

25 YEARS

MONTREAL  
PROTOCOL



*Empowered lives.  
Resilient nations.*



**PARTNERSHIPS FOR CHANGE**

MONTREAL PROTOCOL



United Nations Development Programme



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## FOREWORD

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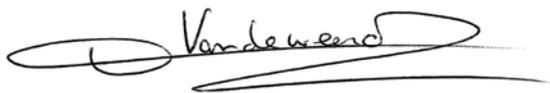
In 1987 the international community agreed to the Montreal Protocol on Substances that Deplete the Ozone Layer. The adoption of the Protocol heralded a new era of global environmental responsibility and resolute action. Overwhelming scientific evidence of depleting stratospheric ozone layer and associated negative consequences motivated countries to take decisive steps to phase out the consumption and production of ozone depleting substances used in important economic sectors.

Now, after 25 years, the Montreal Protocol is hailed as the most successful environmental agreement. The implementation of the Montreal Protocol resulted in enormous sustainable human development benefits. The analysis of positive synergies—winning strategies for the environment, equity and human development (UNDP Human Development Report, 2011)<sup>1</sup> revealed that the Montreal Protocol is an excellent example of win-win-win strategies of integrating environmental and equity concerns while promoting human development.

Lessons of the Montreal Protocol will be extremely valuable in devising the most effective ways in tackling climate change. Important success factors of the Protocol include among others the embedded principle of common but differentiated responsibilities, the existence of sound technical and scientific assessments to inform decisions and establishment of a dedicated financial mechanism, the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol.

It is also important to note that the political will as well as science and technology came together to solve the issues of ozone layer depletion and the universal ratification of the Protocol indicates worldwide commitment to its implementation. The industry /private sector had a critical role and have been committed to find alternatives for applications which spread to many important sectors of the society, covering construction sector, building and house air conditioning, household appliances, food storage and transport refrigeration, medical aerosols, agriculture and fire fighting.

UNDP is privileged to have had the opportunity to contribute to the global success of the Montreal Protocol and stands ready to continue its support to the developing countries to meet their obligations under the Protocol and at the same time assisting countries to move towards an inclusive and green development path.



**Dr. Veerle Vandeweerd**

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1 [http://hdr.undp.org/en/media/HDR\\_2011\\_EN\\_Complete.pdf](http://hdr.undp.org/en/media/HDR_2011_EN_Complete.pdf) (page 67)

# INTRODUCTION

*By Dr. Suely Carvalho, Director of the Montreal Protocol Unit/Chemicals, UNDP*

16 September 2012 marked the 25th Anniversary of the Montreal Protocol on Substances that Deplete the Ozone Layer. That date coincided with the International Day for the Preservation of the Ozone Layer, the United Nations commemorative day that marks the date when the treaty was established in 1987. The theme for this year's celebration "Protecting our atmosphere for generations to come" emphasizes the extraordinary collaboration and environmental benefits achieved by the international community through the implementation of the Montreal Protocol.

The Montreal Protocol is an international treaty designed to protect the ozone layer by phasing out the production and consumption of numerous substances responsible for ozone depletion. Although challenges remain, the Montreal Protocol has been recognized as a global success, demonstrated by the massive elimination of production and consumption of chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform worldwide since it came into force in 1987.

The Montreal Protocol is the only treaty ever to achieve universal ratification with 197 parties. The ongoing efforts to implement the Protocol decisively demonstrate that difficult environmental issues can be tackled and resolved successfully in an equitable and sustainable manner.



The dedicated financial mechanism for the implementation of the Montreal Protocol is the Multilateral Fund (MLF). It was established by a decision of the Second Meeting of the Parties to the Montreal Protocol (London, June 1990) and began its operation 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. Since 1991, the Fund has approved activities including industrial conversion, technical assistance, training and capacity building worth over US \$2.8 billion. The MLF is replenished based on the principle of stable and sufficient funding to support developing countries to meet Protocol's objectives. Performance based agreements between the Country and the Executive Committee of the MLF are key to the success of the financial mechanism and to delivering results. The Global Environment Facility (GEF) has been assisting 18 countries with economies in transition in Eastern Europe and former Soviet Union in meeting their obligations to phase out the use and production of ozone-depleting substances according to the Montreal Protocol. UNDP established the dedicated Montreal Protocol Unit (MPU) in 1991 to spearhead and coordinate its efforts to support the developing countries as one of the implementing agencies of the Multilateral Fund. By October 2012, UNDP has assisted partner developing countries to access a total of US \$630 million in funding from the Multilateral Fund for the Implementation of the Montreal Protocol and US\$ 33.5 million from the Global Environment Facility to eliminate ozone depleting chemicals. UNDP support has assisted 118 countries to avoid over 4 gigatonnes of CO<sub>2</sub>-eq emissions on a cumulative basis and to eliminate more than 68,500 tonnes of ozone-depleting substances.

This publication is intended to give a snapshot of the work carried out by UNDP and features some prominent examples of UNDP support at the country level from 2001 till July 2012. The human development impacts are many and UNDP has been honored by the request for assistance from 118 countries who entrusted UNDP with the implementation of the Montreal Protocol programme in their countries, in many cases, in partnership with other multilateral and bilateral agencies.



# UNDP AND THE MONTREAL PROTOCOL PROGRAMME

UNDP provides a variety of services to support the developing countries to comply with the Montreal Protocol; these include but are not limited to capacity building, technology transfer and technical assistance, formulation and implementation of country and sector strategies, assistance to access and sequence funding from different sources, and facilitate public and private partnerships.

The map below shows countries where UNDP implemented Montreal Protocol projects from 1991 to 2012. One hundred and eighteen (118) countries received assistance from UNDP, 105 countries classified under the Article 5 of the Montreal Protocol were financed by the Multilateral Fund (MLF) and 13 countries with economies in transition (CEIT) were financed by the Global Environment Facility (GEF).



