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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 phaseout 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 must take responsibility for the Banks, created by the use and effective phase-out of ODSs, before these GHGs are emitted to the atmosphere. The International Panel on Climate Change ("IPCC") and the Technology and Economic Assessment Panel ("TEAP") estimated in 2002 that approximately 21 gigatons ("Gt.") of CO₂ equivalent ("CO₂-eq.") are contained in Banks.⁵ Unless action is taken now, the IPCC/ TEAP Special Report predicts that total direct emissions of CO_2 -eq. are expected to reach 2.3 Gt. per year by 2015, nullifying all of the reductions in GHGs achieved under the Kyoto Protocol.⁶

The history of the Montreal Protocol is one of a dynamic and evolving treaty that responds quickly to changes in ozone and climate science, technology, and the needs of industries and countries dependent on ODSs and their substitutes. Following in this tradition, and consistent with the purpose and spirit of the Montreal Protocol to protect the global environment, decisions should be made to include high-GWP HFCs among the categories of regulated chemicals and to expand the Montreal Protocol's mandate by covering the destruction of Banks. Critically-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 and to finance the incremental costs that developing countries must incur to avoid using 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.

The Montreal Protocol and its Parties have repeatedly recognized the need to address the full environmental implications of their actions.⁷ 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 are 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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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."⁸ 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.⁹ 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.¹⁰ 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.¹¹

It is important to note that, while the Montreal Protocol sets specific timelines for the phaseout of ODSs, it does not specify the manner in which the phaseout goals are to be achieved. This flexibility allows Parties to meet the targets in a manner best suited to their individual situations.¹² Parties are permitted to utilize materials that have

been stockpiled, produced, or used as a feedstock in the production of other chemicals.¹³ 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.¹⁴

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.¹⁵ 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.¹⁶ 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.¹⁷

Under Article 10A of the Montreal Protocol, non-Article 5 countries are required to transfer "best available, environmentally

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.

The Montreal Protocol's

safe substitutes and related technologies" to Article 5 nations at "fair and most favorable trade conditions."¹⁸ 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 1989.¹⁹

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,²⁰ 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"),²¹ designed to cover incremental costs incurred by developing countries as a result of the phase-out of their consumption and production of ODSs.²²

Every three years, the Parties to the Montreal Protocol determine the budget for the Multilateral Fund for a threeyear "triennium," with contributions from over forty developed nations based on a United Nations assessment scale.²³ 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.²⁴ 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.²⁵

The Multilateral Fund has helped industry in developing countries replace chemicals and equipment and reorganize production processes, effectively stimulating the redesign of products.²⁶ 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 2010.²⁷ 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 1993,²⁸ 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/13.²⁹ That requires the TEAP to "consider how available alternatives compare with hydrochloro-fluorocarbons ("HCFCs"), with respect to such factors as energy efficiency, total global warming impact, potential flammability, and toxicity."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."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.³²

The Montreal Protocol's contribution to climate change and the high GWP of many ODSs and their substitutes are widely recognized.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.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 CO2-eq. emissions into the atmosphere. 35

The role of the Montreal Protocol in controlling GHGs was explicitly affirmed in the 2007 G8 Summit Declaration, which pledged: "We 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."³⁶ Following the historic agreement to accelerate the phase-out of HCFCs, the Leaders Meeting of Major Economies on Energy Security and Climate Change

The regulation and

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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."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.³⁸

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."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 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 CO₂-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 CO₂-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 approach⁵² 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 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.55 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.⁵⁶ 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.57

Twelve technologies have been approved to date under the Montreal Protocol for the destruction of CFCs and halons.⁵⁸ 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 eightytwo ODS destruction plants in operation as of 2006.59 Commercial ODS destruction facilities using technologies approved by the TEAP are in operation in twenty countries worldwide.⁶⁰ ICF estimates that ODS destruction capacities range roughly from forty to six hundred metric tons per year.⁶¹ 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.⁶² The pilot studies approved by the Montreal Protocol and a similar study being undertaken by the World Bank⁶³ 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 validation and verification of the destruction of ODSs. These findings can then be incorporated into international carbon off-set 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.⁶⁴ Most non-Article 5 countries have available infrastructure and facilities to destroy ODSs effectively in a validated and verifiable manner.⁶⁵ 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")⁶⁶ 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.⁶⁷ The CCX has developed a protocol to measure and verify GHG emission reductions resulting from the destruction of ODSs.⁶⁸

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.⁶⁹

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.⁷⁰ 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 2002.⁷¹ 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 HFC-23 is very low, approximately \$0.20 per ton of CO₂-eq.,⁷⁴ and the price of CERs is typically between \$5 and \$15 per metric ton of CO₂ -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

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.

