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Message from the Director

To foster the phase-out of a number of substances responsible for ozone depletion, the international community adopted the Montreal Protocol (MP). Protecting the ozone layer presents an unusually complex set of challenges. Nonetheless, a combination of key factors has allowed the Montreal Protocol to become a successful agreement. These include:

- Common but differentiated responsibilities between developed and developing countries,
- Commitment to transfer clean technologies and to create the necessary local capacities,
- Establishment of the Multilateral Fund (MLF),
- Incorporation of instruments deliberately designed to be flexible and dynamic,
- Scientific inputs throughout the negotiation, assessment and implementation phases,
- Active participation of the private sector and civil society throughout the entire cycle, and
- Trade sanctions imposed to achieve the agreed goals.

Since 1992, when UNIDO became the fourth implementing agency of the Montreal Protocol, the Organization has implemented over 600 investment projects and executed more than 500 non-investment activities. As such, a substantive amount of the world's total consumption of ozone depleting substances (ODS) was phased out through UNIDO's intervention. UNIDO's activities have largely focused on promoting innovative technologies. Still, there are many challenges ahead, including moving the phase-out date of hydro chlorofluorocarbons (HCFCs) by ten years. In response, UNIDO is preparing HCFCs phase-out management plans (HPMPs) as well as a number of demonstration projects. These should be finalized by the end of 2009. In doing so, the Organization seeks to address four challenges simultaneously:

- A zero ozone depleting potential,
- A very low global warming potential,
- Efficient energy consumption, and
- Reasonable cost-effectiveness ratio.

In a nutshell: since the inception of the Montreal Protocol, the experience of helping to protect the ozone layer has offered invaluable lessons for policymakers, multilateral bodies and industry. Together, these important actors form a formidable alliance in confronting the new global environmental challenges. UNIDO is very proud to be part of this essential effort and share some of its experiences.

Sidi Menad Si Ahmed
Director, Montreal Protocol Branch,
UNIDO

UNIDO FOCUS

Montreal Protocol on Substances that Deplete the Ozone Layer

The Montreal Protocol (MP) is an international chemical management treaty. Through the Protocol, countries agree to control, in line with an agreed schedule, the production and consumption of substances that damage the Earth's protective shield. In doing so, governments, international organizations, the private sector and civil society provide a concrete example of how urgent challenges can be effectively addressed. The Multilateral Fund (MLF) was also established to provide support for projects to eliminate ozone depleting

substances (ODS). This has led to National Ozone Units (NOUs) being enabled as government focal points in 131 countries. Indeed, the Protocol has now been widely recognized as an unprecedented success, evidence of which can be gleaned from the massive reductions in ODS use worldwide. In his report to the General Assembly's Millennium Summit, former UN Secretary-General Kofi Annan pointed to the Protocol as "perhaps the most successful environmental agreement to date."

The Multilateral Fund and its Modus Operandi

To support the achievement of the objectives of the MP, a Multilateral Fund has been established. As a first step, a company has to understand the potential benefits of changing its processes to non-ODS technologies. In the preparatory phase, the company pre-selects an appropriate technology. Thereafter, a project is designed to obtain MLF financing. Specifically, the following strategic aspects are addressed:

- Identification and assessment of the stakeholders' critical prerequisites and needs,
- Existence or development of strong institutional competencies in recipient countries,
- Market overview, including comparison between ozone depleting substances and non-ODS substitutes,
- Comprehensive (thus time-consuming) technology transfer using limited, task-oriented resources,
- Dissemination of technical and economic information with the guarantee that acceptable quality levels will be maintained, and
- Project design and implementation with built-in maximum flexibility for effective responses to dynamic environments.

DID YOU KNOW?



Ozone is an uncommon molecular form of oxygen: in the stratosphere, it is formed by the action of sunlight on oxygen.



ODS diminish the girth of the stratospheric ozone layer.