## UNDP Montreal Protocol Programme at a Glance (1991-2012)

Funding Source	Tonnes (ODP) phased out	No. of Projects	No. of Countries	Total Grant Value (million US\$) <sup>2</sup>
MLF	66,675.5	2,186	105	630.2
GEF	1,894	39	13	33.5
TOTAL	68,569.5	2,225	118	663.7

### Dual Benefits of UNDP Montreal Protocol Programme Ozone Layer And Climate Protection

Total grant value, (million US\$)	Tonnes (ODP) phased out	Cumulative Climate Benefits (Gigatonnes of CO <sub>2</sub> -eq reduction)	Cost effectiveness (US\$/tonne of CO <sub>2</sub> -eq)
663.7	68,569.5	4.16	0.16

<sup>2</sup> For detailed information per country please refer to Annexes at the end of the publication.



## PARTNERSHIPS FOR SUSTAINABLE HUMAN DEVELOPMENT

### Montreal Protocol Programme's Country Stories

2011 UNDP Human Development Report<sup>3</sup> cited the Montreal Protocol as **an example of integration of environmental and equity concerns while promoting human development.** UNDP partners with governments and private sector and provides targeted policy advice and specialized technical assistance, training and technology transfer to adopt ozone and climate friendly technologies and best occupational practices. The programme covers a wide variety of sectors, such as the manufacturing (and servicing) of products in the refrigeration and air-conditioning, foams, medical aerosols for asthma treatment, and agricultural sectors. Market transformation for the introduction of environment-friendly products and corresponding policy and technological advances were achieved. This has brought to developing countries the access to state of art technology, reduced energy bills for consumers, fostered innovation, and created a more equitable market for greener products, allowing indigenous manufacturers to maintain competitiveness.

There are many examples of UNDP work under the Montreal Protocol which brings numerous development gains.

### Supporting Sustainable Agriculture

Since 1997, UNDP has helped thousands of farmers in 20 countries with technology transfer, assistance and training on alternatives to methyl bromide, ozone depleting substance and toxic chemical used by crop growers as a fumigant to treat soil against harmful insects, worms and weeds. In addition to being an ozone-depleting substance this toxic chemicals can negatively affect agricultural workers, including many women and children.

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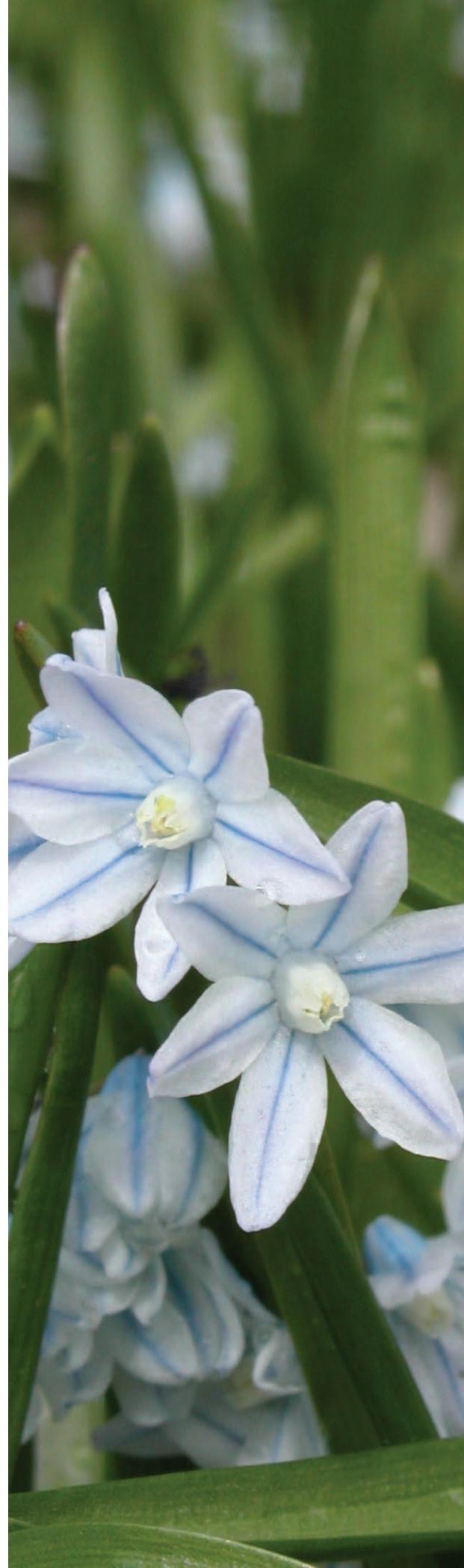
3 [http://hdr.undp.org/en/media/HDR\\_2011\\_EN\\_Complete.pdf](http://hdr.undp.org/en/media/HDR_2011_EN_Complete.pdf) (page 67)

For example, in **Sri Lanka**, the “*Ozone Friendly Pure Ceylon Tea*” logo launched in May 2011 will help to promote Sri-Lanka’s best known export product that sustains an industry worth US\$ 1.5 billion a year. This became possible as a result of the phase out of methyl bromide in tea industry, implemented by UNDP together with UNEP. Other good examples can be extracted from the work done in **Argentina, Bolivia, Chile, Costa Rica, Fiji, Ghana, Kyrgyzstan, Lebanon, Malawi, Malaysia, Mexico, Peru, Philippines, Sri Lanka, and Zimbabwe** where important commodities to the country economy can now be produced, stored and transported free of methyl bromide with multiple development gains.

In **Lebanon** UNDP supported Lebanon’s Ministry of Environment to achieve complete phase out of methyl bromide in cultivation of vegetables, cut flowers, and tobacco. The ultimate goal of the national strategy for the replacement of methyl bromide 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 was implemented in 2001-2007 has established positive cooperation with the country’s agricultural producers by training more than 10,000 farmers and the application of non-chemical techniques raised grower confidence and resulted in phase-out of 281.37 metric tons of methyl bromide by mid 2008.

The project also promoted recycling techniques for low-density polyethylene (PE) sheets, which are used when treating soil with both chemical and non-chemical alternatives. 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.



## Addressing the Needs of the Fishery Sector

In **Costa Rica**, 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 refrigerant systems based on CFCs. 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.



The refrigerant consumption in 2003 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).

