The Montreal Protocol Must Act to Prevent Global Climate Change While Restoring the Ozone Layer

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THE MONTREAL PROTOCOL MUST ACT TO PREVENT GLOBAL CLIMATE CHANGE WHILE RESTORING THE OZONE LAYER

by Mark W. Roberts*

**INTRODUCTION**

“Not everything that is faced can be changed. But nothing can be changed until it is faced.”

—James Baldwin

The Montreal Protocol on Substances that Deplete the Ozone Layer (“Montreal Protocol”) has forced the phase-out of more than ninety-five percent of several classes of chemicals that deplete the ozone layer in developed countries and approximately fifty to seventy-five percent of these ozone depleting substances (“ODSs”) in developing countries.1 As a consequence of these phase-outs, a significant portion of ODSs that are used as refrigerants and foam-blowing agents are now being replaced with hydrofluorocarbons (“HFCs”). Although HFCs are not ODSs, they are extremely powerful greenhouse gases (“GHGs”) that exacerbate climate change. Most HFCs have a global-warming potential (“GWP”)2 hundreds to thousands of times greater than carbon dioxide (“CO₂”). The Montreal Protocol must respond to climate impacts of HFCs by encouraging the use of other energy-efficient ODS substitutes with low GWP.

A second issue that the Montreal Protocol must address is that, although existing stockpiles of ODSs have been taken out of service, ODSs in discarded stockpiles, equipment, and products, collectively referred to as “Banks,”3 are rapidly emitting powerful GHGs into the atmosphere.4 The emissions from Banks are delaying the recovery of the ozone layer and exacerbating global climate change. Banks are currently not regulated by either the Montreal Protocol or the Kyoto Protocol of the United Nations Framework Convention on Climate Change (“UNFCCC”). The Montreal Protocol and its Parties have repeatedly recognized the need to address the full environmental implications of their actions.5 Regulation of high-GWP HFCs, a class of chemicals that was commercialized directly due to the phase-out of ODSs under the Montreal Protocol, and managing and destroying the Banks of ODSs under the Montreal Protocol, and managing and destroying the Banks of ODSs is the next steps in fulfilling this mandate.

**THE MONTREAL PROTOCOL**

The Montreal Protocol has been widely touted as the most successful international environmental treaty to date, having phased out the production and consumption of the vast majority of ODSs in accordance with set timeframes. The Montreal Protocol includes the innovative approach of having developed countries (“non-Article 5 countries”) phase out ODSs on a faster schedule than developing countries (“Article 5 countries”), thereby acknowledging both developed nations’ larger

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1. Climate Assessment Panel (“TEAP”) estimated in 2002 that approximately 21 gigatons (“Gt.”) of CO₂ equivalent (“CO₂-eq.”) are contained in Banks.03 Unless action is taken now, the IPCC/TEAP Special Report predicts that total direct emissions of CO₂-eq. are expected to reach 2.3 Gt. per year by 2015, nullifying all of the reductions in GHGs achieved under the Kyoto Protocol.06

2. Coordination with the UNFCCC to: (a) have the phase-out of high-GWP HFCs serve as a case study for effective technology transfer and funding mechanisms that can be incorporated into post-Kyoto Protocol institutions for other GHGs; and (b) develop effective funding mechanisms for destroying Banks before they are released to the atmosphere.

3. The Montreal Protocol’s mandate by covering the destruction of Banks.

4. Critical-necessary actions to achieve these goals include:

   1. A decision by the Montreal Protocol to add high-GWP HFCs as controlled substances.

   2. A decision by the Montreal Protocol to discourage the production and consumption of high-GWP HFCs.

   3. Expansion of the Montreal Protocol’s activities to include the management and destruction of Banks worldwide.

   4. Coordination with the UNFCCC to: (a) have the phase-out of high-GWP HFCs serve as a case study for effective technology transfer and funding mechanisms that can be incorporated into post-Kyoto Protocol institutions for other GHGs; and (b) develop effective funding mechanisms for destroying Banks before they are released to the atmosphere.

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contributions to historic emissions and developing nations’ need to provide for their own future economic and environmental development. Additionally, the Montreal Protocol includes proven mechanisms to assist Article 5 countries in meeting their ODS reduction goals by facilitating technology transfer and providing financial assistance to ensure compliance and the creation of necessary infrastructure.

The most basic tenet of the Montreal Protocol is the Parties’ obligation to limit “consumption” and “production” of “controlled substances.” By definition, “controlled substances” include any substance listed in the annexes to the Montreal Protocol, regardless of whether it exists alone or within a mixture. To enable the Parties to meet their mandate to restore the ozone layer, the Montreal Protocol can add a substance to the annexes of controlled substances when it is recognized as a significant ODS. Additionally, the Montreal Protocol permits Parties independently to regulate substances not included in the Protocol or undertake more stringent control measures than required under the Montreal Protocol.