Scientists have established a common benchmark - ozone depleting potential (ODP) - against which each ODS is measured. The point of reference used is trichlorofluoromethane CFC-11, which has an orientation level of 1. Other substances are assigned values in relation to how much a comparable weight would deplete the ozone layer.



The use of ODP as a standard measure makes it possible to compare how different projects focusing on different chemicals will affect the ozone layer.



UNIDO's Role as an Implementation Agency of MLF Projects

As an implementing agency, UNIDO helps its client countries attain their ozone-related objectives. More specifically, UNIDO provides the following services:

- Policy, strategy and programme design,
- Development of supporting institutions,
- Support for enterprises during the compliance period, and
- Generation of databases on the impact of MP activities.

Within the above, the Organization focuses its work on six specific areas of expertise: ODS

production, refrigerants, plastic foams, halons, solvents, fumigants and aerosols. In each area, UNIDO identifies cost-effective ways of reducing ODS use. For example, more than 20 developing countries have benefited from UNIDO's expertise in the development and implementation of methyl bromide demonstration and phase-out projects. So far, the Organization has trained more than 150,000 farmers in the use of non-chemical alternatives to methyl bromide. This has given them the opportunity to become - through the adoption of new technologies - more competitive in international markets. There is now particularly visible progress in the tobacco, cut flower and horticulture sectors.



Phasing-out Methyl Bromide in Morocco

Innovation in MLF Projects

Among the MLF implementing agencies, UNIDO plays a leading role in ensuring the transfer of the latest non-ODS technologies to developing countries. In some instances, the Organization even spearheads their development: for example, UNIDO formulated the first two fully hydrocarbon domestic refrigeration projects (namely, cyclopentane and isobutane). The Organization also took the lead in promoting liquid carbon dioxide blowing technology as the most advanced alternative solution for the manufacturing of flexible polyurethane foam. Likewise, UNIDO was the driving force behind demonstration projects in the fumigant sector, which convinced farmers that there are alternatives to methyl bromide for soil and storage fumigation.

As an additional benefit, UNIDO also enabled companies to increase their productivity and lower their operating costs - through less maintenance and higher product quality and reliability. As a result, these activities contribute to generating employment, both by sustaining existing jobs and by creating new ones. Furthermore, UNIDO's technical assistance in the polymer processing and plastics transformation industry has led to the establishment of 12 Research and Development centres for plastics and polymers in various geographic regions. Additionally, UNIDO has taken the lead in promoting liquid crystal display (LCD) blowing technology as an advanced alternative solution for flexible polyurethane (PU) foam. As a consequence, UNIDO's share of LCD projects in the MLF foam sector represents 32 percent in terms of ODP, 28 percent in terms of number of LCD projects and 31 percent in terms of funding.

DID YOU KNOW?



In December 2008, UNIDO received US\$ 557,918,748 from the MLF to assist 85 developing countries and economies in transition to adhere to their compliance obligations under the MP. These countries are now well positioned to reach full observance of their MP targets by the end of 2009. Consequently, by that date, the Organization will have contributed to the elimination of a substantive amount of the world's total consumption of ODS. Overall, the MLF Executive Committee approved the expenditure of over US\$ 2.3 billion to support over 6,000 projects and activities in 148 countries. The completion of these projects will result in the phase-out of the consumption of more than 254,687 ODP tons and the production of about 176,439 ODP tons of ODS.

Technical Training, Demonstration and Strategic Support in MLF Projects

Training programmes are an integral component of all UNIDO MLF projects. The programmes, focusing on management and technical skills, contribute to absorbing and adapting new information. For example, the installation of the latest non-ODS technology requires on-the-job and external training of operators as well as of maintenance staff so that optimal performance of the new equipment is ensured. Likewise, safe handling of the new equipment and chemicals, especially with conversions to hydrocarbons (which are flammable) and replacement of CFC-based solvents with (more toxic) substitutes is another essential training component in all UNIDO projects.

