

Briefing to the 39th Open-Ended Working Group of the Parties
to the Montreal Protocol

July 2017, Bangkok

BUILDING A STRONG FOUNDATION FOR CONTINUED SUCCESS

The Montreal Protocol in its 30th year



ABOUT EIA

EIA is an independent campaigning organisation committed to bringing about change that protects the natural world from environmental crime and abuse. As part of our work, we have undertaken groundbreaking investigations into the illegal trade in ozone depleting substances (ODS) and have been closely involved in the international ozone and climate negotiations for well over a decade.

ACKNOWLEDGEMENTS

JULY 2017

© Environmental Investigation Agency 2017

All images © EIA unless otherwise stated

This report was produced by the London and Washington D.C. office of the Environmental Investigation Agency (EIA).

EIA is solely and entirely responsible for the contents of this report.

Report design: www.designsolutions.me.uk

INTRODUCTION

With the ink barely dry on the Kigali Amendment and ratification under way, the real work now begins. In the coming years, the Parties to the Montreal Protocol must give content to their commitments, translating words into action on the ground.

This begins with a replenishment fit for purpose, one that provides sufficient funding for the ongoing HCFC phase-out as well as activities to enable the pending HFC phase-down and obligations on HFC-23 by-product emissions. Thereafter, Parties must adopt cost guidelines that will create a sustainable financial framework for the transition to energy-efficient, low global warming potential (GWP) and zero-GWP technologies.

Although the HCFC phase-out and Kigali Amendment are already transforming the marketplace, there is a risk that a slow pace of change will lock in mid-GWP HFCs, significantly increasing costs and avoidable emissions. With the climate imperative now squarely within the remit of the Montreal Protocol, the Parties must work to identify ways to capture additional and cost-effective climate benefits through the HCFC phase-out, promoting a smart transition now to avoid a double transition in the future. This will require amending outdated and restrictive standards which currently inhibit the market penetration of low-GWP and zero-GWP technologies.

But these are not the only challenges. The Parties must also grapple with issues unaddressed in the Kigali Amendment. This includes the recovery and destruction of banks of controlled substances which, until the HFC amendment proposals dominated the conversation, were the subject of several reports by the Technology and Economic Assessment Panel (TEAP). It also includes proactive measures to mitigate the heightened risk of significant illegal trade resulting from an incomplete Annex F, as well as addressing threats posed by the potential commercialisation of new HFCs.

With the adoption of the Kigali Amendment, the Parties to the Montreal Protocol have joined the urgent global effort to prevent dangerous anthropogenic climate change. It is now time to take meaningful actions to implement the Kigali Amendment and fulfil its potential.

A large, jagged iceberg with a blue tint floating in the ocean. The iceberg is the central focus, with its sharp, crystalline edges and deep blue color. The water is a dark teal color, and there are smaller pieces of ice floating around the base of the main iceberg. The sky is not visible, suggesting the photo is taken from a low angle or is a close-up.

“With the adoption of the Kigali Amendment, the Parties to the Montreal Protocol have joined the urgent global effort to prevent dangerous anthropogenic climate change.”

SETTING UP THE KIGALI ARCHITECTURE: COST GUIDELINES AND FAST-START FUNDS TO MAXIMISE COST-EFFECTIVE CLIMATE BENEFITS OF THE HFC PHASE-DOWN

The Kigali Amendment, if implemented successfully, could avoid emissions of over 70 billion tonnes of carbon dioxide-equivalent (CO₂e) by 2050.¹ The agreement provides a strong market signal that will accelerate innovation and technology development and remove barriers to climate-friendly technologies, conditions which could lead to a more rapid hydrofluorocarbon (HFC) phase-down than currently prescribed under the amendment. This would not only yield additional climate benefits, but also significantly lower overall financial costs.²

While the Kigali Amendment was an historic achievement, it did not capture all the available technically and economically feasible climate and financial benefits. During negotiations, at least 80 Article 5 (A5) Parties advocated a more ambitious HFC phase-down than the schedule which was ultimately agreed, with a suggested freeze date starting in 2021.³ Those A5 Parties are all now in Group 1 and many still seek to make a fast and smart transition to low-GWP and zero-GWP technologies, one capturing additional climate benefits while avoiding a costly double transition in the future.

Thus at this critical stage, with the framework underlying the Kigali Amendment still in its infancy, it is important that decisions taken by the Parties at both the Meeting of the Parties (MoP) and the Executive Committee (ExCom) of the Multilateral Fund (MLF) promote: (i) leapfrogging under the remaining HCFC phase-out; (ii) early action ahead of schedule under the pending HFC phase-down; and (iii) consideration of the energy efficiency of low-GWP and zero-GWP replacement technologies. These objectives are complementary and contingent on early and additional funding for enabling and other activities in the next replenishment.

Sixteen donor countries pledged \$27 million to MLF in 2017 to “provide fast-start support for implementation” of the

HFC phase-down.⁴ These contributions were subject to “...an ambitious amendment with a sufficient early freeze date...”,⁵ which in EIA’s view suggests the funds should be prioritised for A5 Parties which undertake early action to prevent HFC growth or phase down HFCs ahead of the 2024 freeze date. In particular, the fast-start fund should help support A5 Parties to identify strategies and activities to phase down HFCs in advance of the agreed schedule. These could include:

- Activities to achieve ratification, mandatory licensing and reporting (noting the importance of implementing national custom codes that differentiate individual HFCs and key HFC blends);
- An assessment of HFC consumption, key HFC growth areas and identification of priority sectors to address;
- Identification of barriers to the adoption of low-GWP and zero-GWP replacement technologies and strategies to overcome them, including with respect to safety standards, energy efficiency, market acceptance and readiness;
- Identification of capacity-building, demonstration projects and training needs for the handling of low-GWP and zero-GWP replacement technologies to HFCs, i.e. natural refrigerants and not-in-kind technologies;
- Identification of immediate action that can be taken to halt or limit HFC growth (e.g. bans on the import or use of HFC-based equipment or certain HFCs, refrigerant management activities, market incentives);
- Identification of synergies with ongoing HCFC Phase-out Management Plans (HPMPs) and areas where changes to HPMPs will be required to avoid transitions to HFCs.