After extensive consultation with stakeholders, and with UNDP support, a pilot end-user incentive project was launched as part of the country's refrigerant management plan. Three fishing vessels were converted and benefits included lower operating costs for the cooling system which repaid the investment in less than 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.

### Achieving Carbon Neutrality in Small Island States

**Maldives** has developed the first strategy to achieve complete phase-out of Hydrochlorofluorocarbons (HCFCs) by 1 January 2020 thus contributing to carbon neutrality proposed to be achieved by the country in 2020. Besides being the third largest contributor to the Maldives' economy, after tourism and commerce, fisheries continue to provide an important source of income for about 20 percent of the population, with about 22,000 individuals involved in full-time fishing activities. UNDP's assistance is through a retrofit incentive scheme of the refrigeration and air-conditioning equipment so the fisheries sector adopts environmentally friendly HCFC-free alternatives. Through this scheme, identified users in the sector - mainly storage, operations and processing, would be provided with incentives for retrofitting equipment with HCFC free alternatives. For implementing this project, two ministers - the Minister of Environment and Energy and the Minister of Fisheries and Agriculture - signed a performance-based agreement in November 2012. With UNDP assistance and funding from the MLF, Maldives would be able to achieve cost-effective transition from HCFCs to alternatives in this economically and socially important sector and thus, progress systematically towards a carbon neutral economy.



## Technology Transfer in Support of Public Health and Access to Medication

In **Bangladesh, Colombia, Cuba, India** and **Pakistan**, UNDP has been supporting the efforts of manufacturers for a technological transition to ozone-friendly and affordable alternatives in the production of metered dose inhalers, which relieve and prevent asthma attacks. These projects have important linkages to public health management in these countries. For example, Bangladesh, Pakistan, and Cuba have more than 7 million, 17 million; and 1 million people respectively suffering from asthma and chronic obstructive pulmonary disease (COPD). In addition, technology transfer enabled those countries to keep their national manufacturing of metered-dose inhalers, thus saving local jobs and allowing the population to access affordable life saving drugs.



## Support to Small and Medium-Sized Enterprises (SMEs) in Medical Cleaning Applications

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 (SMEs) 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.

UNDP assisted the Chinese State Environmental Protection Administration (SEPA) and the Ministry of Information Industry in March 2000, in the development of a multi-year, performance-based solvent sector phase-out plan with total funding US\$52 million from Multilateral Fund (MLF). 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.

The Medical Cleaning Applications sub-sector is important from a human health perspective and consumed about 1,700 metric tonnes of HCFC-141b in 2009, representing about 39% of the overall sector consumption. The sub-sector manufactures products that are applied widely and involve more than 400 enterprises, with a large number of SMEs, with limited access to alternative technologies. Since the 1980s, along with China's rapid economic development, the sub-sector has made great progress and maintained an average annual growth rate of over 15%, and China has thus become the world's leading medical macromolecular product manufacturer. According to statistics, in 2009, the gross sales in the sub-sector exceeded US\$1.5 billion, 16% higher in real terms than a year earlier.

The main products manufactured in this sub-sector include syringes, infusion sets, blood transfusion sets, various puncture instruments (e.g., hypodermic needles, scalp vein sets, blood collection needles, intravenous canulae, puncture needles, biopsy needles, etc.), catheters and other sanitary materials. The devices manufactured are siliconized to reduce friction and reduce the patients' pain; in addition, the silicification tooling used in the manufacturing of these devices needs regular cleaning, so as to prevent the tooling stained with silicone oil from polluting the joints of puncture instruments.



During the implementation of China Solvent Sector Plan, small and medium companies were able to obtain the technical support from national and international experts, more job opportunities were created, safety in the working environment was enhanced, and awareness of ozone protection was promoted.

### Brokering Important Public and Private Sector Partnerships

UNDP is supporting the implementation of national and sector strategies in more than 30 countries for the elimination of hydrochlorofluorocarbons (HCFCs) controlled under the Montreal Protocol, in the refrigeration and foam sectors. For example, in **Indonesia**<sup>4</sup>, UNDP helped to catalyze finance, and acted as a broker for an important public private partnership among Indonesia, Japan and the Japanese air conditioning industry. UNDP played a pivotal role advising on ways to access financing and helping to draw a plan of necessary regulatory and legislative changes to ensure that the technology conversion will be sustainable. Indonesia Government put in place the regulatory actions that will be needed to sustain the industrial conversion to happen at the private sector level, demonstrating strong leadership and setting the path to the transformational change in a critical market to the country and regional economy. As a result of this technology transfer, the manufacturing of air conditioners in Indonesia will be converted to use a technology with significantly enhanced climate mitigation benefits, estimated at 15 million tonnes equivalent of CO<sub>2</sub>-weighted global warming gasses annually.



4 <http://www.undp.org/content/undp/en/home/presscenter/articles/2012/03/26/indonesia-partnership-helps-protect-climate-and-build-green-economy.html>

## Good Governance Bringing Sustainable Results

**Brazil** has phased-out the consumption of CFCs<sup>5</sup> in 2007, 3 years before the formal commitments under the Montreal Protocol, and has created an important regulatory and institutional framework to control ozone depleting substances required to sustain phase-out efforts. It has shut down its CFC production in 1999 and also has put in place a strong chain for recovery-recycling-reuse of CFC and Halons. Finally it had prioritized locally-developed alternatives in the phase-out of Methyl Bromide consumption as soil fumigant.

The country is in compliance with all its commitments with the Montreal Protocol and has phased-out about 17,000 ODP tones of ozone depleting substances. In addition to government actions to ensure the sustainability of the programme, the Multilateral Fund contributed with US\$ 92 millions in grant funding, 75% of this total mobilized with the assistance of UNDP, selected by the government as Brazil's Lead Agency for both CFC and HCFC phase-out. The private sector has been a key partner and invested to supplement industrial conversion costs not covered by the MLF.