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 would 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

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 UNFC-CC'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

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 Plan⁸⁴ makes it clear that the post-2012 climate framework will emphasize technology transfer for developing countries and sectorial emissions reduction approaches. Recent submissions by developing countries concerning mechanisms for technology transfers have included the creation of technology assessment panels and encouraged capacity building to enable these countries to address GHGs effectively. These techniques have already been deployed by the Montreal Protocol; therefore, a phase-out of high-GWP HFCs under the Montreal Protocol would serve as a model to demonstrate that these techniques can be usefully applied to control other GHGs.

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-Kvoto Protocol regime. this could build trust between developed and developing countries within UNFCCC negotiations and instill confidence that reductions in all GHGs would

The objectives of the Montreal Protocol obligate the Parties to complete the task of restoring the ozone layer without exacerbating the global climate crisis.

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.⁸⁵ Simple amendments would allow the Parties to ensure that the phase-out of ODSs is accomplished without exacerbating climate change.⁸⁶ 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 phaseout 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.⁸⁷ When the Montreal Protocol was adopted, the Parties included in the Preamble both the concept that they were "[*c*]onscious

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."⁸⁸ 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.⁸⁹ These actions include all of the decisions cited above,⁹⁰ 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.⁹¹

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.92 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. By keeping HFCs within the "basket" of GHGs regulated by the UNFCCC, funding for the phase-out of high-GWP HFCs under the Montreal Protocol could become available through the funding mechanisms created by or in conjunction with the UNFCCC to defray some or all of the costs of the phase-out. Financing from the funding mechanisms currently being negotiated within the UNFCCC climate talks, as well as approving the destruction of ODSs to generate CERs, could create substantial new sources of funding for the Montreal Protocol to take on this important work. A phase-out of high-GWP HFCs would again act as a model to demonstrate the efficacy of certain aspects of its financial mechanisms.

CONCLUSION

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

 ¹ Donald Kaniaru et al., Strengthening the Montreal Protocol: Insurance Against Abrupt Climate Change, in THE MONTREAL PROTOCOL: CELEBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS 165, 165-66 (Donald Kaniaru ed., 2007).
 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 high hundreds and even thousands (e.g., HFC-23 has a GWP of 11,700 times greater than CO₂). See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC/TEAP SPECIAL REPORT: SAFEGUARDING THE OZONE LAYER AND THE GLOBAL CLIMATE SYS-TEM: ISSUES RELATED TO HYDROFLUOROCARBONS AND PERFLUOROCARBONS 30 (2005) [hereinafter IPCC/TEAP Special Report], available at http://www.ipcc.ch/pdf/ special-reports/sroc/sroc_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. CO₂-eq. between 2008 and 2012, reducing emissions by approximately 1.1 Gt. CO₂-eq. per year for that period, or approximately 4.3 Gt. CO₂–eq. *See* UN FRAMEWORK CONVENTION ON CLIMATE CHANGE [UNFCCC], KEY GHG DATA: GREENHOUSE GAS EMISSIONS DATA FOR 1990–2003, at 15 (2005), *available at* http://unfccc.int/resource/docs/publications/key_ghg.pdf.

⁷ See, e.g., Eleventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, Beijing, P.R.C., Nov. 29–Dec. 3, 1999, Report of the Eleventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Decision XIX/6, UNEP/ OzL.Pro.11/10 (Dec. 17, 1999) [hereinafter Eleventh Report], available at http://hqweb.unep.org/ozone/Meeting_Documents/mop/11mop/MOP_11.asp (implementing freeze on production of HCFCs due to the adverse impacts of that class of chemicals); Nineteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, Can., Sept. 17–21, 2007, Report of the Nineteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Decision XIX/6, UNEP/OzL. Pro.19/7 (Sept. 21, 2007) [hereinafter Nineteenth Report], available at http:// ozone.unep.org/Meeting_Documents/mop/19mop/MOP-19-7E.pdf (accelerating the phase-out of hydrochlorofluorocarbons in part due to the GWP of these substances and their by-products).

⁸ See Montreal Protocol on Substances that Deplete the Ozone Layer, art. 2, Sept. 16, 1987, 26 I.L.M 1541 (1987) [hereinafter Montreal Protocol], available at http://www.unep.ch/ozone/pdf/Montreal-Protocol2000.pdf.

