environmental investigation agency

Climate

From Compliance to Climate Action: Delivering on the Montreal Protocol's Full Potential

EIA Briefing to the 47th Meeting of the Open-ended Working Group of the Parties to the Montreal Protocol, 7-11 July 2025

Introduction

As the climate crisis intensifies and threats to the ozone layer continue to mount, there are multiple urgent issues before parties at the 47th Open-ended Working Group (OEWG47) of the Montreal Protocol.

In 2024, human-induced warming pushed Earth's average global surface temperatures to a record 1.52°C above pre-industrial levels.[1] With current warming already driving an increase in the "occurrence and intensity of climate and weather extremes", every fraction of a degree matters and the work of the Protocol to address ozone-depleting substances (ODS) and hydrofluorocarbons (HFCs) is more vital than ever.[2]

The challenge is no longer confined to climate change and ozone depletion. A growing body of scientific research highlights the interlinkages between chemical pollution, climate change and biodiversity loss.[3] Many F-gases either are, or break down into, per- and polyfluoroalkyl substances (PFAS, known as 'forever chemicals') and their proliferation demands that the Montreal Protocol grapples with the full lifecycle and environmental impact of fluorinated chemicals.

Now is not the time for hesitation. It is a moment for renewed commitment to bold, science-led multilateral action reflecting the interdependence of the climate, ozone and chemical regimes. The Montreal Protocol has the tools, legacy and mandate to lead. The Environmental Investigation Agency (EIA) urges parties to demonstrate the resolve to do so in order to sustain and build on past success.

Agenda item 3: Terms of reference for the study on the 2027–29 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol

The significant investment for the 2024-26 triennium of $965,000,000, agreed in 2023, was an acknowledgement of the increased obligations of Article 5 (A5) parties and the importance of the ongoing simultaneous hydrochlorofluorocarbon (HCFC) phase-out, HFC phase-down and associated activities.

If anything, the challenges facing A5 parties have since increased and the next triennium will be critical to ensuring that all A5 parties are able to maximise the effectiveness of implementation. This includes providing the resources to support enhanced early action on HFCs, ahead of and beyond upcoming compliance targets. Indeed, even with only limited incentives in place, 38 per cent of the 73 countries with approved Kigali Implementation Plans (KIPs) have agreed targets that surpass the 10 per cent HFC reduction target by 2029 required by the Kigali Amendment.

The Multilateral Fund (MLF) will also need to provide resources to meet the 2030 ban on production and consumption of HCFCs and to implement the ODS collection and disposal plans developed under the recently agreed funding window for end-of-life management.[4] Some 104 countries have taken advantage of this new funding window so far, demonstrating the critical importance of addressing ODS banks to A5 parties.

Training and capacity-building remain key areas for investment across both HCFC Phase-Out Management Plans (HPMPs) and KIPs, particularly given that most remaining HCFC consumption is in the servicing sector. Improving the effectiveness of servicing sector activities for HCFCs, for example lifecycle refrigerant management (LRM), will also reap significant benefits and avoid longer-term costs by helping countries to avoid HFC growth.

Tailoring the provision of capacity-building activities to meet regional needs – through initiatives such as Centres of Excellence – can help countries to meet their compliance targets while maximising the benefits of implementation. By simultaneously delivering on energy efficiency standards, safe alternative refrigerant adoption and improved LRM, regional approaches have the potential to reinforce the Protocol's legacy of cost-effective emissions reductions through ambitious and strategic programmatic funding.

To meet the need for continued robust implementation, the terms of reference for the TEAP replenishment report should specifically address the following:

- options for supporting early action under A5 countries' KIPs to facilitate and encourage the phase-down of HFCs ahead of mandatory reduction targets
- the need to deliver regionally tailored, cross-cutting support in the servicing sector which addresses training and capacity-building, energy efficiency, the safe adoption of alternative refrigerants and best practices for LRM
- end-of-life management, including the implementation of plans developed under ExCom Decision 91/66 for the collection and disposal of controlled substances identified in national inventories of banks, in accordance with Decision XXXV/11 on LRM
- additional funding to support low-volume-consuming and very-low-volume-consuming countries in addressing the unique challenges presented by their national circumstances
- the greater level of funding needed to support institutional strengthening and the implementation of the compliance assistance programme, given the increased risk of HCFC illegal trade as the final phase-out date is approaching.

Agenda item 4: Presentations by the Technology and Economic Assessment Panel on its 2025 progress report

4(a) Lifecycle refrigerant management

Decision XXXVI/2 requested that the TEAP, in its annual Progress Reports and its 2026 Quadrennial Assessment report, provide parties with updated information on LRM activities.

The TEAP's May 2025 Progress Report contains the first of these updates, providing information on activities reported by several parties to improve LRM, including new and/or strengthened regulations which focus on the recovery, reclamation and destruction of refrigerants. Table 1 provides a summary of national actions and data included in the report.