It is important to note that, while the Montreal Protocol sets specific timelines for the phase-out of ODSs, it does not specify the manner in which the phase-out goals are to be achieved. This flexibility allows Parties to meet the targets in a manner best suited to their individual situations. Parties are permitted to utilize materials that have been stockpiled, produced, or used as a feedstock in the production of other chemicals. Moreover, trade in recycled and used chemicals is not included in the calculation of consumption to encourage the recycling of materials as a means of satisfying consumption needs while facilitating phase-out of production.

Article 5 of the Montreal Protocol, entitled Special Section of Developing Countries, was negotiated to establish a grace period for compliance with the control provisions to phase out consumption and production of ODSs ranging between ten and fifteen years, depending on the chemical, beyond the deadlines for developed countries. Only those nations with an annual per capita consumption of ODSs of less than 0.3 kilograms per year can take advantage of the more lenient extended phase-out schedule. Article 5 charges developed nations with the responsibility to provide financial and technological assistance to the developing nations in the implementation of technologies and processes with less ozone depleting effects.

Under Article 10A of the Montreal Protocol, non-Article 5 countries are required to transfer “best available, environmentally safe substitutes and related technologies” to Article 5 nations at “fair and most favorable trade conditions.” This commitment to facilitate the access of developing countries to relevant scientific information, data, training, and technology was reasserted in the Helsinki Declaration adopted at the First Meeting of the Parties in 1989.

**Financial Mechanism/Multilateral Fund**

To address the hesitancy among developing nations to ratify the Montreal Protocol due to concerns over resources required for compliance and impacts on their development, mechanisms were incorporated into the Montreal Protocol to provide the financial resources necessary for developing nations to meet their shared obligations. The dominant feature of the financial mechanisms is the Multilateral Fund for the Implementation of the Montreal Protocol (“Multilateral Fund”), designed to cover incremental costs incurred by developing countries as a result of the phase-out of their consumption and production of ODSs.

Every three years, the Parties to the Montreal Protocol determine the budget for the Multilateral Fund for a three-year “triennium,” with contributions from over forty developed nations based on a United Nations assessment scale. The Multilateral Fund is managed by an Executive Committee comprised of seven industrialized nations and seven developing countries, which reports annually to the Meeting of the Parties. At the 56th Meeting of the Executive Committee in Doha, Qatar in November 2008, the Executive Committee approved 116 projects and activities for sixty-five countries totaling $57,347,247 plus $9,956,600 support costs for bilateral and implementing agencies.

The Multilateral Fund has helped industry in developing countries replace chemicals and equipment and reorganize production processes, effectively stimulating the redesign of products. The Multilateral Fund has played a pivotal role in facilitating the transfer of technology and enhancing capacity building and development capabilities, thereby contributing to the overall success of the Montreal Protocol.

**Recognition of the Interplay Between ODSs and Climate Change**

The Montreal Protocol has already significantly benefited international climate change mitigation. It is estimated that the phase-out of chlorofluorocarbons (“CFCs”) and other ODSs will
have reduced GHG emissions by 135 Gt. of CO$_2$-eq. between 1990 and 2010.\textsuperscript{27} Both the text of the Montreal Protocol and subsequent decisions by the Parties make clear that the phase-out of ODSs should not occur in a vacuum; rather, relevant scientific information and environmental impacts, including climatic effects, should be considered. The Parties supported this concept by adopting Decision V/8 in 1993,\textsuperscript{28} requiring Parties to consider ODS substitutes in light of their environmental impacts. The following year, the Parties further expanded their mandate to consider environmental impacts other than ozone depletion by adopting Decision VI/13.\textsuperscript{29}

That requires the TEAP to “consider how available alternatives compare with hydrochlorofluorocarbons ("HCFCs"), with respect to such factors as energy efficiency, total global warming impact, potential flammability, and toxicity.”\textsuperscript{30}

The interplay between the phase-out of ODSs and climate change was again explicitly recognized at the Tenth Meeting of the Parties in 1998 when forty Parties issued a statement making it clear that climate impacts should be considered in the work of the Montreal Protocol. The Parties stated that there are “scientific indications that global warming could delay the recovery of the ozone layer” and “environmentally sound alternative substances and technologies are available for virtually all HCFC applications.”\textsuperscript{31} The Parties urged:

all Parties of the Montreal Protocol to consider all ODS replacement technologies, taking into account their total global-warming potential, so that use of alternatives with a high contribution to global warming should be discouraged where other, more environmentally friendly, safe and technically and economically feasible alternatives or technologies are available.\textsuperscript{32}

The Montreal Protocol’s contribution to climate change and the high GWP of many ODSs and their substitutes are widely recognized.\textsuperscript{33} As a result, in 2007, the Parties decided to accelerate substantially the phase-out of HCFCs, primarily due their emissions contribution to global climate change.\textsuperscript{34} It is estimated that the more rapid phase-out of HCFCs will result in the following:

- A reduction of potential emissions of HCFCs by approximately forty-seven percent from what would have been emitted if the accelerated phase-out had not been adopted, avoiding the emission of nearly one million tons of ODSs; and
- A transition to low-GWP substitutes for HCFCs that are currently commercially available and under development, avoiding between 3 and 16 Gt. of CO$_2$-eq. emissions into the atmosphere.\textsuperscript{35}

The role of the Montreal Protocol in controlling GHGs was explicitly affirmed in the 2007 G8 Summit Declaration, which pledged: “[W]e will also endeavor under the Montreal Protocol to ensure the recovery of the ozone layer by accelerating the phase-out of HCFCs in a way that supports energy efficiency and climate change objectives.”\textsuperscript{36} Following the historic agreement to accelerate the phase-out of HCFCs, the Leaders Meeting of Major Economies on Energy Security and Climate Change reaffirmed their commitment to helping the climate by declaring on July 9, 2008: “[R]ecognizing the need for urgent action . . . we commit to . . . actions under the Montreal Protocol on Substances that Deplete the Ozone Layer for the benefit of the global climate system.”\textsuperscript{37} The explicit focus on climate benefits and energy efficiency, in addition to ozone benefits, when assessing the overall impacts of ODS substitutes and other strategies adopted by the Montreal Protocol, is consistent with the Montreal Protocol’s history of basing actions on sound science and objective technical assessments.

At the Twentieth Meeting of the Parties in November 2008, the impact on the global climate of ODS substitutes was recognized in Decisions XX/7 and XX/8, which began the process of evaluating the management and destruction of Banks and the availability and feasibility of low-GWP alternatives to ODSs.\textsuperscript{38}

\textbf{Preemptive Action Encouraging the Use of Low-GWP Alternatives to ODSs Will Have Significant Climate Benefits}

The timing is right for the Parties to control the use of high-GWP HFCs as ODS substitutes, even if these substitutes are not ODSs themselves, as the commercialization of high-GWP HFCs is the direct result of the Montreal Protocol’s phase-out of ODSs. The UN Conference on Environment and Development calls on the Parties to “[r]eplace CFCs and other ozone depleting substances, consistent with the Montreal Protocol, recognizing that a replacement’s suitability should be evaluated holistically and not simply on its contribution to solving one atmospheric or environmental problem.”\textsuperscript{39} The Montreal Protocol’s continued condoning of the use of high-GWP HFCs conflicts with its precautionary and holistic approach to phasing out ODSs by creating altogether different, but no less dire, environmental consequences. This is particularly true where substitutes for ODSs

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\textbf{The regulation and phase-out of high-GWP HFCs under the Montreal Protocol would ensure a more comprehensive approach by all significant producers and users of HFCs on an equitable basis.}
with low-GWP, including carbon dioxide (GWP = 1), hydrocarbon and hydrocarbon blends (GWP < 3), and HFC-152a (GWP = 140) are all technically- and economically-feasible replacements for high-GWP HFCs currently used in both automotive and stationary air conditioning and refrigeration units.40

The Montreal Protocol has historically regulated refrigerants, foam-blowing agents, aerosols, firefighting chemicals, specialty medical chemicals, and a limited number of other chemicals that deplete the ozone layer. As a result, the Parties have acquired an in-depth understanding of these industries and the uses of ODSs. HFCs are now being used as replacements for ODSs in the same sectors41 or are being created as by-products of the production of these ODSs.42 Therefore, regulating HFCs would be a logical extension of the Montreal Protocol’s mandate and consistent with its holistic approach to sectors interacting with and affected by the phase-out of ODSs.

Decision XX/8, adopted in November 2008, requested that the TEAP report on the status of alternatives to HCFCs and HFCs include a description of the various use patterns, costs, and potential market penetration of alternatives.43 The results of the TEAP’s investigation are going to be presented at a workshop before the next Open-Ended Working Group Meeting in Geneva, Switzerland in July 2009.44 The meeting will address technical and policy issues related to ODS alternatives, with a particular focus on how the Montreal Protocol can address the impact of high-GWP HFCs while maximizing the ozone and climate benefits of the early phase-out of HCFCs.45 The UNFCCC has been invited to participate, as HFCs are within the “basket” of GHGs being controlled by the UNFCCC and its Kyoto Protocol. It is anticipated that the results of the investigation and workshop will lead to concrete measures to encourage the use of low-GWP substitutes for ODSs.

Unless the use of high-GWP HFCs is promptly curtailed globally, their rapid emergence as the primary substitutes for HCFCs and other ODSs could significantly negate the climate mitigation benefits achieved by the historic phasing-out of ODSs, offsetting reductions of other GHG emissions under the Kyoto Protocol. Absent coordinated global action under the Montreal Protocol in consultation with the UNFCCC, emissions of ODS substitutes will exacerbate the global climate crisis. The Montreal Protocol has the technical and funding mechanisms in place to implement control measures in order to address the prompt phase-out of high-GWP HFCs and demonstrate how classes of GHGs within specific sectors can be effectively controlled and eliminated. However, having the phase-out of HFCs occur under the Montreal Protocol will require substantial international support. The control of HFCs by the Montreal Protocol would be a model for a UNFCCC sectorial approach to control of GHGs after 2012. The Parties must act with urgency once again to strengthen and expand the scope of the Montreal Protocol by amending it to control high-GWP HFCs before their use and production are widespread and the cost to transition to low-GWP substitutes increases exponentially and becomes potentially prohibitive.