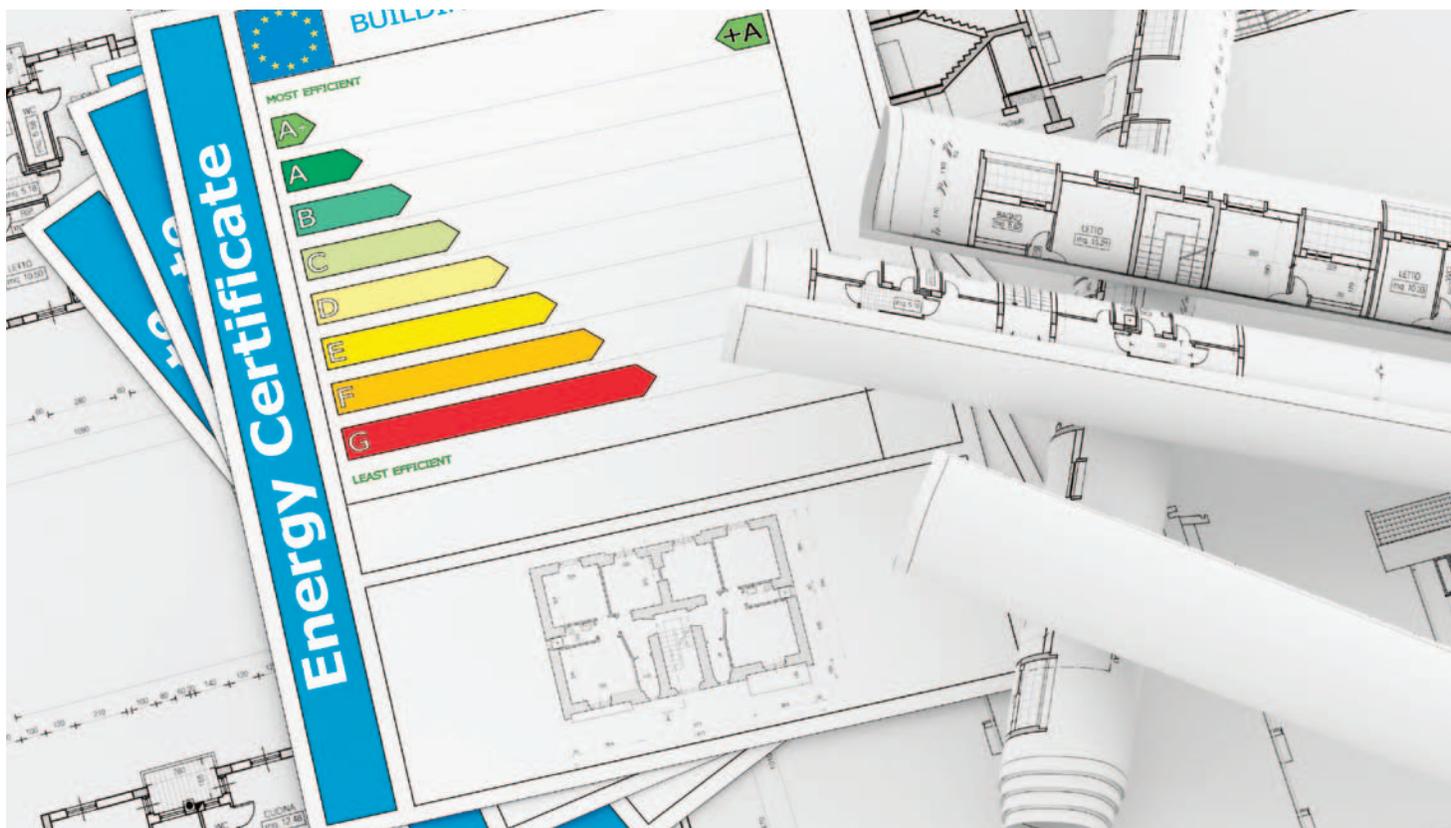
Brazil gave a strong signal in the direction of its HCFC phase-out commitments by setting limits in the growth of HCFCs consumption, from 2009 to 2012, the only country to do that immediately after the Protocol was adjusted. In practice it means that this voluntary action helped to curb the growth of HCFCs, which have high global warming potential, by avoiding the formation of stockpiles and market speculation.

5 The consumption of CFCs for medical use in asthma inhalers was allowed till 2010.

## Breaking Technology Barriers with Innovation and Scaling up

Developing countries and companies may face several challenges to comply with the Montreal Protocol, such as the setting and enforcing of a robust regulatory/licensing system to control HCFCs, the industrial conversion required in a short time frame and the adoption of alternative technologies that are mature, commercially available, cost effective and safe. Companies must be prepared to deal with those different parameters and characteristics of the new technologies. The MLF has provided support for several demonstration projects to assess, under local conditions, the viability of different environment-friendlier alternatives.

With the help of UNDP, **Brazil** and **Mexico** have led those assessments in the foam sector and as result, a large number of small and medium enterprises have now options to consider regarding low carbon and cost effective alternative solutions, creating a healthy market competition and lowering the price. UNDP has also been implementing technology demonstration projects in **China, Colombia, Egypt, and Turkey**.



As a result of the dissemination of the results of the demonstration projects in partnership with the private sector companies, other developing countries will be also able to understand technical processes in adopting environment-friendly alternatives and access the range of state-of-the-art and environmentally-friendly technologies demonstrated.

For example, the demonstration projects<sup>6</sup> in Brazil and Mexico assessed the performance of alternatives to replace HCFC-141b based systems used to manufacture foam products. As result, products supplied to the automotive industry; construction sector, shoes manufacturing, etc. have been using new tested alternatives as viable options.

In **Brazil**, as a result of the successful demonstration project, the company who selected one of the tested technologies is now producing climate and ozone friendly foam panels that are being used in the construction of houses for the low income families. The construction system allows houses to be built in a fast (4 days) and sustainable way, with waste reduction, recycling possibilities and less energy use. The company that chose the technology tested has been selected by a competitive bidding as the provider of houses to the Brazilian Federal Government social programme Minha Casa, Minha Vida (My Home, My Life). Replication impact to other countries such as **Angola**, **Paraguay**, and **Mozambique** is already a reality.