REPLENISHMENT OF THE MULTILATERAL FUND

Throughout the negotiations that ultimately resulted in the Kigali Amendment, non-A5 Parties promised additional funding to support A5 Party implementation of any agreed control measures on HFCs.

The TEAP XXVIII/5 Replenishment Task Force (RTF) report estimates total

“The Kigali agreement provides a strong market signal that will accelerate innovation and technology development and remove barriers to climate-friendly technologies.”

funding requirements for the 2018-20 replenishment of the MLF to be between \$602.71 and \$758.85 million, including \$21.5-44.2 million for HFC phase-down enabling activities.⁶ The estimate is based on combining estimates for funding: (i) HCFC consumption phase-out activities (the bulk of the funding), (ii) HCFC production phase-out activities, (iii) non-investment components and supporting activities, (iv) HFC phase-down enabling activities and (v) HFC-23 mitigation activities.

Under non-investment and supporting activities, the RTF estimated \$0-10 million for HCFC demonstration projects related to low-GWP replacement technologies, based on the assumption that either no further demonstration projects will be needed or that a similar funding amount to past triennia will need to be allocated. Given the pace of technological innovations and the significant opportunity to leapfrog HFCs and avoid double transitions at this stage of the HCFC phase-out, EIA believes that the replenishment should be sufficient to cover additional demonstration projects that allow for fast action and leapfrogging.

The RTF calculates institutional strengthening (IS) support based on previous levels and does not consider an increase to deal with the additional capacity required for new tasks related to the HFC phase-down. It is not clear whether the separate amount estimated for HFC enabling activities specifically includes institutional strengthening for HFC activities. However, given that the funding for HFC enabling activities of \$13.5-20.2 million is based primarily on historical funding for HCFCs, it is unlikely to be adequate to address the additional complications and challenges of the HFC phase-down. Moreover, there needs to be a distinction between funding enabling activities, which are designed to enable the pending HFC phase-down, and fast action and leapfrogging, which are activities taken in advance of the HFC phase-down. With respect to the latter, funding should be provided via demonstration projects or for other activities (as suggested in the previous section) which allow A5 Parties to commit to sustainable aggregate reductions ahead of the 2024 freeze.

Funding required for HFC-23 mitigation activities is estimated at \$8-21.5 million, with capital and operating costs estimated for 2020 only. Of these, operational costs are the bulk of the

expense, in the range of \$6.4-19.1 million. Annualised capital costs in 2020 are estimated to be \$0.8-1.6 million, while enabling activities for a few facilities not in operation are estimated at \$0.8 million.⁷

Emissions of HFC-23 will continue to be a concern – and a cost – as long as HCFC-22 production continues. Since HCFC-22 production is stable or even increasing for its use as feedstock, it is clear that a sustainable approach needs to be found to address HFC-23 emissions, which are still high despite huge amounts of funding to companies in developing countries via the Clean Development Mechanism (CDM).

EIA agrees with India that HFC-23 should be controlled “by the producers of HCFC-22 on their own cost as a negative environmental externality both in non-A5 and A5 countries.”⁸ In particular, in terms of China, the MLF has already funded some HFC-23 relevant costs through the HCFC production phase-out agreement in 2013, where China agreed to “coordinate with its stakeholders and authorities to make best efforts to manage HCFC production and associated by-product production in HCFC plants in accordance with best practices to minimise associated climate impacts.”

However, given the urgent need to reduce A5 Party HFC-23 emissions, which were 93.6 million tonnes CO₂e in 2015,⁹ limited MLF support should be considered to enable other A5 Parties to meet the 2020 deadline (or preferably move ahead of the deadline). The most effective way to avoid HFC-23 emissions is to shut down HCFC-22 production altogether. EIA therefore supports continued discussion of the eligibility of swing plants for closure under the HCFC guidelines, in light of the new Kigali decisions.

EIA also supports funding of limited capital costs to ensure A5 Parties are equipped to deal with HFC-23 in 2020; however, a strict cut-off date should apply so no new production of HCFC-22 for feedstock is eligible. The support should prioritise those production lines or facilities that did not receive money from the CDM. EIA does not support MLF funding for incremental operating costs to destroy HFC-23, which should be carried out by the companies in question as part of the price of doing business.



© GCAP Coolcast

ABOVE:
Ammonia refrigeration training.

SAFETY STANDARDS: IMPLICATIONS FOR IMPLEMENTATION AND NEED FOR GREATER A5 PARTICIPATION

Decisions XXVIII/2 and XXVIII/4 note the importance of the issue of international and national safety standards and codes, some of which limit the low-GWP refrigerant choices available for certain refrigeration, air-conditioning and heat pump subsectors in the near to medium term.¹⁰ Decision XXVIII/4 calls on Parties to the Montreal Protocol to support the timely revision of relevant standards in a manner that is technology-neutral to enable the safe use and market penetration of low-GWP replacement technologies. EIA welcomes attention to this important issue that has been under the radar for far too long.