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<sup>9</sup> See id., art. 1, para. 4.
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¹⁰ See id., art. 2, para. 9.

¹¹ See id., art. 2, para. 11.

¹² See UNITED NATIONS ENVIRONMENT PROGRAMME [UNEP], DIVISION OF TECH-NOLOGY, INDUSTRY AND ECONOMICS/GRID-ARENDAL, VITAL OZONE GRAPHICS: RESOURCE KIT FOR JOURNALISTS 26 (2007), available at http://www.grida.no/ _res/site/file/publications/vitalozone.pdf.

¹³ See Seventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Vienna, Austria, Dec. 5-7, 1995, *Report of the Seventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision VII/30, UNEP/OzL.Pro.7/12 (Dec. 27, 1995) [hereinafter Seventh Report], *available at* http://www.unep.org/Ozone/ Meeting_Documents/mop/07mop/MOP_7.asp; *see also* UNITED NATIONS ENVI-RONMENT PROGRAMME, BACKGROUNDER: BASIC FACTS AND DATA ON THE SCIENCE AND POLITICS OF OZONE PROTECTION 4 (2008) [hereinafter UNEP Backgrounder], *available at* http://ozone.unep.org/Events/ozone_day_2008/press_back-grounder.pdf.

¹⁴ See Fourth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, Den., Nov. 23–25, 1992, *Report of the Fourth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision IV/24, UNEP/OzL.Pro.4/15 (Nov. 25, 1992) [hereinafter Fourth Report], *available at* http://www.unep.ch/ozone/4mop_cph. shtml; *see also* UNEP Backgrounder, *supra* note 13, at 4.

¹⁵ See Montreal Protocol, supra note 8, art. 5, paras. 8 bis, 8 ter.
 ¹⁶ See id., art. 5, para. 1.

¹⁷ See id. art. 5, paras. 2-3. Additionally, adjustments to the Montreal Protocol permitted developed nations to increase their production of ODSs by a set percentage specifically to assist developing nations in meeting their basic domestic needs. See Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, Eng., June 27–29, 1990, *Report of the Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Annex I, UNEP/OzL.Pro.2/3 (June 29, 1990), *available at* http://www.unep.ch/ozone/2mlonfin.shtml. In 1995, the Parties adopted a decision enabling developing countries to export ODSs to other developing countries. See Seventh Report, *supra* note 13, at Decision VII/9.
¹⁸ See Montreal Protocol, *supra* note 8, art. 10A.

¹⁹ See First Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Helsinki, Fin., May 2–5, 1989, Report of the First Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Appendix I (Helsinki Declaration on the Protection of the Ozone Layer), UNEP/OzL.Pro.1/5 (May 6, 1989), available at http://ozone.unep.org/Publications/ MP_Handbook/Section_3.8_Annexes_Declarations/Helsinki_Declaration.shtml.

Endnotes: The Montreal Protocol Must Act to Prevent Global Climate Change While Restoring the Ozone Later *continued on page 66*

ENDNOTES: THE MONTREAL PROTOCOL MUST ACT TO PREVENT GLOBAL CLIMATE CHANGE continued from page 40

²⁰ See Mostafa K. Tolba et al. Global Environmental Diplomacy: Negotiating Environmental Agreements for the World, in THE MONTREAL PROTOCOL: CEL-EBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS, supra note 1, at 38.
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.

²⁵ See Press Release, Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, 56th Meeting Approves 116 Projects and Activities for 65 Countries (Dec. 1, 2008), http://www.multilateralfund.org/ news/1228514896375.htm. Projects receiving approval included renewal of institutional strengthening projects in twenty-five countries, projects for the removal of CFCs from the manufacturing process for metered dose inhalers in five nations, and approval of a bilateral proposal for an international methyl bromide compliance workshop for Article 5 countries. *Id.*

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.

²⁷ Donald Kaniaru et al., Appendix 1, Frequently Asked Questions: Strengthening the Montreal Protocol by Accelerating the Phase-Out of HCFCs at the 20th Anniversary Meeting of the Parties, in The MONTREAL PROTOCOL: CELEBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS, supra note 1, at 261. Stated another way, it has been estimated that the phase-out of ODSs under the Montreal Protocol has resulted in the equivalent of a reduction of 11 Gt. of CO₂-eq. per year—delaying climate change by up to 12 years. Guus J.M. Velders et al., *The Importance of the Montreal Protocol in Protecting Climate*, 104(12) PROC. NATL. ACAD. SCI. USA 4814, 4817 (2007), available at http://www.pnas.org/content/104/12/4814.full.pdf.