In parallel, UNDP also worked in partnership with a system house in **Mexico** that is specialized in the use of Polyurethane Foam for shoe soles. The shoes sector in the Guanajuato province of Mexico is a traditional economic activity started in 1645 with more than 93 enterprises. This industry has a US\$ 221 million market and it employs more than 90,000 people directly and more than 70,000 people indirectly. Shoe factories exported around 12 millions of pairs in the first quarter of 2012.

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6 [http://www.undp.org/content/undp/en/home/librarypage/environment-energy/ozone\\_and\\_climate/Low-carbon-alternatives-in-foams/](http://www.undp.org/content/undp/en/home/librarypage/environment-energy/ozone_and_climate/Low-carbon-alternatives-in-foams/)

MLF funded demonstration projects, such as the ones mentioned, looked at adapting different emerging technologies to local conditions for the production of greener and more affordable consumer products and are scaling up at regional and global level, with close engagement of private sector bringing numerous development benefits.

### Market Absorption of Low Cost and Environmentally Friendly Technology

Cost of technology is an important element in the decision making process in a manufacturing plant as it will impact market absorption of a product and its cost at the consumer side.

In **Egypt**, low cost options for the use of Hydrocarbons (HC) as foaming agent in the manufacture of polyurethane foams for products that are critical to the economy were studied as part of a demonstration project. The HC technology already existed since around 1992 and was broadly applied in companies in developing countries that would meet a critical operation size and technical proficiency. Since that time, significant system optimization has taken place in Europe. In light of that knowledge, the pilot project was designed to develop, optimize, and validate low cost options for hydrocarbons as auxiliary blowing agent in polyurethane (PU) foam applications with an attempt to widen the access of smaller-scale businesses to important climate and ozone layer neutral solutions in daily work.



As result, a substantive technology report was issued and adopted by the MLF in April 2012 for further dissemination to other interested parties worldwide thus extending the scale in exchange on best practices to the global level. Both options that have emerged from the project – pre-blended cyclopentane systems and direct hydrocarbon injection – have been selected for the next subsequent stage of projects to eliminate HCFCs in Egypt.

Important sector of the Egyptian economy will be impacted, such as, the civil construction, food transportation and food product storage. This will result in (1) improving longer term energy efficiencies in buildings and private businesses, and leading to energy savings in support of national energy programmes, and (2) further strengthening distribution chains for green commodities and widening stable food access - the intervention, thus, will contribute to overall development agenda of the country. The good results will confidently enable small and medium enterprises to access lower cost technology and improve general private sector performance to contribute to stability of economies. Such approaches developed by UNDP also allow for sector-wide technology conversion and create fair market conditions for comprehensive enterprise coverage that, in turn, help maintain commercial status quo, improve technical capacities and professionalism of work force and promote sector competitiveness through environmentally friendlier technologies in local and foreign markets.

### **Towards innovative Use of Local Resources for Nigeria and Sub-Saharan Region**

**Nigeria** has to rely on imports of HCFC and HFC-based refrigerants which harm the ozone layer and negatively affect the climate. Hydrocarbons would be a valid alternative to such chlorinated carbons also taking into account the oil wealth of Nigeria. However, refrigerant-grade hydrocarbons must be imported from Europe or the Middle-East and are therefore considered expensive. As a result, systems that are based on hydrocarbons are often charged with impure LPG instead. The latter is not a recommended practice as it results in early system failures and as it may lead to subsequent safety hazards associated with liquid petrol gas (LPG) in combination with lack of awareness and training.

UNDP in partnership with the private sector and the government of Nigeria has been supporting the development of an innovative technology to produce environmentally friendly refrigerants. A pilot-scale facility financed partly by the MLF will be producing refrigerant-grade pure hydrocarbons from locally produced LPG.

The activities underway are expected to result in a hydrocarbon pilot production through the building of a distillation and bottling unit at a local engineering company. The project would further allow for conducting quality testing and to market the product to a select group of service providers. These service providers will commit to a training and certification program on good practices in the use of hydrocarbon refrigerants and will function as trainers when the program is expanded at a later date.

Intermediate results have demonstrated that the initiative is promising. An actual commercial plant will be built by the same enterprise through private initiative and funding. Such a full-scale facility will be able to serve not only Nigeria but also the rest of the Sub-Saharan region with high-purity refrigerants that will replace current use of refrigerants with negative impacts on ozone layer and global climate. The hydrocarbon availability would support an environmentally friendly technology, while at the same time

eliminating possible misuse of LPG for servicing of refrigeration equipment. It is also expected to lead to a greener market of refrigerants in Nigeria. It is indeed anticipated that through market penetration of cheap and pure hydrocarbon refrigerants, the need for HCFC and high global warming potential refrigerants will decrease accordingly.

It is also worthwhile to note that this project is one of several components of the mitigation program in the “Overarching Climate Change Strategy” developed to address the climate change and development challenges in ways that lead to a low carbon, high growth, climate resilient, socially equitable, gender sensitive and sustainable development path.



This project is an example how UNDP can support to bring innovations to emerging economies that can minimize foreign currency expenditures on chemical imports, eliminate supply dependencies associated with these imports, and instead concentrate resources on a long-term use of natural refrigerants. This, in turn, would strengthen the national capacity to produce domestic installations and secure jobs.

### Enhancing Long Term Viability of Small and Medium-Sized Enterprises (SMEs)

**India** has done an excellent job in both protecting the environment and enhancing long term small and medium-sized enterprise (SME) viability and sustainable livelihoods. Many SMEs used CFCs (chlorofluorocarbons) to manufacture foam insulation products such as jugs and flasks, requiring low-cost simple machines and providing employment for semi-skilled workers. Under the Montreal Protocol, India had to reduce CFC use in the foam industry. A UNDP initiative helped India develop a group

