

Second Chance

How the Montreal Protocol can take further steps to protect the environment



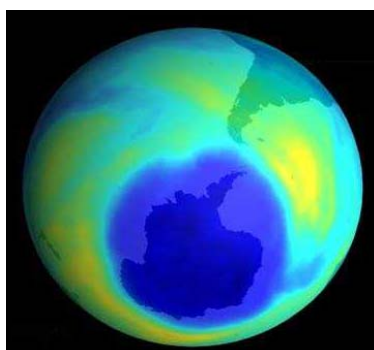
Briefing to Parties at the 28th Open-Ended Working Group Meeting and the 55th Executive Committee Meeting of the Montreal Protocol

The Montreal Protocol has been widely praised as the most effective environmental treaty to date. Not only has it placed the ozone layer on a path toward recovery but it has delayed global warming by an estimated 7-12 years by reducing greenhouse gas emissions by some 135 billion tonnes of carbon dioxide equivalent (CO₂-eq.) between 1990-2010.¹ Its importance as both an ozone and climate treaty cannot be underestimated. As our understanding of the science of climate change grows, so does its gravity. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report has warned that warming of the climate system is now 'unequivocal' and that current climate change policies are not enough to adequately curb greenhouse gas emissions over the next few decades.

The task of mitigating climate change is a daunting one but there is still much that can be done by Parties to the Montreal Protocol. The Protocol's effectiveness to date has been in part due to its flexibility and openness to amendments. The solutions to phasing out ozone depleting substances (ODS) have not really involved changing lifestyles so much as changing methods to achieve those

lifestyles. As ODS are phased out, Parties have the opportunity to promote the introduction of environmentally friendly alternatives. This chance was missed during the CFC (chlorofluorocarbon) phase-out, which allowed the rapid growth of HCFCs (hydrochlorofluorocarbons). The decision to accelerate the phase-out of HCFCs offers new prospects for ensuring that environmentally sustainable alternatives are adopted.

The Environmental Investigation Agency (EIA) offers the following briefing to outline policy recommendations in two areas where Parties to the Montreal Protocol can further achieve climate and ozone savings. The Montreal Protocol is rightly proud of its track record to date and most recently of its decision to accelerate the phase-out of HCFCs. However, Parties have to act now to ensure that the *potential* climate benefits of the HCFC phase-out are realised, by promoting the uptake of climate friendly alternatives to HCFCs. Parties to the Montreal Protocol can further contribute towards protecting the climate and ozone layer through prioritising ODS bank recovery and destruction in both A5 and non-A5 countries.



Issues for Parties to consider in implementing the HCFC phase out

In 2007 the Montreal Protocol renewed its commitment to the environment by swiftly agreeing to accelerate the phase-out of HCFCs by ten years. The agreement received enormous media coverage and restated the Montreal Protocol's position as the most effective environmental treaty to date. The United States Environmental Protection Agency (EPA) recently estimated that the agreement has the potential to save up to 16 billion tonnes CO₂-eq. by 2040.² To put these climate savings into perspective, at best the Kyoto Protocol is expected to reduce CO₂ emissions by 10 billion tonnes between its 1990 baseline and 2012 reduction targets.³

In order to achieve these savings, the Parties must find ways of implementing their commitments under Decision XIX/6 with regard to climate impacts. Paragraph 9 encourages Parties "...to promote the selection of alternatives to HCFCs that minimize environmental impacts, **in particular impacts on climate...**", while Paragraph 11(b) agrees that the Executive

Committee will give priority to projects and programmes focusing on "...*substitutes and alternatives that minimize other impacts on the environment including on the climate, **taking into account global-warming potential, energy use and other relevant factors.***" (emphasis added)

The Parties should reaffirm these commitments and request the Executive Committee of the Multilateral Fund to ensure that promotion of climate-friendly alternatives to HCFCs is a priority in the forthcoming discussions of HCFC phase-out cost considerations. Although the Montreal Protocol's official mandate does not include climate mitigation, it is clear that this organisation has been effective at reducing greenhouse gas emissions and is able to do more. Prioritising funding for climate friendly alternatives to HCFCs offers a cost effective way of ensuring the recovery of the ozone layer while simultaneously achieving enormous climate savings.

Alternatives to HFCs

As ODS have been phased out there has been a marked rise in emissions of hydrofluorocarbons (HFCs), from very low levels in the early 1990s to 0.4 billion tonnes CO₂-eq. in 2002. Emissions are expected to reach over 1.2 billion tonnes CO₂-eq. by 2015.⁴ This rapid growth in HFC emissions could intensify as developing countries phase out HCFCs.

