20 years of Success

MONTREAL PROTOCOL

on Substances that Deplete the Ozone Layer

UNDP

Protecting the Ozone Layer

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNDP is the UN's global development network, advocating for change and connecting countries to knowledge, experience and resources to help people build a better life. We are on the ground in 166 countries, working with them on their own solutions to global and national development challenges. As they develop local capacity, they draw on the people of UNDP and our wide range of partners.

World leaders have pledged to achieve the Millennium Development Goals, including the overarching goal of cutting poverty in half by 2015. UNDP's network links and coordinates global and national efforts to reach these goals. Our focus is helping countries build and share solutions to the challenges of:

- Democratic Governance
- Poverty Reduction
- Crisis Prevention and Recovery
- Energy and Environment
- Information and Communications Technology
- HIV/AIDS

UNDP helps developing countries attract and use aid effectively. In all our activities, we encourage the protection of human rights and the empowerment of women.

THE MULTILATERAL FUND (MLF) FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

The Multilateral Fund was established by a decision of the Second Meeting of the Parties to the Montreal Protocol (London, June 1990) and began its operations in 1991. The main objective of the Multilateral Fund is to assist developing country Parties to the Montreal Protocol whose annual per capita consumption and production of ozone-depleting substances (ODS) is less than 0.3 kg to comply with the control measures of the Protocol. Currently, 146 of the 191 Parties to the Montreal Protocol meet these criteria. They are referred to as Article 5 (1) countries.

Contributions to the Multilateral Fund from the industrialized countries, or non-Article 5 countries, are assessed according to the United Nations scale of assessment. As of March 2007, pledges from some 49 industrialized countries (including countries with economies in transition) totaled over US$ 2.2 billion.

The Fund is managed by an Executive Committee assisted by the Fund Secretariat. Projects and activities supported by the Fund are implemented by four international implementing agencies (UNDP, UNEP, UNIDO, World Bank) and a number of bilateral government agencies.

Since 1991, the Executive Committee of the Multilateral Fund has approved over 5,500 projects and activities in 144 countries. These activities include industrial conversions, technical assistance, training and capacity building and have, as of 31 December 2006, resulted in the elimination of the annual consumption of 215,462 ODP tonnes and production of 158,737 tonnes of ODS.

GLOBAL ENVIRONMENT FACILITY (GEF)

The Global Environment Facility (GEF) was established to forge international cooperation and finance actions to address four critical threats to the global environment: biodiversity loss, climate change, degradation of international waters and ozone depletion. Launched in 1991 as an experimental facility, the GEF was restructured after the 1992 Earth Summit in Rio de Janeiro. The facility that emerged after restructuring was more strategic, effective, transparent and participatory.

During its first decade, the GEF allocated US$ 6.2 billion in grants, and generated over US$ 20 billion in co-financing from other sources to support over 1,800 projects that produce global environmental benefits in 140 developing countries and countries with economies in transition. GEF funds are contributed by donor countries. Every four years, donors commit money through a process called the "GEF Replenishment." In August 2006, 32 donor countries pledged US$ 3.13 billion to the fourth GEF Replenishment, which will fund operations between 2006 and 2010.

In addition to its original mandate, the May 2003 GEF Council approved two new focal areas. The GEF now provides financial assistance for the mitigation and prevention of land degradation and persistent organic pollutants (POPs). GEF-funded projects are managed through the implementing agencies: UNDP, UNEP and the World Bank. The GEF also benefits from having the following executing agencies: African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Food and Agricultural Organization, Inter-American Development Bank, International Fund for Agricultural Development and the United Nations Industrial Development Organization.

Foreword

2007 marks the 20th anniversary of the Montreal Protocol on Substances that Deplete the Ozone Layer, the international treaty that aims to protect the ozone layer by phasing out consumption and production of ozone depleting substances (ODS) used in a myriad of applications around the world.

The Protocol was built through recognition that while ozone depleting substances permeated modern life and played an important role with respect to human development, they also can pose significant risks to both the environment and human health. At the time of its adoption in 1987, the Protocol was at the vanguard as it signaled the global community's acceptance of the first legally binding international multilateral environmental agreement, heralding a new era of environmental responsibility. It was established through a participatory process that brought government decision-makers, scientists and academics, industry partners and civil society to the table in search of a solution for the protection of a global good. Today, the Montreal Protocol is widely lauded as an example of international cooperation at its best!

Complemented in 1991 by the establishment of its dedicated financial mechanism, the Multilateral Fund for the Implementation of the Montreal Protocol (MLF), the Protocol has set the standard for cooperative and concerted global environmental partnership. As it prepares to enter its third decade, lessons on how it has achieved its success will be valuable in informing the global environmental community as well as its own future work, encouraging new partnerships and synergies. Indeed, one such important message is that the Montreal Protocol has played a dual role. Certain ozone depleting substances are also greenhouse gases and hence their elimination serves to protect not only our earth's ozone layer but also the global climate.

We, at UNDP, advocate for the importance of addressing issues related to the protection of the global environment. Integrating sound chemicals management schemes into national development policies and plans forms part of this work. As one of the implementing agencies of the MLF and the Global Environment Facility (GEF), UNDP has managed a portfolio worth US$ 500 million to assist more than 100 countries to meet the aims of the Protocol.

Our organization is proud to have had the opportunity to contribute to the global success of the Montreal Protocol. This publication focuses on UNDP's contribution to the Montreal Protocol process and highlights our ongoing commitment to the important work that remains to be done to protect the ozone layer.

Olav Kjorven
Director
Bureau for Development Policy
United Nations Development Programme

The Montreal Protocol came into force on 1 January 1989 when it had been ratified by 29 countries and the European Economic Community (EEC). It now boasts 191 Parties.

Introduction

In the 1970s, scientists discovered that certain man-made compounds contributed to the depletion of the ozone layer, the protective shield that encompasses the earth. At the time, these chemical compounds were widely used in many industrial and agricultural processes, and were so common as to be found in every-day household items such as styrofoam cups, refrigerators, spray deodorants and cushions.

Ozone Depleting Substances (ODS), as this broad family of chemicals came to be known, damage the ozone layer by causing it to thin. This thinning poses a significant danger to the global environment and human health as it allows increased levels of ultraviolet (UV) radiation to reach the earth's surface. Increased UV radiation in turn leads to higher incidence of skin cancer and eye cataracts, can compromise the immune system, and threaten the ecological balance of watersheds, agricultural lands and forests.

International attention was drawn to the urgency of need for appropriate measures in 1984 when it was confirmed that the ozone layer over Antarctica was disappearing, resulting in the apparition of an 'ozone hole'. The Montreal Protocol on Substances that Deplete the Ozone Layer, the first global legally-binding environmental treaty, was signed in 1987. Its aim: to protect the ozone layer by phasing out the production and consumption of substances responsible for its depletion. 2007 marks the 20th anniversary of the signing of the Protocol.

With the financial support of the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol, the Global Environment Facility (GEF) and various bilateral donors, the United Nations Development Programme (UNDP) has been working with a broad range of partners, including governments, industry, representative organizations such as technical associations, agricultural institutes, academia and civil society, to help developing countries and countries with economies in transition adopt and implement strategies that target the preservation of the ozone layer and sustainable development.

Although in the early years of the Montreal Protocol, concern was expressed that no economical, safe and/or environmentally-friendly alternatives were available that could offer the same advantages as ODS, such wariness and doubt was rapidly dispelled. Initial skeptics failed to see the potential and weight that emerging partnerships - between governments, international and national organizations and institutions, chemical companies and end-user industries – could lend in supporting ozone-layer protection by providing leadership and pledging to achieve phase-out. And so, '… *early pessimism gave way to technical optimism, innovative product development*

UNDP works to help countries reduce the vulnerability of their poor to health and environmental stresses; facilitates the integration of environmental issues into national environmental and poverty reduction planning frameworks; and helps increase access to the best available and affordable alternative and environmentally-friendly technologies.

and profitable commercialization' [1] and these ground-breaking partnerships fundamentally began to change the way the world did business.

Through provision of targeted policy advice and technical assistance, training and technology transfer services, UNDP has worked for well over a decade to develop capacity and help countries meet their commitments under the Montreal Protocol by phasing-out the use of ODS in industrial production, refrigeration servicing and mobile air-conditioning, fire protection and agricultural production. Besides provision of expertise to large-scale investment projects that result in high ODS phase-out impact, UNDP has also reached out to small and medium-size enterprises (SMEs) and Least Developed Countries (LDCs), working with them to design programmes that address their specific national concerns and circumstances.

Since 1992, UNDP has managed a global programme in more than 100 countries worth over US$ 500 million of largely MLF funding, supporting more than 1,900 projects. When fully implemented, these projects will have prevented over 63,000 tonnes of ODS being released into the earth's atmosphere. On the ground, these projects have allowed UNDP to engage in partnerships with industry associations worldwide, to assist thousands of enterprises in addressing their ODS phase-out objectives, and to reach out to over 100,000 refrigeration and air-conditioning servicing technicians and 500,000 agricultural producers globally.

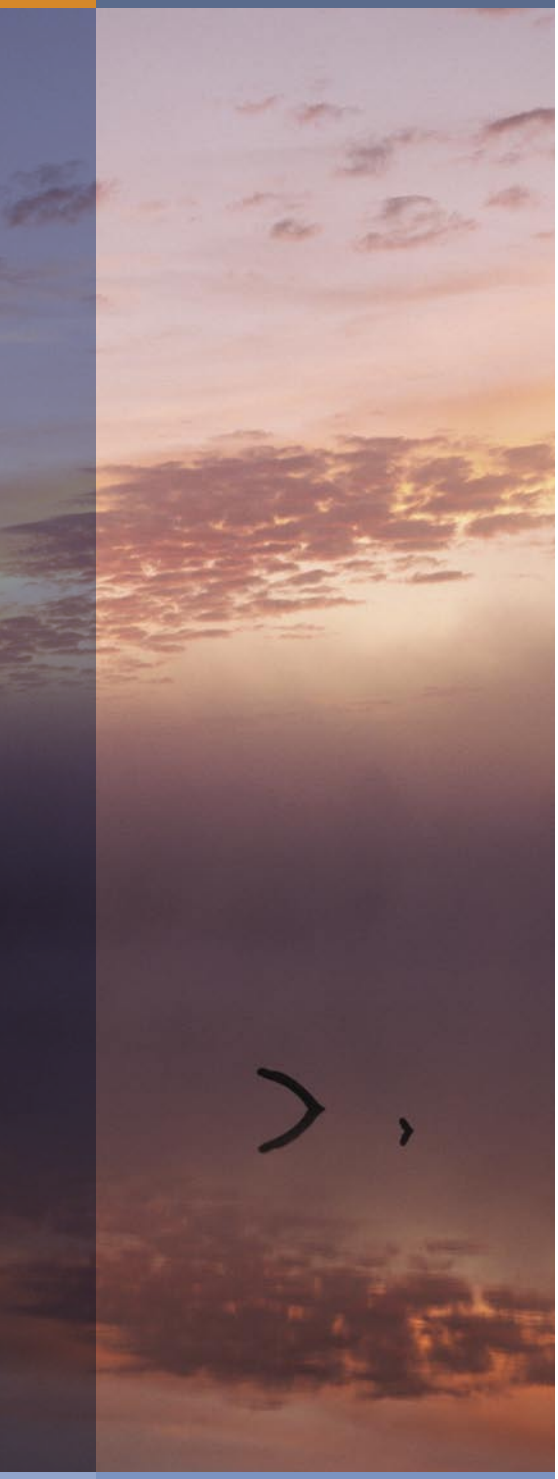
Since the Montreal Protocol came into effect, atmospheric concentrations of the most important ODS have either leveled off or decreased, and the production of ODS that exceeded 1.8 million tonnes annually in 1987, had been reduced to some 83,000 tonnes in 2005. As a result, the thinning of the ozone layer leveled off in 1998 and is now projected to return to pre-1980 levels between 2050 and 2075 [2].

There is much to applaud in the Montreal Protocol experience and indeed, it has been recognized as being an extremely successful international environmental agreement. Nevertheless, challenges still face the ozone layer protection effort and, '*maintaining momentum and funding for the final phase-out is crucial to a happy conclusion to this unprecedented international success story.*' [3]

Issues such as the continued production of ODS, the illegal trade in these substances, the escalating increase in HCFC production and consumption, and the steady growth of ODS stockpiles and the potential that they may be disposed off in an unsound manner, could have negative effects on the repair of the ozone layer. And, given that certain ODS also have a high global warming potential, attendant and synergistic benefits with respect to curbing global warming can emanate from the total global phase-out of ODS.