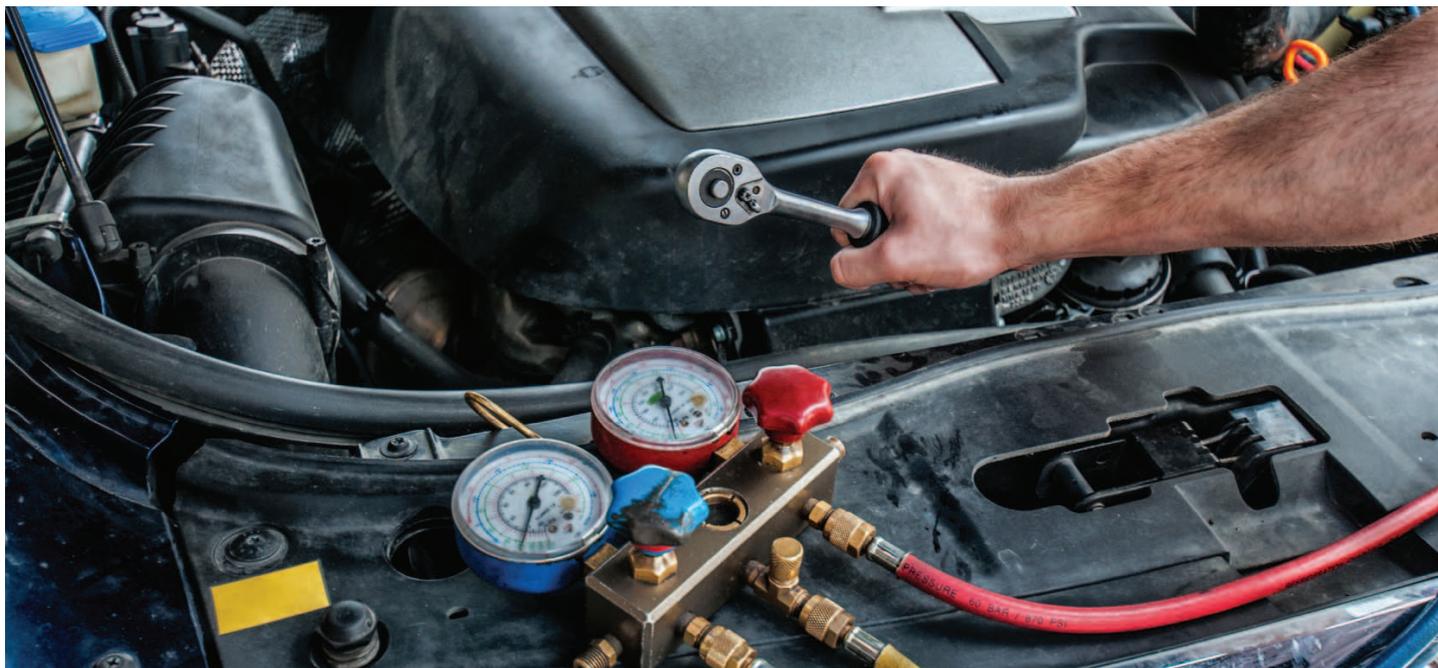
approach to eliminate CFC use in 80 SMEs employing 2,000 workers. Customized low-cost, low-output non-CFC foaming equipment was designed for easy, economic and efficient operation and maintenance by workers. The workers were also trained to handle the technical and environmental issues involved. This success in 2000 was then replicated three times to cover an additional 70 SMEs employing an additional 1,500 workers for a total of 150 SMEs and 3,500 workers. The project was recognized for saving 150 SMEs from bankruptcy and preventing 3,500 workers (and their dependents) from losing their livelihoods.



**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 Malaysia 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.

## Towards Greener Transport Sector

**Cambodia** had a significant consumption of CFCs in servicing refrigeration and air-conditioning applications in early 2000. Of the total consumption of CFCs, Mobile Air-Conditioner (MAC) servicing accounted for more than 80% of CFC imports. Servicing was carried out by technicians located in different parts of the country and the CFC consumption growth in this sector posed a significant challenge to Cambodia in achieving complete phase-out of CFCs by 1 January 2010 as mandated by the Montreal Protocol. As part of this project, three technical institutes, namely, National Technical Training Institute, Cambodia-India Entrepreneurship Development Center and Industries Technical College, were provided with training equipment for continuous training of service technicians on good service practices and servicing equipment with ozone friendly alternatives. In addition to over a thousand technicians trained and more than 7,000 car air conditioners retrofitted, this project helped the MAC service technicians, who are small size enterprise owners, in cost-effective adoption of CFC free technologies, thus helping the technicians continue their business operations without risking business disruption due to the technology change taking place as a result of implementation of Montreal Protocol.



## Catalytic Effect of Incentive Programme for End-Users

A significant portion of **Georgia's** ozone depleting substances 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.

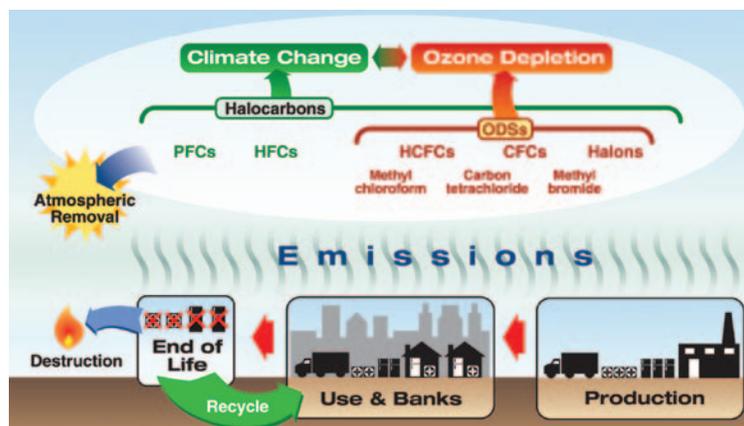
In partnership with Georgia's Refrigeration Association, the national ozone focal point publicized details of the new refrigeration equipment, along with calculations of the favorable thermodynamic and economic gains that resulted from their use. Detailed accounts of the conversion processes, and the 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 National Ozone Unit's awareness-raising campaign, resulting in the additional phase out of 2.5 tonnes of CFCs per year.

