



Institute for Governance & Sustainable Development*

**FREQUENTLY ASKED QUESTIONS ABOUT
DESTROYING OZONE-DEPLETING
SUBSTANCE BANKS UNDER
THE MONTREAL PROTOCOL**

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TABLE OF CONTENTS

INTRODUCTION.....	1
QUESTION 1: What are ODS banks?.....	2
QUESTION 2: What is the climate impact of existing ODSs banks?.....	2
QUESTION 3: What are the climate and ozone benefits of managing ODS banks to destruction?.....	3
QUESTION 4: Why is immediate action needed to prevent emissions of ODSs from banks?.....	4
QUESTION 5: How much will it cost to prevent ODS emissions from banks?.....	5
QUESTION 5A: How much will it cost to manage ODS banks to destruction in Article 5 Parties?.....	6
QUESTION 5B: How much will it cost to manage ODS banks to destruction in non-Article 5 Parties?.....	7
QUESTION 5C: Will ODS-bank destruction interfere with legitimate on-going demand for recycled ODSs from banks?.....	8
QUESTION 6: Are existing international efforts to address ODS banks adequate to prevent these emissions?.....	8
QUESTION 7: Which sources of funding can be mobilized to recover and destroy ODS banks?.....	9
QUESTION 7A: How can ODS bank recovery and destruction be financed in non-Article 5 Parties?.....	9
QUESTION 7B: How can ODS bank recovery and destruction be financed in Article 5 countries?.....	10
QUESTION 8: How can the entities established under the Montreal Protocol facilitate the management of ODS banks to destruction?.....	12
QUESTION 9: What actions can the Parties to the Montreal Protocol take to promote the recovery and destruction of ODS banks?.....	13

INTRODUCTION

Strengthening the Montreal Protocol on Substances that Deplete the Ozone Layer (“Montreal Protocol”) to promote the destruction of “banks” of ozone-depleting substances (“ODSs”) is critical to preventing dangerous anthropogenic interference with the climate system. Climate change is occurring faster than expected, exceeding previous Intergovernmental Panel on Climate Change (“IPCC”) predictions. Tipping points for abrupt and irreversible climate changes are sitting just beyond the horizon.¹ Urgent action is required.

In response, policymakers are searching for complementary measures to achieve near-term climate mitigation while long-term climate solutions are being developed and post-2012 climate negotiations continue. One cost-effective opportunity to prevent a significant amount of greenhouse gas (“GHG”) emissions in the near-term is to recover and destroy banks of unwanted ODSs found in existing stockpiles and discarded products and equipment.

To seize this time-sensitive climate-mitigation opportunity, the governments of the world must come together to create new synergies among the most successful multilateral environmental agreement (“MEA”), the Montreal Protocol,² the world’s most important one, the United Nations Framework Convention on Climate Change (“UNFCCC”), and international funding institutions in an all-hands-on-deck approach.

At the 20th Meeting of the Parties (“MOP”) to the Montreal Protocol last year, the Parties initiated efforts to promote the recovery and destruction of ODS banks. Building on previous reports by the Technology and Economic Assessment Panel (“TEAP”) and IPCC,³ as well as previous decisions of the Parties to the Montreal Protocol,⁴ the Parties adopted Decision XX/7.⁵ Through Decision XX/7, the Parties: commissioned further analysis on the costs and benefits of ODS bank recovery, collection, and destruction; requested the Ozone Secretariat host a workshop with UNFCCC and other stakeholders to explore co-financing opportunities by leveraging the climate benefits of ODS bank destruction; and authorized the Multilateral Fund for the Implementation of the Montreal Protocol (“MLF”) to commence ODS-bank-destruction pilot projects as a matter of urgency.⁶

This year, the Federated States of Micronesia and Mauritius, two island nations facing existential threats from sea-level rise, submitted a joint proposal to amend and strengthen the Montreal Protocol to promote the destruction of ODS banks to capture the climate benefits.⁷ If adopted by the Parties, this amendment will deliver desperately needed, fast-action climate mitigation to complement critical cuts needed in CO₂ emissions.

This document provides initial answers to frequently asked questions related to the proposed amendment to promote ODS bank destruction under the Montreal Protocol (the “ODS Banks Amendment”).

QUESTION 1: What are ODS banks?

The term “ODS banks” describes the total amount of ODSs contained in existing equipment, chemical stockpiles, foams, and other products not yet released into the atmosphere.⁸ These ODSs also are powerful GHGs.⁹ Under the current system of governance, ODS banks exist in a regulatory void. This is because the Montreal Protocol only controls ODS production and consumption, not emissions.¹⁰ Once placed onto the market, ODSs are no longer subject to control measures under the Montreal Protocol.

ODS banks accumulate in three primary sectors: refrigeration, air conditioning, and foams.¹¹ For refrigerators and air-conditioning units, the ODSs in the new equipment gradually deplete over the course of their useful lifetime until, at the time of disposal, a portion of the original amount remains in the discarded equipment until it eventually leaks into the atmosphere. For insulating foams, the ODSs do not deplete over time—it is inseparable from the product—and therefore remains in the foam until decommissioned. At that time, the foam will either enter the waste stream, where it will gradually leak into the atmosphere, or be recovered and destroyed in an environmentally sound manner. Over the last several decades, the Montreal Protocol’s exclusive focus on production and consumption has led to the accumulation of millions of ozone-depleting potential (“ODP”) tonnes and billions of carbon-dioxide equivalent (“CO₂-eq.”) tonnes of ODSs in banks. (See Question 2.)

For purposes of this discussion, we will mirror TEAP’s assessment of ODS banks and limit our discussion to “reachable” banks, i.e., banks that have yet to be emitted or reach the waste stream.¹²

QUESTION 2: What is the climate impact of existing ODSs banks?

According to IPCC and TEAP, ODS banks will contain approximately 16-17 billion tonnes (“Gt”) CO₂-eq. across all sectors worldwide in 2010, consisting of 12 Gt CO₂-eq. of CFCs and 4-5 Gt CO₂-eq. of HCFCs.¹³ Actions to recover and destroy CFC and HCFC banks in refrigeration and air conditioning—both stationary and mobile—represent the most cost-effective means of protecting the ozone layer and climate system. (See Question 5-5B.) But this window of opportunity is rapidly closing:

- Non-Article 5 Parties (developed countries): TEAP estimates that approximately 72% of CFC banks and 40% of HCFC banks in the refrigeration and air-conditioning sectors will be emitted over the 2010-2015 period. These lost banks will release CFC emissions of 0.7 Gt CO₂-eq. and HCFC emissions of 0.6 Gt CO₂-eq.¹⁴
- Article 5 Parties (developing countries): TEAP estimates that over 65% of the CFCs in refrigeration and air-conditioning units will be emitted over the 2010-2015 period.¹⁵ These lost banks will release CFC emissions of 1.7 Gt CO₂-eq. in Article 5 Parties.¹⁶ In addition, unlike in non-Article 5 Parties where HCFC consumption is decreasing, HCFC consumption in Article 5 Parties will rise through 2012. TEAP estimates that HCFC refrigeration and air-conditioning banks in Article 5 Parties will increase by 11% over the 2010-2015 period, totaling 1,304,074 tonnes or approximately 2.36 Gt CO₂-eq. in 2015.¹⁷

For insulating foams, the nature of foam insulation affords a little more time. In both non-Article 5 and Article 5 Parties, CFC and HCFC banks contained in foams are not expected to leak or enter the waste stream as quickly as refrigeration and air conditioning. Therefore, ODS banks in insulating foams will experience a gradual decline over decades as opposed to the dramatic decline in the coming years that is expected to occur in ODS banks in refrigeration and air conditioning.

