling

Access to Technology, Equipment, and Chemicals. SMEs are generally not active in identifying suppliers of new technology, equipment and chemicals. Unable to easily seek out different sources of information, SMEs often rely on their suppliers' advice about what new technology to adopt. Additionally, SMEs do not always receive advice even from larger suppliers because their small size (and hence, small sales potential for the supplier) does not merit the type of attention given to larger customers. SMEs therefore need improved access to mechanisms for technology transfer.

Caribbean: SME Owner Gets New Equipment

Access to Financing. The SME's need for financial assistance is great due to slim operating margins, meaning SMEs are more averse to the risks of adopting new technologies than large companies. Financial institutions tend not to underwrite environmental technology transfer activities for SMEs. SME awareness about the financial assistance under the Multilateral Fund is rising, but more work in this area is required because of the sheer number of enterprises involved. Financing programmes supported by the Multilateral Fund have also been limited in number and scope. Even when SMEs are aware of financing programmes available in their respective countries, the procedures for receiving assistance under the Multilateral Fund may appear complicated for SMEs, which would point to the need for streamlining or simplifying the application procedures.

Misconceptions regarding the potential for financial savings. SMEs generally do not understand the potential for financial savings because the current price of CFCs does not reflect future prices. Furthermore, most believe in unlimited future availability of CFC-12 in the local market. Furthermore, the lack of trust in the technical efficacy of the new equipment/new practices drives the concern for financial viability. Finally, they have concerns about the perceived extra time required to use the equipment during servicing.

Small appreciation of the value of non-ODS equipment as an "advertising tool" for convincing potential new customers that a shop is technologically advanced. SMEs fear that conversion to a new technology or substance could only compromise their business and do not perceive the potential for improved advertising through use of a new process or product that is environmentally friendly. However, many service shops that have been involved with technology transfer programmes are proud of having R&R machines. Many service shop owners put the machines in front of the shops to put them on display.

6. Approaches and Experiences with Assisting SMEs

This section provides information on strategies that have been carried out to assist SMEs globally. The first section discusses strategies that have been found to be generally successful in promoting engagement with SMEs on environmental issues, given the particular conditions in which most SMEs operate. Following sections provide a summary of the overall institutional structure provided by the Montreal Protocol for addressing ODS use in SMEs, the key agencies involved in working with SMEs, and the types of ODS reduction projects that have been carried out to date under the Multilateral Fund.

6.1 Evolving Understanding of Engagement with SMEs on Environmental Issues

SME assistance globally has typically focused on economic development. However, with the increase in environmental regulations affecting SMEs around the world, there has been a more recent push to assist SMEs with regulatory compliance and pollution prevention, because often smaller businesses need technical and financial support in order to improve their environmental profiles and comply with regulations.[33]

MAC SME Workshop in Chile

SMEs face difficulties that stem from regulatory systems developed to serve the needs of large firms, and the cumulative pressure of those regulatory requirements. SMEs identify high compliance costs, extensive and complicated paperwork and economic regulations that prohibit certain activities as the most onerous burdens they face.

An effective strategy for designing a programme to provide assistance to SMEs, no matter the focus, is to make the project specific to the type of SME being targeted,

[33] OECD. 2002. *OECD Small and Medium Enterprise Outlook*. Organisation for Economic Co-operation and Development.

comprehensive yet simple, and interactive but purely informational.[34] When promoting environmental issues to SMEs, an effective strategy has been to focus on the economic benefits of the programme, such as reduced costs, increased competitiveness, and an improvement in image.[35] In general, an effective strategy has been to keep the project local by utilizing regional funding intermediaries and experts. Also important is to ensure that all stakeholders are incorporated into the project and that cooperation between stakeholders is encouraged. Stakeholders can include SMEs themselves, customers, suppliers, large companies working with SMEs, local authorities, national governments, industry associations, and NGOs.

Additionally, effective programme designs have included a capacity building element in order to improve the management capacity, skill level, and technological expertise of SMEs, and a support network for SMEs though forums such as regional partnerships between stakeholders.[36] Within these partnerships, it was made certain that SMEs had a clear, single contact point for support and that all members had a clearly defined role within the partnership.[37] Individual programmes can also be bolstered by linking SMEs to the appropriate national and international networks and markets such as research and technology networks, industry associations, and public agencies.[38] And finally, effective programmes have been designed to produce measurable results that are monitored by independent, progressive, informed evaluations.[39]

An enabling environment for SMEs within the country and the government is essential for programme success. This can include a stable economic environment and the implementation of fair regulations and regulatory costs. In order to promote a general enabling environment for SME development within countries, effective programmes have made efforts to include SME development in national development and poverty reduction programmes.[40]

6.2 ODS Phaseout Assistance for SMEs

6.2.1 Under the Multilateral Fund

The Multilateral Fund for the Implementation of the Montreal Protocol (MLF) provides funds to help developing countries comply with their obligations under the Protocol to

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[34] Ecotec Research and Consulting. 2000. Report on SMEs and the Environment: Analysis of the replies given by 6 European Union Member States to a European Commission's questionnaire on Small and Medium-Sized Enterprises (SMEs) and the Environment. Report for European Commission, Directorate General Environment. Brussels, February 2000.

[35] Brilhante, O. M. 2001. "Environmental Management System (EMS) and Pollution Prevention in Small and Medium Enterprises (SMEs) in the Netherlands, Brazil, and Vietnam." International Conference on Industry and Environment. Ho chi Minh City, Vietnam. April 20-21, 2001.

[36] UN. 2002. *A Partnership for Progress.* The United Nations Development Assistance Framework for Thailand, 2002-2006. United Nations Country Team in Thailand. Bangkok, September 2002.

[37] Ecotec Research and Consulting, 2000.

[38] OECD, 2004. "Promoting Entrepreneurship and Innovative SMEs in a Global Economy: Towards a More Responsible and Inclusive Globalisation. Executive Summary of the Background Reports." *Second OECD Conference of Ministers responsible for Small and Medium-sized Enterprises (SMEs).* Organisation for Economic Co-operation and Development. Istanbul, Turkey. 3-5 June 2004.

[39] OECD, 2004.

[40] OECD, 2004.

phase out the use of ozone-depleting substances (ODS) at an agreed schedule. Developing countries whose calculated consumption of ODS is less than 0.3 kg per capita per year are considered to operate under Article 5, paragraph 1 of the Montreal Protocol, which makes them eligible for assistance under the MLF. This source of funding was established to provide financial and technical support to Article 5 countries in order to facilitate their compliance with the Protocol. Funds are used, for example, to finance the conversion of existing manufacturing processes, train personnel, pay royalties and patent rights on new technologies, and establish national Ozone Offices. They also finance a clearinghouse and Regional Networking of Ozone Officers. Out of a pledged US$2.1 billion[41], the MLF has supported over US$1.8 billion for 5,000 projects and activities in 139 developing countries. This support has already helped to phase-out over 200,000 tonnes of ozone-depleting substances.[42]

The MLF's work is implemented through four implementing agencies, which have contractual agreements with the Executive Committee: the UN Environment Programme (UNEP), UN Development Programme (UNDP), UN Industrial Development Organisation (UNIDO) and the World Bank. The roles of the IAs have evolved into the following as is described on the MLF website[43] :

- The World Bank, which disburses almost half of the total funding, concentrates on large-scale phaseout and investment projects at plant and country levels.
- UNDP organises demonstration and investment projects, technical assistance and feasibility studies.
- UNIDO prepares and appraises investment project proposals and implements phaseout schedules at plant level.
- UNEP's Division of Technology, Industry and Economics (UNEP/DTIE) carries out no investment projects, but rather helps to establish the infrastructure within which projects can proceed. This includes carrying out institutional strengthening activities (such as establishing National Ozone Units within each country) facilitating regional networks, and helping to prepare country programmes, especially for low-volume-consuming countries. UNEP/DTIE also provides clearing-house functions, and produces a range of training materials. In 2002 it initiated its Compliance Assistance Programme geared towards achieving total phaseout, and decentralised most of its resources to the regional level, facilitating direct support to developing countries.

Up to 20 per cent of the contributions of contributing Parties can also be delivered through their bilateral agencies in the form of eligible projects and activities.

Financial assistance under the MLF is provided in two main categories - investment projects and non-investment projects (including Country Programmes, Institutional

[41] MFS, http://www.multilateralfund.org/about_the_multilateral_fund.htm

[42] UNEP press release, 27 June 2005, "Exemptions & $420m Phase-out Support Considered in Ozone Meeting Montreal".

[43] MLF Website http://www.multilateralfund.org/implementing_agencies.htm

Strengthening projects, technical assistance and training projects, networking and information dissemination). Though the number and costs of the different types of projects vary considerably, each constitutes a critically important element for Article 5 countries in sustaining the 1999 CFC freeze and in achieving the goal of complete CFC phaseout by 2010.

The first step towards implementation of the directives of the Montreal Protocol is the formulation of a Country Programme by a National Team. The Country Programme incorporates a comprehensive account of the current consumption of ODS in the country, defines the institutional, political and industrial framework and estimates the economic and social consequences of meeting national commitments under the Montreal Protocol. Once the Country Programme has been prepared and approved by the Executive Committee of the MLF, financial assistance can be requested through the NOU for investment and non-investment projects, in accordance with the Action Plan defined in the Country Programme. Institutional Strengthening projects, which are aimed to strengthen national capacities to coordinate and monitor phaseout activities are normally approved concomitant with approval of the Country Programme.

6.2.1.1 National Ozone Units (NOUs)

The creation of an NOU is a key milestone in the ability of an Article 5 country to receive and manage international assistance for implementation of the Montreal Protocol. The NOU is very much the focus of attention of the MLF and Implementing Agencies since it is the principal working focal point under this multilateral environmental agreement Their purpose is to strengthen the countries' institutional capacity, to help provide resources to enable the phaseout of ODS, and to act as liaisons between country governments and the implementing agencies, bilateral agencies, the Executive Committee, and the MFS as well as the Implementation Committee and the Ozone Secretariat. The NOUs are incorporated into the national governments and are responsible for designing, implementing, and monitoring a country programme for ODS phaseout.[44]

NOUs are often the front-line of support for SMEs, as it is often they who must initiate activities and programmes to identify, reach and assist small businesses. Programmes that assist SMEs can focus on several different aspects of the ODS phaseout challenge for small businesses, including training/education, policy measures, financial assistance and technology transfer. Training can be provided through workshops, training manuals, etc. and can include information such as facts about ODS and the benefits of reducing their use or specific technical training for the use of recycling/retrofitting equipment. Policies can be enacted at the government level in order to control the use of ODS through regulations, financial incentives/disincentives or voluntary programmes. Programmes can provide financial assistance through loans, revolving funds, loan programmes, grants and microfinance to allow SMEs to purchase equipment that will enable the reduction of ODS use. Programmes can also directly provide improved technology to SMEs through technology transfer.