Associated with the successful transfer of ODS phase-out technologies are the enhancement of project design, production engineering,

equipment maintenance and repair skills. Whereas redesign of the first batch of refrigerators typically required advice from international experts, the trained company engineers can now use their acquired skills to redesign the remaining models. Another example: urethane technicians that learn how to reformulate chemical compounds to phase out ODS are then able to apply the same skills to introduce new molded and integral skin foam products.

UNIDO-led technology transfer programmes are more than a simple exercise in phasing-out ODS (and their replacement by non-ODS alternative technologies); they are also activities that encompass best practices in manufacturing, trade facilitation, training, know-how transfer, quality, safety and sustainable development.

DID YOU KNOW?



Capacity Building and Trade Facilitation, Engines of Development

UNIDO MLF projects routinely aim at increasing the competitiveness of enterprises in domestic and international markets by concurrently replacing their chemicals and equipment and adjusting their production processes to evolving market requirements.

Productivity benefits flowing from process and product innovation associated with ODS phase-out are improved design and quality of products, thus helping firms improve their export potential

UNIDO's Approach to Methyl Bromide Phase-out

Since 1996, UNIDO has been a driving force behind methyl bromide phase-out projects. As such, it has trained farmers in developing countries on alternative technologies to methyl bromide for soil and commodities fumigation and conducted demonstration projects in over 20 countries. The success of these projects convinced the MLF of the approach's validity, which in turn led to the approval of additional investment projects.

UNIDO has supported a wide range of farmers growing flowers, strawberries, tobacco seedlings and horticulture crops, as well as companies involved in the food storage sector. A total of 173 Projects have been implemented

in 53 developing countries, accounting for the elimination of more than 8,000 tons of methyl bromide. To further sustain the projects and to ensure a safer environment for the local producers and companies, UNIDO has promoted the adoption of non-chemical alternatives to methyl bromide including grafting, steam pasteurization, soil solarization and soilless cultivation, as well as the introduction of an Integrated Pest Management concept.

Methyl bromide conversion provides important results towards the achievements of the Millennium Development Goals (MDGs) through higher quality of yielded products

(when compared to those prior to conversion) and a decrease in chemical inputs in agriculture, thereby creating a safer environment for rural activities.



UNIDO helps farmers become more competitive in international markets through the adoption of new non-chemical alternatives

DID YOU KNOW?



Methyl bromide is a colorless, nonflammable and highly toxic gas, which belongs to the family of organic halogen compounds. It is also a broad spectrum pesticide with applications in the control of pest insects, nematodes, weeds, pathogens and rodents. Methyl bromide is used in agriculture - primarily for soil fumigation - as well as for commodity and quarantine treatment. Exposure to this chemical will affect not only the target pests it is used against, but non-target organisms as well. Methyl bromide dissipates rapidly into the atmosphere. Human exposure to high concentrations of methyl bromide can result in failure of central nervous and respiratory systems. It is also a significant ozone depleting substance.



New Challenges: Phasing-out Transitional Hydro Chlorofluorocarbons (HCFCs)

Introduced in the 1990s as alternative chemicals to replace chlorofluorocarbons (CFCs), HCFCs were later added to the list of MP controlled substances. At the time, it was acknowledged that these chemicals, with considerably lower ODP, were transitional in their application, production and consumption. They would also have to be phased-out under the Protocol as many HCFCs possess high global warming potential, well

over that that of carbon dioxide. UNIDO encourages the use of natural replacement alternatives in the refrigeration sector, primarily cyclopentane and isobutane, as well as n-pentane and carbon dioxide in the foam sector.

Technically speaking, there are many options to replace HCFC refrigerants, equipment and systems, such as hydro fluorocarbons and ammonia.

Accelerated Phase-out Schedule

The 55th Meeting of the Executive Committee of the Montreal Protocol approved the required funds to launch the HCFC phase-out management plan, thereby reiterating the need for urgent action towards phasing-out HCFCs. UNIDO secured funds to carry out comprehensive surveys of national and enterprise-level

supply and consumption of these chemicals in Article 5 countries. This had the objective of defining strategic options in the formulation of HCFC phase-out strategies. The expected outcome will be an HCFC phase-out management plan that is acceptable to all stakeholders involved.