Standards that unnecessarily restrict the use of flammable refrigerants most immediately affect A5 Parties seeking to leapfrog or bypass HFCs through the HCFC phase-out, as well as non-A5 Parties meeting the first control measures of the Kigali Amendment or national legislation, such as in the case of the European Union (EU). Outdated

standards limit the uptake of energy-efficient low-GWP refrigerants, such as hydrocarbons, and will incentivise a higher uptake of transitional mid-GWP HFCs in order to meet interim consumption reduction steps under the Kigali Amendment HFC phase-down schedule.

Although dedicated working groups exist to work on key international standards under the International Electrotechnical Commission (IEC) and the International Organisation for Standardisation (ISO), the process for completing and publishing revised standards often requires substantial investment of time and resources, which has led to narrow stakeholder participation and a general lack of awareness of the process and impact of standards.

Table 1 breaks down participation and key issues to be addressed by four international working groups that are critically important for successful implementation of the Kigali Amendment and accompanying decisions. As the TEAP Decision XXVIII/4 task force report on standards notes, A5 country participation is limited, with just one to three members from a few countries, while 25 to 30 members are based in non-A5 countries.¹¹

TABLE 1: EXISTING WORKING GROUPS ADDRESSING FLAMMABLE REFRIGERANTS IN INTERNATIONAL STANDARDS

WORKING GROUP	IEC SC61C WG4 ¹²	IEC SC61D WG9 ¹³	IEC 61D WG16 ¹⁴	ISO TC86 SC1 WG1 ¹⁵
Standard	IEC 60335-2-89	IEC 60335-2-40	IEC 60335-2-40	ISO 5149
Equipment Covered	Commercial refrigeration	Air-conditioning and heat pumps	Air-conditioning and heat pumps	Refrigeration and air-conditioning
No. of non-A5 Participants	27	30	25	51
No. of A5 Participants	3	2	3	1
Key issues under discussion	Requirements for increased refrigerant charge for all flammable refrigerants Draft proposals for 1kg and 500g	Requirements for expanding charge sizes of A2L refrigerants only Draft proposal enhanced tightness systems and other safety measures	Requirements for expanding charge size of A2 and A3 refrigerants Draft proposal releasable charge and improved tightness	Working on various aspects relating to new and revised requirements for alternative refrigerants for inclusion into ISO 5149 No drafts yet released
Estimated timeline for completion	1-3 years	1 year	2-6 years	>5 years

* Source: Information contained in this table comes from the TEAP Decision XXVIII/4 Task Force Report on Safety Standards for Flammable Low Global-Warming-Potential (GWP) Refrigerants, May 2017.

There are a number of options for expanding participation in standards development, including:¹⁶

- Countries with IEC membership through a National Committee may apply to join as a Participating (P) member of the relevant subcommittees dealing with refrigeration and air conditioning, i.e. IEC SC61C or SC61D;¹⁷
- Countries that are observing (O) members on these subcommittees may consider becoming P members, actively attending meetings and with the ability to vote on proposals to change standards that impact them;
- Countries with national standards bodies may wish to consider forming a national working group of technical experts in order to assess the possibility of moving forward with updates to national standards.

Broader participation by experts in A5 countries could lead to more timely progress on key technical issues affecting refrigerant choices in priority sectors and increased focus on the most cost-effective and efficient technologies. For instance, work on A2L ('mildly flammable') refrigerants has received increased attention and focus for several years as it is in the interest of multiple US, European and Japanese companies to open up the market to HFC-32, HFOs and a number of new HFC blends that are A2L. Greater A5 Party participation may help sustain momentum to address the full range of alternatives, including A3 refrigerants. Participation in standards working groups will also contribute to greater country knowledge of technical aspects of ongoing discussions around proposed changes, allowing for more rapid adoption and deployment of international standards changes at the national level. Finally, a country or a group of countries wishing to accelerate the introduction of a standard or regulation nationally can do so independently from the international standards process, for instance by choosing to adopt a proposal that is still in a draft stage at the international level.

ENERGY EFFICIENCY

With the adoption of Decision XXVIII/2, in particular the request to ExCom "to develop cost guidance associated with maintaining and/or enhancing the



© Keng Po Leung

energy efficiency of low-GWP or zero-GWP replacement technologies and equipment...," the Montreal Protocol is set to take advantage of additional mitigation opportunities to reduce indirect emissions.¹⁸

ABOVE:
Improving the efficiency of air-conditioning and refrigeration can reap significant climate benefits.

The issues identified with the development of cost guidance are still under consideration and include:¹⁹

- Incremental Costs – Incremental costs for maintaining and/or enhancing energy efficiency in the manufacturing and servicing of refrigeration and air-conditioning equipment, including in situ manufacturing;
- Payback Periods and Economic Benefits – Payback periods and economic benefits associated with energy-efficiency improvements in the refrigeration and air-conditioning sector;
- Funding Modalities – Possible modalities for funding, including operational modalities for co funding with other institutions at the national and global level, in order to maintain and/or enhance energy efficiency and address associated challenges in the refrigeration and air-conditioning sector;
- Minimum Energy Performance Standards – Requirements for establishing minimum energy-efficiency standards, including the testing and verification of energy efficiency in equipment;

- Institutional and Regulatory Framework – The institutional and regulatory framework needed in Article 5 countries to support and monitor improvements in energy efficiency, including in the refrigeration and air-conditioning servicing sector.