[44] UNIDO,. 2004. The Montreal Protocol: National Ozone Units." Document #16690. Available online at: http://www.unido.org/doc/16690.

6.2.1.2 Refrigerant Management Plans (RMPs)

In low-volume consuming countries (LVCs), Refrigerant Management Plans have been adopted to provide a comprehensive approach to CFC phaseout at the national level. RMPs are particularly relevant to the SME issue since most CFC consumption is in this sector and most companies in LVCs are considered SMEs. RMPs are thus a major tool to assist small businesses.

An RMP is a comprehensive strategy to phase out the use of ozone-depleting refrigerants (CFCs and HCFCs) used for servicing and maintenance of refrigeration and air-conditioning systems. This national strategy is structured to do the following:

- contain, recover, and recycle refrigerants in order to provide the CFCs needed for CFC-using equipment that is not yet obsolete;
- provide for retrofits and timely replacements of equipment to ensure a smooth transition to non-ODS equipment and operations.
- offer assistance to set up an ODS legislation including an import/export quota system.

Training is an integral RMP component which provides support in technology transfer. It is important for countries to initiate the preparation of their own RMPs to ensure phaseout in this sector.

6.2.2 The Global Environment Facility (GEF)

Although they operate under separate mandates, the GEF and the MLF are coordinated mechanisms with similar purposes in the field of ozone protection. The GEF's activities are designed to complement, enhance and add to the work of the MLF. The GEF's assistance in preventing the production and consumption of ODS is in accordance with countries' commitments to the Montreal Protocol. Because most countries with economies in transition are classified as non-Article 5 Parties under the Montreal Protocol, they are not eligible to draw on the MLF for assistance in phasing out ODS. Since 1992, the GEF has provided about US$149 million to traditional industrialized countries in Eastern or Central Europe or countries that have succeeded the former Soviet Union to phase out ODS as required by the Montreal Protocol.

Due to the short timeframe of ODS phaseout, the GEF funds only Short-term Response Measures. There are no longer-term GEF operational programmes for ozone depletion.

The GEF, which helps developing countries fund projects that benefit the global environment, also serves as financial mechanism for the UN Framework Convention on Climate Change, Convention on Biological Diversity, UN Convention to Combat Deforestation, and Stockholm Convention on Persistent Organic Pollutants. Additional to their service to the MLF, UNDP, UNEP, and the World Bank also operate as implementing agencies for the GEF.

The GEF works specifically with SMEs though the Environmental Business Finance Programme (EBFP)[45], a GEF programme administered by the International Finance Corporation (IFC) that currently works with SMEs focusing on climate change and biodiversity issues.[46]

Several lessons have been learned thus far from the implementation of the GEF/IFC programme, including the following:

- Providing financing through intermediaries that are knowledgeable about the local conditions is crucial for the promotion of sustainable benefits and local ownership of projects;
- Involving all stakeholders including local governments, NGOs, in-country intermediaries, and indigenous communities is important;
- Promoting capacity building of the intermediaries and SMEs is an essential activity during project implementation;
- The presence of an enabling regulatory/policy environment within the country is needed to make a programme possible; and
- Flexibility in programme design and delivery is needed due to the diversity of factors.[47]

6.2.3 Bilateral Funding and National Programmes

In addition to financial contributions to the MLF, many developed countries carry out bilateral cooperation projects with Article 5 countries. While carried out within the provisions of the Protocol, these bilateral projects provide an opportunity for donors to work directly with recipient countries and to demonstrate some of their leading technological and training capabilities. In addition to bilateral funding, many developed countries also carry out small business pollution prevention programmes that include ODS phaseout. Canada has both the Small and Medium-Sized Enterprises Workgroup and the Pollution Prevention for Small Business website both established under the Canadian Pollution Prevention Roundtable. The United States has the Small Business Workgroup and Small Business Environmental web page established under the U.S. National Pollution Prevention Roundtable.

Some Article 5 country governments have also established pollution prevention roundtables such as the SME programme of the Indonesian Pollution Prevention Roundtable (KMB). KMB Indonesia was developed to promote cleaner production in SMEs through education, training and information sharing. Knowing that big industries have the luxury to hire cleaner production experts, this roundtable conducts its own training programmes. KMB Indonesia decided that the priority for cleaner production concepts must be on small and medium-sized industries.

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[45] Formally known as the IFC/GEF Small and Medium Scale Enterprise Program.

[46] IFC, 2005. Environmental Business Finance Program. Available online at: http://www.ifc.org/ebfp.

[47] GEF M&E, 2004. Small and Medium Scale Enterprise Program Project Implementation Review. The Global Environment Facility Monitoring and Evaluation Unit. Available online at: http://www.gefonline.org/projectDetailsOPS3.cfm?projID=91

Some Article 5 countries have ministries devoted to assisting SMEs in many areas, for example India has a Ministry of Small Scale Industries.[48]

6.2.4 Non-Governmental Organizations (NGOs)

Several NGO organizations are involved in general SME support and capacity building, such as technology transfer and training. Often, these organizations specifically assist SMEs in their ODS phaseout compliance. Many of the NGOs involved with SME capacity building and support are focused on business development and technology transfer. Very few organizations exist that are wholly devoted to help SMEs transition out of ODS.

MAC Recovery and Recycling Machine in Latin America

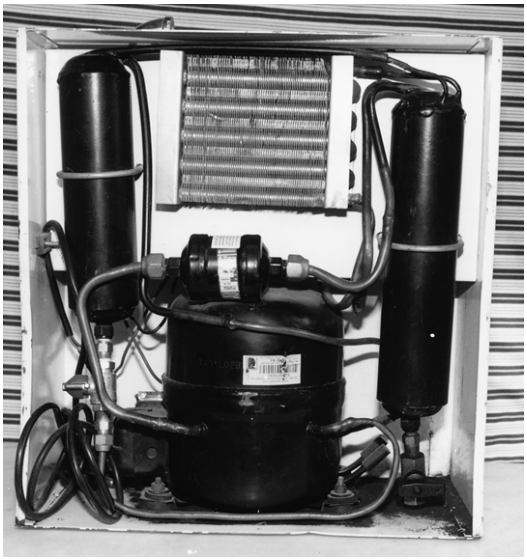
[48] http://ssi.nic.in/

7. Overview of SME ODS Reduction Projects

The following strategies and practices were gathered from numerous case studies on SME ODS reduction projects referenced in order to draw conclusions about successful strategies for targeting SMEs and encouraging ODS phase-out.

7.1 Refrigeration and Air-Conditioning

The majority of ODS reduction assistance projects for SMEs have focused on the refrigeration and air-conditioning sector. The majority of these are service companies which are SMEs that consume less than ten tonnes of ODS annually. The normal sector composition is of domestic, commercial and industrial refrigeration and air-conditioning in the following areas:



Coolant Recovery Machine in India

- The cold chain of food production, storage, distribution, retailing and home storage of chilled or frozen food.
- Air and fluid cooling for industrial and commercial processes.
- Air-conditioning of domestic and commercial premises including offices, hotels, retail outlets and leisure complexes.
- Mobile air-conditioning including cars, trucks, agricultural machinery and buses.

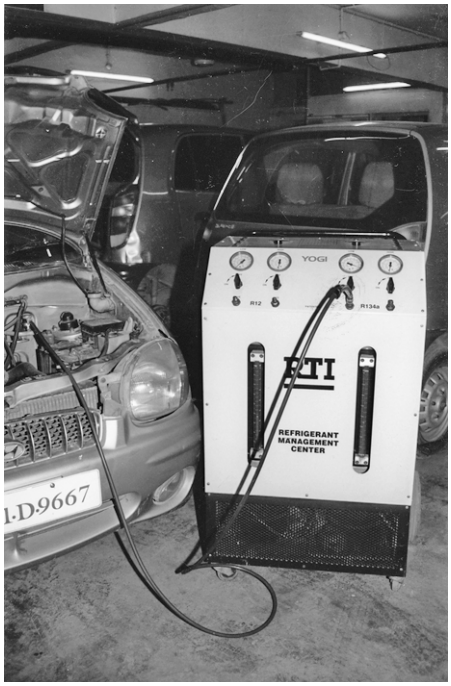
While refrigeration equipment may vary through the sector, the principles of good servicing practices, which are taught through training workshops as a part of the country's refrigerant management plan, are applicable to all refrigeration and air-conditioning systems and applications. Refrigerant Management Plans have begun to address the SME sector in their implementation of the following activities:

- Training programmes on good practices in refrigeration for service technicians;
- Training programmes for customs officers on control and monitoring of ODS;
- The establishment of recovery & recycling programmes for CFC refrigerants;

- Promotion of public awareness; and
- An improved system for collection of data on and control and monitoring of ODS consumption.

Recovery and Recycling (R&R). Successful R&R systems will make recovered or recycled refrigerant available for reuse, which will reduce the need for virgin CFC refrigerants and allow existing CFC-based equipment to operate until the end of its economic life. This is particularly important as virgin CFC refrigerants become increasingly scarce and expensive –once the phaseout schedules required by the Montreal Protocol come into force and imports of CFCs are controlled through licensing systems. Some completed R&R projects have had only modest results, with recovery and recycling rates far behind the projected quantities because the abundant availability of cheap CFC refrigerants and the continuous import of CFC-using equipment has undermined the market for recovery and recycling. In a number of countries where import control systems are in place, and the import of CFCs has been restricted, the price of CFC has increased significantly. In some projects it has been reported that increasing incidents of contamination of CFC refrigerant with others (i.e., R-22, and hydrocarbon) have in fact disrupted the operations of the R&R machine. To ensure success of this type of project, an integrated approach including investment, training, and policy measures to track entry points of contamination, must be put in place.

Retrofitting. There are several options for the end-user sector to phase out ODS use in their companies. Retrofitting is the replacement of the refrigerant towards alternatives. It may require replacing specific parts of the equipment. In addition, new equipment can be more energy and cost-efficient and save the SME precious resources. In the refrigeration sector, often ODS-based equipment can be replaced with transitional refrigerants such as HCFCs or alternative substances. The most commonly used non-ozone-depleting refrigerants are HFCs (which have zero ODP but contribute to global warming) and hydrocarbons (which have zero ODP and zero global warming potential but are flammable and therefore require specific safety precautions).