UNDP works to help countries reduce the vulnerability of their poor to health and environmental stresses; facilitates the integration of environmental issues into national environmental and poverty reduction planning frameworks; and helps increase access to the best available and affordable alternative and environmentally-friendly technologies.

Proud of its role as a partner in the global ozone family, UNDP remains committed to assisting developing countries and countries with economies in transition to meet their compliance targets under the Montreal Protocol and manage the manufacture, use and disposal of unwanted ODS, as well as other chemicals, as such efforts are considered an important element in helping countries make progress with respect to the Millennium Development Goals (MDGs).



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The Science of Ozone Layer Depletion and its Impacts

What is ozone?

Ozone is a gas in which each molecule is made up of three oxygen atoms (O_3). It occurs both in the earth's stratosphere, which extends from 10km to 60km above the earth's surface, and at ground level. Ozone is much less stable than atmospheric oxygen (O_2).

Good ozone

Ozone in the stratosphere is considered 'good' because it blocks harmful ultraviolet (UV) radiation from reaching the earth's surface.

Bad ozone

At ground level, ozone is considered to be a health and environmental risk and is a main component of urban smog, produced mainly by the action of UV radiation on combustion gases from vehicle exhausts or industrial emissions. Ground level ozone is considered toxic due to its strong oxidant properties and ability to cause breathing problems. Ground level ozone also damages crops, trees and other vegetation by reducing their ability to take up carbon dioxide from the atmosphere.

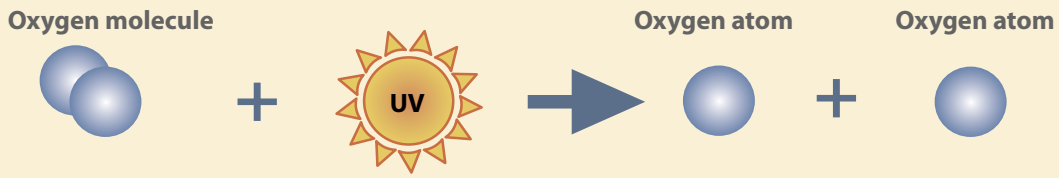
What is the ozone layer and how do human activities deplete it?

The ozone layer, which contains 90 percent of the world's ozone, is found between 15 and 35 km above the surface of the earth in the lower stratosphere. The ozone layer acts like a shield and absorbs most of the sun's harmful ultraviolet-B (UV-B) radiation that otherwise would reach the earth's surface.

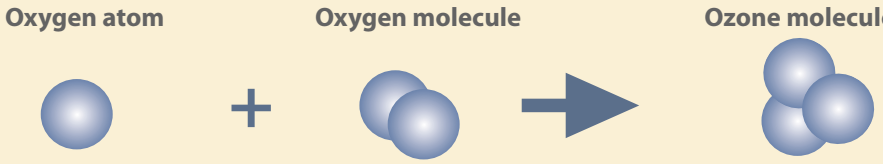
In 1973 two chemists, Frank Sherwood Rowland and Mario Molina, began studying the impacts of chlorofluorocarbons (CFCs) in the earth's atmosphere. They discovered that CFC molecules were stable enough to remain in the atmosphere until they reached the middle of the stratosphere where they would finally,

It is estimated that 20 percent of stratospheric chlorine comes from natural sources such as volcanoes and ocean spray, with the remaining 80 percent emanating from man-made compounds such as CFCs [4].

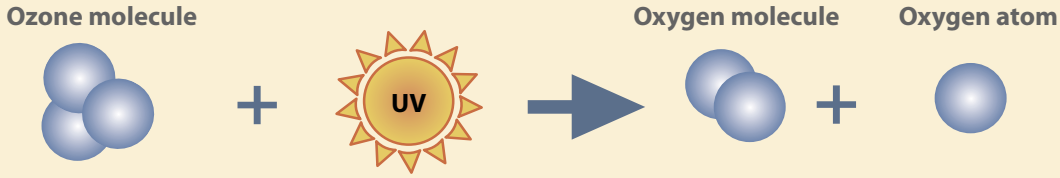
SPLITTING AND REFORMATION OF OZONE MOLECULES IN THE STRATOSPHERE IS A NATURAL AND CONTINUOUS PROCESS



1. An oxygen molecule absorbs high energy UV radiation and splits releasing two oxygen atoms



2. An oxygen atom combines with an oxygen molecule forming an ozone molecule



3. An ozone molecule absorbs high energy UV radiation and splits releasing one oxygen molecule and one oxygen atom

IMAGE 1: FORMATION AND SPLITTING OF OZONE MOLECULES BY UV RADIATION

after an average of 50-100 years (for two common CFCs) be broken down by UV radiation, releasing a chlorine (Cl) radical in the process.

It has been estimated that it takes a CFC molecule an average of 15 years to travel from the ground level to the upper atmosphere. The chlorine radical that is ultimately released can destroy up to 100,000 ozone molecules [6].

The two chemists theorized that these chlorine radicals would be able to destroy large numbers of ozone molecules and could contribute to ozone layer depletion. By 1985, other scientists discovered that bromine, used in fire-retarding halons and agricultural fumigants, was also a potent ozone-depleting substance.

The discovery of an 'ozone hole' in 1985 by the British Antarctic Survey team marked the first evidence of stratospheric ozone depletion. It was clear that a growing number of man-made chemicals containing chlorine and bromine and other related halogen compounds were

Since the invention of CFCs in the 1920s, they have been widely used in air-conditioning and cooling units as refrigerants, as spray propellants in aerosol cans, and in the cleaning of delicate electronic equipment. CFCs do not occur naturally in nature – they are all man-made [5].

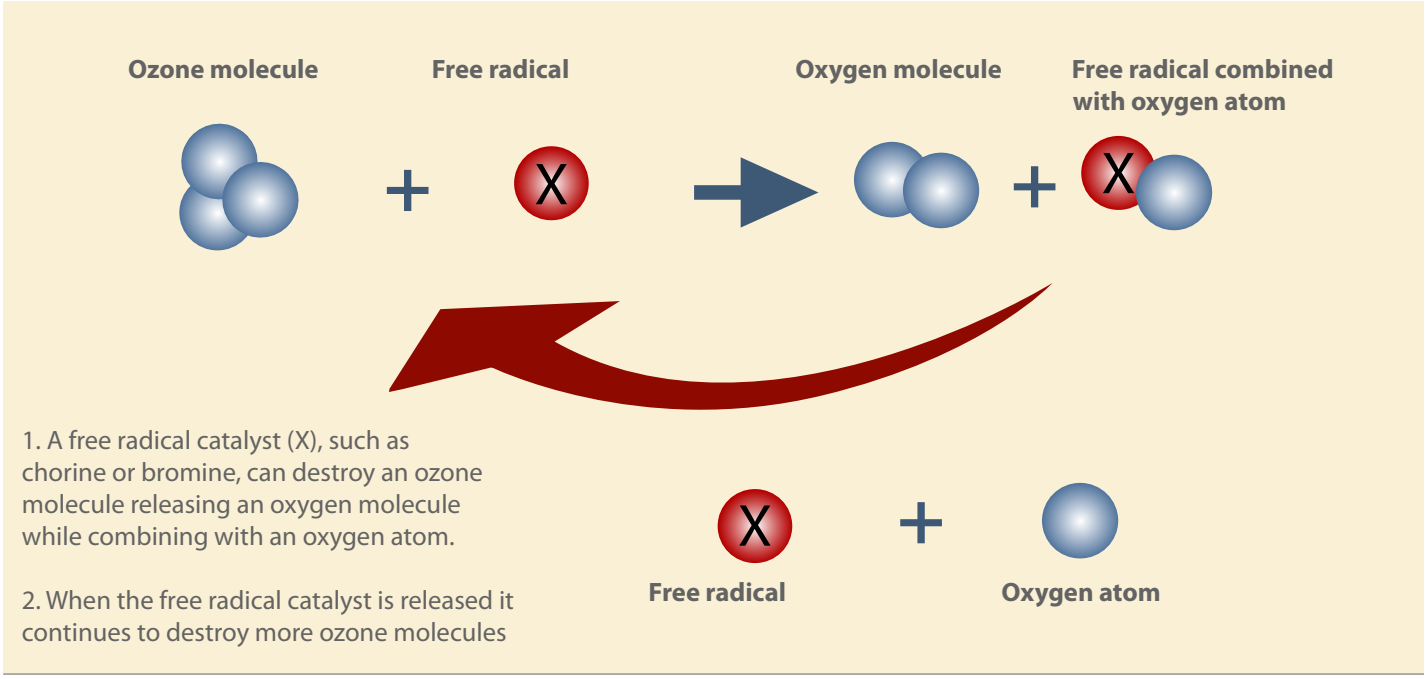


IMAGE 2: DESTRUCTION OF AN OZONE MOLECULE BY A FREE RADICAL

UV-A = long wave radiation with a wavelength rage between 400 - 320 nanometers
UV-B = medium wave radiation with a range between 320 nm - 280 nm.

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the cause of the damage. Research showed that stratospheric ozone could be destroyed by a number of free radical catalysts. Most radicals present in the stratosphere are of natural origin, but the presence of chlorine and bromine radicals was shown to have dramatically increased as a result of human activity.

The culprits were ozone depleting substances (ODS) widely used in refrigeration, foam insulation production, industrial cleaning processes, fire safety and agricultural fumigation.

Although the loss of ozone has been greatest over the Antarctic, where there has been a near total loss of ozone at some altitudes, research has shown that ozone depletion has occurred over every continent. By 1994, the world's total ozone was less than half that of the 1970s. However, thanks to concerted action taken at the global scale, scientific monitoring has shown that since 1998 the ozone layer has not grown any thinner over most of the world. Indeed, it appears to be recovering in response to the global reduction of ODS production, use and emissions. The ozone layer is projected to return to pre-1980 levels by 2050 to 2075 [7].

Why ozone depletion poses a threat to human health and the global environment

A thinner ozone layer allows more UV radiation to reach the earth's surface. Overexposure to UV radiation is generally accepted to be a contributing factor to skin cancer. The most common forms found in

One study showed that a 10 percent increase in UV-B radiation was associated with a 19 percent increase in melanomas for men and 16 percent for women [8].

humans - basal and squamous cell carcinomas - have been strongly linked to UV-B exposure.

Malignant melanoma, a much less common but far more dangerous form of skin cancer (lethal in 15-20 percent of the cases diagnosed), has also been attributed to increased levels of UV-B radiation. Increases in UV radiation (UV-A and UV-B) also cause other health concerns, including eye damage (such as cataracts), suppression of the immune system and premature skin aging.

UV radiation can also seriously affect plant growth and productivity, with important implications for food security. Sensitive crops, such as soy beans, experience damage from UV radiation, as do plants such as rice that rely on UV-sensitive bacteria living on their roots for the retention of nitrogen. Scientists also believe that marine phytoplankton, the microscopic plants that constitute the basis of the marine food chain, are particularly susceptible to increases in UV radiation. Reduction in their numbers could have a profound effect on other marine species, including commercial fish stocks.