EIA agrees with these issues for development and shares the aspiration expressed by many Parties to take advantage of energy efficiency opportunities with the understanding that the focus should remain on the HFC phase-down.²⁰

EIA believes that any agreed funding for energy efficiency should follow the carefully crafted language in Decision XXVII/2, namely that funding be allocated toward “maintaining and/or enhancing energy efficiency of low-GWP and zero-GWP replacement technologies”. While low-GWP is not specifically defined, this should be taken to mean replacement technologies with near-zero GWP and certainly less than 150, which is often used as a proxy for low-GWP.²¹ This focus on energy efficiency of low-GWP and zero-GWP replacement technologies is also set out in Decision XVIII/3.²² There is little reason to direct finite funds for energy efficiency toward transitional alternatives like HFC-32 or HFC/HFO blends that, during the course of the HFC phase-down, will require another transition in the near future.

BELOW:

Little has been done to advance the recovery and destruction of ODS and HFC banks.

Studies show that overlooking the GWP of the refrigerant will offset much of the mitigation to be achieved through energy savings – with significant implications for the climate system.²³

The issue of energy efficiency is set to return to the Parties of the Montreal Protocol through both the cost guidelines under Decision XXVIII/2, which will be presented to the Parties for their “views and inputs before finalisation” in 2018,²⁴ and Decision XXVIII/3, which requests a report by TEAP be presented at MoP29 in 2017 and for which a follow up decision will likely be needed.²⁵ Thus the Parties will have an opportunity to ensure that energy efficiency goes hand in hand with the transition to low-GWP and zero-GWP replacement technologies, as originally envisioned in Decision XXVIII/2 and Decision XXVIII/3.

EIA notes that efforts to address energy efficiency under the Kigali Amendment can also be relevant to projects and activities under the HCFC phase-out. In 2016, the ExCom approved all IS projects and renewals at a level 28 per cent higher than the historically agreed level, among other things to “...address the challenges related to the phase-out of HCFCs in line with the objectives of Decision XIX/6 and the transition to alternatives that minimised environmental impact.”²⁶

ODS AND HFC BANKS

To date, little has been done to advance the recovery and destruction of ozone depleting substance (ODS) and HFC banks. Before the focus of the Montreal Protocol shifted to HFCs, TEAP had been charged with producing several reports that offered early insights into the climate benefit and financial costs of recovering and destroying banks.²⁷ No progress on this issue has been made since then.

Scientific studies have shown that unless collection and destruction of banks is combined with the HFC phase-down, HFCs will continue to impact the climate for several decades even after the phase-down.²⁸ The Parties to the Montreal Protocol therefore have an obligation to address this ongoing failure by the world’s most successful environmental treaty and formulate a holistic strategy for management and destruction of ODS and emerging HFC banks.



© Alexander Nicholson

Since Decision XXVIII/2 requests the ExCom to develop new guidelines on methodologies and cost calculations on both “[r]ecycling and recovery of hydrofluorocarbons” as well as “the cost-effective management of stockpiles of used or unwanted controlled substances, including destruction,” TEAP should undertake an immediate and comprehensive evaluation of the costs associated with the management of ODS and HFC banks.²⁹ As has been done for other controlled substances in the past, the Parties should request the TEAP begin work to identify technologies that adequately destroy HFCs to enable parties to approve a list of destruction technologies.

The challenge with management of banks has been both recovery and destruction. The lack of recovery can be attributed to the lack of trained technicians and awareness, lack of testing equipment (to promote recycling during servicing and identify used refrigerants for reclamation and destruction), the use of disposable non-refillable containers, the lack of compensation for technicians that recover and deliver used refrigerants (placing technicians in a situation of bearing costs for storage, delivery and disposal or otherwise venting) and the hands-off role of producers and distributors (generally few take-back or deposit-refund obligations on used refrigerants exist). The lack of destruction can be attributed to lack of facilities, lack of finance to adapt existing facilities (such as cement kilns), or transportation challenges (shipment to those countries with destruction facilities). Seizures resulting from successful efforts to control illegal trade also contribute to stockpiles thus adding to the challenge. However, cost-effective solutions can be found for these challenges, in particular when supported by national legislation that creates a sustainable national regulatory framework promoting recovery and destruction.

With the adoption of the Kigali Amendment, the Parties should return their attention to ODS and HFC banks, requesting TEAP to undertake a comprehensive evaluation of the costs and mitigation associated with the management of ODS and HFC banks, and further reviewing national legislation and best management practices in countries with higher recovery and destruction rates.

ILLEGAL TRADE AND THE INTEGRITY OF THE HFC PHASE-DOWN

Compliance with the phase-out of ODS has been consistently undermined by illegal trade, with the first cases emerging in the mid-1990s. At that time it was estimated that 20 per cent of the global CFC trade was illegal.³⁰ In 1995, Parties agreed to incorporate a licensing system,³¹ which it did through an amendment to the Montreal Protocol in 1997.³² In addition, there have been numerous decisions on illegal trade.³³ The common theme among them is the critical role that an implemented and enforced licensing system plays in preventing illegal trade and the value of complementary measures, such as banning non-refillable containers and establishing minimum requirements for labelling.³⁴

Enforcement of the HFC phase-down under the Kigali Amendment will face the same illegal trade challenges that Parties have and still are facing with the ODS phase-outs. However, EIA expects the challenge to be significantly greater, for a number of reasons including:

- The omission of several commercially important HFCs from Annex F, thereby excluding them from reporting and licensing requirements;
- The substantial tail of HFC consumption (15 per cent) at the end of the phase-down, as opposed to a complete phase-out which is easier to enforce;
- The existence of four separate HFC phase-down schedules (as opposed to two);
- The overlap of the HCFC phase-out and start of the HFC phase-down in developing countries;
- The growing demand for refrigeration and air-conditioning that increases the quantity of chemicals traded and therefore the opportunity for illegal trade.