MAC Coolant Recovery and Recycling Machine in India

Replacement. For older refrigeration & air-conditioning systems, replacing an out-of-date system may be more cost-effective than retrofitting the system, especially the energy savings which may be realised by modern technology are taken into consideration.

7.1.1 Case Study #1: MLF Mobile Air-Conditioning (MAC) Voucher Project in Thailand (Implemented by the World Bank, Government Thailand and UNDP)

There have been a number of MAC projects funded under the MLF. The majority of these projects are targeted at local community-level MAC service shops. Key elements of these projects have included selecting suppliers and participants, distributing equipment, training technicians, producing communication materials, and conducting follow-up evaluations. One project utilized an innovative market-based voucher system to distribute equipment to local SMEs. Below is a discussion of key elements of that successful programme:

Local Implementation Partner (LIP). The LIP was in charge of recruiting project participants, organizing training events, ensuring that all equipment was delivered to participants, and collecting data on the effectiveness of the project. The LIP incrementally increased its role in implementing the project as the project progressed in order to transfer capacity for project implementation to the local level and reduce overall costs of project implementation.

Suppliers and Participants. A group of local equipment suppliers were recruited based on a detailed set of technical and service criteria. The suppliers that met all of the minimum criteria were certified to provide CFC-12 MAC recovery/recycling equipment to MAC shops participating in the project. Potential MAC shop participants were identified through research and field work. Initial contact was made by both the implementation team and equipment suppliers, during which information was provided regarding the Montreal Protocol and the ozone layer, the benefits of participating in the project, and the responsibilities of project participants and organizers. During these consultations, each shop was invited to attend a subsequent Project Interest Meeting (PIM).

At the PIM, invited MAC shops were given a more thorough presentation about the project and its goals, the mechanics of project implementation, the costs of equipment, and the specific requirements for participation. Equipment suppliers also attended the PIM and provided presentations and equipment demonstrations. Each supplier and equipment package varied in price and shops were free to choose among higher and lower cost alternatives.

Equipment Distribution and Technician Training. After the PIM, MAC shops were given between one and two weeks to select equipment from one of the four qualified equipment suppliers. Equipment was purchased using a voucher system that allowed MAC shops to purchase equipment using a combination of shop contributions and a set subsidy value, meaning that MAC shop contributions to the total cost of the equipment varied based on each MAC shop's choice of equipment supplier and equipment package. The subsidy value of the final voucher decreased over time to provide incentives for MAC shops to participate as early as possible and to reward early participation.

After the PIM, MAC shops submitted Part-A of the equipment voucher to their selected equipment supplier, and the equipment supplier then sent the vouchers to the project leader.

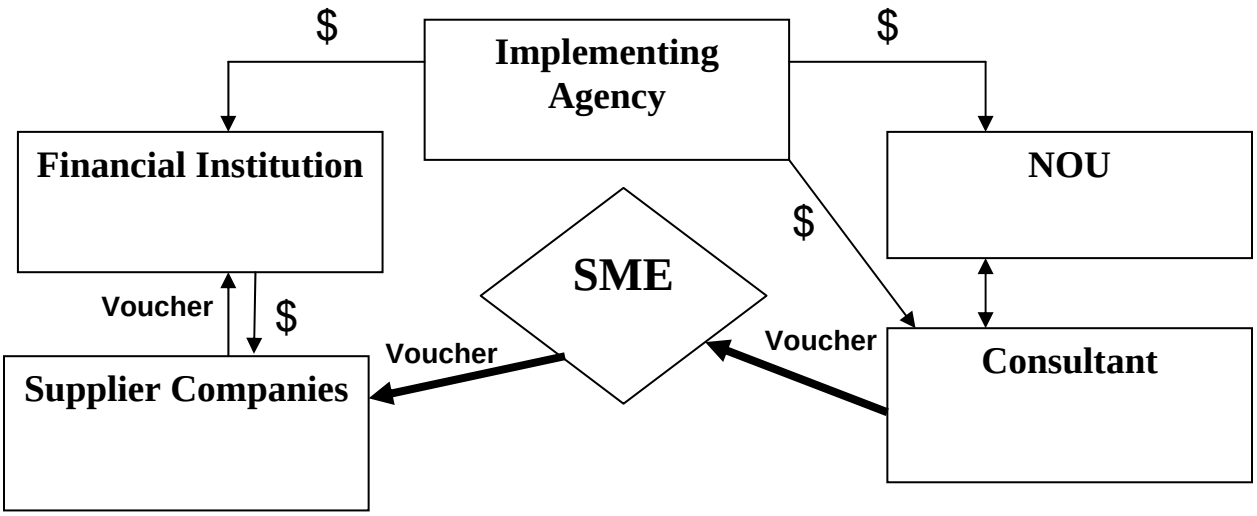
Prior to participant selection, expert training instructors were recruited to provide the technical training required for MAC training workshops. Project participants were required to attend the mandatory one-day training workshops during each stage of the project in order to receive the equipment. Training materials covering a range of environmental, service-related, and equipment-related training modules were utilized for the training workshops. The four equipment suppliers were also obligated to provide equipment-specific hands-on training to technicians.

Once the final participants were selected, the suppliers delivered the equipment and conducted technician training. The shops then paid the suppliers and signed Part-B of the voucher to verify that delivery and training had occurred. The supplier then submitted Part-B of the voucher to the financial institution to receive 80 percent of the voucher value.

Follow-Up Evaluation. Upon completion of a follow-up visit to each MAC shop by the project leader (approximately one month after equipment delivery and training) during which the project leader confirmed that the equipment supplier had delivered equipment as agreed and had provided training and a required follow-up visit, each MAC shop signed Part-C of the equipment voucher and submitted it to the project leader. The project leader then submitted the signed voucher to the financial institution, authorizing them to disburse the remaining 20 percent of the voucher value to the equipment supplier. Each shop was required to submit an equipment use log sheet for the initial nine months after receiving the equipment. The project leader also followed up with each MAC shop approximately six months after equipment delivery to collect data concerning the operation and success of the project.

Communication Materials. Communication materials and publications aimed at both shop technicians and patrons of the MAC shops were distributed to MAC shops as part of the project.

Figure 1. Voucher System for SMEs



Project Conclusions. The project succeeded in reducing CFC-12 consumption (as a component of emissions reductions) across the shops participating in the project by an average of 40 percent of the total previous consumption. Overall CFC-12 emissions reductions equalled about 76 MT annually without affecting the total volume of servicing jobs. In addition, about 2 MT and 16 MT of CFC-12 emissions were avoided annually due to reductions in "top-offs" (i.e., charging refrigerant without fixing leakage points) and to more effective identification and repair of system leakage, respectively, through training in best-practice servicing techniques.

Eighty-four percent of MAC shop respondents claimed that they use the machine for all CFC-12 service jobs where top-offs are not demanded. The 16 percent of shops that reported not using the equipment for all non-top-off jobs cited technical reasons that precluded the use of recovery/recycling equipment, such as excessively oily refrigerant or refrigerant that has been contaminated beyond the point where it can be reused (this is an accurate response, since it is sometimes technically impossible to use a recovery/recycling machine when a burned out compressor or other problem has contaminated refrigerant beyond use). These responses indicate that, on a general level, MAC shops are making good use of the recovery/recycling equipment whenever technically possible and when customers permit.

7.1.2 Lessons Learned from the Voucher System

Status Quo for Delivering ODS Alternative Technology. Traditionally, technology replacement projects that supply non-ODS technologies buy a bulk amount of equipment and deliver the equipment to the SMEs. The problem that occurs with this model is that it functions outside of the traditional SME supply chain. Within these traditional projects, the supplier of the technology is removed from the process, increasing the risk of unsustainable results. Furthermore, the project implementation team does not typically have the ability to identify the best SMEs to work with, (i.e., ones that will stay in business and use the equipment effectively). This type of project also makes it difficult to create a sense of ownership in the SME because the SME is given

equipment instead of buying the equipment or contributing in a meaningful way to the total price of the equipment.

Traditionally, the NOU loosely oversees the delivery of the equipment to the SMEs. In the voucher system model it is the financial institution that is accountable for monitoring whether or not the supplier delivered the equipment and if the equipment is in operation.

Creating a Sense of Ownership. In the past, SME project managers had often reported that SMEs want to select the piece of equipment that is best for them. When SMEs obtain equipment for free and cannot select the specific equipment type/model that they want, they often do not use the equipment properly. SME owners have sometimes sold equipment or not kept it in good working order in situations where they did not make an investment in the equipment. Delivering equipment to SMEs does not create a sufficient sense of ownership for the SME owner.

SME Shop Owner with New Equipment in Chile

7.2 Solvent Sector

There have been many projects involving SMEs in the particular sub-sectors of the solvent industry. Solvent sub-sectors that have used CFC-113 include: electronic assembly production processes, precision cleaning and general metal degreasing during manufacture, dry cleaning, and other industrial applications.[49]

Not-in-kind alternatives exist in the precision cleaning sub-sector, but the required equipment is often too costly for Article 5 countries.[50] Alternatives for the general metal cleaning sub-sector must be customized for each application.

Options for replacement of CFC-113 include: non-ozone-depleting halogenated organic solvents, non-ozone-depleting non-halogenated organic solvents, HFCs & HFEs, HCFCs, and PFCs. Not-in-kind alternatives include aqueous cleaning, semi-aqueous cleaning, emulsion cleaning, and "no-clean" alternatives.[51] Based on MLF guidance, the best alternative should be selected based on the following criteria:

- should not be an ozone-depleting substance;
- should enable the enterprise to maintain product reliability level at least equal to the past methods;

[49] UNEP, 2001, "Protecting the Ozone Layer: Solvents and Coatings," p 12.
[50] UNEP, 2001, "Protecting the Ozone Layer: Solvents and Coatings," p 14.
[51] UNEP, 2001. "Protecting the Ozone Layer: Solvents and Coatings," p 20.

- should be economical;
- should not create significant environmental impact; and
- should not compromise worker or consumer health and safety.