Most HFCs are potent global warming gases and there needs to be a sober recognition of the environmental costs of producing these gases. Claims that their emissions may be significantly reduced by tackling leakage and improving end-of-life recovery currently create overly optimistic scenarios about how the world will deal with these gases. EIA's experience of monitoring and investigating the illegal trade of CFCs and other ODS gives us a particular appreciation for the benefit of not producing environmentally harmful gases in the first place.

Despite the lack of a global policy limiting HFC use, the commercial sector is aware that the viability of HFCs is rapidly declining as the tide shifts towards

natural refrigerant solutions. For example, through the 'Refrigerants, Naturally!' initiative supported by United Nations Environment Programme (UNEP) and Greenpeace, multinational companies such as The Coca Cola Company, Unilever, McDonald's, PepsiCo, IKEA and Carlsberg have all made pledges to promote a shift in their point-of-sale cooling technology towards natural refrigerants. These changes are being made whilst improving, or at the very least equalling, energy efficiency compared to existing fluorocarbon technology.⁵

To date 'Refrigerants, Naturally!' has been enormously successful and companies involved have made real achievements towards their goals. Unilever has fitted 200,000 hydrocarbon units in Europe, Asia and South America⁶ while The Coca Cola Company recently confirmed plans to install 100,000 CO₂ bottle coolers by 2010.⁷ The scene is now set for the sector to move rapidly away from HFCs.

Climate indicators

Decision XIX/6 provides direction to the Executive Committee to take account of the climate impacts of alternatives to HCFCs when considering funding criteria. These are usually measured in terms of direct and indirect emissions, associated with the global warming potential (GWP) of the gas used and energy consumed in usage respectively.

The agreement to accelerate the phase-out of HCFCs has created a technological fork in the road. Signals sent now to the international market will determine the direction of the refrigeration sector over the next 30 years. When considering climate indicators Parties should ensure that the indicators send very simple clear signals to the market which will drive the development of increasingly climate friendly technologies. EIA currently favours GWP as a primary indicator as it is internationally agreed and straightforward to monitor. While energy efficiency is equally important, current estimates can be difficult to compare.

(a) Global Warming Potential

GWP works well as a climate indicator as it can be scientifically quantified and agreed upon. Its use as a climate indicator is well established in both United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, and in European Union (EU) legislation. Its efficacy as a catalyser of innovative solutions has been demonstrated by the EU mobile air conditioning (MAC) directive which limits the use of refrigerants with GWPs greater than 150 in MAC units. This groundbreaking legislation has not only encouraged the development of low GWP HFCs and natural technologies⁹ but potentially offers a model which can be emulated globally.¹⁰

(b) Energy efficiency

The importance of energy efficient efficiency is undeniable as the energy used by refrigeration and air conditioning equipment can have a greater climate impact than the direct emissions associated with the equipment. Clearly, equipment design should be optimised to achieve maximum efficiency, regardless of refrigerant used. However there are contradictions in reported efficiency figures which are a cause for concern, a situation that is not helped by the vested interests of the agencies producing the data.¹¹

Parties should strive to promote the use of low or zero GWP substances *combined* with energy efficient equipment to create the maximum possible environmental benefit.

(c) Life cycle climate performance

Life cycle climate performance (LCCP) is a summation of all the different lifetime emissions associated with a product. It includes many variables associated with production, end-of-life, maintenance, energy efficiency, and GWP of the refrigerant used. How the final sum is reached is open to a plethora of variables and assumptions, for example: leakage rate; the levels of conscientiousness of service technicians; whether average annual, seasonal, daily or hourly temperatures are used etc. It has been estimated that the detail and precision of calculation methods can affect the results by up to 100%.¹² LCCP may be a useful tool for manufacturers to assess their own equipment but its openness to interpretation makes it a controversial climate indicator at present.

Cost effectiveness and financing

Using the Montreal Protocol to benefit the climate is currently *the* most cost-effective tool available to governments looking for climate change mitigation options. The Montreal Protocol has not only promoted the recovering of the ozone layer but has accrued climate benefits of over 100 billion tonnes CO₂-eq. at a cost of just over US\$0.02 per tonne CO₂-eq.¹³ With current carbon dioxide prices hovering at around \$30 a tonne it would be irresponsible to throw away the opportunities for further cost-effective climate savings presented by the HCFC phase-out.