QUESTION 3: What are the climate and ozone benefits of managing ODS banks to destruction?

ODS emissions will have significant climate impacts in the near- and mid-term. Preventing the emission of all ODSs in banks from 2004-2025 would have resulted in a direct positive radiative forcing avoided equal to approximately 3–4% of the total radiative forcing from all anthropogenic GHG emissions over the same period.¹⁸ At present, in non-Article 5 Parties, there are 3.8 Gt CO₂-eq. in ODS banks that can be managed to destruction with low or medium effort. In Article 5 Parties, there is 5 Gt CO₂-eq. (See **Question 5A-5B.**)

The opportunity to destroy the 8.8 Gt CO₂-eq. in these banks must be seized now or be forever lost. The ODS banks that are most cost-effective to manage to destruction (See **Question 5A-5B.**) are the same banks that will emit the vast majority of their ODSs by 2015.¹⁹ (See **Question 2.**) Without destruction, these banks will emit approximately 3 Gt CO₂-eq. by 2015,²⁰ offsetting the majority of the 5 Gt CO₂-eq. emission reductions sought during the first commitment period of the Kyoto Protocol to UNFCCC (“Kyoto Protocol”).²¹

End-of-life and complementary measures can provide significant climate mitigation. TEAP reports that “[e]nd-of-life measures [across all sectors] are consistent and significant contributors to savings in terms of ... climate, with cumulative savings of around ... 6 [Gt] CO₂-eq.”²² Complementary measures—early retirement, for example—provide further climate benefits in addition to financial benefits to host countries. TEAP estimates that early retirement of equipment will mitigate an additional 3.5-4 Gt CO₂-eq. emissions over the 2011–2050 period, not accounting for further CO₂-eq. savings from increased energy efficiency.²³

ODS-bank destruction releases nominal amounts of indirect CO₂ emissions during recovery, collection, transport, and destruction of ODS banks. TEAP analyses show, however, that these emissions are inconsequential when compared to the CO₂-eq. emission reductions from destroying ODS banks. For example, the refrigeration sectors are energy-intensive in terms of recovery, collection, transport, and destruction. Nevertheless, the CO₂-eq. emissions associated with managing these banks to destruction are just 0.09% and 6% of the CO₂-eq. emissions avoided for CFC- and HCFC-containing refrigerators, respectively.²⁴

The ODS in banks also deplete the ozone layer. Promoting their destruction will have significant ozone benefits too. According to TEAP, end-of-life measures across all sectors have potential cumulative savings of around 300,000 ODP tonnes.²⁵ Simply destroying the most cost-effective banks in refrigeration and air conditioning units at end-of-life, starting in 2008, could have accelerated the return of the ozone layer by up to two years.²⁶ These ozone benefits must be

accounted for when considering the cost of managing ODS banks to destruction as they will save tens to hundreds of billions of dollars worldwide in health-care costs associated with skin cancer, eye cataracts, and other ozone-related ailments.

QUESTION 4: Why is immediate action needed to prevent emissions of ODSs from banks?

Immediate action is needed to avoid missed opportunities. The cost-effective climate and ozone benefits available now will be unattainable later. At the present, ODS banks are leaking into the atmosphere and will continue to do so until a comprehensive global program to manage ODS banks to destruction is established. Further, the majority of ODSs in the most cost-effective banks will be emitted by 2015 unless destruction activities begin immediately. (See Questions 2-3.) In other words, funding now will achieve more ODS-bank destruction per dollar than future funding—a one-time down-payment for immediate climate mitigation. This was a key message from the June 2009 TEAP report issued in response to Decision XX/7, which requested further information and guidance on the costs and benefits of ODS bank destruction.²⁷

The urgency we face today underscores the need to establish the infrastructure in advance to minimize costs in the future. Other more-expensive-to-manage ODS banks will only be available for cost-effective management to destruction in the mid-term if the necessary infrastructure and governance institutions are developed now.

To cultivate further opportunities for cost-effective ODS bank destruction, the Montreal Protocol needs to: identify cost-effective ODS-bank-destruction projects; train technicians; and develop the infrastructure and governance institutions necessary to recover, store, transport, and destroy these banks.

There are 8.8 Gt CO₂-eq. of ODSs in low- and medium-effort banks—categories differentiating relative efforts to manage ODS banks to destruction—and a roughly equal amount is also present in ODS banks that are currently more costly to manage to destruction.²⁸ Economies of scale may be achieved; there are numerous costs associated with managing cost-effective banks that are also necessary to destroy more expensive banks, but these costs will not be incurred twice. These overlapping costs will significantly reduce the costs of future ODS banks management if ODS banks destruction starts with cost-effective banks and then strengthens to include all banks.

Investments in ODS-bank-destruction infrastructure will yield climate benefits for years to come. Many banks, particularly in Article 5 Parties, will either be replenished with CFCs and HCFCs in the mid-term or will be replaced with the next generation of chemicals. (See Questions 2-3.) In Article 5 Parties, HCFC production and consumption will increase through 2012, and these banks will continue to be replenished with HCFCs for decades to come. (See Question 2.)

In all Parties, banks of high-GWP hydrofluorocarbons (“HFCs”) will continue to grow as HFCs replace ODSs in these sectors as a result of the CFC and HCFC phase-outs.²⁹ Conservative estimates project that HFCs in all banks worldwide will be approximately 4.7-5 Gt CO₂-eq. by 2015 and more than 5.7 Gt CO₂-eq. in 2020, growing significantly thereafter.³⁰ These banks will need to be managed using the same infrastructure, training, and governance institutions required to manage ODS banks. Investing in the recovery and destruction of cost-effective ODS banks in

the near-term pays a double dividend for ozone and climate protection in the mid- and long-term because these investments will be available for use in the future.

A comprehensive ODS-bank-destruction program requires preparatory groundwork to create the institutional structure and secure funding. (See **Question 7A-7B.**) This means, as an initial matter, that certain decisions or amendments must be adopted to initiate the legal and administrative processes to allow the Montreal Protocol to receive and use supplemental funding through MLF and alternative sources, including UNFCCC, Kyoto Protocol, Global Environmental Facility (“GEF”), United Nations Development Programme (“UNDP”), and World Bank. These decisions or amendments will be a condition precedent to securing outside climate funding. (See **Question 7B.**)

In addition, the creation of the institutional structure within the Montreal Protocol must be coordinated with these international funding institutions and processes under these institutions must also be commenced forthwith if funding is to be made available in the near-term. (See **Questions 7B and 8.**) To date, only a nominal amount of funding has been provided to MLF. The funding made available in 2008 for pilot projects is insufficient to destroy all cost-effective ODS banks available during the 2009-2010 period or lay the foundation for a comprehensive, global program to begin operating soon thereafter. An aggressive and expansive funding effort is needed. The Parties must act swiftly to adopt enabling decisions or amendments, coordinate with their governments to ensure concurrent processes in other international institutions, and secure funding commitments for additional funding to MLF as soon as possible.

QUESTION 5: How much will it cost to prevent ODS emissions from banks?

There are three cost-incurring steps in the sound environmental management of unwanted ODSs in banks: (i) segregation from the waste stream; (ii) collection and recovery; and (iii) destruction.³¹ The costs of labor, population density, and existing infrastructure are all factors that have an effect on the costs of segregating from the waste stream, collecting, recovering, and destroying ODSs.³² All of these factors contribute to the variation between the costs of managing ODS banks to destruction in non-Article 5 and Article 5 countries. Some of these costs are already being incurred in many Parties as part of recycling or other programs and will not require MLF or other funding.