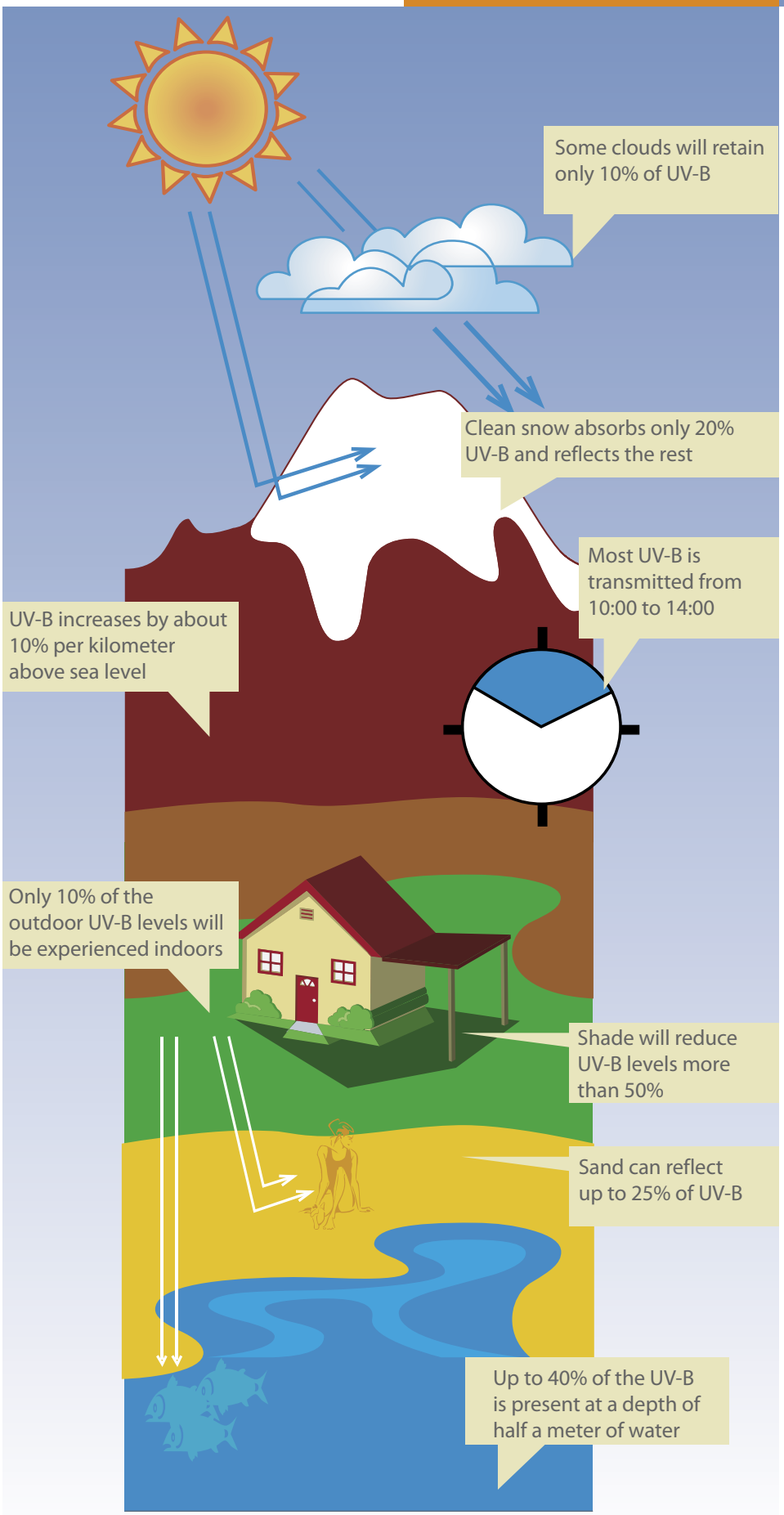

IMAGE 3: THE EFFECTS OF DIFFERENT SURFACES ON THE UV-B RECEIVED BY AN OBJECT [9]

Protecting the Ozone Layer – the Montreal Protocol

The urgent need to take measures to phase-out the use of ozone depleting substances (ODS) was confirmed by the 1980s' discovery of the ozone hole and the severe levels of ozone depletion occurring in many regions of the world.

In 1987, the Montreal Protocol on Substances that Deplete the Ozone Layer, the first legally binding international agreement, formally recognized the significant threat of ODS. The Protocol and its subsequent amendments espoused a precautionary approach and provided a mechanism to reduce and phase-out the global production and consumption of ODS by setting out a strategy for immediate action, even before all the scientific ramifications were fully understood.

The Protocol is structured around several groups of halogenated hydrocarbons that have been shown to play a role in ozone depletion. All of these ODS contain either chlorine or bromine. For each group, the treaty provides a timetable (see table at the back of this publication) that specifies an initial 'consumption freeze' as well as dates by which the production of those substances must be phased out and eventually eliminated. Different targets have been set for developed and developing countries in recognition of the latter's need for accelerated industrial development.

At present, 191 nations are parties to the Montreal Protocol. The overall level of compliance to the Montreal Protocol has been high and its implementation has been hailed as an example of exceptional international cooperation. By the end of 2006, the parties to the Montreal Protocol had together phased out over 95 percent of ODS, reducing production levels from a 1987 level of over 1.8 million weighted tonnes annually to some 83,000 tonnes in 2005.

The Multilateral Fund for the Implementation of the Montreal Protocol

The Multilateral Fund (MLF) for the Implementation of the Montreal Protocol was the first dedicated financial mechanism to be created under a legally binding Multilateral Environmental

ODP = Ozone Depleting Potential the ratio of the impact on ozone caused by a substance, compared to the impact of a similar mass of CFC-11. The ODP of CFC-11 is defined as 1.0.

In 1995, Rowland and Molina were awarded the Nobel Prize for Chemistry along with Paul Crutzen, a Dutch chemist who demonstrated that chemical compounds of nitrogen oxide also accelerated the destruction of stratospheric ozone.

Agreement (MEA). It was established by a decision of the Second Meeting of the Parties to the Montreal Protocol and began operations in 1991.

The Multilateral Fund is managed by an Executive Committee, assisted by the Fund Secretariat, and reports annually to the Meeting of the Parties on its operations. To ensure equal representation, the Executive Committee comprises seven members from developing and seven from developed countries, selected each year by the Protocol meeting.

The MLF is replenished on a three-year basis. Pledges from some 49 industrialized countries (including countries with economies in transition) totaled over US$ 2.2 billion over the period 1991 - 2005. The Fund provides financing for activities including the closure of ODS production plants and industrial conversion, technical assistance, information dissemination, training and capacity building aimed at phasing out ODS used in a broad range of sectors.

The MLF has four implementing agencies [United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Industrial Development Organization (UNIDO), and the World Bank]. Since the inception of the MLF, UN and bilateral agencies have provided support to developing countries to enable them to meet the reduction targets set under the Protocol. The Executive Committee has approved more than 5,500 projects and activities in 144 countries, which as of 31 December 2006 has resulted in the elimination of the annual consumption of 215,462 ODP tonnes and production of 158,737 tonnes of ODS.

ODS = Ozone Depleting Substance a compound/substance that is able to destroy stratospheric ozone molecules and can contribute to ozone layer depletion.

Since the Montreal Protocol came into effect, the atmospheric concentrations of the most important CFCs and related chlorinated hydrocarbons have either leveled off or decreased [10].

The Global Environment Facility - GEF

The Global Environment Facility (GEF) funds projects that enable countries (Russian Federation and nations in Eastern Europe and central Asia) that are not eligible for MLF support to phase out ODS. As of 1 August 2007, the GEF allocated more than US$ 182 million, with co-financing of US$ 187 million, to ODS phase-out projects.

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Adapting to Changing Needs: Evolution of ODS Phase-out Policy

Over the past 15 years, UNDP has played an important role supporting developing country Parties to the Montreal Protocol. With the financial support of the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol, the Global Environment Facility (GEF) and various bilateral donors, UNDP has worked in partnership with a broad range of national partners including governments, industry, technical associations, agricultural institutes, academia and civil society, to manage a global programme worth over US$ 500 million in more than 100 countries.

Once completed, these projects will have helped prevent over 63,000 tonnes of ODS being released into the earth's atmosphere and will have contributed to the sustainable phase-out of ODS use in important economic sectors such as foam production, refrigeration and air-conditioning, aerosol and solvents applications, fire protection and agriculture. Equally as important, UNDP has been in a position to contribute to the evolution of MLF policy by sharing the lessons learned and experience gained in working with decision-makers and stakeholders from many countries.

There are some unique aspects to the Montreal Protocol. The chemicals it targets were once widespread, used in a range of industries, in many different technologies, and across a variety of sectors. In its early years therefore, MLF policy had to balance environmental considerations with the socio-economic concerns of the developing country. An interactive approach was key to securing the support of government, as well as a broad range of affected industry partners. UNDP, along with other MLF implementing agencies, was well-placed to facilitate the interactive dialogue required at both national and multilateral levels, and to provide guidance to client countries and the MLF itself.

Laying the groundwork and building confidence

Enabling country drivenness

Two important considerations governed the early work of the MLF and let to the development of Country Programmes – the fact that certain ODS-using sectors could benefit from the immediate availability of relatively mature alternative technologies, and recognition of the need to build developing country capacity to effectively identify and manage assistance required.

The Country Programme is essentially a situation analysis which helps countries review national consumption trends, identify principal stakeholders by sector, and initiate a national dialogue centered on Montreal Protocol objectives. Country Programmes also outline a policy and regulatory framework to respond to Protocol requirements, facilitate identification of technological conversion needs and outline the type of investment and technical assistance required.

In the early 90s, recognizing that securing the interest of large ODS-consuming developing countries was necessary to get the process started, UNDP assisted China, India, Indonesia, Iran, Malaysia, and later Brazil, to complete their Country Programmes.

Approval of a Country Programme was important for a host of reasons:

1) It allowed for establishment of National Ozone Units (NOUs), national entities that manage and oversee phase-out activities and report national ODS consumption and production;
2) It provided a snapshot of ODS uses which allowed for a comprehensive initial list of actions for different sectors to be prepared and policy measures to be delineated;
3) It allowed for an initial estimate of costs for national compliance with the Protocol; and,
4) It sparked preparation of investment and technical assistance project proposals, many of which would be funded.

As the number of projects grew, new mechanisms that improved the accuracy of ODS consumption and production measurements evolved and new chemicals were added to the Protocol's list of controlled substances. It soon became clear that the actions enumerated in the Country Programmes would not be able to address all Montreal Protocol implementation needs.

Reaching out to the needs of smaller countries

By the mid-1990s it also became clear that important segments of developing country stakeholders were not represented in the actions underway in the MLF. Countries with less expansive ODS-using sectors and small and medium size enterprises were recognized as facing a unique set of issues in implementing the Protocol and its phase-out requirements.

UNDP assists its partners to comply with Montreal Protocol targets by providing:

- **Capacity development** – assisting governments to develop more effective national policies and programmes to meet ODS elimination targets including development of country programmes, institutional strengthening and national phase-out management plans.
- **Technical assistance, training and demonstration programmes** – providing technical support and information dissemination regarding ozone-friendly alternatives to ODS through practical hands-on training sessions and in-field demonstrations designed to build technical and economic confidence in alternative substances and processes.
- **Technology transfer** – facilitating access to the best available alternative technologies and related technical assistance to allow governments and enterprises to adopt alternative production processes and ozone-friendly technologies.

Adapting to Changing Needs: Evolution of ODS Phase-out Policy

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This led on the one hand to the definition of what constituted a low ODS volume consuming (LVC) country. In 1996 a new project modality specifically aimed at LVCs was developed. Since the bulk of ODS consumption in LVCs was concentrated in the refrigeration sector, funding was allocated for refrigerant management and assistance to control and monitor consumption phase-out. This was the beginning of the Refrigerant Management Plan (RMP), a comprehensive set of training and awareness-raising activities, coupled with policy development and provision of equipment to ensure sustainable recovery and recycling. UNDP would play an important role in the implementation and evolution of the RMP.

UNDP also played another important role during this period in addressing the special challenges faced by small and medium-size enterprises (SMEs), that had to that point prevented them from becoming effectively engaged in the Montreal Protocol process. Based on in-country experience in Colombia and Mexico's refrigeration sector and Malaysia's foam sector, UNDP initiated the group, or 'umbrella', project modality. Umbrella projects provided a framework that allowed smaller, less sophisticated ODS users to phase-out their consumption as cost-effectively as possible. This was achieved by encouraging bulk procurement, standardizing equipment specifications and non-ODS production processes and involving local ODS suppliers or distributors.

UNDP's recommendations for the umbrella project modality were captured in a 1996 policy paper on approaches to ODS phase-out in SMEs, prepared in collaboration with UNEP. The new implementation modality was significant in that it encouraged a sectoral view of ODS consumption and financing.

Evaluating, redirecting efforts and expanding scope

By 1997, UNDP was working with countries to prepare umbrella projects that covered the growing number of SMEs. Prompted this time by a World Bank policy paper, a new project modality, the 'sectoral approach' was adopted by the MLF.

The sectoral approach supported the total phase-out of a controlled substance in a sector using financial and policy incentives. Financial incentives were provided by performance-based MLF funding,

but only released in tranches based on a country's actual progress in reaching phase-out targets. This spread accountability across enterprises and government, with both taking responsibility for achieving phase-out targets.

In November of that year, with assistance provided by UNDP, China received approval for a solvents sector phase-out plan worth US$ 52 million that covered several thousand SMEs. Others soon followed in Latin America and Asia.

New solutions to address a growing family of ODS

In 1997, agreement was also reached with developing country Parties on a phase-out schedule for non-quarantine and pre-shipment uses of methyl bromide (MeBr), an ODS used for both soils and post-harvest uses. Unlike other substances controlled by the Protocol, no single alternative was available for MeBr's many uses. The importance of agriculture in many developing country economies meant that the idea of moving away from MeBr use was initially met with reluctance at both policy and field levels.