### Synergies with Conventions and Protocols

#### Integrated plan for energy efficiency, climate change mitigation and ozone protection

UNDP has supported the Government of **Ghana** to develop an Integrated Plan for Energy Efficiency, Climate Mitigation and Ozone Depleting Substances Destruction for the Refrigeration Sector. This Integrated Plan looks at the sector holistically and provides an opportunity for UNDP to work closely with our partners in Ghana (the Energy Commission and Environmental Protection Agency) to ensure that the various programmes are coordinated and benefits are maximized. These programmes attempt to access and sequence various funding mechanisms, as they would include the programme on Market Transformation funded by the Global Environment Facility (GEF), the HCFC Phase-Out Management Plan (HPMP) and a Pilot Project on ODS Waste both funded by the Multilateral Fund (MLF) as well as proposals related to carbon financing and other sources of finance. The ultimate objective of this plan is to bring economic, social and environmental benefits to the people of Ghana through the scaling up of energy efficient appliances with low global warming potential (GWP).



The proposed Integrated Plan will address all subsectors (refrigeration and air conditioning including car air conditioning and chillers) and all types of refrigerants and end of life and maintenance schemes. It is evident that some of the actions undertaken would address the objectives of both the Montreal Protocol and the Kyoto Protocol.

Source: Metz, Kuijpers, Solomon, Andersen, Davidson, Pons, De Jager, Kestin, Manning and Meyer. 2005. 'IPCC/TEAP Special Report: Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons. Summary for Policymakers and Technical Summary'. Geneva: IPCC.

## Integrated Approach to Chemicals and Waste Management

In line with national policies on efficient use of energy, integrated management of hazardous waste and management of electrical and electronic waste, the Government of **Colombia**, supported by UNDP, designed a pilot demonstration project for integrated waste management of ozone depleting chemicals and related waste, particularly generated by ozone depleting substances (ODS) recovery and recycling programmes and from discarded equipment containing such chemicals.

This project aims to demonstrate the technical, economic and environmental viability of ODS destruction at the national level through the articulation of several policy guidelines that include the implementation of the Montreal Protocol, the environmental policy for integrated dangerous waste management, the national policy for the management of electrical and electronic equipment waste and the program of rational and efficient use of energy and other forms of unconventional energy. UNDP will provide the technical knowledge and expertise to achieve the articulation of these initiatives to develop relevant policies and pilot practices.

Colombia plans to replace 2.6 million old CFC-based domestic refrigerators between 2013 and 2023 as part of the above mentioned initiatives. The fund for the demonstration project will be a fraction of those required for the full implementation but it will be the cornerstone to demonstrate how a developing country could integrate different international initiatives, particularly management of ODS, POPs and waste.



## WAY FORWARD

With the accelerated phaseout of the HCFCs in 2007, the Montreal Protocol turned into a treaty which protects both the ozone layer and the climate. UNDP has been a pioneer in initiating work related to HCFCs phase-out. In 2006-2007, UNDP was the first agency to assist twelve countries to complete their HCFC surveys. In 2008-2009, UNDP received approvals to prepare projects in 38 countries, mostly with a view to formulate HCFC Phase-out Management Plans (HPMPs), whether at the national level or sector-specific (mostly focused on foam and refrigeration products manufacturing conversion). HPMPs and/or Sector Plans have now been finalized for 43 countries. As result, UNDP was able to increase substantially the amount of financial resources mobilized for a large number of countries. Currently, UNDP has been helping countries to access funding to maximize climate benefits of HCFCs elimination work at country level, and identify alternative chemicals and technically sound solutions. UNDP works in close partnership with national and international counterparts to bring additional benefits to climate, leveraging our work and presence on the ground.

The country examples illustrate that, in addition to the direct benefits of achieving the phaseout of ozone depleting chemicals, the Montreal Protocol has created enabling conditions that have stimulated a transition to an inclusive and Green Economy<sup>7</sup>.

As a follow-up to Rio+20, UNDP will continue to be a broker of effective partnerships and looks forward to continue supporting developing countries to maintain the success of the Montreal Protocol and bring the needed transformational changes. In this work UNDP will continue to strive to maximize climate co-benefits and ensure inclusive green development.



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7 <http://new.unep.org/ozonaction/AboutTheBranch/MontrealProtocolandTheGreenEconomy/tabid/104424/Default.aspx>

## ANNEX 1: MLF GRANT RESOURCES MOBILIZED PER COUNTRY VIA UNDP MONTREAL PROTOCOL PROGRAMME (1991 – JULY 2012)

Country	Number of projects	MLF Grant US\$ thousands <sup>8</sup>	ODS tonnes phased out
Angola	3	183.2	3.5
Argentina	67	17,846.3	1,691.5
Armenia	5	689.8	2.2
Bahamas	2	166.4	12.6
Bahrain	8	1,041.8	96.2
Bangladesh	27	6,673.0	498.7
Barbados	5	236.8	13.1
Belize	7	395.0	12.1
Benin	2	158.0	27.3
Bhutan	5	180.0	0.1
Bolivia	15	1,205.1	37.6
Botswana	1	20.0	0.0
Brazil	209	70,768.4	11,651.1
Brunei Darussalam	3	467.8	52.5
Burkina Faso	2	148.6	30.9
Burundi	10	469.7	48.1
Cambodia	8	1,167.5	69.7
Cape Verde	2	99.4	1.3
Central African Republic	3	143.4	0.0
Chad	8	621.6	24.8
Chile	19	3,637.6	207.3
China	170	160,925.2	12,353.1
Colombia	55	26,596.0	1,768.1
Comoros	2	75.0	0.4
Congo	5	371.3	25.1
Congo, Democratic Republic of	17	2,251.5	324.6
Costa Rica	44	10,096.5	802.0
Cuba	30	11,496.8	605.3
Djibouti	5	335.5	10.4
Dominica	3	103.0	0.7
Dominican Republic	31	5,008.9	532.1
Ecuador	1	100.0	0.0
Egypt	45	18,249.3	2,472.6
El Salvador	16	2,408.5	395.3