**Emissions From Banks Pose an Immediate Climate Threat**

Emissions from Banks threaten to delay the recovery of the ozone layer and dramatically impede global efforts to combat climate change. While the use and production of many ODSs have been drastically reduced over the past two decades, ODS Banks still remain in products and machinery throughout the world. ODSs in Banks are continuously being released to the atmosphere, either through leakage or when ODSs or products containing them are disposed of at the end of their useful lives.46 However, the Montreal Protocol defines “consumption” as imports plus production minus export, thus excluding the regulation of ODSs in Banks from the Montreal Protocol.47 This does not include the atmospheric release of ODSs from Banks and as a result ODSs have not been regulated by the Montreal Protocol to date. Nonetheless, potential solutions exist to remedy this problem.

**Banks Can Be Effectively Maintained and Destroyed**

The mandate for the Montreal Protocol must be immediately expanded to implement a comprehensive program to address the maintenance and destruction of Banks. The TEAP has estimated that the potential cumulative savings if ODSs were recovered and destroyed across all sectors would be approximately six billion tons of CO$_2$-eq. between 2011 and 2050, noting that a sizeable portion of those ODSs would require significant collection efforts.48 To put this into perspective, this large a release of GHGs would offset all of the gains accomplished under the Kyoto Protocol.49 If the world’s Banks of ODSs in refrigeration, stationary air conditioning, and mobile air conditioning (i.e., those that are most easily and cost-effectively recovered) were destroyed, it is estimated that the release of approximately 2.8 Gt. of CO$_2$-eq. would be prevented by 2015.50 As these emissions are already occurring continuously throughout the world, the gains that could be achieved by preventing these “super” GHGs from being emitted to the atmosphere are available immediately.

Approximately forty percent of Banks are installed in the refrigeration and stationary and mobile air conditioning sectors, while the remaining sixty percent are in foams, medical aerosols, fire protection, and other sectors.51 Furthermore, Banks are continuing to increase as the complete phase-out date for ODSs approach$^{52}$ and the phase-out of HCFCs is being expedited. Therefore, Banks will become an increasing problem in the near future.

The Montreal Protocol and the Parties to it have recognized the risk to both the ozone layer and the global climate from emissions from Banks. As a result, the scope of the problem and the destruction options and their associated costs have been evaluated for many years.53

In November 2008, at the Twentieth Meeting of the Parties, the Parties took the first concrete steps to manage and destroy Banks. In Decision XX/7,$^{54}$ the Parties agreed to a broad range of actions to evaluate the management and destruction of Banks,
including: (1) evaluating ways to mitigate emissions of ODS from Banks through the Montreal Protocol or by national and/or regional legislative strategies; (2) authorizing pilot projects to evaluate collection, transport, storage, and destruction of ODSs to generate data on how these measures will protect the ozone layer and achieve climate benefits; and (3) evaluating and adopting best practices and performance standards to prevent emissions from Banks, whether by recovery, recycling, reclamation, reuse as feedstock, or destruction.\(^5\) The Parties also commissioned the TEAP to conduct a cost-benefit analysis of destroying banks of ODSs versus recycling, reclaiming, and reusing such substances, taking into consideration the relative economic costs and environmental benefits to the ozone layer and climate.\(^6\) Additionally, recognizing that financial constraints limiting the ability to manage and destroy Banks are going to be the decisive factor as to whether emissions from Banks can be effectively destroyed, the Parties scheduled a meeting of experts from funding institutions, such as the UNFCCC, the Global Environment Facility, the Executive Board of the Clean Development Mechanism, and the World Bank, to assess possible funding opportunities before the next meeting of the Open-Ended Working Group.\(^7\)

Twelve technologies have been approved to date under the Montreal Protocol for the destruction of CFCs and halons.\(^8\) In developed countries, different technologies are in use for CFC destruction on a commercial basis. For instance, in Japan, more than ten technologies were being used in approximately eighty-two ODS destruction plants in operation as of 2006.\(^9\) Commercial ODS destruction facilities using technologies approved by the TEAP are in operation in twenty countries worldwide.\(^10\) ICF estimates that ODS destruction capacities range roughly from forty to six hundred metric tons per year.\(^11\) The cost to destroy ODS at these facilities varies by country, technology, capacity, and ODS type. Overall, it was estimated that ODS destruction costs range between two and thirteen dollars per kilogram, with an average of about seven dollars per kilogram.\(^12\) The pilot studies approved by the Montreal Protocol and a similar study being undertaken by the World Bank\(^13\) are intended to determine what technologies work best for which ODSs, to identify ODSs that are actually recoverable, to devise a plan to address ODSs in Article 5 countries, to ascertain the recovery costs for different ODSs, and to suggest methodologies for verification and certification of the destruction of ODSs. These findings can then be incorporated into international carbon offset regimes.