The Kigali Amendment omitted three common HFCs from Annex F on the basis of their low GWPs – HFC-1234yf and HFC-1234ze (also known as hydrofluoroolefins, HFOs) and HFC-161 – despite the fact that they are HFCs and had been proposed for inclusion since 2010, first by the North American proposal and then by the Island States



ABOVE:
Seizure of CFC-12 declared as HCFC-22 in Indonesia.

“ Tackling illegal HFC trade will be a significant challenge for Parties to the Kigali amendment.”

“High levels of short-lived ODS demonstrate the need for comprehensive global monitoring of the ozone layer.”

BELOW:

Testing of the Stratospheric Aerosol and Gas Experiment (SAGE III) launched in February 2017, bound for the International Space Station to measure the Earth’s ozone and other gases.

proposals.³⁵ These HFCs have been identified by TEAP as key components in 36 of 40 HFC blends and are also being proposed as substitutes in pure form in many applications.³⁶ As the Secretariat notes, a significant portion of the trade in HFCs is in mixtures and blends containing HFCs, rather than pure substances, a very different situation from previous ODS phase-outs.³⁷

With the omission of these substances from the annexes and reporting requirements, there will be a significant void in information about country production and global trade in these chemicals. This will make it much harder to identify the types of trade discrepancies that are early indicators of illegal activity. Moreover, it will encourage mislabeling of controlled HFCs as HFOs or other non-controlled HFCs to avoid licensing and other controls. Mislabeling of CFCs as HCFCs or, more recently, HCFCs as HFCs is a common method used to smuggle ODS.³⁸

While new eligible costs of “training of customs officers” and “prevention of illegal trade of hydrofluorocarbons”³⁹ were approved by the Parties for the Kigali Amendment under Decision

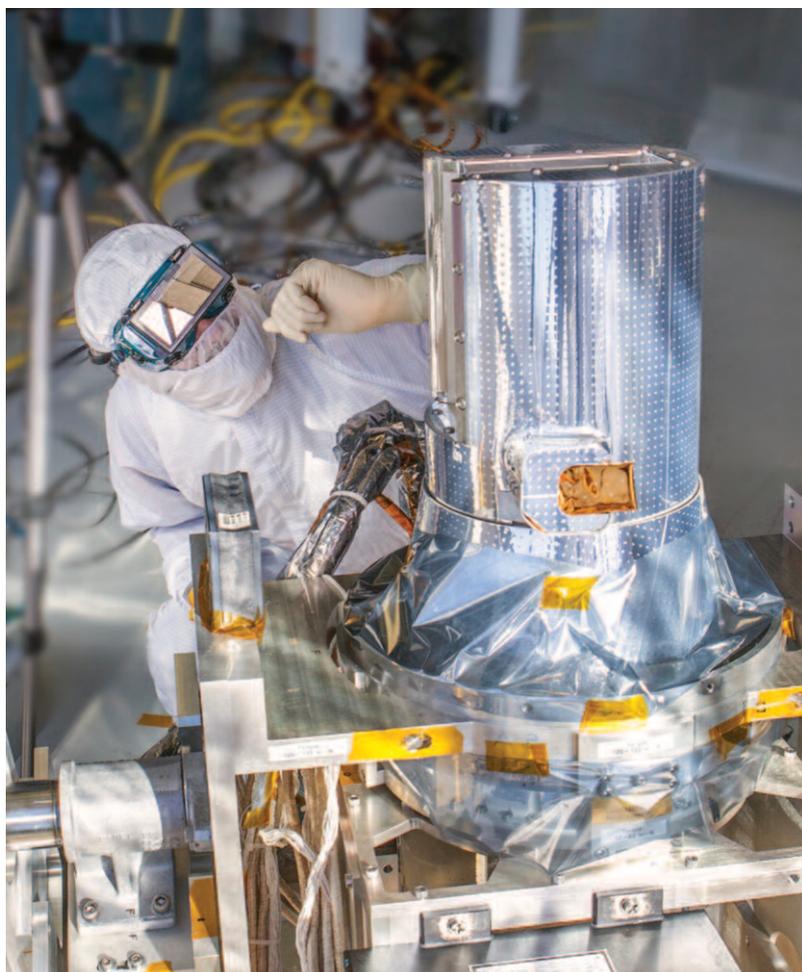
XXVIII/2, this effort is unlikely to be successful without adequate monitoring and reporting of relevant trade.

The Secretariat has suggested that Parties consider allowing the reporting of quantities of mixtures and blends rather than the specific amounts of the pure HFCs contained in those mixtures and blends. EIA supports this approach and encourages the transparent dissemination of this data. In addition, EIA strongly recommends that Parties agree to include reporting of non-Annex F HFCs that are consumed or produced as pure substances or in HFC blends (i.e. HFOs and HFC-161).