The order of preference of alternatives based on these criteria is:

- "no-clean";
- Aqueous cleaning;
- Hydrocarbon-surfactant ("semi-aqueous") cleaning;
- Organic solvent cleaning (with solvents less toxic than non-ozone-depleting conventional halogenated solvents);
- Non-ozone-depleting conventional halogenated solvents (trichloroethylene (TCE) and tetrachloroethylene (PCE), Methyl Chloride (MC);
- Organic solvent cleaning (with solvents more toxic than non-ozone-depleting conventional halogenated solvents);
- HFCs and HFEs;
- HCFC-225;
- HCFC-141b; and
- PFCs.[52]

Three methods have been used in phasing out ODS in the solvent sector in SMEs: the voucher system, the self phaseout system, and a reimbursement mechanism.

Voucher System. The solvent voucher system is similar to the MAC voucher system. The enterprise receives a voucher or coupon to buy both equipment and alternative chemical cleaning agents. The value of the voucher is related to the quantity and type of OD solvent used by the enterprise. A financial institution or implementing agency receives 10 percent of the voucher amount granted, and must verify the claimed level of consumption.

One solvent programme evaluation noted that it is difficult to complete conversion projects in less than two years. It is important to make sure that old equipment is disposed of or destroyed to prevent reversion back to OD solvent use. In addition, when retrofitting existing machines, the machines should also be upgraded to reduce emissions. Besides, enterprises indicated that they would have liked even more technical assistance, as well as more and earlier information related to equipment and equipment specifications. In some countries phaseout projects have been conducted in tandem with cleaner production training. This has produced great benefits because cleaner production training usually requires adaptation of ODS-alternative solvents. Furthermore, enterprises learn additional ways that they can improve production and reduce pollution.

[52] UNEP, 2001. "Protecting the Ozone Layer: Solvents and Coatings," p 35.

7.2.1 Case Study # 2: Solvent Sector Plan in China

The Solvent Sector Plan (SSP) in China involves several aspects that have contributed to ODS phaseout in the solvent sector. UNDP is the implementing agency which works closely with the State Environmental Protection Administration (SEPA). The Ministry of Information, the Ministry of Commerce and the General Administration of Customs also work with SEPA in implementation of this programme. The Government of China has established a number of policies to aid the phaseout. Production of CFC-113 is reduced each year. International trade, with regard to both import and export of OD solvents, is restricted. The implementation programme calls for three methods to enable phaseout. The first is a voucher system. Chemical suppliers or other industry representatives are designated as Intermediate Execution Agents (IEAs). The IEAs identify relevant enterprises to apply for grant funding from SEPA. The enterprise receives a voucher or coupon to buy both equipment and alternative chemical cleaning agents. The value of the voucher is related to the quantity and type of OD solvent used by the enterprise. IEAs receive 10 percent of the voucher amount granted, and must verify the claimed level of consumption. The second method is gradual self phaseout. A number of enterprises have entered into self phaseout agreements with SEPA, which only monitors declining annual consumption. A reimbursement mechanism is being considered to provide financial assistance to those enterprises discovered after they have already converted to alternative solvents.

SEPA also provides technical assistance. The China Cleaning Engineering Technical Cooperation Association (CCETCA) is a formal technical body that supports China's entire cleaning sector by coordinating activities. The Alternative Technical Support System (ATSS) was created especially for implementation of the SSP, and is primarily intended to support small enterprises.

Project Conclusions. The evaluation of the SSP noted several successes. Highlighted characteristics of the SSP include: effective communication efforts by SEPA and increased domestic availability of equipment and substitute solvents in the last few years. Grants were reported as not being the main incentive to conversion.

The SSP evaluation noted that it is difficult to complete conversion projects in less than two years. It is important to make sure that old equipment is disposed of or destroyed to prevent reversion back to OD solvent use. In addition, when retrofitting existing machines, the machines should also be upgraded to reduce emissions. Enterprises indicated that they would have liked even more technical assistance, as well as more and earlier information related to equipment and equipment specifications.

The solvent sector project in China addresses SMEs but larger companies that use small amounts of ODS are also included. Many SMEs are using these chemicals but they don't know the chemicals are ODS. They only know the substance by the trade names. A full list of inventory trade names[53] that correspond to ODS is available on UNEP's website.

[53] http://www.uneptie.org/ozonaction/library/tradenames

7.3 Foam Sector

SMEs are important producers of foam in both developed and developing countries. Product reformulation and the use of alternative blowing agents and new manufacturing technologies have helped phase out ODS, especially CFCs, which must be phased out completely by January 2010. Many larger companies have switched to hydrocarbons, but SMEs have had difficulties with this transition because of safety concerns and higher manufacturing costs.[54]

The major foam types that require CFC usage are:

- Polyurethane (both rigid and flexible);
- Extruded polystyrene (both board and sheet);
- Phenolic; and
- Polyolefin (including polyethylene and polypropylene foams).[55]

Measures for reducing dependence on CFCs in the foam sector include: substituting CFCs with alternative blowing agents; modifying production processes to avoid the use of external chemical blowing agents; and adopting technologies that do not require the use of foamed polymers. The alternatives for blowing agents include hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), hydrocarbons (HCs), and inert gases.

Several problems still face small foam producers. The first is that the cost effectiveness of transitioning to a different blowing agent decreases with lower production levels. There is also a rising trend of conversion to HCFC alternatives, which are not desirable because they are also scheduled for phaseout under the Montreal Protocol. The conversion to HCFC alternatives is on the rise. SMEs' decision to adopt HCFC technology may be, among others resulted from the fact that other alternatives are flammable. To adopt flammable alternatives, SMEs may have to relocate their facilities due to the safety regulations within the country. There are process changes and new methods which reduce CFC emissions, i.e.:

- Preventing the release of CFCs into the atmosphere during foam production. This can be done by using a closed loop CFC unloading system, using a closed CFC blending system or flushing without CFCs. One method for capturing CFCs and HCFCs is carbon adsorption. This works best with open-cell foams such as flexible polyurethane foams because of the large amounts of CFCs released during manufacturing[56].

- Reducing or eliminating the need for CFCs. Changes in polyols and other chemicals used in the foaming part of the production process can also reduce or,

[54] IPCC, 2001. "A3.7 Developing Countries and Countries with Economies in Transition." Available at <http://www.grida.no/climate/ipcc_tar/wg3/153.htm>.

[55] UNEP, 2001. "Protecting the Ozone Layer: Foams," p 15.

[56] UNEP, 2000. "How SMEs Can Protect the Ozone Layer," p.34.

in favourable cases, eliminate the need for CFCs in both rigid and flexible foams. New equipment such as variable pressure foam equipment allows lower density flexible polyurethane foams to be produced without an auxiliary blowing agent. You can also modify the production process for polyurethane foams by the use of increased levels of water in the chemical reaction so that CFC use can be reduced.

7.3.1 Case Study #3: Umbrella Project for Small and Medium-Sized Foam Sector Enterprises in India

In 1997, the Indian Ministry of the Environment and Forests and UNDP developed a project involving 80 SMEs that manufacture rigid polyurethane foam. Typical uses of this type of foam include thermal insulation for buildings and products such as jugs, flasks and coolers. UNDP worked with a local supplier who developed a chemical formulation that allowed these companies to use ozone-friendly substitute technologies. Standardization and bulk procurement opportunities, together with the use of local expertise, made the conversion process more economical. However, this conclusion may depend on the definition of conversion process. If the definition covers the capital cost of investment plus recurrent cost (maintenance, down-time, and etc.), the conclusion may be different. It may be true that buying equipment in bulk could make the product cheaper on the unit price basis. However, bulk procurement is normally limited to a few suppliers. These few suppliers may have constraint in their capacity to provide after sales service or maintenance to a large number of enterprises in the future. Because of limited providers of equipment, the maintenance cost could be higher. The project was successfully completed in 2000, and UNDP went on to develop three more similar umbrella projects between 1999 and 2001, covering another 70 companies.

7.4 Aerosol Sector

Aerosol production is usually split between self-fillers and contract fillers. In many Article 5 countries, there are a large number of SME self-filler enterprises, which are rarely regulated and often operate in make-shift facilities such as homes, garages, or backyards. Examples of aerosol products that still use CFCs in Article 5 countries include room deodorants, personal care products, and industrial, automotive and medical aerosols.

While the majority of developed countries are able to utilize hydrocarbon aerosol propellants (HAPs) in order to convert away from the use of CFCs in aerosols, many Article 5 countries are not able to readily utilize HAPs safely and effectively because of their limited availability, high flammability, and the associated costs required in order to relocate production facilities and modify filling plants for their use. The cost of relocation of production facilities is also a major hindrance to ODS phaseout in SMEs.

Because aerosol filling requires a large labour force, the loss of aerosol filling plants in Article 5 countries would result in many job losses. But because of the high costs associated with converting away from CFC use, not all SME filling operations can be directly adapted for HAP use in order to meet the needs of the required phaseout.

Therefore, alternative means are needed in order to make conversion more feasible for SMEs in Article 5 countries.

Several types of projects have been initiated in order to work with SMEs using aerosols, including projects focusing on the following:

- the conversions of aerosol fillers to HAPs;
- the use of other in-kind substitutes; and
- the use of out-of-kind substitutes.

Conversions of Aerosol Fillers to HAPs. Many projects have created a centralized filling centre that multiple companies can send their aerosols to in order to be filled with HAPs. The use of a centralized filling centre prevents the added costs that SMEs would incur because of the need for new equipment in order to deal with HAPs.

These filling centres often serve both large and small companies, but encouraging smaller companies to use the filling centres can sometimes be more difficult. One project engaged a manufacturing association and the department of environmental protection in order to influence smaller companies to utilize the filling centres.

The filling centre concept can create complications for SMEs if a contractual approach is used. In order to avoid this problem, another project utilized a cash and carry 'rent a filling line' approach instead of a contract filling approach, which streamlined the filling process by preventing the need for paperwork, keeping costs low, and maintaining the confidentiality of the hydrocarbon formulations.

In smaller countries with more limited aerosol production, a centralized facility might not be a feasible option. In one such case, one company was assisted in converting their operations to HAPs, and it was assumed that the price differential created with the use of HAPs would encourage the other companies to seek assistance for conversion as well. In order to keep costs low, open-air filling was used. This maximized the benefits of natural ventilation and limited the need for expensive equipment such as an explosion proof facility, ventilation fans, and gas detectors.

Use of Other In-Kind Substitutes. In many countries and areas, there are no available sources of HAPs within a reasonable distance to make transport economically feasible. In these cases, alternative substitutes such as CO_2 or dimethylether (DME) have been utilized in order to phase out the use of CFCs.