Table 1: *TEAP Progress Report Information on LRM Regulations and Policies and Data on Recovery, Reclamation and Destruction*

Country	Reported LRM Policy Actions	Data on refrigerant recovery, reclamation, and destruction
Australia	[No recent update in TEAP 2025 Progress Report]	• 505 tonnes of used and unwanted refrigerant recovered and disposed of in 2024, preventing 1.1 million tonnes of CO_2e.
Canada	[No recent update in TEAP 2025 Progress Report]	• Destroyed over 4,600 tonnes of refrigerants to date. • ODS recovery increased 13 per cent for 2022-23 fiscal year to 124 tonnes, HFC recovery increased by 33 per cent to 150 tonnes. • Destruction increased by 32 per cent year over year (YoY) for both ODS (54 tonnes) and HFCs (107 tonnes) for the same fiscal year. • Unconfirmed quantities of recovered refrigerant were retained for reclamation by commercial entities for resale during the same period.
China	• Issued regulations and standards aimed at managing or promoting the recovery, recycling, and destruction of ODS. • Introduced policies to boost household appliance recycling, aiming for a 15 per cent increase in recycling rates by 2025.	• Refrigerant recovery increased 2020-2023, from roughly 800 to 2,100 tonnes, with an annual growth rate of approximately 36 per cent. The report does not specify how recovered refrigerant was treated (i.e., reclaimed or destroyed).[5]
European Union	• Mandated a complete phase-out of HFCs by 2050 and is accelerating the transition to alternatives through its F-gas Regulation.	• Data shows a fluctuating trend; in 2023 the amount of reclaimed HFCs reported was less than 1,000 tonnes. The EU report does not cover all reclamation facilities which partially explains the fluctuation. • Amount of refrigerant destroyed increased between 2018 and 2021, but decreased by about 7 per cent in 2023, though there was a 9 per cent increase in destruction of unsaturated HFCs/HCFCs.
India	• Revised its electronic waste regulations to cover refrigerants, using an EPR approach to manage e-waste and associated refrigerants.[6]	[No recent data in TEAP 2025 Progress Report]
Japan	• Plans to reduce HFC consumption will utilise full reliance on reclaimed refrigerants. The Japan Refrigeration and Air Conditioning Industry Association will promote reclamation in cooperation with related industries.	[No recent data in TEAP 2025 Progress Report]
United States	• Established the Emissions Reduction & Reclamation (ER&R) program, with provisions for leak repair and increased use of reclaimed refrigerants. Estimates this will result in 120 million tonnes CO_2e of avoided emissions by 2050.[7]	• HFC reclamation increased from 2,450 tonnes in 2021 to 3,440 tonnes in 2022 with a year on year (YoY) increase of about 40 per cent, and to 4,120 tonnes in 2023 with a YoY increase of about 20 per cent.
New Zealand	• New regulations mandating participation in LRM schemes (previously voluntary). • From 2028, a new training and certification element to recognise technicians prior learning and promote best practices and appropriate qualifications to safely handle and manage all current and future refrigerants.	[No recent data in TEAP 2025 Progress Report]

Although the TEAP LRM Taskforce previously identified significant emissions reductions if LRM measures were universally adopted, it is important to recall that even in those countries with the most developed recovery, reclamation and reuse (RRR) systems to date, recovery rates still rarely exceed 40 per cent.[8] Approaches to increase recovery rates should be further explored and could include measures such as incorporating target rates within extended producer responsibility (EPR) schemes. RRR plays an important role in reducing the demand for virgin HFC production; however, EIA cautions parties against focusing solely on RRR measures without parallel efforts to replace HFCs with climate-safe alternatives.

It is clear that significant investment is needed to provide the equipment and infrastructure necessary to improve leak detection and repair and to support RRR and destruction.[9] The TEAP highlights that these efforts are being hampered by a global shortage of necessary refrigerant identification equipment, in particular equipment capable of identifying the wide range of refrigerant blends.[10]

Furthermore, although the TEAP reports that leak detection systems have seen technological advancements, it is unclear how accessible these advanced technologies are globally.

Resolving these issues of availability and accessibility will be essential to the advancement of LRM practices globally, as will ensuring that economic incentives are in place, for technicians and throughout the supply chain, to encourage best practice at all stages of the equipment and refrigerant lifecycle.

EIA reminds parties that under Article 9 of the Montreal Protocol, they have an obligation to promote the "… research, development and exchange of information on: best technologies for improving the containment, recovery, recycling, or destruction of controlled substances or otherwise reducing their emissions."