Spatial distribution and ODS application are also important considerations. The proximity of banks to one another, accessibility of ODSs in banks in a specific sector, and the ODS application as a refrigerant or foam must be taken into account. Further, certain applications that originally used CFCs with a GWP of 10,000 or more in non-Article 5 Parties later used HCFCs with lower GWPs at the time improved economic conditions allowed Article 5 Parties to purchase the equipment in large quantities. This means that, in certain sectors, the costs of managing a particular application’s ODS bank to destruction is less in Article 5 Parties than in non-Article 5 Parties on a per-kilogram-of-ODS basis, but more on a CO₂-eq. basis.

QUESTION 5A: How much will it cost to manage ODS banks to destruction in Article 5 Parties?

It will cost significantly less than many other climate-mitigation measures. For Article 5 Parties, TEAP identified those sectors requiring a *low effort* to manage ODS banks to destruction and estimates their corresponding costs and climate benefits as follows:³³

Sector	Available ODS on a CO₂-eq. Basis³⁴	Overall Cost of Bank Management (in millions US\$)³⁵	Cost per CO₂-eq. Tonne (in US\$)³⁶
Fire Protection	0.07 Gt CO ₂ -eq.	249 – 362	3.6 – 5.2
Industrial Refrigeration	0.24 Gt CO ₂ -eq.	942 – 1,370	3.9 – 5.7
Transport Refrigeration	0.07 Gt CO ₂ -eq.	242 – 374	3.5 – 5.3
SAC	0.39 Gt CO ₂ -eq.	2,012 – 3,109	5.2 – 8.0
MAC	0.12 Gt CO ₂ -eq.	193 – 299	1.6 – 2.5
Commercial Refrigeration	0.78 Gt CO ₂ -eq.	13,704 – 17,815	17.5 – 22.8
Domestic Refrigeration	0.58 Gt CO ₂ -eq.	9,215 – 12,051	15.9 – 20.8
Total	2.25 Gt CO₂-eq.	26,557 – 35,830	11.8 – 15.9

TEAP also identified those sectors requiring a *medium effort* in Article 5 Parties to manage ODS banks to destruction and provides their corresponding costs and climate benefits as follows:³⁷

Sector	Available ODS on a CO₂-eq. Basis³⁸	Overall Cost of Bank Management (in millions US\$)³⁹	Cost per CO₂-eq. Tonne (in US\$)⁴⁰
Fire Protection	0.10 Gt CO ₂ -eq.	324 – 472	3.2 – 4.7
SAC	0.51 Gt CO ₂ -eq.	3,570 – 5,950	7.0 – 11.7
MAC	0.16 Gt CO ₂ -eq.	343 – 572	2.1 – 3.6
Commercial Refrigeration	1.02 Gt CO ₂ -eq.	19,619 – 24,970	19.2 – 24.5
Block – Pipe	0.01 Gt CO ₂ -eq.	214 – 292	21.4 – 29.2
Domestic Refrigeration	0.76 Gt CO ₂ -eq.	11,988 – 15,677	15.7 – 20.6
Steel-Faced Panels	0.18 Gt CO ₂ -eq.	7,111 – 9,185	39.5 – 51.0
Block-Slab	0.02 Gt CO ₂ -eq.	696 – 899	34.8 – 45.0
Total	2.76 Gt CO₂-eq.	43,865 – 58,017	15.9 – 21.0

To put these costs into a climate perspective, under the Kyoto Protocol’s Clean Development Mechanism (“CDM”), one CO₂-eq. tonne of avoided GHG emissions in Article 5 Parties sold on the carbon market at an average price of US\$22 from 2005-2008.⁴¹ By comparison, ODS-bank destruction cost an average of US\$14-18.7 per CO₂-eq. tonne to prevent all 5.01 Gt CO₂-eq. of ODS-bank emissions from low- and medium-effort banks in Article 5 Parties. These costs

decrease to an average of US\$13.2-17.7 per CO₂-eq. tonne when preventing the 4.67 Gt CO₂-eq. of ODS-bank emissions in refrigerators and air conditioners.

QUESTION 5B: How much will it cost to manage ODS banks to destruction in non-Article 5 Parties?

It will cost significantly less than many other climate-mitigation measures. For non-Article 5 Parties, TEAP identified those sectors requiring a *low effort* to manage ODS banks to destruction and provides their corresponding costs and climate benefits as follows:⁴²

Sector	Available ODS on a CO ₂ -eq. Basis ⁴³	Overall Cost of Bank Management (in millions US\$) ⁴⁴	Cost per CO ₂ -eq. Tonne (in US\$) ⁴⁵
Fire Protection	0.15 Gt CO ₂ -eq.	524 – 762	3.5 – 5.1
Industrial Refrigeration	0.23 Gt CO ₂ -eq.	801 – 1,165	3.5 – 5.1
Transport Refrigeration	0.03 Gt CO ₂ -eq.	181 – 279	6 – 9.3
SAC	0.84 Gt CO ₂ -eq.	4,651 – 7,188	5.5 – 8.6
MAC	0.34 Gt CO ₂ -eq.	387 – 598	1.1 – 1.8
Commercial Refrigeration	0.12 Gt CO ₂ -eq.	3,058 – 3,975	25.5 – 33.1
Domestic Refrigeration	0.40 Gt CO ₂ -eq.	9,363 – 12,243	23.4 – 30.6
Total	2.11 Gt CO ₂ -eq.	18,965 – 26,210	9 – 12.4

TEAP also identified those sectors where it will require a *medium effort* in non-Article 5 Parties to manage ODS banks to destruction, and provides their corresponding costs and climate benefits as follows:⁴⁶

Sector	Available ODS on a CO ₂ -eq. Basis ⁴⁷	Overall Cost of Bank Management (in millions US\$) ⁴⁸	Cost per CO ₂ -eq. Tonne (in US\$) ⁴⁹
Fire Protection	0.05 Gt CO ₂ -eq.	177 – 257	3.5 – 5.1
SAC	0.28 Gt CO ₂ -eq.	2,147 – 3,578	7.7 – 12.7
MAC	0.12 Gt CO ₂ -eq.	179 – 299	1.5 – 2.5
Commercial Refrigeration	0.04 Gt CO ₂ -eq.	1,139 – 1,449	28.4 – 36.2
Block – Pipe	0.01 Gt CO ₂ -eq.	221 – 301	22.1 – 30.1
Domestic Refrigeration	0.14 Gt CO ₂ -eq.	3,169 – 4,145	22.6 – 29.6
Steel-Faced Panels	1.02 Gt CO ₂ -eq.	37,160 – 47,999	36.4 – 47.1
Block-Slab	0.01 Gt CO ₂ -eq.	1,042 – 1,345	104.2 – 134.5
Total	1.67 Gt CO ₂ -eq.	45,234 – 59,373	27.1 – 35.6

ODS-bank destruction in non-Article 5 Parties costs an average of US\$13.4-17.9 per CO₂-eq. tonne to prevent all 4.78 Gt CO₂-eq. of ODS-bank emissions from low- and medium-effort

banks. This is significantly lower than the 2005-2008 average price of US\$22 per CO₂-eq. tonne that non-Article 5 Parties paid to Article 5 Parties under CDM in lieu of achieving emission reductions at home.⁵⁰ These costs decrease to an average of US\$9.9-13.7 per CO₂-eq. tonne when giving priority to the 2.54 Gt CO₂-eq. of ODS-bank emissions in refrigerators and air conditioners.