Use of Not-in-kind Substitutes. Although not as common as the conversion to HAPs, switching from an aerosol use to a mechanical pump has been utilized by some industries in order to move away from aerosol use, and in some cases, pumps have become the main dispensing method (e.g., window cleaners). While some products cannot be transitioned to use a mechanical pump and some companies do not consider pumps the best available technology, they are often the most feasible option when HAPs are not readily available.

7.4.1 Case Study #4: Establishment of an Aerosol Filling Centre for SMEs in Indonesia[57] (Project by the World Bank and the Government of Indonesia)

In Indonesia the production of aerosol products is about equally split between self-fillers and contract fillers. Currently, CFC use in the country is largely limited to room deodorants, personal care products, and industrial, automotive and medical aerosols. Many of the small fillers—typically in small shops in urban areas—use CFC propellants because the costs of switching to a safe hydrocarbon operation are too high.

Because it is not economically feasible to convert all the SMEs, a larger company—PT Candi—is receiving funds to provide a filling service centre that can be used by smaller SMEs. In this way SMEs will not have to face the expense of the new installations needed to handle flammable and explosive hydrocarbons.

This cash and carry 'rent a filling line' system is preferable to contract filling because it eliminates the need for complicated paperwork. In addition costs can be kept low and the confidentiality of formulations can be maintained. This project assisted SMEs to comply with the Government of Indonesia's ban on CFC use for all aerosols by December 1997.

7.5 Types of Financial Assistance for ODS Projects

Financing is a major issue for most SMEs. In some sectors and countries, it is perhaps "the" issue. For example, in the foam sector, the FTOC indicates that "the financial constraints of SMEs remain key factors in many transition strategies, both in developing and developed countries."[58] SMEs often have trouble obtaining financing because banks and traditional lending institutions are averse to risky ventures. However, there are many types of financial assistance available for SME projects. The most useful types of financial assistance for SMEs for ODS reduction have been identified as those that have the most flexibility. This section outlines two types of financial assistance, concessional lending and revolving funds, which have been proven successful for SME projects geared towards environmental improvements like ODS reduction. Case study examples are provided when appropriate to illustrate these concepts.

7.5.1 Loan and Grant Options

As an SME in an Article 5 country, it is very difficult to apply for funds for ODS phaseout projects. Because large companies were the main target group for Multilateral Fund assistance when the funds were first available, SMEs have typically not benefited to the same extent as large enterprises. There are many options for funding including loans and grants. Possible sources of financing include: MLF, other international sources (e.g. GEF), national public financing, and private financing. It's difficult for any size enterprise to get financing but if they can make a good business argument then financing could be possible. It may be that in some subsector there may be convincing business arguments for investment. For example: HAPs are traditionally less expensive than CFCs in the aerosol sector and the case for conversion could be better business.

[57] Source: World Bank Project, PT Candi Conversion and Aerosol Filling Center.

[58] UNEP Technology and Economic Assessment Panel, 2002 Assessment Report, March 2003, ibid., pg. 29.

Given these constraints, some of the following approaches to lending have proven to be very effective for distributing funds to Article 5 countries for ODS phaseout projects with SMEs**.** The following loans schemes examples are for medium and large -sized companies and these examples can be applied to SMEs,

Below are several different examples of lending strategies used to finance ODS phaseout activities.

Government as Debt Manager: Multilateral Fund (MLF) Project in Turkey. In an MLF project approved for Turkey, the government decided independently of any Fund requirement that a refrigerator manufacturer was in such sound financial condition that it did not need a full grant for the conversion. Accordingly, the government proposed that it would take the full grant that the enterprise in question was eligible for under existing Executive Committee rules and provide a portion of those funds to the firm in the form of a loan. In this case, the government assumed the responsibility for collecting the loan money from the firm. In some cases, governments and/or NOUs may not have the management capacity or authority to collect money directly from a private firm. In such cases, the collection task could be given to an outside entity, such as a bank. The outside entity would have to be given some amount of money to cover its costs of collection and management of the funds. In addition, Turkey did not have to increase its foreign debt burden. The grant from the Fund is managed by the country as a loan; therefore, the government did not assume a debt to the Fund or to any other institution. Indeed, even if the firm defaulted on the loan, the government would owe no one any funds.

NOU as Debt Manager: USEPA/MLF Project in the Dominican Republic. In the case of the US bilateral recovery and recycling project in the Dominican Republic, the US agreed with the Dominican Republic to deploy 23 sets of recovery and recycling machines. Participating shops were required under the project to pay 40 percent of the costs of the equipment as follows: 5 percent at the time of training, 20 percent when the equipment was delivered, and then three monthly payments of 25 percent. The NOU in the Dominican Republic collected the payments and was given $2,000 (approximately 10 percent of the sum collected) as a management fee. The funds collected were used primarily to purchase a second round of equipment for additional shops. Shops that did not make their payments had their equipment confiscated for redeployment to other shops.

Government Guaranteed Loans: Chiller Replacement in Thailand. In this case, a local institution in Thailand encouraged chiller owners to submit letters of credit to secure a loan for the purchase of new chillers. On this basis, the government of Thailand would be able to guarantee repayment of the loan in the case of default by any of the chiller owners. With this arrangement, the MLF and GEF were able to provide a loan to the government to facilitate the purchase of 24 new CFC-free chillers. This project was designed to demonstrate that the purchase of new energy-efficient chillers was cost effective in its own right.

In this case, the government will delegate the collection and loan management task to a local institution which would be given a fee to undertake this task. The case of the Thai chiller project, which was approved by the Executive Committee, is different from the

two cases above, in that, in the Thailand case, the MLF can be seen as the direct lender, and the country is responsible for repayment of the loan in the case of failure. While this can be seen as potentially increasing the foreign debt of the country, by securing letters of credit from the chiller owners prior to accepting the loan, the government has ensured that any losses would be covered by the chiller owner and not the government.

Commercial Bank Loan. In this scenario, a refrigerator manufacturer who is found to be financially secure and not in need of a full grant to effectuate its conversion is seeking to have 50 percent of the cost of the project in the form of a loan. The firm notifies the relevant implementing agency of its primary lender, and the Fund/agency agrees with the lender to guarantee the loan. Because the loan is guaranteed and risk is reduced, the lender can afford to charge an interest rate that is lower than the typical one charged in the country. The Fund may also choose to buy down that interest rate further. In this case, the government is uninvolved in the project and assumes a management role. In addition, the government does not assume a debt to the Fund or to any other institution. Even if the firm defaulted on the loan, the government would owe no one any funds. Instead, the Fund would have to repay the loan.

Revolving Fund. The definition of a revolving fund is a separate fund (with a set of accounts that are independent of other programme accounts) established for the purpose of carrying out specific activities that, in turn, generate payments to the fund for use in carrying out the same activities.[59] Revolving funds are used to refinance environmental investment loans. The revolving fund provides environmental investment loans to SME such as industrials, hospitals and hotels. The type of investment activities that can be financed by revolving funds are:

1. Investments in production facilities aimed at substantial pollution reduction and/or natural resource saving by financing more efficient and cleaner production equipment/process technologies (cleaner production investments).

2. Investments in machinery and equipment to be used by the SME to recycle, reuse and recover waste materials and waste products.

3. Investments in waste treatment plants and equipment to reduce and neutralize industrial waste and pollution after the production process (end-of-pipe solutions).

Revolving Fund System for Environmental Management in Indonesia: Industrial Efficiency and Pollution Control (IEPC) Project. This project was designed to develop institutional support for SMEs for handling environmental problems caused by their production process. Through incentives systems, an IEPC loan was established for SMEs to use in their environmental investment. The IEPC-project is a pilot project established by the Indonesian government and the cooperation from various organizations, both private and public.

[59] US Housing and Urban Development Agency. www.hud.gov/offices/cpd/library/glossary/r/index.cfm

The Government of Indonesia received funding from the German Government to finance the components of this project as follows:

1. To finance a revolving fund to refinance environmental investment loans primarily to SME;

2. To finance cost of Technical Assistance Unit; and

3. To finance equipment necessary for the treatment of slaughter house residues.

The Ministry of the Environment is the main implementing agency for the project. However the major stakeholders also include the Ministry of Finance and Participating Banks. One of the most important factors for this project is the monitoring process. In this case, because the fund is provided through a loan, the success and effectiveness of the project rely mainly on the usage of the loan by SMEs and also on the SMEs' performances. The involvement of local governments for monitoring can play an important role in this process.

8. Strategies to Assist SMEs

Refrigerant Recovery and Recycling System in Chile

It has become increasingly evident that SMEs in Article 5 countries require adequate assistance if they are to make the transition to non-ODS technologies smoothly and avoid severe economic and social dislocations. The remainder of this section is a compilation of key lessons learned from existing SME-focused activities carried out under the MLF. The study found that the most successful SME-focused programmes for ODS phaseout were able to address this challenge through three key steps of engagement:

Getting the message to SMEs. Getting the message to SMEs can be very difficult. SMEs often don't participate in traditional industry or trade organizations, which are usually the primary avenue for disseminating information. Finding and engaging directly with SMEs is a foundation for success.

Getting SMEs to agree with the message (i.e., what SMEs should be doing, and why). Getting SMEs to agree that it is important for them to phase out ODS use is equally critical. In many cases, the benefits to the SME associated with phasing out ODS use will not be clear unless efforts are undertaken to educate SMEs on a one-to-one basis through direct programmatic action or through trusted local market players/stakeholders on whom SMEs depend for reliable sources of business information.

Assisting or facilitating SMEs to act on the message. Providing appropriate and effective technical assistance for SMEs that do express an interest in phasing out ODS use is critical. The study found that SME projects/programmes

that engage SMEs with a useful and well-integrated package of awareness-raising, training, and technical assistance can be successful.

8.1 Overview of Strategies

The following table lists several highlights of the lessons learned and recommendations from various projects involving small businesses and the phaseout of ODS. These lessons learned have been compiled into a new strategy for working with SMEs, which is detailed below. The lessons learned are presented within five key themes that emerged over the course of the study. The following table displays possible strategies for achieving the three steps of engagement above.

Getting the Message to SMEs

Use Local Networks to find and Communicate with SMEs
• Find SMEs through Local Networks • Leverage Local Vocational Schools • Leverage Supplies of Equipment and Materials • Leverage Trade Associations (Reward those who play by the rules)
Understanding SME Culture is Key
• Short Courses to Encourage Attendance • Need Sensitivity to Mom and Pop/Micro Enterprise Worldview • Difference between Manager and Technician Perspective.