The response adopted by the MLF Implementing Agencies, including UNDP, was to initiate demonstration projects on the viability of MeBr alternatives and build confidence among primary stakeholders – principally farmers and Ministries of Agriculture. Given the variability of the agricultural sector - where soil types can react differently from one hectare to the next or where pests can quickly eat through grains improperly treated for storage - a stepped approach was essential. MeBr alternatives, already commercially available in developed countries, were extensively tested to show they met specific local soil, climatic or use requirements.

By early 2000 sufficient positive results had been achieved for developing countries to adopt sectoral, performance-based phase-out plans

Adapting to Changing Needs: Evolution of ODS Phase-out Policy

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for MeBr use. Phase-out deadlines were often ahead of Montreal Protocol targets. Countries like Malawi which was once a significant African consumer of MeBr, worked with UNDP to phase-out consumption and has been MeBr-free since the beginning of 2005.

Targeting compliance through to 2010

The advent of strategic sector and national plans

By the end of 1999, the policy debate shifted to how best support achievement of developing country compliance targets through to 2010, the year that 100 percent CFC phase-out is mandated. Discussion and negotiation on planning for the compliance period focused on the need to deliver assistance in a more strategic manner through a national phase-out approach.

For medium and large volume-consuming countries, the result was the adoption of CFC National Phase-Out Plans (NPPs). These were large-scale, multi-year, performance-based programmes that set elimination strategies for all CFC-consuming sectors in a country through technology transfer, technical assistance, extensive capacity development and awareness-raising activities. NPPs included strict levels of phase-out, timetables for the adoption and implementation of policies and regulations, and required detailed costing across broad categories of activities.

Given the magnitude of such projects, management units had to be organized and funded to manage multi-stakeholder dialogue and recruit the necessary technical and legal expertise during the NPP's implementation. This process raised national ownership to new heights, placing responsibility for timely execution and achievement of results firmly in the hands of partner countries and the multi-stakeholder management process.

UNDP has successfully assisted the Government of Brazil in designing its NPP, valued at US$ 27 million total, for accelerated phase-out of its remaining CFC consumption.

UNDP also implements other national phase-out plans (NPPs) or sectoral components of such plans in a a number of countries around the world, as highlighted in Table 1.

Table 1: UNDP-MLF supported MeBr Phase-out Plans, National Phase-out Plans (NPPs), National Sector Phase-out Plans (SPPs) and Terminal Phase-out Management Plans (TPMPs) as of July 2007

	Latin America & the Caribbean	Asia & the Pacific	Africa	Europe & the CIS	Arab States
MeBr Phase-out Plans	Argentina, Costa Rica		Kenya, Malawi		Lebanon
National Phase-out Plan (NPP)	Brazil, Colombia, Cuba, Dominican Republic, Panama	Bangladesh, Indonesia, Iran, Sri Lanka	Democratic Republic of Congo, Nigeria		Lebanon
National Sector Phase-out Plans	Argentina (Foams), Mexico (Foams)	China (Solvents), India (Refrigeration Manufacturing, Servicing and Solvents)			
TPMPs	Bolivia, Costa Rica, Dominica, Fiji, Grenada, Jamaica (component), Paraguay, St. Kitts & Nevis, St. Vincent & the Grenadines, Trinidad & Tobago, Uruguay	Bhutan, Nepal	Comoros, Gabon, Ghana	Georgia, Kyrgyzstan, Moldova	Bahrain

LVCs have not been forgotten in the process. Terminal CFC phase-out plans in the refrigeration and air-conditioning servicing sectors, called Terminal Phase-out Management Plans (TPMPs), were designed to meet the characteristic needs of LVCs by building on the Refrigerant Management Plan (RMP) model.

The genesis of the TPMP offered the same type of flexibility and enhanced national ownership being extended to larger consuming Parties through sectoral and national phase-out plans. Numerous TPMPs are in operation today with many more under preparation.

Encouraging cross convention synergies

The most recent development in the refrigeration and air-conditioning sector involved CFC-use in building chillers, large-scale air-conditioning units. In 2005, the MLF promoted a demonstration funding window of

Adapting to Changing Needs: Evolution of ODS Phase-out Policy

3

US$ 15 million to promote sustainable institutional and financial mechanisms to facilitate integrated management and replacement of CFC-chillers. Previous to the announcement of the demonstration fund, this sub-sector had not received much MLF support. The knowledge that investment in CFC-free chillers could yield significant energy savings gains that would, within a few years, allow end-users to recoup their investment were viewed as a sufficient incentive to spur activity in the sub-sector. Therefore, as per MLF incremental costs calculation policies these projects yielded incremental saving and could not receive funds. However, by 2005, with the exception of a few pilot projects, it had become clear that lack of knowledge and financing options among end-users were impeding action. Aware that the impending 100 percent CFC phase-out of 2010 may negatively impact this important sub-sector, the demonstration fund was approved.

The CFC-chillers demonstration funding window aimed to create an enabling environment for chiller owners in light of the declining availability of CFCs required to operate already installed systems. The funding window encouraged conversion away from CFC-using chiller systems to non-CFC-using, more energy efficient (EE), models. In turn, such conversions could increase the potential for EE gains in related building heating, ventilation and air-conditioning (HVAC) systems, thus encouraging economic and environmental benefits that promote cross-convention synergies and support the objectives of the Montreal and climate regimes.

UNDP, working in concert with countries in Latin America and the Caribbean, where NPP and TPMP partnerships had already been established, was successful in securing US$ 4 million for MLF chiller demonstration projects in Brazil, Colombia, Cuba and the Caribbean region. In Cuba, UNDP is working in partnership with the Canadian government and Canadian companies to implement strategic chiller conversions in support of the country's energy reform programme. In the other countries, UNDP's approach is to use the MLF funding to leverage additional financing from other sources to enhance the scale-up potential to transform the market for EE in building systems. To date, in Brazil the MLF seed funding was used as co-financing against a GEF-funded climate project worth US$ 13.5 million that boasts

an additional US$ 15 million in co-financing from the Inter-American Development Bank and over US$ 50 million of the power distribution company AES-Eletropaulo.

Closing the gaps

Metered-dose inhalers (MDIs) are effective and accurate delivery mechanisms for the medications used to control asthma and chronic obstructive pulmonary disease, ailments that affect many millions of people around the world. CFCs have been widely used as propellants in MDIs to deliver medication into the respiratory airways. Although alternatives do now exist, such technologies are protected by intellectual property considerations and are therefore, not yet widespread.

Recognizing that developing country producers of MDIs for critical human health purposes may face non-compliance issues under the Protocol arising from their continued use of CFCs, the Parties decided in late 2006 to offer assistance. The 18th Meeting of the Parties requested the Executive Committee of the MLF to consider, as a matter of urgency, the funding of projects that support developing country MDI manufacturers to transition away from CFC-based MDIs production. UNDP is at the vanguard, working in close cooperation with a number of MDI-manufacturing developing countries to help them maintain compliance and economic sustainability, without jeopardizing the health of their populations.

2010 and beyond

Within just one decade, the MLF results-based delivery mechanism of choice had moved from the individual project modality to incentive-driven, performance-based agreements. It was an impressive change, in which UNDP was involved every step of the way. The task is not yet over. As the Montreal Protocol prepares to enter its third decade, new policies – some relating to Protocol itself, and others to the MLF – are being discussed and negotiated. UNDP continues to have an important role to play in the successful evolution of both.

4

Building National Capacity to Deliver Results through Institutional Strengthening

Capacity development is key to positive change and helping people build better lives. It stands at the core of UNDP's efforts to help countries reduce poverty. As the environment is an essential part of the sustainable human development equation, building developing country capacity to respond to environmental concerns is central to UNDP's work, including efforts to help countries meet their targets under the Montreal Protocol.

Much of the success of the Montreal Protocol may rest on the fact that its Multilateral Fund (MLF) was quick to recognize the importance of strengthening national capacity to plan for, and respond to, national actions that contribute to the global phase-out of ozone-depleting substances (ODS). In 1991, the MLF formally recognized the need to build and sustain such capacity among the developing country Parties. Since the Montreal Protocol was the first ever legally-binding multilateral agreement on the environment, building capacity was key to ensuring compliance and achieving the Protocol's objectives.

Institutional Strengthening (IS), funding was provided to enable the necessary national management frameworks to be established within the Parties' appropriate government institutions, help develop the necessary understanding of the Protocol's issues and procedures, and develop skills to ensure proper implementation and compliance. National focal points were designated to manage these activities, and a series of National Ozone Units (NOUs) were established.

Since 1991, UNDP has had the privilege of working in partnership with the NOUs of 21 countries across the globe, disbursing over US$ 19 million to support institutional strengthening and national capacity development.

The prime role of the NOUs is to facilitate dialogue between relevant national stakeholders and government decision-makers. As a first task, using MLF seed funding, a NOU must oversee completion of a Country Programme that charts the national strategy for eliminating consumption and/or production of ODS. The Country Programme, based on national circumstances and in accordance with the Protocol schedules, will be used as the basis for evaluating and funding any additional activities and projects. In recent years, IS projects have moved away from the project-by-project approach to adopt more

strategic sectoral or full-scale national ODS phase-out programmes.

NOUs play a dual role as managers of IS projects. From a technical perspective, they are the key drivers in initiating, designing, formulating and managing activities to support national phase-out strategies. From the policy angle, the NOUs work closely with partners to develop legislative and regulatory mechanisms, and are also responsible for meeting Protocol requirements by reporting their country's annual ODS consumption and production data.

UNDP is involved in the implementation of institutional strengthening projects approved under the MLF in 21 countries: Argentina, Bangladesh, Brazil, Chile, China, Colombia, Costa Rica, Cuba, Georgia, Ghana, India, Indonesia, Iran, Lebanon, Malaysia, Nigeria, Pakistan, Sri Lanka, Trinidad and Tobago, Uruguay and Venezuela.

UNDP has been involved in the implementation of 62 percent of foam sector projects approved under the MLF.

Phasing-out ODS Use in Foams

Although we use a variety of foam products every day they largely go unnoticed. Foams are used to insulate your refrigerator or water heater, as well as your house and office. They are also in the cushions of your furniture, car seats and office chairs.

When the Montreal Protocol was negotiated, CFC-based foams accounted for more than 25 percent of worldwide CFC consumption (267,000 tonnes a year). As early as the mid-1980s, the global foam industry and its suppliers had begun to reduce or eliminate CFC use. Thanks to industry initiative and concerted global action under the Montreal Protocol, more than 99 percent of CFCs used in foam production were discontinued by 2005, without consumers noticing the difference.

Given the early start of the foam industry in developing alternatives to CFC use, technologies were mature and widely commercially available by the time the MLF began funding projects in the early 1990s. By facilitating the transfer of existing reliable and effective non-CFC technology, the MLF was able to set an important standard that would facilitate its efforts in other sectors. The success of early foam sector projects built confidence at the enterprise level, strengthened national cooperation and secured the buy-in of the national government partners, as well as the participation of international industry in the MLF process of international industry. This in turn helped kick-start entire national ODS phase-out programmes.

Growing developing country demand for assistance made it clear that cost-effective means of technology transfer were needed. UNDP responded by expanding assistance that had initially been offered to larger, well-organized enterprises, first through individual projects, then through the design of group projects and finally through elaboration of strategic multi-year performance-based national phase-out programmes.

UNDP instituted innovative procurement processes that included, for example, bulk-procured standardized replacement technology/equipment, and addressed capacity development by involving local and regional experts to produce better project designs based on detailed knowledge of national circumstances. In this way, UNDP ensured that projects were made more cost-effective, without compromising their quality or their contribution to countries' sustainable development.

Brazil - Greening the foam production industry

At a time when virtually all polyurethane foam manufacturers were using CFCs as a blowing agent, UNDP was approached by Poly-Urethane Industria E Comercio Ltda, a national chemical and equipment supplier, with the idea of introducing a castor oil-based polyurethane CFC-free system to the Brazilian market.

At that time, Poly-Urethane supplied standard petroleum based polyurethane chemicals purchased from major international suppliers and blended to customers' specifications. In order to move away from CFCs to the new castor-oil based process, the existing dispensing equipment needed replacement.