CONSIDERATION OF NEW HFCs NOT LISTED AS CONTROLLED SUBSTANCES IN ANNEX F

In addition to the omission of commercially significant HFCs (HFOs), there are several new HFCs, some with very high GWPs such as HFC-227ca (GWP 2,640), HFC-245cb (GWP 4,620) and HFC-329p (GWP 2,360), which were not listed in any of the Amendment proposals and have only recently come to light.⁴⁰ While these new HFCs are not currently in significant commercial use, the onset of control measures on other HFCs listed in Annex F may incentivise their production and use. Switzerland and Norway proposed language at MoP28 that requested Parties to discourage the development and promotion of new high-GWP HFCs while also encouraging information-sharing and requesting a report by the Scientific Assessment Panel (SAP) and TEAP.⁴¹

EIA supports further consideration of this issue, along the lines of the draft decision by Switzerland and Norway in the Annex of UNEP/OzL.Pro.WG.1/39/2.⁴² However, EIA urges consideration of this issue not to be limited to only new HFCs with “significant global warming potential”. Apart from the fact that “significant GWP” is not defined and is potentially open to lengthy discussion, the issues identified above for HFOs and HFC-161 would also apply to any new “low-GWP” HFCs. Following the report by SAP and TEAP, the timing for which should also be identified in the decision itself, the Parties will then be in a position to determine whether any additional actions are needed, such as regular voluntary reporting and review.



© NASA/Lampley/Sean Smith

SHORT-LIVED ODS THREATEN THE RECOVERY OF THE OZONE LAYER

New scientific research is warning that increasing concentrations of dichloromethane (CH₂Cl₂) and other 'very short-lived substances' (VSLs) could delay recovery of the Antarctic ozone hole by decades.⁴³

Emissions of dichloromethane (also known as methylene chloride) have increased by around eight per cent per year between 2004-14. Scientists predict that if emissions continue to increase at this rate they could significantly offset a portion of the decline in anthropogenic chlorine provided by Montreal Protocol control measures, leading to a significant delay - as much as three decades - to the recovery of the ozone layer, particularly over Antarctica.⁴⁴

Dichloromethane is a chlorine-containing chemical used as an industrial solvent and a blowing agent in the production of foam plastics. It is also the main ingredient for HFC-32, a key component of HFC-410A and other widely used HFC blends which is increasingly promoted in its own right as an alternative to high-GWP HFCs in air-conditioning and other applications.⁴⁵

Dichloromethane is one of the most abundant chlorine-containing VSLs present in the atmosphere. VSLs have not been controlled by the Montreal Protocol since it has been assumed they would have negligible impact on stratospheric ozone due to their short atmospheric lifetimes. It is now clear however that with significant emissions, estimated to be over one million tonnes per year and increasing, this may no longer be the case. The new information speaks to the need for continued comprehensive global monitoring of all ODS production, use and atmospheric levels. In this context, EIA encourages Parties to the Montreal Protocol to support and implement the recommendations from the 10th meeting of the ozone research managers of the Parties to the Vienna Convention (10th ORM), in particular the recommendations under Systematic Observations.⁴⁶

EIA urges Parties to direct the SAP and TEAP to examine the uses, emissions and potential emission sources and impact on the ozone layer of dichloromethane and other chlorine containing anthropogenic VSLs (for example, 1,2-Dichloroethane) that have been detected in Earth's atmosphere.

SUMMARY OF RECOMMENDATIONS

EIA urges the Parties to the Montreal Protocol to:

- Ratify the Kigali Amendment without delay;
- Identify strategies and activities to phase down HFCs in advance of the agreed schedule where possible and prioritise fast-start funding for these activities;
- Request TEAP to include the following in the revised Replenishment Taskforce report: funding for additional demonstration projects; funding for enabling activities at a level higher than for previous HCFC enabling activities; and funding for closure of HCFC-22 plants to address HFC-23 emissions as an alternative to operating costs for HFC-23 destruction;
- Encourage national stakeholders to expand participation in international and national standards bodies to facilitate the safe use of flammable refrigerants, including formation of national working groups where needed;
- Request TEAP to undertake a comprehensive evaluation of the costs and mitigation associated with the management of ODS and HFC banks, including a review of national legislation and best management practices in countries with higher recovery and destruction rates;
- Include reporting of non-Annex F HFCs that are consumed or produced as pure substances or in HFC blends (i.e. HFOs and HFC-161) under the Kigali Amendment reporting;
- Support a decision at MoP29 to discourage the development and promotion of new HFCs, with associated requirements for reporting and review by SAP and TEAP;
- Support and implement the recommendations of the 10th Meeting of the Ozone Research Managers to ensure comprehensive monitoring of ODS including VSLs;
- Direct the SAP and TEAP to examine the uses, emissions and potential emission sources and impact on the ozone layer of dichloromethane and other chlorine containing anthropogenic VSLs (for example, 1,2-Dichloroethane) that have been detected in Earth's atmosphere.