Despite this golden opportunity there seems to be some reluctance to commit to the extra funding required to ensure that further climate savings can be achieved. This may be due to a belief that limiting growth of certain gases based on their GWP (particularly if their ODP is zero as in

the case of HFCs) does not fall under the mandate of the Montreal Protocol. However, the decision of the Montreal Protocol to accelerate the phase-out of HCFCs clearly states that it agreed to “...*encourage Parties to promote the selection of alternatives to HCFCs that minimize environmental impacts, in particular impacts on climate,...*” and that the Executive Committee should give priority to alternatives that minimise impacts on climate, taking into account GWP and energy use.¹⁴ Indeed it would be foolish to transfer this responsibility to another convention simply for the sake of a clearer bureaucratic flow chart.

Funding guidelines should therefore recognise the benefit of climate friendly replacements for HCFCs and commit to flexible guidelines and cost effectiveness thresholds which provide incentives for the use of natural refrigerants.

Dealing with ODS banks

The Montreal Protocol has achieved great success in phasing out the use of ODS. With the CFC phase-out almost completed, it is now an opportune time to consider ways of further protecting both the ozone layer and the climate through the timely destruction of ODS banks.

The term ‘banks’ refers to ODS stored in air conditioning and refrigeration equipment, foams, and ODS that have been stockpiled. The Technology and Economic Assessment Panel (TEAP) has estimated that, without measures to address ODS banks, emissions from CFC banks alone between 2002-2015 are expected to reach in the region of one million ODP (ozone depleting potential) tonnes and 6.6 billion tonnes CO₂-eq.¹⁵ Despite notable efforts by several developed countries, the majority of ODS banks are still escaping into the environment.

An understanding of the distribution of ODS banks offers insights into the best available options. It is estimated that by 2015, over 75% of the CFC refrigerant bank will be in developing countries. In contrast only 15% of the CFC foam bank will be in developing countries.¹⁶ CFC refrigerant collection and destruction is therefore a key issue to be considered when deliberating financial mechanisms to promote the destruction of ODS banks in A5 countries.

Considering the destruction and collection of ODS refrigerant banks in developing countries in terms of their climate saving potential, in addition to ozone layer benefits, indicates that this is an extremely cost effective area for climate savings to be made. The costs of CFC refrigerant collection and destruction are in the region of \$5/kg CFC.¹⁷ Due to the very high GWP of CFCs commonly used the average cost of collection and destruction per carbon dioxide equivalent tonne would equate to about \$0.51.¹⁸

The simplest and most effective way to ensure climate and ozone benefits of the destruction of ODS banks in developing countries is via funding from the Multilateral Fund. The costs of destroying ODS banks in A5 countries in terms of carbon dioxide equivalence are remarkably low and therefore may not be well suited to carbon markets where price of carbon dioxide equivalence savings is far greater. The Montreal Protocol Meetings of the Parties have historically supported efforts to address ODS banks, with

several decisions promoting destruction of such banks in developing countries and recognising the need to financially support these efforts.¹⁹

Coordinating ODS bank destruction with carbon markets

Linking ODS destruction to carbon markets has the potential to result in widespread and rapid ODS bank destruction, however careful consideration is required to ensure the stability of these markets is maintained, substantial climate savings are gained, and illegal production is not stimulated.

The high GWP of CFCs means that relatively small amounts of gas collected can generate large amounts of credits. Montreal Protocol experts have estimated that annual reachable flow of CFCs from refrigerant banks which could be destroyed is just under 10,000 metric tonnes,²⁰ equating to about 95 million tonnes CO₂-eq. per year.²¹ When deliberating whether such savings could be applied to carbon markets caution should be exercised to ensure that carbon markets are not destabilised by a large flux of carbon credits. These concerns may be allayed by the issuance of marginal credits, e.g. for every CO₂ equivalent tonne of ODS destroyed only half a credit would be issued.

The question of whether actual climate savings can be achieved is affected by the type of market such credits might be available on. Initiatives to use voluntary carbon offset markets to destroy ODS are welcomed by EIA as these do have additional climate benefits. In contrast mandatory systems such as the Clean Development Mechanism (CDM), which was designed as a tool for technology-transfer, do not offer climate benefits; at best the CDM achieves zero net climate savings. Again, a possible way of tackling this problem might be to use some kind of marginal credit system which allows climate benefit to accrue.

The potential for increased illegal trade must also be considered. Payment to destroy CFCs may create perverse incentives for illicit CFC production. Therefore any study assessing the viability of ODS destruction on carbon markets must take into account the incentives for illegal production and create secure systems to avoid this.