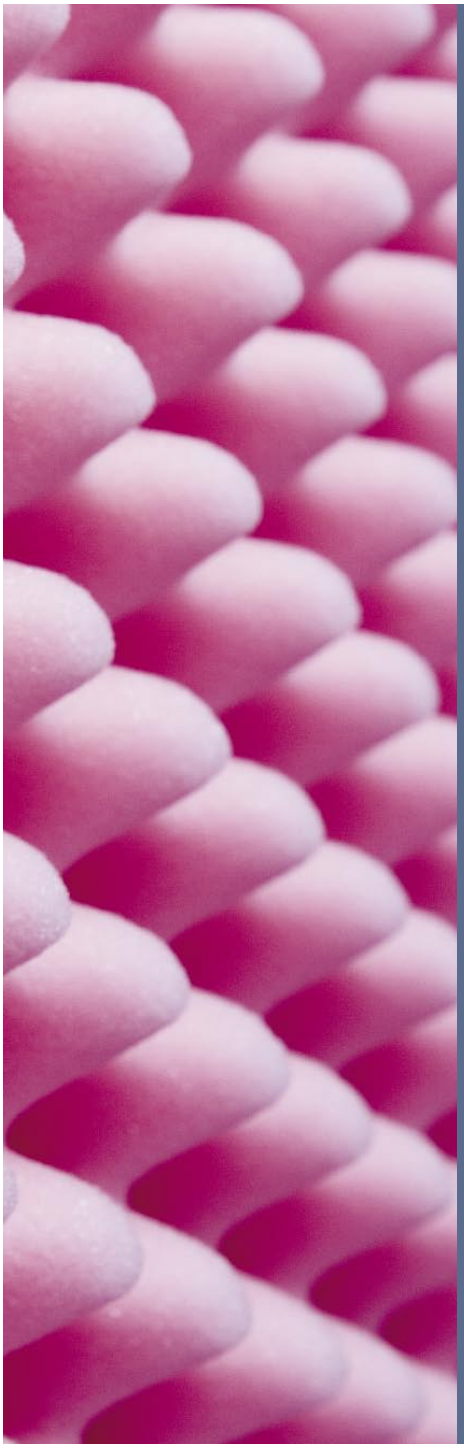
In August 1994 the project 'Conversion of three companies to CFC-free technology in the manufacture of rigid polyurethane spray foam' was approved. The project, which depended on local technical support and coordination, marked a series of firsts for Brazil: the first MLF-funded ODS phase-out investment project to be implemented by UNDP in the country; the first approved group project,targeting conversion of three enterprises; and, the first project, at the global scale, to contribute negative global warming potential thanks to the use of a renewable feedstock with CO_2 absorption potential – mamona, the local name for the castor oil plant.

Poly-Urethane developed and tested prototype equipment, before producing commercial versions for the three enterprises involved in the project, and providing training in its use. By July 1997, the project was certified as technically complete and the three large spray foam contractors that had converted to the non-CFC technology were recognized as having reduced Brazil's CFC consumption by 72 tonnes per year.

Also, by establishing a local, ongoing demand for mamona, Poly-Urethane provided the impetus for the re-establishment of mamona farming in the northern part of Minas Gerais state. By scaling up mamona production to industrial levels, approximately 4,500 farming families were kept employed and mamona is being considered as a possible base for the manufacture of other products. An additional and important advantage of using mamona is that the plants absorb carbon dioxide, thereby reducing greenhouse gas accumulations in the atmosphere. The estimated carbon dioxide absorption level of mamona plants is 34.6 tonnes per hectare, with two growing cycles per year.

Working with a grant of US$ 470,000, this project established partnerships that not only phased-out 72 tonnes of CFCs but also launched an impressive ODS phase-out programme in the Brazilian foam industry, built considerable local capacity, supported innovation, generated local level jobs and economic benefits, and contributed to reducing global warming.

Phasing-out ODS Use in Foams



Colombia - Total phase-out of CFCs in the foam sector

When Colombia ratified the Montreal Protocol its polyurethane foam manufacturing sector was one of the country's main ODS consumers. Given the variety of stakeholders involved in polyurethane foam manufacturing in Colombia, the country's National Ozone Unit worked with each to tailor conversion strategies to their specific needs.

An umbrella project approach was followed to assist smaller companies designed to allow the cost-effective targeting of a large number of enterprises, each with very small individual ODS consumption. Initially two umbrella projects were implemented with the participation of nationally recognized conglomerates – Espumlatex and GMP Productos Quimicos – each made up of more than 20 smaller companies in diverse locations. Equipment was provided from Colombia as well as neighboring developing countries such as Brazil, which allowed technologies adapted to local needs to be acquired at a reasonable cost, thereby increasing both cost-effectiveness and the number of companies assisted.

In December 2002, the MLF approved a final umbrella project for the phase-out of the remaining 123 tonnes of CFCs used in foam manufacture. This helped 36 more enterprises convert to alternative technology, with special technical assistance provided for the smallest companies.

This approach ensured that as early as October 1997, 400 tonnes of CFCs had been phased out from domestic refrigerator manufacturing as a result of conversion projects placing Colombia in good standing. Commercial and industrial refrigeration manufacturing sectors soon followed, resulting in total sector phase-out by 2006.

India - Umbrella projects for conversion to CFC-free technology for SMEs in the foam sector

In 1997, UNDP and the Ministry of Environment & Forests of India developed a group project in the foam sector that covered 80 small and medium-sized enterprises (SMEs) employing around 2000 persons. The SMEs had been using CFCs in the manufacture of rigid polyurethane foam insulation products including building insulation and insulated household appliances such as jugs, flasks and hot/cool cases for food.

Low levels of investment in plants and equipment, limited operating capital, small-scale labor-intensive operations, a very competitive domestic market and cheap imports characterized the SMEs. While there was general awareness about quality assurance, training, environment and safety-related issues, the need to keep costs down meant that that these were rarely practiced. In general, knowledge regarding latest chemicals and technologies was limited and technical capacity to undertake sound procurement practices and decisions was lacking.

Key to the long-term success of the project was ensuring the economic availability and sustainability of new environment-friendly technology. UNDP worked in collaboration with suppliers, including an Indian firm who designed cost-effective CFC-free chemical formulations, to produce customized low-cost foaming equipment. To ensure long-term sustainability the equipment was designed for easy, economic, efficient operation and maintenance. Further economies were achieved through standardization of production processes, bulk procurement of equipment and adaptation to local culture and working practices. Extensive training in technical and environmental issues was also provided to enhance SME capacity. The project was completed in 2000 and its success led the government and stakeholders to apply for more MLF funding to replicate the process through three new projects targeting another 70 SMEs.

Phasing-out ODS Use in Refrigeration and Air-Conditioning

Domestic and commercial refrigeration and air-conditioning systems are an integral part of modern life around the world. Among their many uses are preserving perishables in both households and businesses, regulating temperature-sensitive processes in industries, and providing a comfortable environment in homes, hospitals, offices and vehicles.

The discovery of non-flammable CFCs unlocked the potential of the global refrigeration equipment market. Before the Montreal Protocol, virtually all refrigeration and air-conditioning appliances used CFCs in the production of their foam insulation, and as refrigerants to provide cooling effects. A host of desirable properties made CFCs the refrigerant of choice for domestic and commercial refrigeration units, as well as air-conditioning systems.

The first projects to reduce and eliminate the use of CFCs in the manufacturers of refrigeration and air-conditioning systems under the Montreal Protocol began in the early 1990s. Many components, such as compressors, condensers, evaporators and filter-dryers had been specifically designed to work well with CFCs and replacing them with environmentally acceptable alternatives, while preserving important basics of product design, safety, performance, energy efficiency and product lifetime, was a major challenge.

Design and performance problems were compounded by the fact that in most developing countries the production and servicing of refrigeration and air-conditioning systems represented a major part of a country's overall CFC consumption, and replacement with non-ODS alternatives had to be made with minimal economic impact and social disruption.

Commercial and domestic refrigeration manufacturing

Governments, assisted by UNDP, worked with enterprises and national and international technical experts to identify the most suitable alternatives to CFCs and tackle the conversion of large-scale domestic and commercial refrigerator manufacturers. Negotiations touched on high-level enterprise management commitment, assurances of technology access and quality control with respect to the major changes required for factory operations and machinery. Critical issues, such as avoiding production down-time and market disruption, had to be also considered.

Malaysia - Group project covering 11 SMEs

Malaysia's tropical climate requires reliable, efficient and effective cooling in homes and businesses. In December 2000, Malaysia, with the assistance of UNDP, launched a project at 11 SMEs to phase-out the use of 64.8 tonnes of CFCs used in the production of commercial refrigeration equipment. SMEs were identified as requiring special assistance and resources to achieve the transition away from CFC-reliant technologies.

The 11 SMEs, located in towns across the Malay penninsula and employing between 10-35 employees each, produced an annual total of over 34,000 commercial refrigeration units, including chest freezers, bottle coolers and display cabinets, for the domestic market.

To maximize the impact of project funding, the enterprises, working closely with UNDP technical experts, elected to bulk-buy standardized replacement technology/equipment and harmonize their production lines instead of procuring separate customized equipment for each enterprise. This rationalization resulted in greater overall project cost-effectiveness and savings that were used by the SMEs to improve the quality of their production, seek further efficiencies, reduce waste and achieve a more competitive market positioning.

UNDP's has contributed substantively to encouraging adoption of CFC-free technology in the refrigeration servicing sector. Its End-User Incentive Programme was designed as an effective cost saving strategy to maximize the limited resources of the MLF to phase-out CFCs in the commercial and industrial refrigeration end-user sector in low volume consuming countries (LVCs). Enterprises in existence at least three years and involved in important economic sectors of a country including food storage, supermarkets, hotels, restaurants, fisheries, meat processing plants and breweries, were considered eligible to receive an incentive paymen in order to encourage them to replace or permanently retrofit their existing CFC-based equipment.

UNDP contributed to this process in developing countries through an innovative approach that allowed small and medium-size enterprises (SMEs) to maximize the benefits offered by the MLF. SMEs are more numerous than large-scale enterprises and often widely scattered. They are also less likely to be aware of environmental commitment issues and international technological developments, and generally lack the resources to make a

Phasing-out ODS Use in Refrigeration and Air-Conditioning

Georgia - Incentive programme for end-users

A significant portion of Georgia's ODS consumption (mostly CFCs) originated from its commercial and industrial refrigeration servicing sector. This made it an excellent candidate to participate, with UNDP's support, in a pilot end-user incentive programme in the commercial and industrial refrigeration and transport refrigeration sub-sectors.

In order to encourage Georgian enterprises operating in these sectors to replace or permanently retrofit their existing equipment with systems that used a non-ODS refrigerant, 15 enterprises were identified by the Government as eligible to receive assistance in changing their refrigeration systems and achieve a phase-out of 3.4 tonnes of CFCs per year.

In cooperation with Georgia's Refrigeration Association, the National Ozone Unit (NOU) publicized details of the new refrigeration equipment, along with calculations of the favorable thermodynamic and economic gains that resulted from their use. Detailed accounts of the conversion processes, and the steps taken to destroy the old compressor plants, were also made available.

The incentive programme had a multiplying and catalyzing effect in stimulating the retrofit and replacement of CFC-based equipment in Georgia's commercial refrigeration sector. Two additional enterprises retrofitted their installations without financial help from the programme as a direct result of the NOU's awareness-raising campaign, resulting in the additional phase out of 2.5 tonnes of CFCs per year.

Costa Rica - Addressing the needs of the fishing sector

In 2003, CFC consumption in Costa Rica was heavily influenced by needs of fishing industry in the port of Puntarenas. Although the fisheries sector's refrigeration capacity represented only 5 percent of the country's total installed capacity, it accounted for more than 50 percent of national CFC consumption. The Government, working with UNDP and sectoral stakeholders, decided to design an end-user incentive programme aimed at retrofitting 50 percent of the sector, which became an important component in the Costa Rica refrigerant management plan (RMP).

The port of Puntarenas' fishery sector had been characterized by poor refrigeration practices. In most cases, vessel owners were completely unaware of the high costs that resulted from their inefficient CFC systems. Poor maintenance and leaking cooling systems were common and it was not unusual for substantial quantities of CFC refrigerants to be added to a vessel's cooling system prior to a fishing trip, only to leak out before the vessel returned to shore. An inefficient cooling system could use six times as much CFC as normally required.

After extensive consultation with stakeholders, and with UNDP support, a pilot end-user incentive project was launched as part of the country's RMP.

Three fishing vessels were converted and benefits included lower operating costs for the cooling system which repaid the investment in under one year. As news of the project's success spread, more vessels were converted. The project assumed 50 percent of the associated costs, with the remainder borne by owners.