Getting SMEs to Agree with the Message

Capacity Building is an Important Component
• Knowledge and Training Deficit • SMEs Desire for Training • Idea of the “Skilled Worker” • Best Practices Contribute to ODS Reduction

Assisting or Facilitating SMEs to Act on the Message

Awareness Raising Through Communication and Outreach Supports SME Efforts to Reduce ODS
• Customer Education • Communication Materials Needed • Need to Overcome: Recovery/Recycling Quality of CFC Issue
Market-Based Strategies Can Be Effective for Assisting SMEs
• The Supply Chain Can Be Harnessed to link suppliers to SMEs • Right Structure Already in Place for Delivery of Funds and Information • Innovative Lending/Voucher Programmes

8.2 Use Local Networks to Find and Communicate with SMEs

Interviewees who have successfully engaged SMEs in ODS phaseout consistently noted the use of local networks as a strategy that contributes to project success. One of the major challenges to working with SMEs is finding these businesses and determining what kind of assistance they need. The method that has met with the most success has been using local suppliers of equipment and chemicals. Suppliers know the size of the businesses they serve, and they have a clear incentive to help SMEs. Government officials can be intimidating to SMEs, and often SMEs will not identify themselves to the government because of fear of taxation or other legal requirements. Therefore local intermediaries like suppliers are seen as less intimidating and SMEs are more likely identify themselves to these intermediaries. Furthermore if resources are delivered through these intermediaries then SMEs might be even more receptive to receiving them.

Local intermediaries are best equipped to connect and communicate with small businesses because they live and work with them in their community. Because intermediaries interact with small businesses on a day to day basis, they know how to locate them and know what issues are important to them. Therefore local intermediaries can act as an expert advisor for the small business community. These intermediaries may include the following:

- suppliers (chemical or equipment)
- vocational schools
- business or industry associations
- local government business development agencies
- business clubs (e.g., Rotary)

Case Study — Local Networks in Jamaica

The early involvement of local training institutions and other stakeholders in this project was very important for successful project implementation and project sustainability:

- Teamwork was essential. Relationships with local partners, trainers, technical training institutions, and trade associations were maintained to ensure successful fulfillment of project goals.
- Local community knowledge was essential for assistance with education, i.e., awareness raising and recruiting of technicians for additional training, especially in rural areas.
- Government and stakeholder support was crucial for successful RMP implementation – the NOU in Jamaica managed to build up good working relationships with all stakeholders involved and to gain their trust and support.

Another good way to help local partners attract SMEs is to help them find a local champion. For example, in refrigeration and air-conditioning sector, identify a champion who is skilled at RAC good practices. An expert refrigeration or air-conditioning technician, e.g. one who has been trained under an MLF training project, can be an important contact for a local intermediary working with SMEs. It would be effective if all NOUs could access a list of all such trained refrigeration and air-conditioning technicians and provide suggested names to the local partners for potential "champions." This local champion could be asked to

speak on technical issues at a meeting and serve as a local expert contact for SMEs needing technical advice. In addition, a local expert could also be asked to review the technical materials presented to SMEs in order to check that they are customized appropriately.

The following are potential incentives for intermediaries to facilitate the training of SMEs. The NOU should make the point to the intermediary that by strengthening their linkages to small businesses they can benefit intermediaries in several ways:

- Local intermediaries can strengthen their networks and local markets;
- Suppliers can improve customer and government relations and get free publicity;
- Suppliers can also gain new customers by explaining benefits of new chemicals and equipment;
- Vocational schools can attract new students and encourage technicians to receive further training;
- Local government business development agencies can generate contacts and expand their business networks;
- Industry associations can gain the opportunity to broaden membership and generate greater support and interest in the industry;
- Local intermediaries can provide support for their country's compliance with international obligations under the Montreal Protocol; and
- Local intermediaries can gain a positive public image by helping SMEs and protecting the environment.

8.2.1 Leverage Suppliers of Equipment and Materials

In numerous SME capacity building projects, the supplier or dealer plays a central role in SME outreach and communication. The supplier can play the role of the:

- Educator,
- Monitor for the SME capacity building programme, and
- Recruiter.

Most SME owners rely on their suppliers to offer them advice on their business, including information on the price of materials, the best materials and technologies to use, and the way the market is functioning. Because of its unique position with SMEs, the supplier can easily play the role of the recruiter and reach out to SME owners and encourage attendance at trainings. In some projects, suppliers recruit SME owners to attend meetings and trainings.

In addition, a supplier can also educate or offer information about new technologies and substances to SME owners. SME owners tend to trust their suppliers and believe they have credible knowledge about the industry and the market for their goods and services.

In some projects, suppliers are given ozone awareness and training materials to hand out to their clients. In addition, suppliers can give advice to SME owners regarding the best available technologies for their specific industry.

Finally, suppliers can play the role of monitor in an SME capacity building project. In a voucher system, which will be described later, the suppliers are only able to recover the balance of their capital costs after they verify that the SME has attended training and is using the new technology. Because suppliers can monitor what equipment and how much ODS the SME is purchasing, they are best equipped to monitor the SME's continued compliance.

The main incentive for the supplier to work with these capacity building programmes is business promotion. Furthermore, the suppliers stand to gain, and maintain, a loyal clientele who rely on their business and technical advice. In addition, if suppliers can offer a subsidy or creative financing during the sale of new technologies through mechanisms like a voucher programme, the suppliers may be able to improve business considerably.

8.2.2 Leverage Local Vocational Schools

In many countries, local vocational schools are used to reach SMEs needing to be trained in refrigeration and AC service and maintenance. In some developing countries, refrigeration and AC technicians receive training at vocational schools. UNEP as well as many bilateral organizations, recommended the importance of integrating ODS management and phaseout training directly into existing curricula at vocation schools. One main reason is that integration will shift the technician's perception of ODS management towards considering it a key part of servicing a refrigeration or AC unit. If ODS phaseout training is integrated directly into these programmes, technicians will regard this training as "part of doing their jobs." Furthermore, integrating ODS management training ensures that technicians will not think of ODS management training as something outside the scope of their training. Finally, integration into vocational school curricula will improve the overall sustainability of the training programme by providing technicians with skills that are needed to meet the stipulations of the Montreal Protocol.

It is essential to include non-CFC technology and practices as part of the curricula in these schools. This will ensure that future technicians entering the market are trained in best practices in dealing with both alternative refrigerants as well as the proper containment of CFCs. Some SME phaseout projects have helped revise the syllabi for technician training courses and started apprenticeship training schemes. In addition, some projects developed instructional media packages for training. These media packages consist of general

Bahrain: Vocational School Involvement

In Bahrain**,** 600 technicians from SMEs were trained at a program established as part of the curriculum at the Bahrain Technical Institute. The program focused on MAC servicing. For these vocational schools to provide effective training they must be equipped with appropriate recovery units, recycling machines, recovery bags, and/or MAC recovery units.

information on ODS reduction strategies and how to implement these strategies and proved extremely useful in facilitating training. Furthermore, the projects sought to raise awareness about non-ODS technologies among the faculty of engineering colleges and polytechnics through workshops.

In order to integrate ODS management training into vocational school's curriculum, the lead agency implementing the project, such as a project under the country's Refrigerant Management Plan, must supply the vocational schools with the best available technologies for ODS management. Bilateral organizations commented that supplying the vocational schools with the best equipment was often overlooked by implementing agencies which led to limited success with the training programmes.

8.2.3 Leverage Trade Associations

One concern that SME owners express is the inability to compete with other SMEs due to the higher price of alternatives if not all SMEs in the sector comply with the regulations. The SME that does not "play by the ODS reduction rules" will have lower costs until the price of ODS starts rising with scarcity. SME owners need the assurance that if they switch to alternatives they will be supported by government or trade associations until the entire local industry has completed phaseout.

Trade associations can play an important role in SME capacity building projects due to their ability to create a standard of quality in the industry. Trade associations can support trained technicians by giving them recognition of high quality servicing which will increase demand of their skills. In addition, the trade associations can help to educate end users. In addition, trade associations can also recruit suppliers and SMEs to participate in capacity building programmes and spread awareness of new technologies.

8.3 Understanding SME Culture is Key

Working effectively with SMEs means understanding the SME world view and managing logistics accordingly. The following is a list of tips learned from numerous SME training projects:

- Distribution of certificates to each participant after successful completion of the training programme.
- Exchange of practical information among the participants and development of a network of personal contacts.
- Each participant should be provided a copy of a manual on good practices. The manual on good practices should be disseminated in their local language in hard copy and in electronic files on a CD-ROM.
- Where possible, outreach should be conducted at the shop level.
- Lunch, coffee, and tea were served to participants, which saved some time and avoided transport requirement.
- The training equipment needs to be complete and appropriate.

8.3.1 Need to be Sensitive to SME Worldview

Many bilateral project managers stated that the majority of SMEs in the Article 5 world are actually 'micro enterprises'. A micro enterprise can be defined as a business with five or fewer employees with very little working capital.[60] A micro enterprise is usually a one person or family-run business. These "mom and pop" businesses are often trade oriented, such as refrigeration and AC service and maintenance, and are passed down from father to son with very little formal training. In the case of these small or micro enterprises it is important to consider the business roles in the family. The father in the family usually operates the store and the mother is usually in charge of money management. Usually, these families have operated these businesses for decades and are often adverse to change. When approaching these businesses with suggestions for changes in operations, trainers must be respectful. Furthermore, these "mom and pop" businesses often do not have good record keeping or accounting methods, and therefore they have a hard time measuring increased revenues or costs. Thus, it may be difficult to demonstrate the possibility of increasing profits by using alternative practices and/or technologies.

When a trainer approaches these "mom and pop" businesses, it is important that they are not perceived as coming to tell them how to operate, which can be perceived as very disrespectful. It is more important to have someone familiar approach the business owners to tell them why they need to change. This individual must emphasize the benefits and potential revenue gains for the family. In many "mom and pop" businesses, the adult children in the family can often be a better target for training because many have had international experiences and are often more interested in new technologies. However, even in this situation, it is important to recognize that the patriarch of the family is the decision-maker and should be given respect.