Recommendations

The Environmental Investigation Agency recommends that Parties to the Montreal Protocol consider the following:

1. Implementation of the HCFC phase out taking into account:
 - The necessity for clear and effective climate indicators, which includes GWP as a primary indicator, to be used in HCFC phase out guidelines;
 - The urgent need for governments to commit to extra funding to implement the HCFC phase-out in an environmentally responsible manner.
2. Development of a Montreal Protocol policy to deal with ODS banks, taking into consideration:
 - Parties are well placed to rapidly develop a simple and effective strategy for ODS bank collection and destruction in A5 countries through MLF funding;
 - The implications of placing ODS destruction onto carbon markets in terms of market stability, real climate savings and illegal trade of CFCs.

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- ³ G.J.M. Velders *et al.*, (2007) 'The importance of the Montreal protocol in Protecting Climate,' 103. Proceedings of the National Academy of Sciences, p4818.
- ⁴ TEAP/IPCC (2005) Special Report on Safeguarding the Ozone Layer and the Global Climate System Issues related to Hydrofluorocarbons and Perfluorocarbons.
- ⁵ 'Refrigerants, Naturally!' Media Statement accessed at www.refrigerantsnaturally.com
- ⁶ <http://www.unilever.com/ourvalues/environment-society/sustainable-development-report/environ-sus/climate-change/more-on-our-impacts.asp?print=true> Accessed June 2008
- ⁷ Press Release R744.com 'Coca-Cola CEO calls for global use of CO₂' 5 June 2008
- ⁸ Spatz, M and B.Minor (2008) 'Honeywell and DuPont are developing a low GWP HFC: HFO-1234yf' Presentation at the German Car industry (VDA) Winter Meeting, Austria
- ⁹ Press Release, R744.com. 'Car makers end research on chemicals, VDA confirms' http://www.r744.com/news/news_ida168.php accessed 12 September 2007
- ¹⁰ Following the introduction of the EC MAC directive the Californian Air Resources Board is attempting to create similar legislation.
- ¹¹ For example www.fluorocarbons.org claim that the Alternative Refrigerant Cooperative Research Project found that enhanced HFC-134a systems have significantly better energy savings than CO₂ systems in a hot climate such as North America. (Ref: http://www.fluorocarbons.org/en/applications/air_conditioning.html#c4, accessed June 2008) In contrast an article presented to the VDA claims that improved CO₂ MAC systems have greater energy efficiency than enhanced HFC-134a systems, even in hot climates such as Phoenix, USA (ref: A. Hafner *et al.* (2004) 'Life Cycle Climate Performance (LCCP) of Mobile Air-Conditioning Systems with HFC-134a and R-744')
- ¹² *Pers. comm* D.Colborne, 19 June 2008.
- ¹³ G.J.M. Velders *et al.* (2007) estimated climate savings of the Montreal Protocol to be, on average, 8 billion tonnes CO₂-eq/ year between 1990-2010 with a reduction of 30% due to ozone depletion and HFC emissions. Total Multilateral Fund allocations and provisions in USD \$ 2,201,590,523 (1991-2007) ref: <http://www.multilateralfund.org/files/52/5203.pdf>
- ¹⁴ Decision XIX/6: Adjustments to the Montreal Protocol with regard to Annex C, Group I, substances (hydrochlorofluorocarbons)
- ¹⁵ Data extrapolated from TEAP supplement to the TEAP and IPCC (2005) Special Report on Safeguarding the Ozone Layer and the Global Climate System (SROC). Page 20 estimates that under BAU global CFC banks decrease from 2,430 to 1,411 kilo tonnes (a growth factor of 0.58). The growth factor was applied to Table 3-2 to give a loss of 6.615 billion tonnes CO₂-eq.
- ¹⁶ Data calculated from IPCC/TEAP SROC (2005)
- ¹⁷ TEAP (2005) supplement to TEAP/IPCC (2005) Special Report on Safeguarding the Ozone Layer and the Global Climate System Issues related to Hydrofluorocarbons and Perfluorocarbons.
- ¹⁸ Using a weighted GWP of 9775 for CFCs (this value is based on CFC refrigerant bank size in 2002 found in Centre for Energy Studies (2004) 'Determination of comparative HCFC and HFC emission profiles for the Foam and Refrigeration sectors until 2015, Part 1' and GWPs taken from World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) (2006) *Scientific Assessment of Ozone Depletion*.
- ¹⁹ Examples include Decision XVII/7 and XVII/18
- ²⁰ Executive Committee (2006) document UNEP/OzL.Pro/ExCom/48/42 : Report of the Meeting of Experts to Assess the Extent of Current and Future Requirements for the Collection and Disposition of Non-reusable and Unwanted ODS in Article 5 Countries (Follow up to Decision 47/52)
- ²¹ See ref 18 for GWP calculation.