²⁸ Fifth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Bangkok, Thail., Nov. 17–19, 1993, *Report of the Fifth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision V/8, UNEP/OZL.Pro.5/12 (Nov. 19, 1993), *available at* http://www.unep.org/OZONE/Meeting_Documents/mop/05mop/ MOP_5.asp.

²⁹ Sixth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Nairobi, Kenya, Oct. 6–7, 1994, *Report of the Sixth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision VI/13, UNEP/OzL.Pro.6/7 (Oct. 10, 1994) [hereinafter Sixth Report], *available at* http://www.unep.org/ozone/Meeting_Documents/ mop/06mop/MOP_6.asp.

³⁰ *Id.*

³¹ Tenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Cairo, Egypt, Nov. 23–24, 1998, *Report of the Tenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Annex 5 (Declaration on Hydrochlorofluorocarbons, Hydrofluorocarbons, and Perfluorocarbons), UNEP/OzL.Pro.10/9 (Dec. 3, 1998) [hereinafter Tenth Report], *available at* http://www.unep.ch/ozone/pdf/10mop-rpt.pdf. 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).

³⁵ See Mark W. Roberts, Environmental Investigation Agency, A Climate Briefing 5 (2008), *available at* http://www.eia-global.org/PDF/report--Climate --Jan09.pdf.

³⁶ G8 Summit, Heiligendamm, Ger., June 6–8, 2007, *Declaration on Growth and Responsibility in the World Economy* para. 59, *available at* http://www.g-8. de/Content/EN/Artikel/_g8-summit/2007-06-07-summit-documents.html (select hyperlink to article).

³⁷ G8 Summit, Hokkaido, Japan, July 7–9, 2008, *Declaration of Leaders Meeting of Major Economies on Energy Security and Climate Change* paras. 3, 10, *available at* http://www.mofa.go.jp/policy/economy/summit/2008/doc/doc080709_10_en.html.

³⁸ See Twentieth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Doha, Qatar, Nov. 16–20, 2008, Report of the Twentieth Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer and the Twentieth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer 38-41, UNEP/OzL.Pro.20/9 (Nov. 27, 2008) [hereinafter Twentieth Report], available at http://ozone.unep.org/Meeting_Documents/mop/20mop/MOP-20-9E.pdf.
 ³⁹ U.N. Conference on Environment and Development, Rio de Janerio, Braz.,

June 3–14, 1992, Agenda 21, section 9.24(e), *available at* http://www.un.org/ es/sustdev/documents/agenda21/english/agenda21chapter9.htm.

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

⁴¹ *See* European Fluorocarbons Technical Committee, Fluorocarbons and Sulphur Hexafluoride, http://www.fluorocarbons.org/en/homepage.html (last visited Apr. 18, 2009).

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 CO_2 . 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").

⁴⁴ See UNEP Provisional Agenda, Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Twenty-ninth meeting, Geneva, (July 15-18, 2009), UNEP/OzL.Pro.WG.1/29/1 [hereinafter Provisional Agenda], available at http://ozone.unep.org/ Meeting_Documents/oewg/29oewg/OEWG-29-1E.pdf.

⁴⁵ See Provisional Agenda, supra note 44.

⁴⁶ See Proposed Adjustments to the Montreal Protocol, UNEP/OzL.Pro. WG.1/28/3/Add.1, available at http://www.unon.org/confss/doc/unep/ozone/ ozL.pro.wg/Pro_WG_1_28/OzL-WG1-28-3-Add1/K0840783_E.doc. citing TEAP, Response to Decision XVIII/12, Report of the Task Force on HCFC Issues (with Particular Focus on the Impact of the Clean Development Mechanism) and Emissions Reductions Benefits Arising from Earlier HCFC Phase-Out and Other Practical Measures (August 2007) at 12, available at http:// ozone.unep.org/Assessment_Panels/TEAP/Reports/TEAP_Reports/TEAP-TaskForce-HCFC-Aug2007.pdf; see also IPCC/TEAP Special Report, supra note 2, at 53 ("With a typical 20-year lifespan, refrigerator end-of-life retirement and disposal occurs at a frequency of about 5% of the installed base each year. This means approximately 75 million refrigerators containing 100 [grams] per unit, or a total of 7500 tonnes of refrigerant, are disposed of annually."). ⁴⁷ See Montreal Protocol, supra note 8, art. 1, para. 6.

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

⁴⁹ See supra note 6 and accompanying text.