Uncertainties in Techno-economic Options

Technical complexities of HCFCs conversion technologies and processes pose unprecedented problems to the MP community since there are many unanswered questions to the following challenges:

- Zero ozone depleting potential,
- Low global warming potential,
- Efficient energy consumption, and
- Reasonable cost effectiveness ratio.

UNIDO will provide its expertise in the implementation of all technology options. This is reminiscent of a similar responsibility borne by UNIDO's recent experience of phasing-out CFC. In this case, the Organization fostered innovations for hydrocarbons, liquid carbon dioxide, water cleaning and steam pasteurization. Today, those technologies are widely used throughout the developing world.



UNIDO plays a leading role in ensuring the transfer of the latest technological options to developing countries

DID YOU KNOW?



While there are many HCFCs, the following compounds account for the most use:

- Designation: Main applications
- CHClF₂: Refrigerants (pure or in blends for CFC drop-ins)
- HCFC-22: Blowing agent component for polyurethane foams (PUR) and for extruded polystyrene foams (XPS)
- HCFC-141b: Blowing agent component for polyurethane and phenolic
- CCl₂FCH₃: insulating, foams, solvents
- HCFC-123 : Refrigerant for large chillers
- CHCl₂CF₃: Firefighting agent
- HCFC-124 :Refrigerant in special applications
- CHClFCF₃ : Firefighting agent
- HCFC-142a: Blowing agent component for PUR
- CClF₂CH₃: and for XPS



UNIDO anticipated the historical agreement on the accelerated phase-out of transitional substances (mainly HCFCs) and initiated early consultations with counterparts in developing countries. These efforts culminated when a seminar on alternative technologies and associated challenges was convened at UNIDO headquarters in February 2007. As a result, 39 projects were secured for HCFC phase-out in 37 Article 5 Countries by December 2008.

SELECTED MP PROJECTS

In an effort to showcase the achievements of the MP, the Ozone Secretariat invited nominations for “exemplary MLF-funded projects”.

More than 70 nominations were appraised by the Multilateral Fund (MF) Secretariat, the Ozone Secretariat and the Chairman of the Executive Committee of the MF together with

representatives of the Fund’s four implementing agencies: the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the United Nations Industrial Development Organization (UNIDO) and the World Bank. The projects presented in this Newsletter are a selection of those implemented by UNIDO.

Phasing-out Methyl Bromide

In the Former Yugoslav Republic of Macedonia (FYROM)

In the Former Yugoslav Republic of Macedonia, tobacco is a major crop, with a yearly total production of 34,680 tons of which over half is being exported. Annual sales are in the order of US\$80 million. They also provide needed revenue for farmers, which are estimated yearly at US\$2,000 per hectare (the country’s cultivated surface area totals some 22,000 hectares, thus an average yield equivalent to 1,580 kg per hectare). Furthermore, 10 percent of the country’s population is employed in the tobacco industry.

Based on the results of an initial demonstration project, tobacco farmers chose to change

their mode of production and to adopt soil-less cultivation using a floating tray technology. In the process of implementation, UNIDO also adapted this technology to the predominantly grown Oriental plant which is considerably smaller than the Virginia plant. While challenging at the outset, the project proved to be a resounding success resulting in the elimination of 41.3 tons of annual methyl bromide use (24.78 ODP tons).

Moreover, the implementation of the floating tray technology yielded the same production levels as the pre-phase-out baseline, but with higher-quality plants.