<sup>8</sup> The amount doesn't include agency support costs

Country	Number of projects	MLF Grant US\$ thousands <sup>8</sup>	ODS tonnes phased out
Eritrea	1	20.0	0.0
Ethiopia	1	30.0	0.0
Fiji	6	360.4	32.2
Gabon	9	451.8	17.8
Gambia	6	310.5	14.6
Georgia	13	1,096.1	29.0
Ghana	27	3,405.3	414.0
Grenada	4	153.4	4.4
Guatemala	9	1,266.2	86.9
Guinea	2	69.9	7.9
Guinea-Bissau	2	307.9	14.3
Guyana	4	278.0	8.0
Haiti	5	429.7	102.7
Honduras	2	165.0	138.6
India	225	62,388.9	8,102.9
Indonesia	83	24,866.5	3,079.0
Iran	82	15,815.5	1,020.6
Jamaica	12	1,375.9	105.0
Jordan	2	41.0	0.0
Kenya	13	1,993.9	10.0
Kyrgyzstan	12	1,228.4	64.0
Lao, PDR	5	371.5	16.3
Lebanon	37	8,792.0	834.2
Lesotho	2	76.1	3.6
Liberia	3	144.0	8.4
Libya	14	1,583.9	314.0
Malawi	13	3,500.1	177.9
Malaysia	108	28,436.3	3,010.6
Maldives	4	615.0	2.9
Mali	7	662.1	57.5
Mauritania	6	368.0	11.0
Mauritius	5	674.2	29.7
Mexico	60	26,293.8	3,001.7
Moldova	9	963.8	87.8
Mongolia	2	133.6	3.9
Morocco	16	3,236.0	494.0
Mozambique	5	273.3	9.2
Myanmar	1	20.0	0.0
Nepal	10	362.0	18.2
Nicaragua	5	465.0	38.9

Country	Number of projects	MLF Grant US\$ thousands <sup>8</sup>	ODS tonnes phased out
Niger	5	145.1	5.8
Nigeria	83	24,662.0	5,066.6
Pakistan	9	1,839.5	102.4
Panama	14	2,012.7	250.1
Paraguay	14	1,895.6	262.8
Peru	25	4,653.7	365.6
Philippines	32	7,066.2	755.0
Region: Africa	6	1,139.9	62.5
Region: Asia and Pacific	5	279.5	0.0
Region: Latin America and the Caribbean	7	1,462.2	0.0
Rwanda	6	318.8	17.5
Saint Kitts and Nevis	3	145.0	0.1
Saint Vincent and the Grena- dines	2	128.0	2.1
Samoa	2	75.0	0.0
Sao Tome and Principe	2	125.0	1.8
Sierra Leone	8	365.5	52.1
Somalia	1	15.0	0.0
Sri Lanka	28	3,526.1	91.4
Suriname	6	493.2	31.2
Swaziland	5	834.4	11.4
Syria	19	834.4	531.3
Tanzania	10	1,069.2	130.5
Thailand	56	12,300.9	2,220.7
Timor Leste	1	96.1	0.0
Togo	7	459.0	30.2
Trinidad and Tobago	20	1,988.0	116.0
Turkey	1	165.0	0.0
Uganda	3	73.5	3.6
Uruguay	30	3,884.1	397.7
Venezuela	34	7,530.2	485.7
Vietnam	19	1,559.7	282.8
Yemen	2	1,487.7	220.0
Zambia	4	240.3	7.2
Zimbabwe	6	366.9	3.9
Global <sup>9</sup>	44	5,281.7	25.5
<b>Totals</b>	<b>2,186</b>	<b>630,212.4</b>	<b>66,675.5</b>

9 Projects aimed to support and mobilize resources for several countries in several regions.

## ANNEX 2: GEF GRANT RESOURCES MOBILIZED PER COUNTRY VIA UNDP MONTREAL PROTOCOL PROGRAMME (1995 – OCTOBER 2012)

Country	Number of projects	GEF Grant US\$ thousands <sup>10</sup>	ODS tonnes phased out
Armenia	5	1,500.0	52.0
Azerbaijan	4	6,100.0	307.0
Estonia	2	500.0	42.0
Kazakhstan	5	3,900.0	618.0
Latvia	3	1,000.0	224.0
Lithuania	4	3,900.0	368.0
Region: Europe and former Soviet Union <sup>11</sup>	11	13,300.0	100.0
Tajikistan	2	500.0	25.0
Turkmenistan	1	100.0	31.0
Uzbekistan	2	2,600.0	127.0
<b>Totals</b>	<b>39</b>	<b>33,500</b>	<b>1,894</b>

<sup>10</sup> The amount doesn't include agency support costs

<sup>11</sup> Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan

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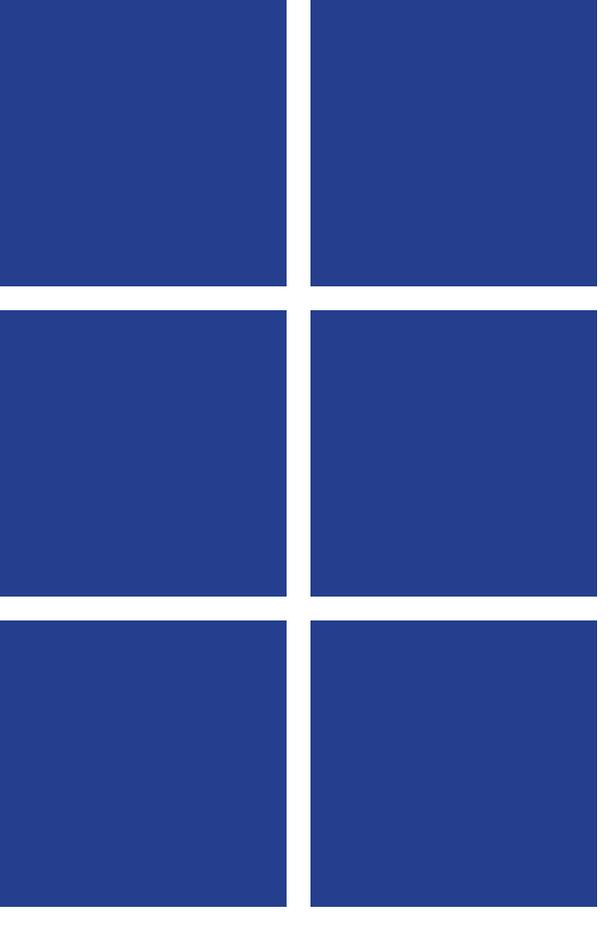
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