REFERENCES

- Decision XXVIII/1 Further Amendment of the Montreal Protocol. Advance copy, available at: <http://conf.montreal-protocol.org/meeting/mop/mop-28/final-report/SitePages/Home.aspx>
- See e.g. Technology and Economic Assessment Panel (TEAP). Decision XXVI/9 Task Force Report – Additional Information on Alternatives to Ozone Depleting Substances, pp. 63-66.
- The A5 Parties included all fifty-four countries of the African Group, fourteen Latin American countries (Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Guatemala, Mexico, Nicaragua, Panama, Paraguay, and Peru) and several Pacific and Caribbean islands (Federated States of Micronesia, Kiribati, Marshall Islands, Mauritius, Palau, Philippines, Samoa and Solomon Islands, among others).
- See The White House Office of the Press Secretary, Leaders from 100+ Countries Call for Ambitious Amendment to the Montreal Protocol to Phase Down HFCs and Donors Announce Intent to Provide \$80 Million of Support, (Sept. 22, 2016), available at <https://www.whitehouse.gov/the-press-office/2016/09/22/leaders-100-countries-call-ambitious-amendment-montreal-protocol-phase>.
- See The White House Office of the Press Secretary, Leaders from 100+ Countries Call for Ambitious Amendment to the Montreal Protocol to Phase Down HFCs and Donors Announce Intent to Provide \$80 Million of Support, (Sept. 22, 2016), available at <https://www.whitehouse.gov/the-press-office/2016/09/22/leaders-100-countries-call-ambitious-amendment-montreal-protocol-phase>.
- Report of the Technology and Economic Assessment Panel (TEAP) Replenishment Task Force, Assessment of the Funding Requirement for the Replenishment of the Multilateral Fund for the Period 2018-2020, (May 2017), available at: http://conf.montreal-protocol.org/meeting/owwg/owwg-39/presentation/Background-Documents/TEAP-XXVIII_5-TF-Report-May%202017.pdf
- TEAP (2017). Ibid. P47
- See Document UNEP/OzL.Pro/ExCom/79/48/Add.1, Addendum to Key Aspects Related to HFC-23 By-product Control Technologies (Decision 78/5) (16 June 2017), available at <http://www.multilateral-fund.org/79/English/1/7948a1.pdf>
- Based on reported data from A5 Parties in Key Aspects related to HFC-23 by-product control technologies. p3. UNEP/OzL.Pro/ExCom/79/48
- TEAP Decision XXVIII/4 Task Force Report Safety Standards for Flammable Low Global-Warming-Potential (GWP) Refrigerants, May 2017; See also: EIA, The Need for Smarter Standards and Codes in Cooling, 2016.
- Decision XXVIII/2 and XXVIII/4 (Establishment of regular consultations on safety standards) Page 31 and 36 available at: <http://conf.montreal-protocol.org/meeting/mop/mop-28/final-report/English/MOP-28-12E.pdf>
- Information on WG4 and list of participants, available at: http://www.iec.ch/dyn/www/?p=103:14:0:::FSP_ORG_ID,FSP_LANG_ID:11922,25
- Information on WG9 and list of participants available at: http://www.iec.ch/dyn/www/?p=103:14:0:::FSP_ORG_ID,FSP_LANG_ID:8534,25
- Information on WG16 and list of participants available at: http://www.iec.ch/dyn/www/?p=103:14:0:::FSP_ORG_ID,FSP_LANG_ID:12590,2
- Information on WG1 available at: <https://www.iso.org/committee/50362.html>
- See Briefing Note Z, Updating the refrigeration, air-conditioning and heat pump (RACHP) safety standards, P 10. Available at http://conf.montreal-protocol.org/meeting/owwg/owwg-39/presentation/briefingnotes/Updating_refrigeration_ac_and_heat_pump_safety_standards.pdf
- List of countries with IEC membership available at: <http://www.iec.ch/dyn/www/?p=103:5:0>
- Decision XXVIII/2, Paragraph 22.
- United Nations Environment Programme, Development of the Cost Guidelines for the Phase-Down of HFCs in Article 5 Countries: Draft Criteria for Funding (Decision 78/3)(5 June 2017), UNEP/OzL.Pro/ExCom/79/46, p. 12.
- United Nations Environment Programme, Development of the Cost Guidelines for the Phase-Down of HFCs in Article 5 Countries: Draft Criteria for Funding (Decision 78/3)(5 June 2017), UNEP/OzL.Pro/ExCom/79/46, p. 12.
- Decision XXVIII/2, Paragraph 22.
- Decision XXVIII/3, Paragraphs 1 and 3.
- See e.g. Lawrence Berkeley National Laboratory, Benefits of Leapfrogging to Superefficiency and Low Global Warming Potential Refrigerants in Room Air Conditioning (October 2015), available at <https://eetd.lbl.gov/sites/all/files/lbnl-1003671.0.pdf> (the ~100 Gt CO₂e figure represented the aggregate sum of (i) ~60 Gt CO₂e indirect emissions avoided due to energy efficiency improvements, e.g. avoiding inefficient HFC-410A in favor of more-efficient low-GWP and mid-GWP alternatives; and (ii) ~40 Gt CO₂e direct emissions avoided due to refrigerant swapping, i.e. avoiding HFC-410A (GWP 2088) in favor of lower-GWP alternatives (ranging from GWP 3 to GWP 675, with an assumed mix of average GWP 490).
- Decision XXVIII/2, Paragraph 10.
- Decision XXVIII/3, Paragraph 3.
- UNEP/OzL.Pro/ExCom/74/56, para 165a-d
- See e.g. TEAP, Task Force Decision XX/7 – Interim Report “Environmentally Sound Management of Bank of Ozone-Depleting Substances” (June 2009); TEAP, Task Force Decision XX/7 – Phase 2 Report “Environmentally Sound Management of Banks of Ozone-Depleting Substances” (October 2009); UNEP, Co-Chairs’ Summary of the Seminar on Environmentally Sound Management of Banks of Ozone-Depleting Substances (16 June 2010), UNEP/OzL.Pro.WG.1/30/6; UNEP, Draft Report of the Seminar on the Environmentally Sound Management of Banks of Ozone-Depleting Substances (Decision XXI/2) (3 August 2010), UNEP/OzL.Pro/Seminar.1/1/2.