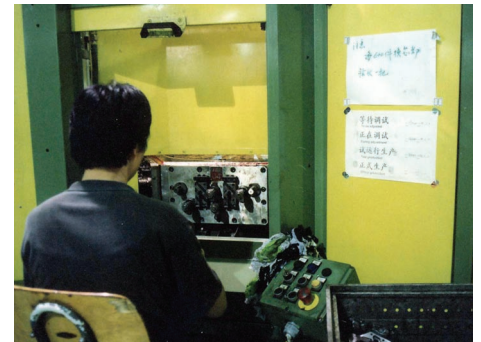


Tobacco farmers in the Former Yugoslav Republic of Macedonia (FYROM) adopt soil-less cultivation using floating tray technologies

Compressor Conversion at Jiaxipera Factory

China

The Jiaxipera Company in China employs 900 staff members in the production of six different compressor models used in domestic refrigerators. Compressors are primary components of refrigerators that drive the process of heat removal. Although they do not contain CFCs themselves, the conversion of compressor manufacturers was an essential component of the phase-out of CFCs used in refrigerators.



UNIDO helps train engineers in China

In 1994, the annual production of compressors amounted to 600,000 units, i.e. approximately 10 percent of the Chinese market (there were no exports).

To provide for its main customers - manufacturers of advanced refrigerators - Jiaxipera requested UNIDO’s assistance in redesigning its compressor products to accommodate isobutane as the new refrigerant (thereby replacing CFC-12).

UNIDO helped train Jiaxipera engineers in redesign techniques and provided assistance in improving the efficiency of the compressors. The resulting products met the latest customer requirements and international standards. Thus, Jiaxipera became one of the first companies in a developing country to produce the latest environmentally-friendly hydrocarbon compressors.

Since Jiaxipera could easily find isobutane compressor users in both local and export markets, its sales increased. In 2000, Jiaxipera produced 1 million compressors and by 2007, its production had increased to over 4 million units a year.



Process Agent Project at Satya Deeptha Pharmaceuticals

India

Since 1994, Satya Deeptha Pharmaceuticals Ltd. had produced up to 323 tons of ibuprofen per year. Carbon tetrachloride has been used as process solvent in the first step of ibuprofen production. Process solvents are chemicals that act as catalysts for the chemical reactions needed to produce a host of modern products and chemicals such as Ibuprofen. Traditionally, there is a small group of ozone-depleting substances that have been used as process agents in both developed and developing countries, and their use in the latter has often been associated with high emission levels. The company eliminated its consumption of carbon tetrachloride by converting to the use of the non-ozone-depleting solvent ethylene dichloride (EDC), while maintaining its production capacity of Ibuprofen at 323 tons per year. The project encountered some technical difficulties, since the use of EDC required a relocation of the

storage site away from the production area. Nevertheless, the project phased out 25.38

metric tons (27.92 ODP tons) of carbon tetrachloride per year.



Satya Deeptha Pharmaceuticals Ltd. in India

GLOBAL FORUM ACTIVITIES

Meeting on Phasing-out HCFCs in A5 Countries

Vienna, Austria, 18-20 February 2008

From 18 to 20 February 2008, UNIDO organized a seminar to introduce stakeholders to the complex aspects of HCFC phase-out programmes, with a focus on the refrigeration, insulation, integral skin and packaging foam sectors.

The technical presentations included discussions on new technologies for substitution of HCFCs, use of propane as refrigerant for air conditioning appliances, equipment needs for HCFC-22 alternatives, status of absorption refrigeration technologies, alternatives for use in polyurethanes foams, as well as containment and recycling of HCFCs and retrofitting of their equipment.

In addition, technical, economic and ecological implications of replacing HCFC foam agents were discussed. With respect to cooling options, all possible technologies including, hydrocarbon, ammonia, desiccant, evaporative and cogeneration were presented and the respective merits discussed. A similar exercise

was undertaken for the other relevant sectors such as refrigeration and foam. The exchange of information that took place enabled UNIDO

and the countries concerned to prepare strategies which incorporated the guidance and lessons learned from the discussions.



Participants of the Meeting on Alternative Substances and Technologies to Phase out HCFCs in A5 Countries and Countries with Economies in Transition

Readers are invited to send their
comments and opinions to:



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