8.4 Capacity Building is Important Component

8.4.1 Knowledge Deficit

All interviewees commented that a large knowledge deficit exists in the majority of SMEs. Many of the employees and managers in these businesses do not have formal education or training. In addition, many of these individuals are illiterate or semi-literate. Thus, workers in SMEs learn about new technologies and service practices predominantly through on-the-job practice and by observing neighbouring or larger shops. They are not accustomed to formal or classroom training. Technicians participating in projects found training on the fundamentals of technologies and best-servicing practices to be of particular value, since most had not been given this opportunity previously. The use of government-sponsored training certificates is also a positive incentive for technicians to participate in project activities. Access to equipment alone without capacity building is insufficient; it is best to combine capacity building with access to equipment.

Although technicians indicate an interest in training, the length of training is a crucial consideration in SME projects. Because most shops have only a few technicians that

[60] Micro enterprise defined by Wells Fargo Bank at http://www.wellsfargo.com/wfcra/glossary.jhtml#N10222

are able to handle service jobs, training activities that take technicians away from the shop result in a direct economic cost to the shop. Based on surveys of SMEs, it was determined that most shops prefer training events of no longer than *one day's duration*.

One project implementation team also observed that equipment suppliers sometimes do not provide adequate hands-on technical training to SME technicians. To handle this problem, a performance requirement should be included in the equipment procurement contract with equipment providers. The project implementers are then able to withhold final payments until all services such as training were provided.

8.4.2 SMEs Desire Training

Most interviewees noted that the training component of many RMPs implemented around the world uses the "train the trainer" approach in order to train the greatest number of refrigeration technicians. Usually, a workshop is held to train and certify master technicians who work for SMEs and vocational training institutions. These technicians then serve as the instructors of future training sessions. By training expert refrigeration technicians to train other technicians, these programmes also utilize the trainers' expertise.

In most refrigeration service shops participating in training courses, technicians are trained in good practices and in retrofitting CFC appliances to use a non-ODS alternative. In addition, some countries require certification in order to perform recovery/recycling activities; however, for the majority of Article 5 countries, certification is not required in order to perform recovery/recycling activities. Although there is no requirement, after training, technicians still receive a certificate to prove their proficiency in ODS management. Therefore because it is seen as a credential, this certification still has value even in countries where certification is not a requirement.

MAC SME Shop Worker in Latin America

In some countries, "train the trainer" projects do not produce the expected results and there is no significant impact on ODS consumption phaseout. Reasons for failure include: lack of interest of training workshops in recycling activities, low prices of CFC, poor quality of training, lack of sufficient equipment, delays at the national level of organizing Phase II after Phase I, and the presence of a large amount of informal activity in the sector. It has been suggested by some programme managers that, in many cases where training does not produce the best results, failure could also be due to a larger representation of informal refrigeration and AC service and maintenance technicians.

8.4.3 Selling the Concept of the "Skilled Worker"

In many countries, refrigeration and AC technicians are not seen as "skilled workers" as are electricians or plumbers. However, when trained properly, refrigeration and AC technicians can be considered "skilled workers" and end users need to be confident that these technicians are trained in a set group of skills. In the U.S., technician skills are measured by issuing a mandatory test to refrigeration and AC technicians in training before allowing them to operate. The questions for this test come directly from the U.S. EPA test bank and are generated from the curriculum delivered by US vocational schools. Thus, end users in the U.S. can be confident in technicians' skills. In addition, being recognized as a 'skilled worker' can also increase job security for technicians. Furthermore, the development of an informal training/certification system can develop the refrigeration and AC service industry.

8.4.4 Best Practices Contribute to ODS Reduction

By training trainers at the shop level, a sustainable "train the trainer" process can be developed. In Ghana, a MAC project successfully used the "train the trainer" approach. A "Code on Good Practices in Refrigeration" was later developed to provide the service sector with a set of rules and procedures in good practices that would contribute to phaseout by upgrading the technological skills of the service technicians. Using the UNEP manual as a model, a local manual was prepared and some four thousand copies were distributed among service technicians, companies, training institutions, importers, and trade associations.

Chile: Promotional Activities for End-Users

To help establish and provide ongoing support to the Chile's RMP program, an extensive communication campaign was delivered, emphasizing the importance of the RMP and of reducing reliance on CFCs. The primary target of these promotional activities was the end users of refrigeration equipment. Activities included written and visual material distribution among users to promote the conversion of different kinds of refrigeration systems. This activity was identified by Chile's refrigeration association and many technicians who see such promotional efforts as necessary to convince their customers to convert their equipment. The campaign helped build support for government and industry actions to reduce the use of CFCs in the country.

The benefits to better ODS management, such as leak detection, increase the overall efficiency of the refrigeration or AC system. One bilateral organization noted that when ODS management training was made mandatory in the US and in many European countries, average leakages rates fell from 50 percent to 5 percent for many refrigeration and AC systems. Thus, technicians with ODS management training are able to use the best maintenance practices that reduce costs to the end user.

8.5 Awareness Raising Through Communications and Outreach Supports SME Efforts to Reduce ODS

8.5.1 Customer Education

Many SME capacity building projects found it important to support trained SMEs by raising public awareness about their training. In some projects, handouts were produced for customers having their equipment serviced to educate them about the reasons for new practices or for the use of an ODS-alternative. One approach taken by India and Afghanistan has been to distribute awareness material on the Montreal Protocol and good practices during national or regional surveys of SMEs for implementing servicing or solvent sector strategies. Increased public awareness may prevent customers from patronizing low-cost untrained technicians, although the cost of a technician may remain an important factor for a customer in Article 5 countries.

8.5.2 Need to Overcome Perception of Poor Quality of CFCs after Recovery/Recycling

Recovery/recycling programmes have met with mixed success in the SME community. One of the most important reasons for their failure is the misconception that the quality of the refrigerant has been compromised after recycling. One phaseout project provided training and equipment for the establishment of a recovery/recycling network. The machines provided by the project were distributed among various shops throughout the country. The eight recycling machines were meant to operate at eight recycling centres. According to information provided by the NOU and by the owner of one of the centres, there is hardly any recycling being done today. This is thought to be partially due to the cost of the recycling technology and the misconception that recycled refrigerant is inferior in quality, but may also be due to other experience that indicates that recycling "centres" do not align with logistical and operational necessities of service enterprises, which require equipment on-site in order to maximize time efficiency and provide direct incentives for recycling to the shop itself. Other problems that can accompany recovery/recycling programmes are that no portable recovery equipment is available to the domestic sector, making it difficult to serve units that are not easily moved, and that individual technicians lack basic equipment for proper servicing.

One project promoting recovery/recycling found that most end-users perceived the recycled ODS as being of poor quality and therefore chose not to patronize the SMEs using recycled ODS. To overcome this perception of inferior quality, the project took on an ambitious campaign to increase public awareness that the recycled material was of the highest quality.

8.6 Market-Based Strategies Can Be Effective in Reaching and Assisting SMEs

Projects that measured results found that many SME owners believe they will save money using new practices or equipment garnered from SME ODS phaseout projects. While this perception is positive, programmes have also been able to provide more specific information on how participating in an ODS reduction programme may provide

benefits to enterprises, and its business outlook. These market-related incentives include:

- reduced costs and thus higher profits;
- the ability to cope with future increases in costs of ODS;
- access to low-cost and high-quality technical training;
- positive customer reaction; and
- the promotional (publicity) value of the equipment.

Voucher Program: The Thai MAC Project
In Thailand's MAC Project, SMEs participating in the project achieved very significant operating cost savings due to reduced purchases of CFC-12, while retaining the same level of business. Data collected before and after the use of recovery/recycling equipment at participating shops indicated that, on average, MAC shops reduced consumption of CFC-12 by 39 percent. This translates into over 60,000 Baht ($1.5 thousand US dollars) in savings based on observed 2001 CFC-12 prices. Potential financial savings is a key benefit of using recovery/recycling equipment.

Enterprise managers will be more concerned about the financial implications of participation in an ODS reduction programme. In many projects, technicians were less interested in the financial savings derived from using recovery/recycling equipment, and more concerned about the introduction of new practices or technologies that will directly facilitate or complicate their work. Evidence from projects indicates that other types of incentives need to be directed at shop technicians to resolve concerns about how the equipment affects how they do their job.

8.6.1 The Supply Chain Can Be Harnessed

The best example of supply chain engagement can be found in the "voucher system approach." The voucher system is an innovative procurement strategy based on the use of vouchers which subsidize the cost of ODS equipment for SMEs. The voucher-based procurement scheme harnesses the existing position of local equipment suppliers to provide both equipment and technical assistance to participating SMEs and has several other key advantages, including:

- Offering end users a choice of recovery/recycling equipment from multiple manufacturers;
- Allowing the project leader to avoid potential technical or other risks associated with relying on a single manufacturer;
- Allowing the project leader to avoid potential charges of favouritism for a particular manufacturer;
- Enabling the project leader to embed a quality control system into the procurement process through payments to suppliers that are based on fulfilment of key responsibilities; and
- Ensuring that the grant subsidy gained through the project cannot be abused, since all grants are carefully screened and tracked through the multi-stage

voucher redemption process.

This procurement strategy is particularly suited to large projects with many participants, since the control system that is built into the process makes project management easier and more effective. One approach that creates a greater incentive to participate in the early phase of the project is providing subsidies that are much higher at the beginning of the programme and then decline in value throughout the life of the programme.

In addition to the voucher system, implementing agencies have reported that merely working with refrigerant suppliers can be very effective. If the implementing agency can ensure that suppliers do not sell refrigerant to technicians without training, the technicians will have a very powerful incentive to become certified.

RMP Evaulation: The evaluation of one country's RMP emphasized that private buying of equipment may lead to more efficient use of machines. To target smaller enterprises, a revolving fund was established to offer loans. The market alone was not able to equalize refrigerant prices so government intervention was recommended to reduce the price of substitutes below that of CFCs to encourage substitution. Areas of difficulty causing non-compliance with the Montreal Protocol included: significant delay in creating the legal basis for the phase-out process, the lack of inter-connection of projects under the RMP, and significant underestimation of baseline CFC consumption.

8.6.2 Willingness to Pay Exists

Paying for recovery/recycling equipment and access to technical training, even at a limited level, encourages SMEs to take project activities seriously and make regular use of the equipment in the course of daily shop business. Data collected following implementation of projects indicates that SMEs believe a small fee is an appropriate amount to pay for training. Caution should be used when organizing training, because free training may be seen as having little value to SMEs, while excessive training fees or requirements related to project participation may deter participation. This view was confirmed in many previous programmes.