- <http://www.atmos-chem-phys.net/14/4563/2014/acp-14-4563-2014.pdf>
- Decision XXVIII/2 entitled “Decision related to the amendment phasing down hydrofluorocarbons,” of the Twenty-Eighth Meeting of the Parties, available at <http://conf.montreal-protocol.org/meeting/mop/mop-28/final-report/English/MOP-28-12E.pdf>
- See p119, UNODC Transnational Organised Crime Threat Assessment https://www.unodc.org/documents/toc/Reports/TOCTA-EA-Pacific/TOCTA_EAP_c10.pdf
- Decision VII/9: Basic Domestic Needs, Paragraph 8
- Decision IX/4: Further Amendment of the Protocol; Decision IX/4, Annex IV: The Montreal Protocol (1997): The amendment to the Montreal Protocol agreed by the Ninth Meeting of the Parties (Montreal, 15-17 September 1997).
- See e.g. Decision VII/33: Illegal Imports and Exports of Controlled Substances; Decision VIII/20: Illegal Imports and Exports of Controlled Substances; Decision XIII/10: Monitoring of International Trade and Prevention of Illegal Trade in Ozone-Depleting Substances, Mixtures and Products Containing Ozone-Depleting Substances; Decision XIII/12: Monitoring of International Trade and Prevention of Illegal Trade in Ozone-Depleting Substances, Mixtures and Products Containing Ozone-Depleting Substances; Decision XIV/7: Monitoring of Trade in Ozone-Depleting Substances and Preventing Illegal Trade in Ozone-Depleting Substances; Decision XVI/33: Illegal Trade in Ozone-Depleting Substances; Decision XVII/16: Preventing Illegal Trade in Controlled Ozone-Depleting Substances; Decision XVIII/18: Preventing Illegal Trade in Ozone-Depleting Substances through Systems for Monitoring their Transboundary Movement between Parties; Decision XIX/12: Preventing Illegal Trade in Ozone-Depleting Substances.
- Decision XIX/12: Preventing Illegal Trade in Ozone-Depleting Substances.
- The original North American (NA) proposal, submitted in 2010, proposed in its annex to include HFC-1234yf, HFC-1234ze and HFC-161. These HFCs were also listed in the NA proposals submitted in 2011 and 2012 but then suddenly, in 2013, the NA proposal began omitting them for unspecified reasons. In contrast, since 2011, the proposals submitted by the Federated States of Micronesia and, more recently, the Island States have consistently included unsaturated HFCs as controlled substances in its annex.
- Technology and Economic Assessment Panel (TEAP). Decision XXVI/9 Update Task Force Report. Additional Information on Alternatives to Ozone-Depleting Substances (September 2015), pp. 28-31.
- Document UNEP/OzL.Pro.WG.1/39/3
- See EIA Briefing to the 38th Meeting of the Open-Ended Working Group of the Parties to the Montreal Protocol, Update on the Illegal Trade in Ozone Depleting Substances, (July 2016); See also EIA briefing to the 26th Meeting of the Montreal Protocol, New Trends in ODS Smuggling, (November 2014)
- Decision XXVIII/2, Paragraph 15(c)(iv)-(v).
- International Panel on Climate Change, Climate Change 2013: The Physical Science Basis (IPCC Working Group I Contribution to AR5), Chapter 8, pp. 732-733.
- United Nations Environment Programme, Issues for Discussion by and Information for the Attention of the Open-Ended Working Group of the Parties to the Montreal Protocol at its Thirty-Ninth Meeting (3 May 2017), UNEP/OzL.Pro.WG.1/39/2, Paragraph 52 and Annex.
- See United Nations Environment Programme, Issues for Discussion by and Information for the Attention of the Open-Ended Working Group of the Parties to the Montreal Protocol at its Thirty-Ninth Meeting (3 May 2017), UNEP/OzL.Pro.WG.1/39/2, Paragraph 52 and Annex.
- Hossaini, R., Chipperfield, M.P., Montzka, S.A., Leesan, A.A., Dhomse, S.S & Pyle, J.A. (2017). The increasing threat to stratospheric ozone from dichloromethane. NATURE COMMUNICATIONS | 8:15962 | DOI: 10.1038/ncomms15962 | www.nature.com/naturecommunications; and Oram, D.E., Ashfold, M.J., Laube, J.C., Gooch, L.J., Humphrey, S., Sturges, W.T., Leedham-Elvide, E., Forster, G.L., Harris, N.R.P., Mead, M.I., Samah, A.A., Phang, S.M., Chang-Feng Ou-Yang, Neng-Huei Lin, Jia-Lin Wang, Baker, A.K., Brenninkmeijer, C.A.M., & Sherry, D. (2017) A growing threat to the ozone layer from short-lived anthropogenic chlorocarbons. Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-497> <http://www.atmos-chem-phys-discuss.net/acp-2017-497/acp-2017-497.pdf>
- Hossaini et al., (2017) *ibid*
- Oram et al., (2017) *ibid*
- See RECOMMENDATIONS FROM THE 10th MEETING OF THE OZONE RESEARCH MANAGERS OF THE PARTIES TO THE VIENNA CONVENTION (10TH ORM), available at <http://conf.montreal-protocol.org/meeting/orm/10orm/report/SitePages/Home.aspx>

ENVIRONMENTAL INVESTIGATION AGENCY (EIA)

EIA - LONDON

62/63 Upper Street
London N1 0NY, UK

Tel: +44 (0) 20 7354 7960

email: ukinfo@eia-international.org

www.eia-international.org

EIA - WASHINGTON, DC

PO Box 53343
Washington, DC 20009 USA

Tel: +1 202 483-6621

Fax: +1 202 986-8626

email: info@eia-global.org

www.eia-global.org