Tackling the destruction of Banks will require a multi-faceted approach. In non-Article 5 countries, feasible regulatory approaches include requiring producer/retailers to collect and destroy ODSs, providing incentives for ODS destruction, and creating industry-lead programs for this purpose.\(^14\) Most non-Article 5 countries have available infrastructure and facilities to destroy ODSs effectively in a validated and verifiable manner.\(^15\) In Article 5 countries, however, there will be a need for financial and technology transfers to store and maintain existing Banks, create destruction facilities, and transport ODSs to existing facilities for destruction, all activities consistent with those traditionally occurring through the Multilateral Fund. Infrastructure building and personnel training in these countries will also be necessary so that the ODS destruction can be validated and verified.

**Funding the Destruction of Banks**

To encourage and finance the destruction of Banks in the short available time frame, funding the Multilateral Fund at traditional levels will not be adequate. One way to generate additional funding would be to tap into the funding from Global Environment Facility (“GEF”\(^16\)) and the carbon trading systems (e.g., the Clean Development Mechanism (“CDM”), Chicago Climate Exchange (“CCX”), and Regional Greenhouse Gas Initiative (“RGGI”)). As of September 2008, the CCX is the only carbon-trading platform that has an established protocol for generating credits for the destruction of ODSs.\(^17\) The CCX has developed a protocol to measure and verify GHG emission reductions resulting from the destruction of ODSs.\(^18\)

Currently, the destruction of ODSs has not been approved as an acceptable offset project under the CDM and therefore cannot generate Certified Emissions Reductions (“CERs”) under the Kyoto Protocol. Under current CDM rules, however, an international body such as the Montreal Protocol can apply to generate CERs by coordinating a Program of Activities comprised of numerous CDM programs. By applying and taking control of ODS destruction programs, the Montreal Protocol could issue CERs and generate significant funds for the Multilateral Fund to distribute to Article 5 countries to ensure the expeditious and controlled destruction of Banks. If the Montreal Protocol takes on the phase-out of high-GWP HFCs, this could generate revenues not only to fund the phase-out and destruction of Banks but also of HFCs as well.\(^19\)

Obtaining funding from the various carbon trading platforms would result in substantial revenues that could be used to facilitate widespread and rapid Banks destruction. However, allowing the destruction of ODS Banks into the carbon trading system has to be structured carefully to maintain the stability of the markets, ensure that the ODSs destruction results in real climate impact, and prevent the increased production of ODSs or high-GWP substitutes simply to profit from the carbon market. Due to the extremely high GWP of many ODSs, the destruction of small volumes of ODSs can result in the potential issuance of very large numbers of CERs. For example, the most common CFCs in reachable refrigeration and air-conditioning are CFC-11 and CFC-12 which have GWPs of 5000 and 8500, respectively.\(^20\) Therefore, destruction of one ton of these substances would result in the generation of thousands of CERs. It was estimated that there were 218,318 tons of CFCs in refrigeration and air conditioning banks in 2002.\(^21\) Destruction of a fraction of these CFC banks and the resultant issuance of CERs could significantly destabilize the carbon markets and divert funding from other projects that reduce the emissions of other GHGs or to prevent deforestation. These problems could be avoided by having the CERs issued for ODS destruction controlled by the Montreal Protocol and having the number of CERs issued correspond...
to the actual cost of destroying the Banks. By tying the CERs issued to the actual cost of destruction, the Multilateral Fund would have the sales proceeds from the CERs to promote quick and comprehensive Banks destruction. This would not create a disproportionate number of CERs or destabilize the carbon markets; rather, it would ensure that the CERs issued were directly tied to the climate benefit achieved.

Destruction of only banned ODS Banks should initially be eligible for CERs in order to prevent the creation of a perverse incentive to produce more ODSs with high GWP simply for the value of the CERs. This problem has already been identified arising from the production of HCFC-22 (GWP = 1780\(^72\)) used widely in window unit air conditioners and small refrigerators, which produce HFC-23 (GWP = 14,310\(^73\)) as a byproduct. CERs can be earned for the destruction of HCF-23 through the CDM. However, as the cost of destroying HCF-23 is very low, approximately $0.20 per ton of CO\(_2\)-eq.,\(^74\) and the price of CERs is typically between $5 and $15 per metric ton of CO\(_2\)-eq. reduction,\(^75\) huge profits could be made from HFC-23 destruction. It has been calculated that the cost of the direct installation of equipment to destroy HFC-23 would only be $100 million compared to $6 billion worth of CERs that have been issued.\(^76\) The CERs for the destruction of HFC-23 are sufficiently profitable that industry observers have suggested that new HCFC-22 production facilities can be financed on the expected profits from the CERs from the HFC-23 destruction alone.\(^77\)

Bank destruction can be incorporated into the carbon markets without creating such perverse incentives by limiting the issuance of CERs to ODSs that are banned. It will be important to also ensure that funding is available to investigate and prevent illegal production of banned ODSs given the sizeable profits that can be made if CERs are given for their destruction.