QUESTION 5C: Will ODS-bank destruction interfere with legitimate on-going demand for recycled ODSs from banks?

No. A related question inquires whether ODS production would increase to offset the destruction of ODSs that might have otherwise been recycled to meet legitimate on-going ODS demand. Experts believe that most of the recycling opportunities for ODSs have already been established prior to any further action on ODS recovery.⁵¹ According to TEAP, the key question is whether the growth of a carbon market for ODSs would distort the existing market for recycled ODSs and, if so, to what effect.⁵² The answer depends on whether ODSs are tradable on the carbon market and, if so, the prices for carbon credits. Nevertheless, to prevent such an outcome, TEAP suggests two avenues to address this concern. First, provisions similar to those designed to avoid “production for destruction” would be added to guard against “recycle to destruction.”⁵³ Second, where further action on ODS recovery stimulates new and competitive supplies for recycling, it may be necessary to consider additional controls on supply and use, if it is not desirable to see the use of recycled materials be directed toward destruction.⁵⁴ In the end, however, recycled materials will ultimately be released unless destroyed so the question is not whether to destroy them but when.

QUESTION 6: Are existing international efforts to address ODS banks adequate to prevent these emissions?

No. Because ODS emissions from banks occur after production and consumption, they are not controlled by the Montreal Protocol. Despite having the jurisdictional authority to fund “cost effective” ODS bank destruction through the MLF (**See Question 7B**), with the exception of the pilot projects approved in Decision XX/7 last year, the Montreal Protocol has thus far not provided financing for ODS bank destruction in Article 5 Parties. Nor are emissions of these powerful GHGs regulated under the Kyoto Protocol—which does not include ODSs under Annex A listing the GHGs targeted for emission reductions.⁵⁵ Because the Executive Board of CDM (“CDM EB”) has rejected methodologies for ODS-bank-destruction projects, the Kyoto Protocol provides no incentives to prevent ODS emissions.⁵⁶ (**See Question 7B.**) To prevent emissions of ODSs in banks, the international community must act swiftly and in a coordinated manner to close this jurisdictional void. Acting pursuant to the principle of common but differentiated responsibilities, different governance approaches must be crafted for non-Article 5 and Article 5 Parties.

Several non-Article 5 Parties have already demonstrated that managing certain ODS banks to destruction can be accomplished efficiently and cost-effectively.⁵⁷ (**See Question 7A.**) Unfortunately, no non-Article 5 Party is currently implementing all proven best practices to prevent the emission of ODSs from their banks. Rather than lose these preventable GHG emissions by waiting—and hoping—that non-Article 5 Parties will adopt and implement existing

cost-effective measures to prevent ODS bank emissions in an *ad hoc* manner, the best way to achieve the climate mitigation benefits of ODS bank destruction in non-Article 5 Parties is to mandate that they achieve a certain level of ODS-bank destruction in specific sectors under the Montreal Protocol.⁵⁸

The Montreal Protocol has set the stage for decisions and amendments to be taken this year to approve robust ODS-bank regulation and finance a comprehensive program to manage ODS banks to destruction in Article 5 Parties.⁵⁹ MLF Executive Committee (“ExCom”) has also undertaken considerable analysis and preparation for the inclusion of ODS-bank destruction within their mandate, including consideration of a facility to house and utilize additional funding from alternative sources to achieve climate benefits beyond those resulting from compliance with control measures under the Montreal Protocol.⁶⁰ (See **QUESTION 7B and 8.**)

At the 20th MOP last year, the Parties took steps to begin addressing emissions from ODS banks by unanimously agreeing to Decision XX/7.⁶¹ This decision directed MLF, for the first time, to finance and commence ODS-bank-destruction pilot projects as a matter of urgency.⁶² In the *start and strengthen* spirit of the Montreal Protocol, Decision XX/7 is a start that must be strengthened this year in order to capture the ozone and climate benefits of destroying ODS banks. Adopting the proposals set forth in the ODS Banks Amendment will do that.

QUESTION 7: Which sources of funding can be mobilized to recover and destroy ODS banks?

Several sources of funding are available to manage ODS banks to destruction in non-Article 5 and Article 5 Parties. The financing approach for non-Article 5 and Article 5 Parties will differ due to dissimilar treatment under various MEAs, domestic resources, governance capabilities, infrastructures, and ODS banks.

QUESTION 7A: How can ODS bank recovery and destruction be financed in non-Article 5 Parties?

It can be financed by providing financial incentives generated from levies and taxes. In non-Article 5 Parties, an effective approach is to provide financial incentives to users and other responsible parties to promote the responsible disposal of ODS-containing products and equipment at end-of-life. These incentives should be supported by a legal mandate requiring proper ODS disposal. One proven method of financing these incentives and ODS-bank destruction is to place a levy on virgin or imported ODSs and their replacements.⁶³ Another method of generating funding for incentives is to place a tax on new ODS-containing equipment, such as new motor vehicles or refrigerators.⁶⁴ To date, these levies and taxes have had no discernable economic impact on applicable sectors and have provided sufficient funding such that additional tax-payer funding has not been required.

QUESTION 7B: How can ODS bank recovery and destruction be financed in Article 5 countries?

Financial assistance from international institutions is needed. Traditionally, all of the funding for ODS reductions in Article 5 Parties has come through MLF.⁶⁵ Because ODSs in banks harm the ozone layer and climate system, it may be possible to manage them through climate-dedicated funding or as part of larger sustainable development projects utilizing numerous international sources of funding. Potential sources include, *inter alia*: direct MLF funding; incremental cost or co-financing from climate-mitigation funds, such as GEF or new financial transfer mechanisms under UNFCCC; and co-financing from implementing agencies, such as UNDP and the World Bank.

MLF Funding.

Direct MLF funding is the only way to deliver the requisite financing to capture these ozone and climate benefits in the near-term. Other sources of funding are not available in the timeframe needed to capture emissions from the most cost-effective ODS banks. It is almost a certainty that without a significant supplemental replenishment to MLF to immediately implement a comprehensive ODS bank destruction program, the bulk of this climate mitigation opportunity will be lost. Further, MLF funding is the only source entirely within the control of the Montreal Protocol; it is not dependent on outside institutions, agencies, or market conditions.

Under Article 10 of the Montreal Protocol, MLF was established to provide funding to “meet all agreed incremental costs of [Article 5] Parties in order to enable their compliance with the control measures of the [Montreal Protocol].”⁶⁶ This provision would apply to ODS banks if the Montreal Protocol required cost-effective ODS banks be managed to destruction in both non-Article 5 and Article 5 Parties. In that instance, Article 10 would require donor countries to provide funding for the agreed incremental cost of compliance with this requirement in Article 5 Parties.⁶⁷

In the alternative, the parties can expand existing MLF programs promoting the management of ODS banks to destruction. In the 1990 amendment to the Montreal Protocol, the Parties created MLF and agreed upon an indicative list of incremental costs that included the “[c]ost of collection, management, recycling, and, if cost effective, destruction of ozone-depleting substances.”⁶⁸ In 1992, the Parties decided to facilitate access and transfer of approved destruction technologies in accordance with Article 10 of the Protocol, together with a provision for financial support under Article 10 of the Protocol for Article 5 Parties.⁶⁹ Last year, Decision XX/7 specifically authorized ODS-bank-destruction pilot projects. These activities demonstrate a pattern and practice of ODS-bank management that, within the current MLF structure, could be expanded to finance the destruction of all cost-effective ODS banks.