By the end of 2006, a total of 17 vessels had been converted and annual national CFC consumption had been reduced by 6.4 tonnes per year. Since the project generated widespread awareness of CFC issues it led indirectly to the reduction of CFC consumption in vessels that were not participants in the original programme and worked to the benefit of the refrigeration servicing industry in Puntarenas.

Phasing-out ODS Use in Refrigeration and Air-Conditioning

6

significant technical transition without outside assistance. However, SMEs represent an important economic sector and, to help them contribute to Montreal Protocol obligations without ignoring their specific needs, UNDP adopted a group project approach which encouraged bulk procurement and standardized training in order to harmonize production processes, maximize cost benefits and enhance experience-sharing and replication.

Refrigeration and air-conditioning servicing

The phase-out of CFCs in refrigeration and air-conditioning servicing posed a different set of challenges. Depending on the size of a country, it is not uncommon for its population of refrigeration and air conditioning systems to number in the millions and be geographically widespread. Given the multitude of stakeholders and users involved, ranging from individual businesses and institutions to communities, the process of replacing CFCs with non-ODS alternatives had to be conducted in as smooth a manner as possible so as to avoid disruption of livelihoods or the essential functions of refrigeration and air-conditioning systems.

Another important consideration stemmed from the fact that because such technical systems represent large financial investments in developing countries, they tend to be serviced many times over the course of their long lifetimes in order to ensure proper functioning and maintenance standards. Such services are provided by thousands of service technicians in both the formal and informal sectors. In low volume consuming (LVC) countries in particular, where the refrigeration and air-conditioning servicing sector in general contributed to over 70 percent of CFC consumption, the challenge was particularly great.

LVCs tend to be those countries most challenged by poverty reduction, where much of the work force is involved in informal activities. Addressing their Montreal Protocol obligations without compromising livelihoods of technicians made the task of transitioning their servicing sectors even more difficult.

Early on, individual service technician training in CFC recovery and recycling was the norm. Within the first decade of the Montreal Protocol however, such stand-alone projects were replaced with the adoption of Refrigerant Management

Plans (RMPs) that proposed a more comprehensive strategy to manage the use and phase-out of CFCs for servicing purposes at the national level. RMPs implemented with the assistance of UNDP encouraged the establishment of regulations to control CFCs and enhancement of institutional, technical and managerial capacity for their enforcement. In tandem, and in order to curb and reduce national demand for new production CFCs amongst private sector end users, best available and appropriate recovery/recycling and other equipment necessary for servicing technicians and establishments was provided. To ensure the sustainability of phase-out activities, the technology transfer was complemented by a rigorous training of trainers programme teaching good servicing practices.

Over time, and based on experience, RMPs for LVCs evolved into Terminal Phase-Out Management Plans (TPMPs). TPMPs proposed a longer-term strategic approach to address all residual CFC consumption in a country within an agreed time frame, usually in advance of Montreal Protocol compliance milestones. Performance-based and following multi-year execution schedules, TPMPs allow developing countries greater flexibility in addressing the specific needs they face in the lead up to the 100 percent CFC phase-out target for 2010.

In medium and large-sized countries, refrigeration and air-conditioning servicing sector requirements were integrated into comprehensive Sector or National Phase-out Plans (SPPs/NPPs) that address one or more ODS-using sectors at the time and offer the same strategic advantages as TPMPs, only on a larger scale.

Phasing-out CFCs in Metered Dose Inhalers (MDIs)

Asthma and Chronic Obstructive Pulmonary Disease (COPD), the most chronic respiratory airway diseases, are estimated to affect over 300 million people worldwide. They cause significant absenteeism from work and school and generate high health care expenditures, which impact national economies.

One treatment widely used to relieve or prevent asthma and COPD attacks is aerosol medication, most commonly delivered into the airways by a Metered Dose Inhaler (MDI). MDIs possess many qualities that set them apart from other inhalation delivery systems: reliability, accurate dosage delivery, portability and ease of use.

When first developed, MDIs used CFCs to propel medication into the respiratory airways. The physical, chemical, and toxicological properties of CFCs made them ideal propellants and allowed manufacturers to produce MDI products that met all design requirements for effective medication delivery and ease of use by patients.

The advent of the Montreal Protocol compelled industrialized countries to begin converting their MDI production to CFC-free formulations. By 1994, CFC-free MDI technology was available and today marketed globally. However, for most countries this technology is not available in the public domain.

To achieve CFC compliance, MDI producing developing countries face two principles obstacles: access to resources to obtain commercially available technology and the time needed to develop alternatives. Failure to convert in a timely manner may threaten their ability to achieve compliance with the CFC Montreal Protocol target and also dangerously impact their public health and national development.

UNDP was the first MLF implementing agency to tackle the challenges faced by developing country Parties in converting their CFC-based MDI production to CFC-free formulations. Based on practical

Asthma and COPD can sometimes lead to premature death. According to the World Health Organization, 300 million people suffer from asthma and 255,000 people died of asthma in 2005. Over 80 percent of asthma deaths occur in low and lower-middle income countries [11]. In some countries over 20 percent of children suffer from asthma along with 5-6 percent of the adult population, with a similar percentage of adults suffering from COPD [12].

experience gained in working with Cuba on its MDI Transition Strategy, UNDP contributed valuable insight and guidance which lead to the development of MLF MDI sector policy and guidelines.

UNDP has played an important advocacy role and created awareness about the situation facing developing countries in converting their MDI sectors, both through direct manufacturing conversion and through inclusion of the sector in national or sectoral phase-out plans that target the long term strategic phase-out of CFCs. UNDP is continuing its work in Cuba and has extended assistance to other countries that face similar challenges. In Uruguay, UNDP is implementing a MDI Transition Strategy and conversion project; in Bangladesh, UNDP, in collaboration with UNEP, supported the development of the country's MDI Transition Strategy and a large-scale MDI conversion project; and in India, Colombia and Pakistan, UNDP is set to work with national partners to address the needs of technology transfer to CFC-free MDIs.

UNDP has been involved in the implementation of 60 percent of MDI related projects approved under the MLF.

Cuba - Phase-out of CFC consumption in the manufacture of MDIs

More than 1.1 million Cubans suffer from asthma. In order to supply domestic needs, Cuba produces six million units of CFC-based MDIs each year, which calls for the use of 109 tonnes of CFCs.

In 2002 there was growing concern in Cuba that a process for obtaining CFC-free MDI technology had not yet begun and that as a result, the country was unlikely to comply with Montreal Protocol CFC phase-out targets. It was also feared that the lack of a replacement technology would seriously jeopardize the availability of medications. The Cuban Government approached UNDP for assistance.

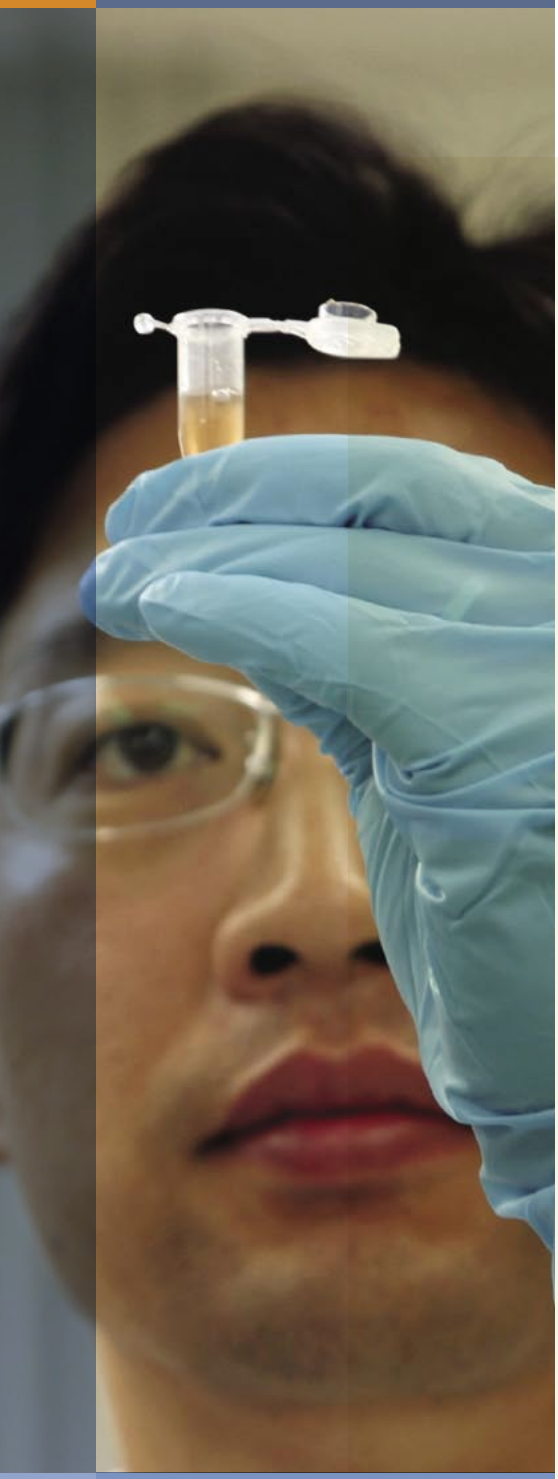
Cuba urgently needed to identify an appropriate replacement technology that would meet specific criteria related to Cuba's laboratory capacity, product availability and cost-effectiveness needs without infringing intellectual property rights. Underpinning these considerations was the need to secure adequate financing to implement a conversion project.

With UNDP's help, the Cuban MDI Technology Transfer Project, the first ever MDI conversion project funded by the MLF, was approved in 2003 with total funding of US$ 5,960,000.

UNDP assisted Cuba to establish base-line equipment needs, to calculate eligible funding limits and identify potential technology suppliers. This ground-breaking work helped develop MLF policy and guidelines for the MDI sector. On behalf of the Government UNDP also negotiated a public-private partnership with a recognized pharmaceutical company able to operate in Cuba, for the development of CFC-free MDI products at an acceptable cost.

The partnership will enable Cuba to get the equipment necessary for the stable and safe production of CFC-free MDIs, along with extensive and targeted training. To facilitate product transition, a national awareness campaign has been launched to inform doctors of the characteristics of CFC-free MDIs so that they may, in turn, educate their patients. The project is under implementation and production of CFC-free MDIs is due to begin in late 2007.

Upon completion, scheduled for 2008, the project will not only have supported Cuba's commitment to the Montreal Protocol but will also have contributed positively to the country's progress on a number of Millennium Development Goals.



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Phasing-out ODS Use in Solvents

Solvents are used in many industrial and household applications, most commonly in cleaning processes and products. In industry solvents are used to clean circuit boards and precision instruments, while household uses includes dry cleaning, detergents, paint thinners, nail polish remover, and many others.

In the late 1940s, it was discovered that ODS-containing solvents had many advantages over other commonly-used organic solvents. ODS use in solvent applications began to grow. Discovery of the ozone hole and ratification of the Montreal Protocol curbed that growth and brought about change in the global use of solvents as both developed and

China - Caihong colour picture tube manufacturing conversion

In 1999, UNDP began to work closely with Caihong Colour Picture Tube Company, China's leading manufacture of picture tubes, to phase out the use of 211 tonnes of trichlorotrifluoroethane (CFC-113) and 331 tonnes of trichloroethane (TCA) used in the company's manufacturing processes. Caihong was considered to be the largest emission source of ODS solvents in China, which made its solvent transition process one of the most complex and valuable undertakings by UNDP in this area.

The phase-out of ODS cleaning agents was achieved through the conversion of 16 cleaning machines. Large ODS solvent-using equipment, most of it located in clean areas, needed to be removed and dismantled, while at the same time equally large replacement technology – principally aqueous cleaners - had to be assembled and tested inside the production facilities.

Using scheduled factory downtime and swiftly completing the de-bugging process allowed the project to be completed 10 months ahead of schedule, with Caihong experiencing minimal production losses. To reduce the company's environmental impact even further, Caihong also installed improved ventilation and de-ionizing equipment in on-site water and water treatment facilities.

developing countries began to commit to phasing-out the use of CFCs, carbon tetrachloride and methyl chloroform as solvents.

No single substitute was available. Since replacements needed to exhibit many, if not all, of the useful properties of ODS solvents, a range of alternatives and non-ODS technologies had to be developed and made commercially available to ensure a sustainable ODS phase-out. Worker safety and environmental considerations were important additional criteria.