**Coordination of Regulation of HFCs Under the Montreal Protocol with the UNFCCC**

HFCs are in the “basket” of gases regulated by the UNFCCC’s Kyoto Protocol.\(^78\) The current regulation of HFC emissions under the UNFCCC should not impede complementary regulation under the Montreal Protocol. The Kyoto Protocol requires industrialized countries that have ratified the Kyoto Protocol to cut their GHG emissions by an average of 5.2% from the 1990 level by the year 2012.\(^79\) The Kyoto Protocol has currently been ratified by 118 countries, including 32 industrialized countries, collectively representing only 44.2% of 1990 emissions.\(^80\) Conversely, all the major ODS and HFC-producing and consuming countries have ratified the Montreal Protocol, which has the ability to impose phase-out requirements on all of these Parties. Therefore, at this stage, the regulation and phase-out of high-GWP HFCs under the Montreal Protocol could ensure a more comprehensive approach by all significant producers and users of HFCs on an equitable basis, thereby substantially reducing the likelihood of illegal trade in HFCs by creating an even economic playing field as a result of the global regulation of HFCs.

In international law, successive treaties on the same subject matter are commonplace, as recognized by the Vienna Convention.\(^81\) International law principles allow a treaty that covers the subject matter of an historic treaty to be entered into force, subject to established rules of interpretation.\(^82\) To the extent the successive treaties are compatible, the provisions of both treaties are enforceable. When they are incompatible and where the subject matter and parties to the treaties are the same, the language of the later treaty or the more specific treaty generally controls.\(^83\)

The Parties to the Montreal Protocol have the expertise to regulate high-GWP HFCs by controlling and phasing out their production and consumption. This is compatible with and complementary to the UNFCCC’s regulation of emissions of HFCs. The technical expertise, mechanism for technology transfer, and Multilateral Fund to assist developing countries make the Montreal Protocol uniquely suited to control and phase out high-GWP HFCs. The Montreal Protocol HFC phase-out would act as a mechanism for developed countries in UNFCCC to achieve deep emissions cuts and act as a technology transfer mechanism to help developing countries reduce their GHG emissions in a measurable, reportable, and verifiable manner. As the UNFCCC negotiates to extend efforts to control GHGs past 2012, it can work in collaboration with the Montreal Protocol to use an HFC phase-out as a tool for Parties to meet strong emissions reduction targets and to ensure that high-GWP HFCs are not needlessly substituted for ODSs in developing countries.

The UNFCCC’s Bali Action Plan\(^84\) makes it clear that the post-2012 climate framework will emphasize technology transfer for developing countries and sectorial emissions reduction

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**A successful collaborative effort between the UNFCCC and Montreal Protocols could alleviate some of the tensions in the current climate negotiations. The Montreal Protocol has demonstrated effective technology transfer and funding mechanisms for developing countries.**
A successful collaborative effort between the UNFCCC and Montreal Protocols could alleviate some of the tensions in the current climate negotiations. The Montreal Protocol has demonstrated effective technology transfer and funding mechanisms for developing countries. If applied to HFCs under the post-Kyoto Protocol regime, this could build trust between developed and developing countries within UNFCCC negotiations and instill confidence that reductions in all GHGs would occur in an equitable manner, without disproportionately disadvantaging the economies of the developing countries.

**Actions Needed to Address High-GWP HFCs and Banks**

**Decision to Add HFCs as a Class of Chemicals Regulated and Phased-Out Under the Montreal Protocol, Including a Pledge Not to Use High-GWP HFCs Where More Environmentally Suitable Alternative Substances or Technologies Are Available**

To date, the Montreal Protocol has only regulated substances that directly deplete the ozone layer. However, the language of the Montreal Protocol does not so limit its authority, and the Parties should amend the Montreal Protocol to expand its mission to include combating climate change associated with ODSs and their substitutes. Simple amendments would allow the Parties to ensure that the phase-out of ODSs is accomplished without exacerbating climate change. The need for the Montreal Protocol to continue its work to find low-GWP substitutes for ODSs is particularly apparent with the projected massive increase in the use of high-GWP HFCs as the result of the phase-out of the ODSs. The objectives of the Montreal Protocol will not be achieved until ODSs have been replaced by substances with minimal adverse impacts to the global environment.