⁵⁰ See United Nations Environment Programme, Technology and Economic Assessment Panel, Response to Decision XVIII/12, Report of the Task Force on HCFC Issues (with Particular Focus on the Impact of Clean Development Mechanism) and Emissions Reductions Benefits Arising from Earlier HCFC Phase-Out and Other Practical Measures 27 (2007), *available at* http://ozone.unep.org/teap/Reports/TEAP_Reports/TEAP-TaskForce-HCFC-Aug2007.pdf. ⁵² Article 5 countries are expected to completely phase-out the production and consumption of CFCs, halons, and carbon tetrachloride by 2010. See Backgrounder, UNEP Basic Facts and Data on the Science and Politics of Ozone Protection (Aug. 2003), *available at* http://www.unep.org/ozone/pdf/Press-Backgrounder.pdf.

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 XVII/17 and Decision XVII/18, para. 1, UNEP/OZL.Pro.17/11 (Jan. 25, 2006), *available at* http://ozone.unep.org/Meeting_Documents/mop/ 17mop/17mop-11.e.pdf; and Twentieth Report, *supra* note 38, Decision XX/7
 ⁵⁴ Twentieth Report, *supra* note 38, Decision XX/7 ("Environmentally sound management of banks of ozone-depleting substances.").

⁵⁵ Id.

- ⁵⁶ *Id.* para. 7.
- ⁵⁷ *Id.* para. 9.

⁵⁸ ICF INTERNATIONAL, DESTRUCTION OF OZONE-DEPLETING SUBSTANCES IN THE UNITED STATES 5 (2008) [hereinafter ICF INTERNATIONAL DESTRUCTION], *available at* http://www.epa.gov/ozone/title6/downloads/ODSDestruction.pdf (draft report prepared for the U.S. Environmental Protection Agency's Stratospheric Protection Division).

⁵⁹ MINISTRY OF THE ENVIRONMENT OF JAPAN, REVISED REPORT OF THE STUDY ON ODS DISPOSAL OPTIONS IN ARTICLE 5 COUNTRIES 15 (2006), *available at* http://www.env.go.jp/en/earth/ozone/ods2006.pdf.

⁶⁰ See ICF INTERNATIONAL, STUDY ON THE COLLECTION AND TREATMENT OF UNWANTED OZONE-DEPLETING SUBSTANCES IN ARTICLE 5 AND NON-ARTICLE 5 COUNTRIES, FINAL REPORT 205 (2008) [hereinafter ICF UNWANTED ODS], available at http://ozone.unep.org/Meeting_Documents/oewg/28oewg/ICF_ Study_on-Unwanted_ODS-E.pdf [Report of the Executive Committee of the Multilateral Fund on case studies called for under decision XVIII/17 on environmentally sound destruction of ozone-depleting substances (decision XVIII/9)]. ⁶¹ See id.

⁶² See id.

⁶³ The 54th Meeting of Executive Committee approved a 2008–2010 study of ODSs. *See generally* Fifty-Fourth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, Montreal, Que., Can., Apr. 7–11, 2008, *The World Bank Business Plan for the Years 2008-2010*, UNEP/OzL.Pro/ExCom/54/11 (Mar. 7, 2008), *available at* http://www.multilateralfund.org/files/54/5411.pdf.

⁶⁴ See Forty-Eighth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, Montreal, Que., Can., Apr. 3–7, 2008, 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) at 47, UNEP/OZL.Pro/ExCom/48/42 (Mar. 20. 2006), available at http://www.multilateralfund.org/files/48/4842.pdf.

⁶⁵ See ICF UNWANTED ODS, *supra* note 60; *see also* ICF INTERNATIONAL DESTRUCTION, *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).

⁶⁷ CHICAGO CLIMATE EXCHANGE, CCX OZONE DEPLETING SUBSTANCES DESTRUCTION OFFSETS 1 (2008) [hereinafter CCX Offsets], *available at* http://www.
theccx.com/docs/offsets/Ozone_Depleting _Substance_Protocol.pdf.
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.

⁷⁰ CFC-113, CFC-114, and CFC-115 are also commonly used in industrial uses. U.S. EPA, Ozone Layer Depletion, Ozone Depletion Glossary, http:// www.epa.gov/Ozone/defns.html; U.S. EPA, Ozone Layer Depletion-Alternatives/SNAP, http://www.epa.gov/ozone/snap/refrigerants/. ⁷¹ TEAP, Response to Decision XVIII/12, Report of the Task Force on HCFC Issues (with Particular Focus on the Impact of the Clean Development Mechanism) and Emissions Reductions Benefits Arising from Earlier HCFC Phase-Out and Other Practical Measures ("TEAP Response"), at 27, (August 2007), *available at* http://ozone.unep.org/teap/Reports/TEAP_Reports/TEAP-TaskForce-HCFC-Aug2007.pdf.