In the final analysis, the Montreal Protocol is beholden to its signatories. The authority to interpret the treaty rests with the Parties. As a result, nothing limits the Parties from issuing an authoritative interpretation of the Article 10 to authorize and fund a comprehensive ODS-bank-destruction program for those banks determined to be *cost-effective*.⁷⁰ Or, in the alternative, the Parties can amend Article 10 within the ODS Banks Amendment that authorizes and funds ODS-

bank destruction beyond compliance with control measures, as has been proposed.⁷¹ This latter alternative, however, could delay funding and implementation during the ratification process.

Incremental Costs or Co-financing.

MLF is considering establishing a special facility to house and use alternative sources of funding.⁷² The proposal would establish an MLF-administered facility to serve as the *situs* for all MLF activities benefiting the climate system, but not related to compliance with obligations under the Montreal Protocol, using additional income (hereinafter the “MP Climate Facility”). The MP Climate Facility would be able to use numerous sources of additional income, including pledges from governments and private entities, incremental-cost funding from international funding mechanisms and co-financing from other entities.

At the present, GEF is UNFCCC’s operational financial mechanism. As part of its mandate, the ozone-layer protection is one of its six focal areas, making GEF an ideal partner for ODS-bank-destruction projects.⁷³ As part of its work, GEF already funds energy-efficiency projects that replace and retire inefficient refrigerators and air conditioners. These projects have the potential to make millions of tonnes of CFCs and HCFCs available for destruction. By utilizing complementary funding to share the costs of recovering, collecting, and transporting ODSs to a central location, MLF funding would only be required to finance the destruction of ODSs—which, for CFCs in refrigeration, can be accomplished at a cost of US\$0.25-1 per CO₂-eq. tonne.⁷⁴

At the moment, GEF is preparing for discussions regarding its fifth replenishment for the 2010-2013 period, which are expected to conclude in early 2010. These discussions will determine what amount of funding is earmarked for ozone protection and other projects to protect the climate system while making readily available large quantities of ODS banks. In the past, GEF operated a climate-change window with the purpose of supporting short-term response measures designed to enable near-term cost-effective reductions in GHG emissions, a purpose that encompasses managing ODS banks to destruction.⁷⁵

In addition to GEF, UNFCCC is currently negotiating a post-2012 climate agreement that may include additional financial mechanisms. One such financial framework under discussion includes Nationally Appropriate Mitigation Measures (“NAMAs”) in developing countries that will receive incremental-cost funding. There are numerous UNFCCC proposals that would allow this facility to finance mitigation measures beyond those preventing the emissions of Annex A GHGs.⁷⁶ Depending on the outcome, it is possible that significant incremental-cost funding beyond what has traditionally been available under MLF and GEF could be available for ODS-bank destruction.

Implementing Agencies.

In some cases, ODS-bank destruction can be integrated into existing sustainable business models to reduce the costs of recovery, storage, and transportation. In these situations, MLF-implementing agencies, UNDP, United Nations Industrial Development Organization (“UNIDO”), and the World Bank can provide some or all funding necessary to make ODS banks

available for destruction or to manage ODS banks through destruction. Efforts to manage ODS banks coincide with other market transformation programs, such as improving the energy efficiency of building components (e.g. chillers) or upgrading domestic refrigerators, resulting in the potential to share costs and thereby reduce the total costs of managing ODS banks to destruction. MLF implementing agencies are typically also involved in such projects run under GEF and can act as a focal point for coordination among these institutions.

In March 2009, MLF-implementing agencies proposed 21 pilot projects to MLF ExCom, and submitted associated project preparation fund requests, of which six were approved.⁷⁷ One such MLF-approved ODS-bank-destruction pilot project implemented by UNDP is in preparation in Brazil. The Brazilian government is considering extending funding to replace energy-inefficient refrigerators in a nationwide subsidy-driven program to complement and complete a successful initiative driven solely by taxes levied on energy utilities to promote energy efficiency in low-income households. In addition, other sources of funding for the collection of ODSs were identified including bilateral donors such as the German government. This project is expected to make 0.33 Gt CO₂-eq. of CFCs available for destruction over the next 10 years. In addition to resources from MLF, other sources of funding will be identified during the preparatory phase of the project, including potential carbon financing. This may reduce the funding required from MLF to as low as the US\$0.25-1 per CO₂-eq. tonne in destruction costs.⁷⁸ This proposal and others are just the type of innovative and holistic sustainable business models needed to cost-effectively capture the climate benefits of ODS bank destruction. The Parties must give MLF the resources and mandate it needs to pursue all viable co-financing opportunities.

Carbon Markets under UNFCCC.

Some advocates are exploring co-financing the management of ODS banks to destruction in Article 5 Parties through CDM. Nearly all Montreal Protocol Article 5 Parties are also non-Annex I Parties under the Kyoto Protocol, and these Parties could presumably host CDM projects that avoid GHG emissions and generate tradable and sellable CERs.⁷⁹ But the Executive Board of CDM rejected the notion that CDM projects may reduce non-Annex A GHG emissions,⁸⁰ although some advocates argue that a close reading of both treaties compels the opposite conclusion. In either instance, this option would appear to be the last resort as it could dramatically reduce the climate benefits of ODS-bank destruction.

QUESTION 8: How can the entities established under the Montreal Protocol facilitate the management of ODS banks to destruction?

Entities under the Montreal Protocol—particularly MLF—should have a central role in facilitating the management of ODS banks to destruction. MLF can do this by directly funding ODS-bank destruction using traditional MLF funds and coordinating with international funding and implementing agencies to use alternative sources of funding. MLF and TEAP are the only entities with the requisite expertise, infrastructure, governance institutions, and existing relationships with national ozone offices capable of benefiting from economies of scale to quickly and cost-effectively destroy ODS banks in the near-term.

MLF and TEAP have several institutional advantages. Given their ozone expertise, information regarding global ODS emissions and distribution in banks is better understood by these entities than any other GHG considered within climate policy. As a result, their capacity to develop and manage a registry of existing ODS banks against which ODS bank management and destruction projects can be mapped is unrivaled.⁸¹ In addition, future investments in infrastructure and technician training in Article 5 Parties are better spent by capitalizing on existing MLF investments to reclaim and recycle ODSs.

The result will be reductions in overall costs of managing ODS banks to destruction. MLF also has several existing cooperative arrangements with other MEAs and implementing agencies that can form the basis for cost-effective sustainable business models to reduce ODS emissions from banks. It is critical that these assets are not squandered but, instead, are applied to ensure the greatest ODS-bank destruction in the most timely and cost-efficient manner while maximizing the climate benefits.

Funding ODS bank destruction through MLF.

The Parties should provide MLF with additional funding without delay. Providing MLF supplemental replenishment funding is the only way to finance a comprehensive ODS-bank-destruction program in 2010 and possibly beyond. Other sources of funding cannot be relied upon to seize this time-sensitive climate-mitigation opportunity. MLF funding will capture climate benefits now, and lay the foundation for further destruction activities and attract additional funding by sending the necessary signal to other international funding institutions and MEAs that MLF stands ready to cooperate, coordinate, and lead the international effort to prevent the emission of ODSs in banks.

Managing alternative sources of funding to destroy ODS banks.