An amendment of the Montreal Protocol specifically to combat climate change caused by high-GWP HFCs, even though they are not ODSs, is consistent with international law principles for treaty interpretation. The first place to look for the intent and scope of a treaty is the text itself, including the Preamble. When the Montreal Protocol was adopted, the Parties included in the Preamble both the concept that they were “[e]nsconced of the potential climatic effects of” ODSs and that they were “[d]etermined to protect the ozone layer by taking precautionary measures to control equitably total emissions of [ODSs] . . . on the basis of developments in scientific knowledge.” The text has to be interpreted in the context of all of the decisions made and actions taken by the Parties under the Montreal Protocol. These actions include all of the decisions cited above, where the climatic effects of ODSs have been recognized and where the reduction and phase-out of ODSs have been required to be viewed in the context of broader environmental consequences, including the environmental impacts of ODS substitutes, and the latest scientific and technological knowledge. These actions also include all of the work performed to evaluate the non-ozone implications of the phase-out of ODSs.

**Expand the Montreal Protocol’s Mandate to Control Management and Destruction of Banks**

Developing countries want predictable and sustained financing if they are going to be obligated to maintain and destroy Banks. The Montreal Protocol ties financial assistance to specific goals and projects. The Montreal Protocol’s Multilateral Fund is one of the mechanisms that has created good relations between developed and developing countries as they have worked to phase out ODSs.

Some of the recent reductions in ODS use have been achieved by unnecessarily replacing ODSs with high-GWP HFCs. It is now well-established that high-GWP HFCs are adding to the global climate crisis. Likewise, to date, the Montreal Protocol has focused on regulation of production and consumption of ODSs and has not regulated the management or destruction of Banks. The objectives of the Montreal Protocol obligate the Parties to complete the task of restoring the ozone layer without exacerbating the global climate crisis. The Parties can accomplish this by: (1) committing not to use high-GWP HFCs
as substitutes for ODSs if other more environmentally-suitable alternative substances or technologies are available; (2) amending the Montreal Protocol to make clear that the protection of the ozone layer is not going to be accomplished through measures that exacerbate the global climate crisis by (a) actively phasing out the production and consumption of high-GWP substitutes and providing financial incentives for the use of low-GWP substitutes for ODSs, and (b) expanding the mandate of the Montreal Protocol to include the management and destruction of Banks; and (3) coordinating with the UNFCCC to (a) have the phase-out of high-GWP HFCs serve as a case study for effective technology transfer and funding mechanisms that can be incorporated into post-Kyoto institutions for other GHGs and (b) develop effective funding mechanisms for Banks management and destruction.

The climate crisis can be effectively combated if it is disaggregated into smaller, manageable components where the strengths of international, regional, and national organizations and entities can be brought to bear. The Montreal Protocol has the unique capacity to regulate and promote the phase-out of high-GWP HFCs used as ODS substitutes and to manage and destroy Banks. Both the transition to the use of high-GWP HFCs and the emissions from Banks are occurring as of the writing of this article, and the opportunity to control both of these serious threats to the global environment is time limited. The Montreal Protocol must be amended promptly to meet these urgent global challenges.

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Endnotes:

The Montreal Protocol Must Act to Prevent Global Climate Change While Restoring the Ozone Later

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2 GWP refers to an index that compares the relative potential of GHGs to contribute to global warming. Many ODSs and HFCs have GWPs in the hundreds and even thousands (e.g., HFC-23 has a GWP of 11,700 times greater than CO$_2$). See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC/TEAP SPECIAL REPORT: SAFEGUARDING THE OZONE LAYER AND THE GLOBAL CLIMATE SYSTEM: ISSUES RELATED TO HYDROFLUORO CARBON AND PERFLUOROCARBONS 30 (2005) [hereinafter IPCC/TEAP Special Report], available at http://www.ipcc.ch/pdf/special-reports/sorcc/sorcc_full.pdf.
3 “Banks” is the term used to describe ODSs contained in “existing equipment, chemical stockpiles, foams and other products not yet released into the atmosphere.” IPCC/TEAP Special Report, supra note 2, at 9.
4 ODSs in Banks are continuously being released to the atmosphere, either through leakage or when ODSs or products containing them are disposed of at the end of their useful lives. See Kaniaru, supra note 1, at 174.
5 IPCC/TEAP Special Report, supra note 2, at 9.
6 Id. at 11. The Kyoto Protocol’s emission reduction target is to reduce GHG emissions by 5.8 percent below a baseline of 18.4 Gt. CO$_2$-eq. between 2008 and 2012, reducing emissions by approximately 1.1 Gt. CO$_2$-eq. per year for that period, or approximately 4.3 Gt. CO$_2$-eq. See UN FRAMEWORK CONVENTION ON CLIMATE CHANGE [UNFCCC], KEY GHG DATA: GREENHOUSE GAS EMISSIONS DATA FOR 1990–2003, at 13 (2005), available at http://unfccc.int/resource/docs/publications/key_ggh.pdf.
9 See id., art. 1, para. 4.
10 See id., art. 2, para. 9.
11 See id., art. 2, para. 11.
15 See Montreal Protocol, supra note 8, art. 5, paras. 8 bis, 8 ter.
16 See id., art. 5, para. 1.
18 See Montreal Protocol, supra note 8, art. 10A.