For example, SMEs in Thailand are willing to make substantial cost-sharing investments in recovery/recycling equipment as shown by results presented in Section II. While the full cost of equipment remains a barrier to reducing CFC emissions for most SMEs, these shops can be convinced to invest in equipment when effective incentives and

Recovery and Recycling Example

In one country ODS phase-out activities included the distribution of 15 recovery and recycling units to industrial refrigeration workshops and the establishment of a recovery and recycling network which included six recovery and recycling centers and 61 recovery units. Almost all of the recovery machines distributed are in use, but the CFC recycling centers, while used during the first two years, are currently not utilized at all. Most commercial technicians simply re-use the refrigerant after passing it through a filter in the recovery machine, but the domestic sector rarely recovers CFC, partially because they have not been supplied with portable recovery devices. Along with the re-use of CFCs in the commercial sector, the RMP has also led to a decrease in flushing with CFCs and venting.

information are provided.

8.7 Difference Between Manager and Technician Perspective regarding Recovery/Recycling

Manager's Perspective. One particular project distributed integrated recovery and recycling units to refrigeration companies at 20 percent of the actual cost of the equipment. It was indicated that little CFC was being recycled after the first project, so the second project distributed not only recovery machines but also provided leak detectors, vacuum pumps, empty cylinders, scales, manifolds, and other tools. The second project provided equipment at a 15 percent cost participation in order to encourage more companies to submit equipment requests. Equipment use was encouraged through an annual contest for recognition as the best technician and workshop, with the prize including new equipment, publicity, and peer respect.

Improvements in R&R: The R&R programme could be improved through the following measures, which may be explored in the development and implementation of the RMP Update:

- More active use of existing R&R equipment by the companies and technicians owning them;
- Agreements between companies and technicians who own R&R equipment provided through the project and those who do not, to share the equipment in order to maximize its use and recover as many CFCs as possible;
- Reallocation of recovery equipment currently not being used to companies and technicians more likely to use them; and
- Provision of additional R&R equipment.

Technician's Perspective.
The recycling centres that were established as a part of many RMPs have not been very successful mainly because equipment owners do not have the ability to transport their devices to the centre for recycling. In addition, no portable recycling/recovery equipment is available for the domestic sector, making it extremely difficult to properly service immobile equipment. One RMP project found that if recovery/recycling of refrigerant is to occur in a country, it must be made easy for SMEs because the easiest and most cost-efficient way for an SME to dispose of ODS is by venting. Therefore, the recycling option needs to be equally easy. An approach used by one project was to get suppliers to buy recycling equipment and become a central repository for used ODS. Unfortunately this project was not successful and suppliers reported that the repository was not used by most ODS users in the area.

9. Conclusions

National Ozone Units and other implementers of the Montreal Protocol are faced with unique challenges when working to promote ODS phaseout among SMEs. The study found that these barriers clearly need to be recognized in order for stakeholders concerned to engage effectively in working with SMEs. The key operational challenge facing organizations working with SMEs is understanding the SME's perspective, so that they can make a compelling case to SMEs that they should take part in ODS phaseout efforts. Project designers must constantly ask the question from the SME's perspective, "What is in it for me? Why should I want to phase out ODS?" It is important that this be considered from the SME's perspective as a small business struggling to survive in what may be a difficult economy.

Over the past fifteen years, approaches to controlling environmental pollutants in SMEs have shifted from a heavily regulated pollutant-by-pollutant approach to a more systems- or market-based approach. Regulatory approaches have proven to be insufficient when working with SMEs, and by necessity much of the phaseout work done at SMEs must essentially be voluntary on the part of the SME. SMEs face difficulties that often stem from regulatory systems. This is in fact the reason why engaging SMEs through the government channel is less than effective in many countries. SMEs tend to consider Ministry of Environment or the Government, as an enforcer. Hence, engaging SMEs in ODS phaseout activities is more complex.

Accordingly, the study sought to capture the learning generated by previous voluntary SME-focused efforts under the Montreal Protocol. What emerged were a handful of specific operational strategies that have worked successfully, or those that evidence suggests could work successfully in the context of a well-structured programme. These strategies have proven to be effective methods for facilitating ODS phaseout in SMEs, and many have the added benefit of promoting capacity building in SMEs. These are important lessons for the future of chemical management under multilateral environmental agreements.

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Appendix B: Interview Questions

The following questions were used to guide each interview:

(1) What projects are you involved with that deal with SMEs and Ozone Depletion?
   (a) Where did the project take place? What ODS regulations were in place in that country?
   (b) When did the project take place, is it an ongoing project?
   (c) How was the project funded? Grant, Microfinance, Lending?

(2) How was the project implemented?
   (a) What SME industry did the project work with?
   (b) Challenges and Barriers
   (c) Did you do anything to try to get around them?
   (d) What type of ODS Reduction Project was it?
      i. New technology
      ii. Best Practice Training
      iii. ODS Substitute
      iv. Decommissioning

(3) Was the project a success or failure?
   (a) How did you measure the project's results?
      i. Estimations of ODS Reduction?
   (b) Did you use any of the following strategies to work with the SMEs? Why? If so, please provide a summary of how the strategies were used.
      i. Working through the Supply Chain
      ii. Focus on increased revenue and customers
      iii. Rely on Local Networks- Most important to work through local NOUs.
      iv. Promote SME Leadership
      v. Utilize Case Studies
      vi. Holding Training Seminars- This is the way you start the project
      vii. Using Web-based training
      viii. Other
   (c) What aspects could be reproduced in other projects?

(4) What would you have done differently? (Did you use any strategies that were unsuccessful?)

Appendix C: NOU Survey Instrument

United Nations Environment Programme

Survey for National Ozone Units

Projects for Small to Medium Sized Enterprises (SMEs)

Please check all boxes that apply in each question and fax back to 1-202-862-1144.

1. What type of projects have you conducted with SMEs?

- ☐ Regulatory/Policy Oriented
- ☐ Financial Assistance Oriented
- ☐ Education/Training Oriented
- ☐ Technology Oriented
- ☐ Other; Please describe: _____

2. What strategies have you found most effective at reaching SME's and encouraging them implement sustainable changes?

Regulatory/Policy

- ☐ Working with governments to establish policies regulation ODS phaseout
- ☐ Encouraging regulatory compliance by improving SME monitoring
- ☐ Other; Please specify: _____

Implementation Process

- ☐ Voucher System for equipment purchase
- ☐ Relying on local networks

Implementation Process (con.)

- ☐ Emphasizing profitability
- ☐ Emphasizing customer satisfaction and
- ☐ Leasing equipment
- ☐ Other; Please specify: _____

Education/Training

- ☐ Providing training manuals
- ☐ Holding training workshops
- ☐ Using web-based training
- ☐ Other; Please specify: _____

3. What groups have you worked with to develop/implement projects with SMEs?

- ☐ Multinational and Bilateral Implementing Agencies (UN, World Bank)
- ☐ Government Agency; Which?: _____
- ☐ Private Foundation; Which?: _____
- ☐ Non-Governmental Organization (NGO); Which?: _____
- ☐ Private Bank; Which?: _____

4. What have your greatest challenges been when working with SMEs?

☐ Finding the SMEs ☐ Financing the Project ☐ Communicating with SMEs
☐ Cost of Substitutes ☐ Lack of Information ☐ Other; Example: _____

5. How have you financed your SME Project?

☐ MLF Grant ☐ Microfinance/Microcredit ☐ Concessional Lending
☐ Local Banks

6. Additional Comments

_____

Thank you for your participation!

Appendix D: Phase Out Schedule

Latest phaseout schedule for countries operating under Article 5 (Beijing Amendments, 1999)

Year Beginning and Thereafter	Control Measures
1 July 1999	Freeze of Annex A CFCs[61] at 1995–1997 average level[62]
1 January 2002	Freeze of halons at 1995–1997 average level[2] Freeze of methyl bromide at 1995–1998 average level Phase out of bromochloromethane
1 January 2003	Annex B CFCs[63] reduced by 20% from 1998–2000 average level[6] Freeze in methyl chloroform at 1998–2000 average level
1 January 2005	Annex A CFCs reduced by 50% from 1995–1997 average level[2] Halons[64] reduced by 50% from 1995–1997 average level[2] Carbon tetrachloride reduced by 85% from 1998–2000 average level Methyl chloroform reduced by 30% from 1998–2000 average level Methyl bromide reduced by 20% from 1995–1998 average level
1 January 2007	Annex A CFCs reduced by 85% from 1995–1997 average level[2] Annex B CFCs reduced by 85% from 1998–2000 average level[65]
1 January 2010	CFCs, halons and carbon tetrachloride phased out per the London Amendment Methyl chloroform reduced by 70% from 1998–2000 average level
1 January 2015	Methyl chloroform and methyl bromide phased out
1 January 2016	Freeze of HCFCs[66] at the year 2015 base level
1 January 2040	HCFCs phased out

[61] Annex A CFC: CFC-11, -12, -113, -114, -115

[62] Calculated level of production of 0.3 kg/capita can also be used for calculation, if lower

[63] Annex B CFC: CFC-13, -111, -112, -211, -212, -213, -214, -215, -216, -217

[64] Halons 1211, 1301, 2402

[65] 34 hydrochlorofluorocarbons

[66] Calculated level of production of 0.2 kg/capita can also be used for calculation, if lower

About the UNEP Division of Technology, Industry and Economics

The UNEP Division of Technology, Industry and Economics (DTIE) helps governments, local authorities and decision-makers in business and industry to develop and implement policies and practices focusing on sustainable development.

The Division works to promote:

> sustainable consumption and production,
> the efficient use of renewable energy,
> adequate management of chemicals,
> the integration of environmental costs in development policies.

The Office of the Director, located in Paris, coordinates activities through:

> **The International Environmental Technology Centre** - IETC (Osaka, Shiga), which implements integrated waste, water and disaster management programmes, focusing in particular on Asia.
> **Production and Consumption** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
> **Chemicals** (Geneva), which catalyzes global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
> **Energy** (Paris), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
> **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
> **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies.

UNEP DTIE activities focus on raising awareness, improving the transfer of knowledge and information, fostering technological cooperation and partnerships, and implementing international conventions and agreements.

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This study provides an overview of approaches adopted to assist small businesses to phase out ozone depleting chemicals under the Montreal Protocol on Substances that Deplete the Ozone Layer. It provides an assessment of which approaches have been most effective in different countries and sectors and offers options and strategies that could be considered by governments to assist small businesses to comply with this multilateral environmental agreement. Over 100 individuals and 50 institutions provided input to this study.

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