The Parties should also take decisions that establish a MP Climate Facility capable of using additional sources of funding and coordinating with other international funding institutions and MEAs to manage ODS banks to destruction. Because the expertise, infrastructure, and network necessary to cost-effectively manage ODS banks to destruction rests with the entities under the Montreal Protocol, establishing the MP Climate Facility is a condition precedent to utilizing funding from additional sources.⁸²

QUESTION 9: What actions can the Parties to the Montreal Protocol take to promote the recovery and destruction of ODS banks?

In view of the urgency of the climate crisis and the rapidly closing window of opportunity to reap this double dividend on ozone and climate protection from banks, it is essential that the Parties to the Montreal Protocol take aggressive actions now, up to, and beyond the next MOP in November 2009 to manage ODS banks to destruction. These actions include:

- mandating that non-Article 5 Parties manage a certain amount of their cost-effective ODS banks to destruction;

- approving a supplemental replenishment to MLF to finance a comprehensive ODS-bank-destruction program;
- requesting the Ozone Secretariat immediately communicate and coordinate with other MEAs, international funding institutions, and implementing agencies to pursue all available funding to finance the management of ODS banks to destruction; and
- requesting the Parties communicate within their governments and with their respective climate counterparts and representatives at international funding agencies to take all decisions necessary to pursue every opportunity to develop and finance programs to manage ODS banks to destruction.

The near-universal ratification of the Montreal Protocol means the Parties to the Montreal Protocol are represented on the decision-making bodies of every international funding institution and include all of the Parties to UNFCCC.⁸³ The representatives to these institutions and Parties to these MEAs can require the necessary coordination by reaching a decision at a sufficiently high level of government to give specific instructions to representatives to seize this singular climate-mitigation opportunity. To pursue the destruction of ODS banks and to reap the ozone and climate benefits of managing ODS banks to destruction, nothing in any treaty represents an insurmountable obstacle.

* IGSD (www.igsd.org) welcomes any questions, comments, or insights readers may have regarding this document. Please send all correspondence to Pete M. Grabel (pgrabel@igsd.org) or Tim R. Grabel (tgrabel@igsd.org).

¹ Tipping points are thresholds for non-linear climatic changes, where small increases in global warming produce irreversible and potentially catastrophic climate impacts, often exacerbating the climate crisis. Climate scientists warn that anthropogenic GHG emissions are pushing the climate system toward such tipping points, with some tipping points as close as 10 years away. Potentially catastrophic impacts and runaway feedbacks include the disappearance of Arctic summer sea ice, disintegration of the Greenland Ice Sheet, collapse of the West Antarctic Ice Sheet, deglaciation of the Himalayan-Tibetan plateau, shutdown of the Atlantic Thermohaline Circulation, dieback of Amazonian and boreal forests, and the release of methane stored in permafrost and ocean hydrates. See e.g. Timothy Lenton, et al., *Tipping elements in the Earth's climate system*, 105 PROC. OF THE NAT'L ACAD. OF SCI. 1786 (2008); V. Ramanathan & Y. Feng, *On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead*, 105 PROC. OF THE NAT'L ACAD. OF SCI. 14245 (2008).

² See Montreal Protocol on Substances That Deplete the Ozone Layer, *opened for signature* Sept. 16, 1987, 26 I.L.M. 1550 (1989) (as amended 32 I.L.M. 84) (1992) [hereinafter Montreal Protocol]. The Montreal Protocol has an unmatched record of mitigating climate change and protecting the ozone layer while supporting developing countries in meeting their obligations under the treaty. From 1990 to 2010, the Montreal Protocol will have reduced ODS emissions by a net of 135 Gt CO₂-eq., delaying climate forcing by up to 12 years and setting the ozone layer on the road to recovery by mid-century. See Guus J.M. Velders, et al., *The importance of the Montreal Protocol in protecting climate*, 104 PROC. NAT'L ACAD. SCI. 4814 (2007) [hereinafter Velders et al. 2007]. In 2007, the Parties to the Montreal Protocol accelerated the phase-out of HCFCs which has the potential to reduce ODS emissions by a further 12-15 Gt CO₂-eq. by 2040. See Velders et al., *The large contribution of projected HFC emissions to future climate forcing*, PROC. NAT'L ACAD. SCI. *Early Edition* (22 June 2009) [hereinafter Velders et al. 2009] at 2, <http://www.pnas.org/content/early/2009/06/19/0902817106>.

³ TEAP and IPCC have previously published reports on ODS banks dating back to 2002. See e.g. TEAP, REPORT OF THE TASK FORCE ON COLLECTION, RECOVERY, AND STORAGE, (April 2002); TEAP, REPORT OF THE TASK FORCE ON FOAM END-OF-LIFE ISSUES – VOLUME 3, (May 2005); IPCC & TEAP, IPCC/TEAP SPECIAL REPORT ON SAFEGUARDING THE OZONE LAYER AND THE GLOBAL CLIMATE SYSTEM: ISSUES RELATED TO HYDROFLUOROCARBONS AND PERFLUOROCARBONS (2005) [hereinafter IPCC/TEAP 2005 SPECIAL REPORT]. This

report was followed up by two reports from TEAP in 2005 and 2007. *See* TEAP, SUPPLEMENT TO THE IPCC/TEAP REPORT (2005) [hereinafter TEAP SUPPLEMENT]; 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 (2007) [hereinafter TEAP RESPONSE].

⁴ The history of the Montreal Protocol is filled with decisions relating to ODS banks. Decision IV/(2) and (6), Decision V/26, Decision VII/35, Decision XIV/6(2)-(3), Decision XV/9(6), Decision XVI/14, and Decision XVI/15 addressed ODS bank destruction technologies. Decision IV/11(3)(b), Decision XVII/11(2), and Decision XVII/18 addressed ODS bank reporting requirements. Decision IV/11(7), Decision XII/8(3)(a), and Decision XVII/17 addressed financing and technology transfers as they relate to ODS banks. Decision VII/31, Decision XII/8(3), and Decision XVII/17(3) addressed barriers to the international movement of ODSs for destruction. Decision IV/12(2), Decision IV/24(4)(a), Decision VII/12(1)(h), Decision X/7(3)(d), Decision XII/8, and Decision XVII/11(1) encouraged the Parties to destroy ODS banks. *See generally* Ozone Secretariat, HANDBOOK FOR THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER (7th ed.) (2006) [hereinafter MP HANDBOOK].

⁵ *See* Montreal Protocol, Report of the Eighth Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer and Twentieth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Doha, Qatar [hereinafter Report of the 20th MOP], at Decision XX/7.

⁶ *See supra* note 5, Report of the 20th MOP at Decision XX/7.

⁷ *See* Proposed Amendment to the Montreal Protocol (submitted by the Federated States of Micronesia and Mauritius), (30 April 2009) [hereinafter ODS Banks Amendment], http://ozone.unep.org/Meeting_Documents/oewg/29oewg/OEWG-29-8E.pdf.

⁸ *See supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at *Summary for Policymakers* at 9.

⁹ *See id.* at 8.

¹⁰ *See generally supra* note 2, Montreal Protocol; *see also* Montreal Protocol, Report of the Thirteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, (2004), at Decision XV/9 (“To recall that the Montreal Protocol does not require the Parties to destroy ozone depleting substances.”)

¹¹ *See* TEAP, TASK FORCE DECISION XX/7 – INTERIM REPORT, “ENVIRONMENTALLY SOUND MANAGEMENT OF BANKS OF OZONE-DEPLETING SUBSTANCES,” (June 2009) [hereinafter TEAP DECISION XX/7 INTERIM REPORT], at 7.