21 See Montreal Protocol, supra note 8, art. 10. The mechanism also includes other forms of multilateral, bilateral, and regional co-operative efforts in compliance with the policies and guidelines of the fund. See Montreal Protocol, supra note 8, art. 10, para. 2; see also United Nations Environment Programme, Division of Technology, Industry and Economics, Chemicals Branch, Some Relevant Aspects of the Montreal Protocol on Substances that Deplete the Ozone Layer, http://www.chem.unep.ch/pops/indxhtms/manwg2.html (last visited Apr. 19, 2009) [hereinafter Relevant Aspects].

22 See Montreal Protocol, supra note 8, art. 10, para. 1. Incremental costs include such items as the supply of substitute chemicals, conversion of existing production facilities and plants, capital costs of equipment, training, premature retirement of equipment, technical assistance, research, and development. See Fourth Report, supra note 14, at Annex VIII; see also Relevant Aspects, supra note 21.

23 See Montreal Protocol, supra note 8, art. 10, paras. 6-7.

24 See Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, About the Multilateral Fund-Overview, http://www.multilateralfund.org/about_the_multilateral_fund.htm (last visited Apr. 18, 2009) [hereinafter Multilateral Fund Overview]; see also Fourth Report, supra note 14, at Annex IX. The day-to-day operations of the fund are managed by a secretariat with a small staff located in Montreal, Canada. See Multilateral Fund Overview, supra.


26 See Ralph Luken & Thomas Graf, The Montreal Protocol’s Multilateral Fund and Sustainable Development, in THE MONTREAL PROTOCOL: CELEBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS, supra note 1, at 71. Central to all Multilateral Fund projects are training programs to enable managers and technicians to obtain the data and skills necessary to adapt to the new technology. See id. at 72.


30 Id.


32 Id.

33 IPCC/TEAP Special Report, supra note 2, Summary for Policymakers at 3-4.

34 Nineteenth Report, supra note 7, at 33-34, 38-39, and 44-45 (Decisions XIX/6, XIX/12, and XIX/20).


40 See, e.g., Velders, supra note 27. An example of the high-GWP HCFCs to be replaced is HFC-134a which is commonly used in vehicle air conditioners and has a GWP of 1300.


42 The production of HCFC-22 has increased by hundreds of thousands of tons per year in the last decade, primarily for use in small air conditioners and refrigerators. See IPCC/TEAP Special Report, supra note 2, at 11. A by-product of the production of HCFC-22, also a refrigerant, is HFC-23, a “super” GHG which has a GWP reported by the UNFCCC to be 11,700 times greater than CO₂. See id., at 30.

43 Twentieth Report, supra note 38, at 40-41 (creating a “[w]orkshop for a dialog[on] high-global warming potential alternatives for ozone depleting substances”).


45 See Provisional Agenda, supra note 44.


47 See Montreal Protocol, supra note 8, art. 1, para. 6.

48 See generally IPCC/TEAP Special Report, supra note 2.

49 See supra note 6 and accompanying text.

51 IPCC/TEAP Special Report, supra note 2, at 9.
53 For examples of decisions relating to Banks destruction, see Fourth Report, supra note 14, Decision IV/11, para. 7, Decision IV/12, para. 2, and Decision IV/24, para. 4; Seventh Report, supra note 13, Decision VII/31; Seventeenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Dakar, Sen., Dec. 12-16, 2005, Report Seventeenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Decision XVI/17 and Decision XVIII/18, para. 1, UNEP/OzL.Pro.17/11 (Jan. 25, 2006), available at http://ozone.unep.org/Meeting_Documents/mop/17mop/17mop11e.pdf; and Twentieth Report, supra note 38, Decision XX/7.
54 Twentieth Report, supra note 38, Decision XX/7 (“Environ mentally sound management of banks of ozone-depleting substances.”).
55 Id.
56 Id. para. 7.
57 Id. para. 9.
61 See id.
62 See id.
65 See ICF Unwanted ODS, supra note 60; see also ICF INTERNATIONAL DESTRICTION, supra note 58.
66 GEF projects in climate change help developing countries and economies in transition to contribute to the overall objective of the UNFCCC. The projects support measures that minimize climate change damage by reducing the risk, or the adverse effects, of climate change. See, e.g., Global Environmental Facility, About the GEF, http://www.gefweb.org/interior_right.aspx?id=50 (last visited Apr. 18, 2009).
68 See ICF Unwanted ODS, supra note 60, at 48. The CCX is unique in approving a methodology for generating emissions credits for ODS destruction and is evidence that methodologies for numerous Banks destruction activities can be established to allow financing opportunities from the diverse institutions funding projects to combat climate change. See CCX Offsets, supra note 63.
69 See generally ICF Unwanted ODS, supra note 60.