While manufacturers in the developed world were working to produce alternatives, programmes targeted at developing country Parties to the Protocol focused on assisting enterprises to select appropriate alternative processes. This became a multi-stakeholder interactive process involving governmental officials, technology and solvents suppliers, end users, and MLF Implementing Agencies.

In most countries, the solvents sector consists of a large number of individual users from many different manufacturing sectors. Identifying and organizing them into groups so that sustainable and cost-effective legal, policy, communications and technology interventions could be carried out was a key challenge. Programmes were therefore initiated to assist governments in identifying enterprises and building awareness among them on the need for sector-wide ODS phase-out.

The identification of eligible enterprises was another challenge. In most countries, the solvents sector did not benefit from any centralized industry associations, usually consisting of a large informal sector that was often not even aware of its ODS use. UNDP worked with partner countries to carry out surveys and conduct outreach programmes, and engaged country national customs By beginning with large-scale consumers and working along distribution lines - training, building capacity and transferring appropriate technology - it was possible to build trust among ODS solvents consumers and their distributors, right down to the smallest end-user. This strategic approach proved vital in countries such as China and India where small-scale users represented between 60-70 percent of the market.

The global UNDP solvent portfolio (US$ 66 million) represents 60 percent of approved solvent projects under the MLF.

China - solvent sector phase-out plan

When the Government of China requested the assistance of UNDP to tackle ODS use in solvents, there were around 2,200 widely-dispersed small and medium-sized enterprises using ODS solvents to clean printed circuit boards and precision instruments in a variety of applications including aviation, electronics, machinery, medical appliances, motor manufacturing, telecommunications and textiles.

In March 2000, UNDP assisted the Chinese State Environmental Protection Administration (SEPA) and the Ministry of Information Industry in the development of a multi-year, performance-based solvent sector phase-out plan. The plan supported development of viable alternatives for cleaning processes and ensured market availability of the most advanced high-quality/low-cost equipment through international and national competitive bidding processes. Technical assistance and training programmes, targeted at small and medium-size users, were combined with public awareness campaigns and helped support the introduction of new processes. At the same time, the phase-out plan supported national legislative measures and their enforcement, through control and monitoring of production and use of ODS solvents, and the phased reduction of ODS usage in the sector.

9

Phasing-out Methyl Bromide

In 1992 the Parties to the Montreal Protocol added methyl bromide (MeBr), an agricultural fumigant used to control a broad spectrum of pests, to the list of ODS. MeBr's major application was in soil fumigation in the production of high-value horticultural crops such as strawberries, tomatoes, cucumbers, melons and cut flowers. To a lesser extent it was also used to disinfest standing structures, such as food processing facilities, and to fumigate durable commodities, such as stored grains, as well as for quarantine and pre-shipment (QPS) treatments on certain products traded between countries.

The versatility, effectiveness and fast-action of MeBr gave it the reputation of a 'silver bullet', and it was popular with large and small-scale agricultural producers around the world. When MeBr was identified as an ODS, many agricultural experts, MeBr users and fumigation companies pointed to its positive properties and expressed concern that it would not be feasible to develop effective alternatives. The result, they predicted, would have very negative consequences on global agricultural productivity.

This reaction, and the importance of agriculture in the national economies of many countries, made negotiating a phase-out schedule that was acceptable to all Parties a lengthy process. Industrialized countries agreed in 1995 to a 2005 phase-out of MeBr use, with the exception of QPS and other critical uses. The schedule was subsequently adapted and extended for developing countries (See table in the back of this publication), although many countries chose to adopt earlier national phase-out schedules.

QUARANTINE AND PRE SHIPMENT (QPS):

QPS treatments are applied to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), where these are of potential importance to endangered areas or where these are present but not widely distributed and require official control, and are mandated by official requirements of an importing country or, existing official requirements of an exporting country.

Before long, a range of alternatives to MeBr use were identified and developed, including new products and more effective application methods for existing chemicals. By 2005, the Methyl Bromide Technical Options Committee (MBTOC) of the Montreal Protocol's Technical and Economic Assessment Panel (TEAP) had identified viable alternatives for about 95 percent of controlled uses of MeBr.

Since 1997, UNDP has been working with developing countries to implement demonstration projects aimed at building stakeholder confidence in the viability of MeBr alternatives. Once positive alternatives had been technically demonstrated

Malawi - 'Floating' a new production system in agricultural production

The Government of Malawi, working with the support of UNDP, recently completed a US$ 2.99 million project to phase-out all non-essential and non-QPS uses of MeBr in the country. In total, 185 tonnes of MeBr, in the past used anually by over 400,000 farmers was eliminated. The project had many successes and Malawi was able to meet the accelerated phase-out targets it had set for itself in 2000, reaching full MeBr phase-out by 1 January 2005. Early on, the Government established a National Project Steering Committee, consisting of a dedicated group of high-level stakeholders from both the public and private sectors. Malawi's Agricultural Research and Extension Trust (ARET), a national institution with close ties to the country's principal agricultural production sector, managed the project and helped enhance its credibility among stakeholders. Close cooperation between stakeholders also supported capacity development by encouraging the local production of materials to support the adoption of a cost-effective 'floating tray system' alternative, thereby developing local and regional market potential for small businesses and enhancing the long-term sustainability potential of the transition away from MeBr use. An added bonus was provided by the project's outreach activities in rural areas which offered an avenue – at the rural community level – for the dissemination of HIV/AIDS-related information developed by the Malawi National Aids Commission to protect beneficiaries and their families.

Phasing-out Methyl Bromide

and production yields validated over a number of agricultural production seasons, larger scale phase-out projects could be developed. Indeed, based on a 2015 phase-out target many countries chose to adopt earlier national phase-out schedules.

The elimination of MeBr use and its replacement with sustainable alternatives nevertheless still had to be approached delicately given the weight of agricultural sectors in many developing countries economies. An

Argentina - Methyl bromide phase-out

The Instituto Nacional de Tecnologia Agropecuaria (INTA) of Argentina, in partnership with the National Ozone Office and UNDP, implements a large-scale MeBr elimination project that targets thousands of farmers of whom approximately 80 percent work on small and medium-sized farms. The project operates in several provinces covering a large and climatically diverse area, from Patagonia in the cool southern regions to Misiones in the tropical north.

The project is working in collaboration with local farmers' cooperatives to conduct a training and extension programme that reaches more than 73,000 farmers and laborers. In each province it established consultative committees who guide project execution and whose members include growers' organizations, local government representatives and teams of regional technical experts.

The cooperative approach adopted by the project, backed by in-field technical validation, has enabled a number of the provinces to make a complete change to non-chemical alternatives, reaching 100% MeBr-free status in some areas well before Montreal Protocol deadlines. Grower confidence in the alternatives is high and the project's technical success is helping underpin regulatory enforcement measures being put in place by the Government. In 2004, the team hosted a highly successful study tour for a MLF-funded sister UNDP project in Malawi, allowing an exchange of approaches and results between agricultural technical specialists and policy-makers.

The project also seized the initiative when the opportunity to encourage broader socio-economic benefits arose during the project's implementation. Since agricultural production tends to produce significant quantities of solid plastic waste some of which, when burned, can result in the release of dioxins, one of the Stockholm Convention Persistent Organic Pollutants, it was clear that recycling opportunities should be explored and a pilot project was initiated in one province. The result, Punto Limpio (Clean Point), attracted private sector co-finance and was implemented in partnership with Cáritas Argentina, a catholic NGO. It encourages growers to return used agricultural materials, specifically polystyrene trays and tarps which are recycled into building materials, then used by Cáritas in community housing construction for the poor. The success of this project has led to another Punto Limpio being established in a neighboring province.

open, consultative process involving extensive and continuous stakeholder participation was required.

UNDP has provided capacity-building and technology transfer and supported activities to help partner countries achieve MeBr phase-out using its unique national execution modality (NEX). The knowledge that the agricultural sector in which MeBr was being used was important to each partner country's sustainable human development goals compelled UNDP and its national partners to look beyond the purely environmental considerations to identify synergies and establish innovative partnerships to broaden the impact of the Montreal Protocol investment. Each of the projects show-cased highlights how successful MeBr phase-out has also resulted in the uptake of additional, value-added innovative activities that support sustainable human development.

The UNDP sector portfolio (US $ 22 million) represents 21 percent of the total approved MeBr projects under the MLF.

Lebanon: Growing alternatives to the use of MeBr

Lebanon's MeBr Alternatives Project, which was launched in partnership with UNDP in 2001, was designed to phase-out the consumption of MeBr used in horticultural production by 2007. A sister project, executed by UNIDO, targeted elimination of MeBr in strawberry production.

The ultimate goal of the national strategy for the replacement of MeBr was to shift to the adoption of environmentally-friendly, non-toxic methods, boosting economical agricultural production, and creating a new trend in the country. The project, which is being executed nationally by the Lebanese Ministry of Environment, has initiated positive cooperation with the country's agricultural producers. The application of non-chemical techniques has achieved excellent results, raised grower confidence and resulted in a significant percentage of MeBr phase-out.

The project also faced a different challenge. Low-density polyethylene (PE) sheets, which are used when treating soil with both chemical and non-chemical alternatives, is used in Lebanon to cover greenhouses and small tunnels. Traditionally, used PE – an estimated annual quantity of 2,000 metric tonnes - has been disposed of by burning, dumping or burying, each of which have undesirable environmental repercussions. The Methyl Bromide Alternatives Project, sought to find a better solution to the PE disposal problem.

The project contacted an existing recycling plant located in an extensively agricultural area and provided its management with the technical information needed to treat used PE. The conversion, completed using private sector co-financing, allowed the plant to recycle up to 5 tonnes of used PE per day creating a win-win situation, with both environmental and socio-economic benefits.

10

Remaining Challenges / Future Opportunities

As the Montreal Protocol prepares to enter its third decade, there is global recognition of its success and its many and varied achievements. They include sustainable phase-out of over 95 percent of the ozone depleting chemicals it set out to control; a high degree of global participation - involving public, private and civil society interests – which has contributed to the excellent compliance standing among the majority of Parties; extensive assistance provided to developing countries to support their compliance objectives; and, indications that within this century the ozone layer is expected to return to its pre-1980 levels.

In addition, the implementation of the Montreal Protocol has yielded important human health benefits, as well as substantial climate benefits. While it has achieved many important successes, the job the Protocol was established to do is not yet complete and a number of challenges remain.

The 2010 targets

In the near term, the principle challenge will be maintaining the momentum for the total global phase-out of ODS required to ensure the ozone layer's repair. By 2010, developing countries must phase-out the remainder (20–30 percent) of the most commonly-used ODS. With the most immediate targets already reached, the final phase-out of, for example, the consumption of CFCs in millions of refrigeration systems and automobile air conditioners, will not be easy. Support for such activities is either already assured or soon to be provided, but countries will have to work hard to ensure that their elimination does not result in undue economic disruption.

The transition to non-CFC metered dose inhalers (MDIs) is still a challenge for a number of developing countries that rely on pharmaceutical grade CFC to manufacture MDIs. Gaining access to CFC-free technologies and technical assistance to convert their manufacturing plants will be key. Inability to move away from CFCs for these purposes may place them in non-compliance with the Protocol. Beyond 2010, the availability of pharmaceutical grade CFCs may become an issue, given that manufacturers will likely cease production. Many developing countries are now working with financial assistance from the MLF to develop and implement transition strategies to CFC-free MDIs.

The 2015 target

Another challenge arises from the continuing use of methyl bromide (MeBr) for quarantine and pre-shipment (QPS) uses not controlled by the Montreal Protocol. Important advances have been made in identifying and encouraging the uptake of MeBr alternatives for non-QPS uses, resulting in many countries having achieved or poised to achieve full phase-out well before the 100 percent phase-out target of 2015. However, steady increase in MeBr use may result from international import/export phytosanitary requirements. Dialogue must continue with the International Plant Protection Convention (IPPC) regarding its International Standards for Phytosanitary Measures Publication No. 15 (ISPM-15), which contains guidelines for regulating wood packaging material in international trade to prevent the spread of pests and promotes, among other things, MeBr use for this purpose. At the same time the search for viable alternatives should continue. If it does not, the valuable work achieved by the Montreal Protocol and its MLF in phasing-out non-QPS uses of MeBr will be steadily undone and protection of the ozone layer will suffer.