¹² *See id.* at 7-9. Once an ODS bank reaches the waste stream it is very difficult to locate and often prohibitively expensive to recover, hence the urgency in addressing ODS banks in advance of their expected entry into the waste stream.

¹³ *See supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at *Summary for Policymakers* at 9 (giving an estimates of CFC and HCFC banks from 2002 – 2015); *see also* TEAP, TASK FORCE DECISION XX/8 REPORT, ASSESSMENT OF ALTERNATIVES TO HCFCs AND HFCs AND UPDATE OF THE 2005 TEAP SUPPLEMENTAL REPORT DATA (May 2009) [hereinafter TEAP DECISION XX/8 REPORT] at 10 (giving estimates of HCFC banks from 2002-2020); *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 21-25 (indicating that previous CFC refrigeration bank estimates may have underestimated the bank by 10%). Based on these estimates, 2010 banks have been approximated.

¹⁴ *Compare supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 22-23 *with supra* note 3, TEAP RESPONSE at 27. Estimates of CO₂-eq. have been calculated based on the GWP of CFC-12 (10,900) and HCFC-22 (1,810), the most common refrigerants found in refrigeration, SAC, and MAC banks. *See* P. FORSTER & V. RAMASWAMY ET AL., IPCC, *Changes in Atmospheric Constituents and Radiative Forcing*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE [hereinafter AR4 THE PHYSICAL SCIENCE BASIS] 212 (S. Solomon et al. eds., 2007) (setting forth the GWP of CFC-12 and HCFC-22); *supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at *Technical Summary* at 53-63 (listing the most common ODSs by sector).

¹⁵ *Compare supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 22-23 *with supra* note 3, TEAP RESPONSE at 27.

¹⁶ *Id.*

¹⁷ *Compare supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 23 *with supra* note 3, TEAP RESPONSE at 27.

¹⁸ *See supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at 136.

¹⁹ *See supra* note 3, TEAP RESPONSE at 27; EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR IMPLEMENTATION OF THE MONTREAL PROTOCOL, REPORT OF THE MEETING OF THE 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) (2006) [hereinafter MLF FOLLOW UP

REPORT] at 13; ICF INTERNATIONAL, STUDY ON THE COLLECTION AND TREATMENT OF UNWANTED OZONE-DEPLETING SUBSTANCES IN A5 AND NON-A5 COUNTRIES (2008) [hereinafter MLF 2008 REPORT] at 11-12.

²⁰ See *supra* notes 14 – 16. This total does not account for HCFC emissions from banks in Article 5 Parties which are difficult to estimate based on TEAP figures because these banks will grow over the period from 2010 to 2015 period, but will nonetheless emit HCFCs during this time. Readily available stockpiles of ODS banks also exist in nearly all countries. See *supra* note 19, MLF 2008 REPORT at 11-12.

²¹ See Kyoto Protocol to the United Nations Framework Convention on Climate Change, *opened for signature* March 16, 1998, U.N. Doc FCCC/CP/1997/7/Add.1, 37 I.L.M. 22 (1998) [hereinafter Kyoto Protocol]. The Kyoto Protocol's emissions reduction target, in terms of CO₂-eq., is -5.8 percent of a baseline of 18.4 Gt CO₂-eq. or -0.97 Gt CO₂-eq. per year by 2008–2012, roughly 5 Gt CO₂-eq. during the 2008-2012 commitment period. See *supra* note 2, Velders, et al. 2007 at 4818.

²² See *supra* note 3, TEAP RESPONSE at 12.

²³ *Id.*

²⁴ See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 54.

²⁵ See *supra* note 3, TEAP RESPONSE at 12.

²⁶ See *supra* note 3, TEAP SUPPLEMENT at x.

²⁷ See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 16 (“For the purposes of this report, one of the key messages in managing the remaining ODS banks is that refrigerant banks will decline through emission much more rapidly than blowing agent banks in foam. Therefore actions on refrigerant banks and emissions are generally seen as having higher urgency. The one exception for the foam sector is the use of foams in refrigeration equipment, where life cycles are generally much shorter than in buildings.”).

²⁸ Compare *supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at *Summary for Policymakers* at 9 with *supra* note 13, TEAP DECISION XX/7 INTERIM REPORT at 43-44.

²⁹ HFCs are the principal substitutes for ODSs in the refrigeration, air conditioning, foams, aerosols, and fire protection sectors. See *supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at *Summary for Policymakers* at 3. These sectors are the same sectors that build up large banks of ODSs and their alternatives, currently high-GWP HFCs. See *id.* at 8-9.

³⁰ See *supra* note 13, TEAP DECISION XX/8 REPORT at 10; *supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at *Summary for Policymakers* at 9; *supra* note 2, Velders et al. 2009.

³¹ See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 28.

³² *Id.* at 10-12.

³³ *Id.* at 44.

³⁴ Figures rounded to the nearest 10 millionth.

³⁵ Figures rounded to the nearest million.

³⁶ Figures rounded to the nearest tenth.

³⁷ See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 44.

³⁸ Figures rounded to the nearest 10 millionth.

³⁹ Figures rounded to the nearest million.

⁴⁰ Figures rounded to the nearest tenth.

⁴¹ See Carbon Finance, *Cost-effectiveness of CDM Projects*, Nov. 18, 2008, <http://www.carbon-financeonline.com/index.cfm?section=cdmjianalysis&action=view&id=11663>, (stating that the average price per CER from 2005-2008 was €16 or US\$22 based on the exchange rate as of June 22, 2009).

⁴² See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 43.

⁴³ Figures rounded to the nearest 10 million.

⁴⁴ Figures rounded to the nearest million.

⁴⁵ Figures rounded to the nearest tenth.

⁴⁶ See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 43.

⁴⁷ Figures rounded to the nearest 10 millionth.

⁴⁸ Figures rounded to the nearest million.

⁴⁹ Figures rounded to the nearest tenth.

⁵⁰ See *supra* note 41.

⁵¹ See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 51.

⁵² *Id.* at 51.

⁵³ *Id.* at 50-51.

⁵⁴ *Id.*

⁵⁵ See *supra* note 21, Kyoto Protocol at Art. 3 & Annex A.

⁵⁶ See UNFCCC, REPORT OF THE TWENTY-EIGHTH MEETING OF THE METHODOLOGIES PANEL (2007) at ¶18 and Annex 12 (excluding non-Annex A GHGs from the baseline because “[p]aragraph 44 of the [CDM Modalities and Procedures] requires that ‘a baseline shall cover emissions from all gases, sectors, and source categories listed in Annex A within the project boundary.’”); see also UNFCCC, METHODOLOGIES PANEL RECOMMENDATION NM0197 (2007), F-CDM-NMSUMmp ver 01 - NM0197-rev. (“gases controlled by the Montreal Protocol are specifically excluded”); UNFCCC, METHODOLOGIES PANEL RECOMMENDATION FORM FOR SMALL SCALE METHODOLOGIES SSC_052, F-CDM-SSCwg ver 01 SSC_052, (2006); UNFCCC, METHODOLOGIES PANEL RECOMMENDATION FORM FOR SMALL SCALE METHODOLOGIES SSC_095, F-CDM-SSCwg ver 01 SSC_095, (2007); UNFCCC, METHODOLOGIES PANEL RECOMMENDATION FORM FOR SMALL SCALE METHODOLOGIES SSC_087, F-CDM-SSCwg ver 01 SSC_087 (2007).