⁷² IPCC/TEAP Special Report, *supra* note 2, at 8.

⁷⁴ See IPCC/TEAP Special Report, supra note 2, at 382.

⁷⁵ LAMBERT SCHNEIDER ET AL., IMPLICATIONS OF THE CDM ON OTHER CONVEN-TIONS: THE CASE OF HFC-23 DESTRUCTION 10 (2005), *available at* http://www. oeko.de/oekodoc/248/2005-006-en.pdf; CDM Executive Board, Report of the THIRTEENTH MEETING OF THE METHODOLOGIES PANEL 4 (2004), *available at* http:// cdm.unfccc.int/Panels/meth/Meth13_rep.pdf.

⁷⁶ Kyoto Protocol 'Loophole' Has Cost \$6 Billion, New SCIENTIST, Feb. 9, 2007, available at http://www.newscientist.com/article/dn11155-kyoto-protocol-loophole-has-cost-6-billion.html.

⁷⁷ Id.

⁷⁸ Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22, at Annex A.

79 Id. at Annex B.

⁸⁰ UNFCCC, Kyoto Protocol, Status of Ratification, http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (last visited Apr. 20, 2009).
 ⁸¹ Vienna Convention on the Law of Treaties, May 23, 1969, art. 30, 1155 U.N.T.S. 331; 8 I.L.M. 679 [hereinafter Vienna Convention], *available at* http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf.
 ⁸² *Id.*

⁸³ The overlap of the Parties that have signed and ratified both the Montreal Protocol and the Kyoto Protocol is almost total. Afghanistan, Chad, the Holy See, Turkey, the United States, and Zimbabwe are the only Parties to the Montreal Protocol that have not ratified the Kyoto Protocol. The doctrine of *lex specialis* favors the more specific treaty.

⁸⁴ Thirteenth Conference of the Parties to the UNFCCC, Report of the Conference of the Parties on its thirteenth session, held in Bali from 3 to 15 December 2007, Addendum, Part Two: Action taken by the Conference of the Parties at its thirteenth session, Decision 1/CP13, available at http://unfccc.int/resource/ docs/2007/cop13/eng/06a01.pdf.

⁸⁵ A parallel amendment to the Vienna Convention would be required.
⁸⁶ An amendment to Article 2F to impose similar restrictions on the use of HFCs as HCFCs would also confirm the Parties determination to discourage the use of high-GWP HFCs. *See* Montreal Protocol, *supra* note 8, at art. 2F. Such an amendment would be consistent with Agenda 21, which calls on the Parties to "[r]eplace CFCs and other ozone depleting substances, consistent with MP, recognizing that a replacement's suitability should be evaluated holistically and not simply on its contribution to solving one atmospheric or environmental problem." *See* Agenda 21, *supra* note 39.

⁸⁷ Vienna Convention, *supra* note 75, art. 31(2).

⁸⁸ See Montreal Protocol, supra note 8, pmbl.

⁸⁹ Vienna Convention, *supra* note 75, art. 31(3).

⁹⁰ See supra note 4. Moreover the parties tacitly acknowledged the issue of lingering ODSs by including a provision designed to encourage recycling to meet consumption needs. See Fourth Report, supra note 14.

⁹¹ UNEP, TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, SUPPLEMENT TO THE IPCC/TEAP REPORT (2005), *available at* http://ozone.unep.org/teap/Reports/ TEAP_Reports/teap-supplement-ippc-teap-report-nov2005.pdf.

⁹² For example, at its 55th Meeting in July 2008, the Executive Committee of the Multilateral Fund approved US \$36 million, plus support costs, for 169 projects and activities in 108 developing countries to fund the elimination of over 1,450 tons of substances that harm the earth's ozone layer. This funding included almost US \$16.2 million for 101 countries for the preparation of plans to address the initial targets set-out in the accelerated timetable for HCFC phase-out agreed by Parties to the Montreal Protocol in September 2007. Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, *Report of the 55th Meeting of the Executive Committee of the Multilateral Fund*, UNEP/OzL.Pro/ExCom/55/53/Corr.1 (2008), available at http://www.multilateralfund.org/files/55/5553.pdf.

⁷³ Id.