The Longer-term scenario

The Parties must also address the longer-term use of hydrochlorofluorocarbons (HCFCs). As the Protocol currently stands production and import of HCFCs may continue in developed countries until 2030 and in developing countries until 2040. However, there is already an imbalance as numerous developed countries have begun phasing out HCFCs at a faster rate than required by the Protocol, while in developing countries HCFC use is escalating. This could threaten not only the protection of the ozone layer in the longer term, but negatively impact developing countries' economies in the short term.

'By 2010, the Montreal Protocol will have prevented the equivalent of between 9.7 and 12.5 gigatonnes of CO_2 from entering the atmosphere - five to six times the reduction target of the first commitment period (2008-2012) of the Kyoto Protocol. [13]

Remaining Challenges / Future Opportunities

10

In order to short circuit potential problems arising, UNDP assisted 12 large and medium-sized HCFC-consuming developing countries to undertake national HCFC surveys. Results showed that there are a multitude of issues that will determine the future of the use of HCFCs and highlighted the countries' concerns and needs, as well as their desire to move towards finding solutions sooner, rather than later. Virtually all the countries surveyed expressed an interest in considering HCFC growth adjustment programmes and accelerated phase-out strategies. Consensus reigned among the 12 that any changes agreed to the Protocol's HCFC targets would need to ensure the sustained and cost-effective availability of environmentally-friendly substitutes, access to technical assistance and technology transfer, as well as funding to facilitate the transition so that no undue burden would be experienced by the countries' economies and no constraints imposed on their consumers and industries.

The HCFC dialogue has significantly evolved. A number of proposals for the adoption of interim phase-out targets that could lead to an overall acceleration of HCFC phase-out have been tabled for the consideration of the Parties at its 19th meeting.

Safeguarding both the ozone layer and the global climate

The phase-out of ODS achieved to date has brought about not only a regeneration of the ozone layer but important reductions in greenhouse gas emissions. This is due to the fact that ODS, as well as some of their substitutes, are also powerful greenhouse gases (GHG) that contribute to climate change (see image 4).

Technical and scientific assessment panels under the ozone protection and

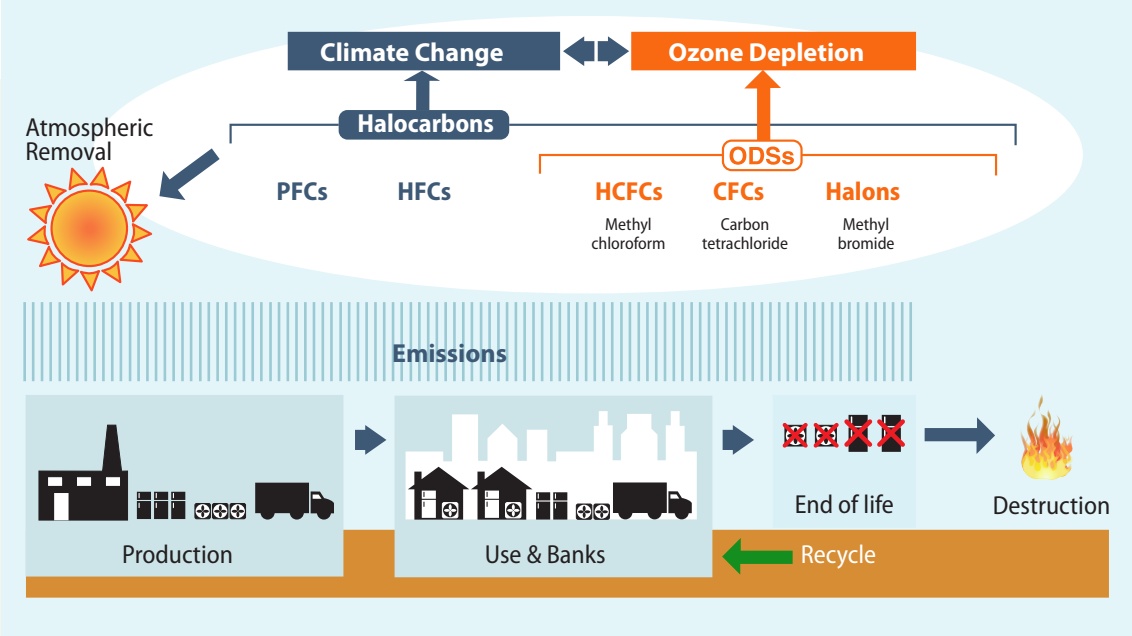

IMAGE 4: THE EFFECTS OF ODS EMISSIONS ON OZONE DEPLETION AND CLIMATE CHANGE [14]

climate change regimes have noted that the global decline in emissions of ODS has brought about reductions in GHG equivalent to several billion tonnes of CO_2 equivalent. These enormous reductions make the Montreal Protocol a key contributor to the global fight against climate change.

Phase-out of ODS achieved under the Protocol has also supported the earth's climate in another way. In the process of converting from ODS use, manufacturers have upgraded equipment, resulting in fewer leaks thereby reducing direct emissions of substitute chemicals to the atmosphere.Equipment upgrades also promote greater energy efficiency, thus reducing indirect emissions from energy generation. Additional climate benefits can still be achieved by further actions under the Montreal Protocol. The phase-out of remaining CFCs and other ODS, along with HCFCs, will even deliver more positive impact towards climate change abatement

Managing ODS banks

With the assistance of the MLF, developing countries have initiated and implemented various successful types of activities in the refrigeration servicing sector aimed at reducing dependence of ODS by establishing good refrigerant management practices, initiating technician training and recovery and recycling programmes. Nevertheless, the final disposal of unwanted ODS, such as those contaminated and therefore, un-recyclable or, those housed in foam insulation in old refrigeration equipment, remains without solution. Even large-scale developing countries who have, with MLF support, invested in establishment of ODS reclamation facilities – centres that treat CFCs to allow them to be re-used, essentially bringing them back to original quality – are faced with the task of finding solutions to dealing with contaminated CFCs that need to be destroyed.

Encouraging the environmentally-friendly disposal of such ODS can serve as an environmental safeguard, as their potential emissions would unnecessarily delay the recovery of the ozone layer and contribute to the warming of the planet.

The removal of barriers in dealing with ODS waste requires development of a sustainable business model, founded on credible technology solutions. It also necessarily involves the need to mobilize financial resources that will allow the problem to be tackled effectively. Addressing the ODS waste problem in such a comprehensive manner is critical for the success of such activities.

'Without the Montreal Protocol, the amount of heat trapped due to ODS would be double that of today. The benefits to the climate, achieve by the Montreal Protocol alone, at present greatly exceed the initial target of the Kyoto Protocol'. [15]

	Substance	Uses	Ozone Depleting Potential (ODP)**	Global Warming Potential (GWP)***	Atmospheric lifetime (yrs)	Consumption freezes and reductions	Final Phase-out date
Common Ozone Depleting Substances	Chlorofluoro carbons (CFCs)	Refrigerants, cleaning solvents, aerosol propellants, and blowing agents for plastic foam manufacture.	0.6 – 1.0	4,680 – 10,720	60	1994 (75%) A & B 1993 (20%) B 1989 (freeze) A 1989 (base level) B 1986 (base level) A	1 Jan 1996 (A & B)
						2007 (85%) A & B 2005 (50%) A 2003 (20%) B 1999 (freeze) A 1998-2000 (base level B) 1995-97 (base level A)	1 Jan 2010 (A & B)
	Halons	Fire extinguishers/fire suppression systems, explosion protection.	3 – 10	1,620 – 7,030	120	1992 (freeze) 1986 (base level)	1 Jan 1994
						2005 (50%) 2002 (freeze) 1995-97 (base level)	1 Jan 2010
	Carbon Tetrachloride (CCL_4)	Production of CFCs (feedstock), solvents/diluents, fire extinguishers.	1.1	1,380	90	1995 (85%) 1989 (base level)	1 Jan 1996
						Jan 2005 (85%) 1998-2000 (base level)	1 Jan 2010
	Methyl chloroform ($CHCl_3$)	Industrial solvent for cleaning, inks, correction fluid.	0.1	144	200	1994 (50%) 1993 (freeze) 1989 (base level)	1 Jan 1996
						2010 (70%) 2005 (30%) 2003 (freeze) 1998-2000 (base level)	1 Jan 2015
	Methyl bromide (CH_3Br)	Fumigant used to control soil-borne pests and diseases in crops prior to planting and in commodities such as stored grains. Fumigants are substances that give off fumes; they are often used as disinfectants or to kill pests.	0.6	5	25	2003 (70%) 2001 (50%) 1999 (25%) 1995 (freeze) 1991 (base level)	1 Jan 2005
						2005 (20%) 2002 (freeze) 1995-98 (base level)	1 Jan 2015
Some Alternatives*	Hydrochloro fluoro carbons (HCFCs)	Transitional CFC replacements used as refrigerants, solvents, blowing agents for plastic foam manufacture, and fire extinguishers. HCFCs deplete stratospheric ozone, but to a much lesser extent than CFCs; however they are greenhouse gases.	0.01-0.5	76 – 2,270	80-110	2020 (99.5% C) 2015 (90% C) 2010 (65% C) 2004 (35% C) 2004 (freeze P) 1996 (freeze C)	1 Jan 2030 (C)
						2016 (freeze P & C) 2015 (base level P & C)	1 Jan 2040 (C)
	Hydrofluoro carbons (HFCs)	CFC replacements used as refrigerants, aerosol propellants, solvents, and fire extinguishers. HFCs do not deplete stratospheric ozone, but they are greenhouse gases.	0	122 – 14,130	23-28	na	na

Table 2: Common Ozone-Depleting Substances and some alternatives [16]

*This is a limited list and does not represent all of the available alternatives; **ODP = Ozone Depleting Potential, which is the ratio of the impact on ozone caused by a substance compared to the impact of a similar mass of CFC-11 (the ODP of CFC-11 is 1.0); ***GWP = Global Warming Potential is the ratio of the warming caused by a substance compared to the warming caused by a similar mass of carbon dioxide (the GWP of carbon dioxide is 1.0); A = CFCs that belong to Annex A – Group 1 (CFC-11, CFC-12, CFC-113, CFC-114 and CFC-115); B = CFCs that belong to Annex B – Group 1 (CFC-13, CFC-111, CFC-112, CFC-211, CFC-212, CFC-213, CFC-214, CFC-215, CFC-216, CFC-217); C = Consumption; P = Production,

Developing countries Parties to the Montreal Protocol, also referred to as Article 5 (1) countries and defined as those that consume less than 0.3 kg of ODS per capita per year

Industrialized countries, also referred to as non-Article 5 countries

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THE UNDP-MPU TEAM

UNDP's Multilateral Fund activities are managed by the Montreal Protocol Unit (MPU) at UNDP headquarters in New York, with the majority of activities executed nationally with support from UNDP country offices.

Since 1991, UNDP-MPU has managed a global programme in more than 100 countries, supporting over 1,900 projects with around US$ 500 million in funding, principally from the MLF.

The MPU team is made up of programme coordinators with expertise in relevant technical, economic and political sectors, who help governments and industry to design, implement, monitor and evaluate ozone-depleting substances (ODS) phase-out projects. The MPU team also has three regional programme coordinators located in Panama, Slovakia and Thailand who support Montreal Protocol programming in Central America, Europe and the CIS, Africa, and Asia and the Pacific .

Over the years, MPU has developed a network of technical experts, as well as regional and national consultants, who provide expertise to partner countries and are brought in to advise on projects.

THE UNDP-GEF TEAM

The Global Environment Facility team of the United Nations Development Programme (UNDP-GEF) is headquartered in New York. UNDP-GEF has six regional coordination units located in Thailand, Slovakia, Lebanon, Panama, Senegal and South Africa.

Working with other international organizations, bilateral development agencies, national institutions, non-governmental organizations, private sector entities and academic institutions, the UNDP-GEF team supports the development of projects and oversees a mature portfolio of projects in all six GEF focal areas of biodiversity, climate change, international waters, land degradation, persistent organic pollutants (POPs) and ozone depleting substance (ODS) phase-out (managed by UNDP-MPU). The cumulative UNDP-GEF portfolio stands at US$ 2.7 billion in core grants, with over US$ 4.2 billion raised in additional co-financing. On behalf of the GEF partnership, UNDP-GEF also manages five corporate programmes, the Small Grants Programme (SGP), the National Dialogue Initiative, the National Communication Support Programme (NCSP), the Support Programme for the National Capacities Self-Assessment (NCSA) and the Country Support Programme (CSP).

UNDP-GEF also implements projects channeled through two special funds under the UNFCCC – the Least Developed Countries Fund and the Special Climate Change Fund – as well the Adaptation Fund under the Kyoto Protocol.

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