25 Years of the Montreal Protocol

MONTREAL PROTOCOL INFORMATION SHEET

20 Years of UNIDO Implementation

Mitigating Climate Change through the Montreal Protocol

Developing Industries with Ozone and Climate Friendly Technologies

The principal aim of the Montreal Protocol is to protect the ozone layer by taking measures to control total global production and consumption of ozone-depleting substances (ODS), with the ultimate objective of their elimination on the basis of developments in scientific knowledge and technological innovation. ODS are used in a number of sectors, namely: refrigeration and air conditioning; foam and solvent manufacturing; inhaled therapy for medical purposes; and agriculture. UNIDO, together with the other implementing agencies of the Montreal Protocol, support these sectors in developing countries (Article 5 countries of the Montreal Protocol) in the process of phasing out these substances.

The Montreal Protocol is currently involved in the process of phasing out hydrochlorofluorocarbons (HCFC), which have been used as the main intermediary replacements of chlorofluorocarbons (CFC). Besides depleting the ozone layer, most ODS are responsible for a climate impact that can occur both directly and indirectly. Direct climate change impact is caused by emissions to the atmosphere. For example, ODS such as CFCs and HCFCs are also powerful greenhouse gases with significant global warming potential, hundreds or thousands of times higher than that of carbon dioxide (CO_2). Indirect climate change impact is linked to the significant amounts of electrical power that the refrigeration and air-conditioning systems using ODS consume during their lifetimes.

This is why activities under the Montreal Protocol have not only contributed to reversing the damage done to the ozone layer, but also resulted in the mitigation of greenhouse gases equal to 11 gigatonnes of CO_2-equivalent per year. However, countries face new climate-related challenges as they proceed with phasing out HCFCs. Available alternatives include hydrofluorocarbons (HFCs); although these are not ODS, most are potent greenhouse gases covered by the UNFCCC, and are also included in the basket of gases subject to emission targets under the Kyoto Protocol.

In the last years, countries have taken resolute steps in implementing Montreal Protocol projects that also bring considerable benefits to the climate, with UNIDO playing a prominent role in promoting sustainable solutions, that is, substances with zero ozone-depleting and low global warming potential, avoiding transitional alternatives. In addition, UNIDO projects upgrade equipment which results in fewer leaks of substitute chemicals to the atmosphere and also promote greater energy efficiency, thus reducing indirect emissions from energy generation.

UNIDO strongly demonstrates the impact on the climate of its Montreal Protocol projects in various sectors.

AIR CONDITIONING AND REFRIGERATION

Refrigerants used in the air-conditioning and refrigeration industries represent a great part of the overall consumption of ozone-depleting substances. One of the most common refrigerant gases used for this application in developing countries, HCFC-22 (R-22), causes less damage to the ozone layer than its predecessor (CFC-12), but has a considerably high global warming potential. According to the Montreal Protocol phase-out schedule for Article 5 parties, HCFC-22 must be completely phased out by the year 2030.

UNIDO projects promote and implement alternative technologies for the air-conditioning and refrigeration sectors that neither deplete the ozone layer nor represent a threat to global warming. The most common alternative refrigerants for these sectors are isobutane (R-600a) and propane (R-290a). These gases have zero ozone-depleting and very low global warming potential and can serve as a functional replacement for CFCs and HCFCs in conventional stationary refrigeration and air-conditioning systems.

Besides converting air-conditioning and refrigeration manufacturing plants, the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol established a funding window amounting to US $15.2 million for implementing agencies to demonstrate the feasibility of replacing chillers through the use of resources outside the Multilateral Fund. The aim of chiller projects is to reduce the consumption of ozone-depleting substances as well as to improve the energy efficiency, demonstrating actual energy savings resulting from the replacement of old CFC chillers and therefore reducing greenhouse gas emissions.

FOAM MANUFACTURING

HCFC-141b has been widely used as foam blowing agent for polyurethane foam and extruded polystyrene foam (XPS) due to its good insulation and foaming properties. Just like HCFC-22, HCFC-141b will have to be completely phased out by 2030. There are several mature alternative foaming technologies.

For the replacement of HCFC-141b in the polyurethane foam industry, the main substitute technologies with no ozone-depleting and very low global warming potential are: hydrocarbons (usually cyclopentane and isopentane), CO_2 generated by reaction between water and isocyanate, and liquid CO_2. For extruded polystyrene, alternative blowing agents promoted by UNIDO include hydrocarbons (usually butane and cyclopentane) and CO_2 technology. In certain cases, in order to meet the requirements of extruded polystyrene processing and performance, mixes of very low volumes of several other blowing agents are used, such as ethanol, methyl ether, methyl formate, or even very small amounts of HFCs.

DESTRUCTION OF OZONE-DEPLETING SUBSTANCES

Ozone-depleting substances in existing stockpiles of chemicals and products that are being discarded because they are no longer useful or replaced in connection with energy efficiency programs, so called ‘ODS banks’, threaten to leak into the atmosphere, potentially jeopardizing the repair of the ozone layer and posing significant threats to the global climate. Because of these threats, the Multilateral Fund finances pilot projects for the destruction of ODS banks in developing countries. UNIDO is implementing several of such pilot ODS banks related projects, which are instrumental in helping to determine the economic feasibility of collection and destruction strategies. Results from these pilot projects will help to identify and secure funding necessary to collect and destroy ODS banks on a larger scale.