⁵⁷ For example, several European Community (EC) member states have enacted laws in response to EC Regulation 2037/2000 that require the recovery and destruction of ODSs from domestic refrigeration and SAC banks. Germany exceeds the requirements of Regulation 2037/2000 in many ways and requires ODSs in foams in these banks to be recovered as well. See *supra* note 19, MLF 2008 REPORT at 97-105; see also *infra* notes 63-64.

⁵⁸ An amendment to the Montreal Protocol requiring non-Article 5 Parties manage certain of their cost-effective ODS banks to destruction should be based on the experiences of those countries already implementing recovery and destruction programs. The level of required ODS bank recovery and destruction should be achievable and cost-effective when compared to other climate mitigation measures. The amount of ODSs required to be recovered by non-Article 5 Parties can be set on a per sector basis, or aggregated across all cost-effective banks to allow the Parties flexibility to pursue destruction based on their individual circumstances and the availability and cost-effectiveness of recovery and destruction in their country. It can also be linked to essential and critical use exemptions, requiring non-Article 5 Parties destroy a certain amount of ODSs in banks in order to receive their essential and critical use exemptions.

⁵⁹ See *supra* note 7, ODS Banks Amendment.

⁶⁰ See Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, Fifty-Seventh Meeting, at Decision 55/2, *Facility for Additional Income from Loans and Other Sources*, (30 Mar. – 3 April 2009); see also *supra* note 19, MLF FOLLOW UP REPORT; *supra* note 19, MLF 2008 REPORT.

⁶¹ See *supra* note 5, Report of the 20th MOP at Decision XX/7.

⁶² *Id.*

⁶³ For example, Australia has implemented a producer responsibility program for bulk ODS disposal of refrigeration and SAC banks, Refrigerant Reclaim Australia (“RRA”), backed by a legal mandate. RRA has been immensely successful and financially self-sufficient. Run by industry and funded by levies placed on the production and import of virgin and reclaimed ODSs, RRA provides a rebate on the return of used refrigerant. The levies and rebates apply to all fluorocarbons, including HFCs, ensuring RRA remains capable of handling all refrigerants as industry moves from using CFCs to HCFCs to HFCs and other alternatives. However, Australia’s program does not mandate the collection of foams in these applications which would increase the resulting ozone and climate benefits using existing governance institutions and infrastructure. See Refrigerant Reclaim Australia, <http://www.refrigerantreclaim.com.au/> (last accessed Feb. 3, 2009); see also *supra* note 19, MLF 2008 REPORT at 61-76.

⁶⁴ Japan has mandated the recovery and destruction of ODS banks in several sectors. In addition to laws mandating the recovery and destruction of ODSs in commercial refrigeration and SAC banks, in 2005 Japan also passed the End-of-Life Vehicle Recycling Law mandating the recovery and destruction of ODSs in MAC banks in vehicles. In response, industry has implemented a recycling program under which end-of-life vehicles are sent to registered recovery operators, who recover ODSs and are paid based on the number of MACs and quantity of refrigerant recovered. The costs of recovery and destruction are borne by vehicle owners at the time of purchase, i.e., incorporated into the cost of purchasing new vehicles. See *supra* note 19, MLF 2008 REPORT at 106-20. Like RRA, this program has also been immensely successful and cost-effective.

⁶⁵ “Article 5 Parties” are Parties operating under paragraph 1 of Article 5 of the Montreal Protocol and are generally considered “developing countries.” See *supra* note 2, Montreal Protocol at Art. 5(1). These Parties receive financial and technical assistance from non-Article 5 countries via MLF to meet their compliance obligations under the Montreal Protocol. See *id.* at Art. 10.

⁶⁶ See *supra* note 2, Montreal Protocol at Art. 10(1).

⁶⁷ See *id.* at Art. 10.

⁶⁸ See *supra* note 4, MP HANDBOOK at 425 (containing the indicative list of incremental cost and listing destruction under paragraph (c)(ii)).

⁶⁹ See Montreal Protocol, Report of the Fourth Meeting of the Parties to the Montreal Protocol, (1992), at Decision IV/11.

⁷⁰ See Vienna Convention on the Law of Treaties, *opened for signatures* May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention on the Law of Treaties] at Art. 31(3)(a).

⁷¹ See *supra* note 7, ODS Banks Amendment at 31-34.

⁷² See Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, Fifty-Seventh Meeting, at Decision 55/2, *Facility for Additional Income from Loans and Other Sources*, (30 Mar. – 3 April 2009); see also *supra* note 19, MLF FOLLOW UP REPORT; *supra* note 19, MLF 2008 REPORT.

⁷³ See Ozone Secretariat, REPORT BY THE SECRETARIAT ON FUNDING OPPORTUNITIES FOR THE MANAGEMENT AND DESTRUCTION OF OZONE-DEPLETING SUBSTANCES, (May 2009) [hereinafter OZONE SECRETARIAT FUNDING REPORT] at 13.

⁷⁴ TEAP estimates that destruction costs for a variety of ODSs using TEAP approved destruction technologies will range from US\$ 3.75-11 per kg. See *supra* note 3, IPCC/TEAP 2005 SPECIAL REPORT at 433. Because CFC-12, the most common ODS in refrigeration and air conditioning, has a GWP of 10,900, it can be destroyed at a cost of per tonne of CO₂-eq.

⁷⁵ See *supra* note 73, OZONE SECRETARIAT FUNDING REPORT at 14.

⁷⁶ See e.g. UNFCCC, AD HOC WORKING GROUP ON LONG-TERM COOPERATIVE ACTION UNDER THE CONVENTION, REVISED NEGOTIATING TEXT – *Advance Version*, FCCC/AWGLCA/2009/INF.1 (June 2009), at 85-109.

⁷⁷ See *supra* note 73, OZONE SECRETARIAT FUNDING REPORT at 10-11.

⁷⁸ Using financing from a Brazilian law requiring energy utilities apply 0.5% of their net operating revenue to energy efficiency projects, a program was launched in 2006 to replace old refrigerators with new energy-efficient refrigerators in low-income neighborhoods. The program has the potential to replace up to 11 million refrigerators over ten years, making 0.33 Gt CO₂-eq. of CFCs available for recovery and destruction. Because the program utilizes numerous sources of funding to collect and store used refrigerators in large quantities, the incremental costs of managing ODS banks to destruction is dramatically reduced. In addition to the social benefit of decreasing energy bills for low-income families, the program will also result in significant climate mitigation from improved energy efficiency. Preventing emissions through improved energy efficiency is an approved means of generating CERs through CDM and can provide complementary funding. The recycling of metal and other materials can provide additional revenue streams. This model is one that can, and should, be replicated in other Article 5 Parties. See Ministry of Environment Government of Brazil, UNDP, & GTZ Proklima, *Management of ODS from Domestic Refrigeration Banks, the Brazilian Experience*, presented at the 20th Meeting of the Parties to the Montreal Protocol in Doha, Qatar (November 2008) (on file with author).

⁷⁹ See *supra* note 21, Kyoto Protocol at Art. 3 & 12.

⁸⁰ See *supra* note 56.

⁸¹ See *supra* note 11, TEAP DECISION XX/7 INTERIM REPORT at 56.

⁸² Article 10(2) of the Montreal Protocol anticipates that in addition to MLF, the financial mechanism established under Article 10(1) “may also include other means of multilateral, regional and bilateral co-operation.” See *supra* note 2, Montreal Protocol at Art. 10(1)-(2). Article 10(10) further states, that the “financial mechanism set out in ... Article [10] is without prejudice to any future arrangements that may be developed with respect to other environmental issues.” *Id.* at Art. 10(10).

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.