Financial mechanisms and support for LRM under the Multilateral Fund

EIA continues to strongly urge parties to prioritise sustainable financing options that maximise the environmental benefits of LRM, such as through the MLF. The MLF has funded training in A5 parties on leak prevention, refrigerant recovery and recycling. Additionally, the MLF has increased the availability of recovery tools in A5 parties, primarily through HPMPs, which have established recovery and recycling centres.

The MLF has also funded pilot projects for the destruction of ODS and, more recently, inventories and plans for ODS disposal.[11] It is necessary to scale up these efforts and make them more effective to ensure developing countries have access to the necessary tools and infrastructure to manage refrigerants through the lifecycle.

Cuba's proposal in relation to ODS and HFC banks

Cuba has submitted a proposal to develop studies and strategies for medium- and long-term solutions to inventories of refrigerant gases nearing their end of life in A5 countries.[12] There is value in improving refrigerant inventories and proposing solutions for responsible management; however, EIA does not support the inclusion of text which would direct the TEAP, and ultimately parties, towards the use of carbon offsetting or the sale of credits on the voluntary carbon market.

EIA strongly opposes the use of carbon markets to finance activities related to substances controlled under the Montreal Protocol, recalling both the history of perverse incentives associated with previous HFC-23 destruction credits under the Clean Development Mechanism (CDM) and recognising the ongoing risk of improper management and issues of equity. These issues are explored in detail in our 2024 report *Polluting the Protocol*.[13]

Cuba's proposal notes there is presently no approved methodology for HFC destruction within the voluntary carbon market. There are good reasons for this, described below, and EIA strongly cautions against any change that would allow the sale of HFC destruction credits.

Allowing credits to be generated from HFC destruction creates a significant risk of perverse incentives, as the product that could be destroyed for profit is still being legally manufactured. Furthermore, destruction of HFCs for offsetting purposes could limit the pool of reclaimed HFCs available for servicing existing equipment in the future, locking in a need for greater ongoing virgin production than would otherwise be the case.

In its 2025 Progress Report, the Fire Suppression TOC (FSTOC) expressed concern about the mid- and long-term availability of halon 1301 and cites the "perverse incentive" created by carbon credits for destruction as a contributing cause, which will accelerate the run-out date for halon 1301.[14] This is a clear precedent which should not be repeated with HFCs.

EIA encourages parties to request that any TEAP analysis of solutions to the ongoing issue of controlled substance banks focuses on proven, reliable funding mechanisms such as the MLF or EPR schemes such as those successfully implemented in Australia and Japan.[15]

Decision XXXV/11 requested the Executive Committee of the MLF to consider a funding window for countries which have developed national bank inventories and plans (in accordance with Executive Committee decision 91/66) to support their implementation.[16] It is of pressing concern that these plans are financed now, allowing for immediate implementation before the inventories become outdated.

EIA strongly recommends, therefore, that a funding window in line with Decision XXXV/11 is approved at the upcoming 97th Executive Committee meeting.

4(b) Metered-dose inhalers with low-global-warming-potential propellants

Metered-dose inhalers (MDIs) use high GWP HFC propellants and are a significant source of emissions in the health care sector.[17]

The new lower-GWP propellants that are being developed and brought to market are HFC-152a, which has a GWP of 153, and HFO-1234ze(E), which has a GWP of 1 but is derived from the ODS carbon tetrachloride (CTC) and is a PFAS.

Given the issues with even these lower-GWP fluorinated propellants, the potential to reduce demand should not be overlooked. Medical professions report changes to the way inhalers are used and prescribed could benefit patients while reducing their use.[18] In many cases MDIs could also be replaced with alternatives that do not use propellants, such as dry powder inhalers (DPIs) and soft mist inhalers (SMIs).[19] DPIs are effective and suitable for most patients and they are already the most common form of inhaler in some countries.[20]

Any transition in the medical sector is complex and must prioritise patient safety while also considering factors such as environmental impact and cost. To make informed decisions about the future of inhaled therapies, parties must be provided with detailed information on all the alternatives to MDIs based on high GWP propellants. However, EIA notes that discussions under the Montreal Protocol have so far focussed, almost exclusively, on the transition to low GWP propellants rather than propellent-free alternatives or other routes to reducing the use of MDIs.

Most recently, the TEAP's 2025 Progress Report responded to Decision XXXVI/6, which requested that it provides updates on low GWP propellants, "including on the availability, technical feasibility, economic viability, safety and

market penetration of those propellants in parties operating under paragraph 1 of Article 5 of the Montreal Protocol on Substances that Deplete the Ozone Layer and in parties not so doing".[21]

Notably, there was no request for similar information relating to alternatives to MDIs. EIA therefore urges parties to consider the opportunities to avoid the use of MDIs and to ensure that any future requests to the TEAP include specific requests for information on alternatives such as DPIs.

4(d) Other issues

Per- and polyfluoroalkyl substances (PFAS)
The TEAP's 2025 progress report contains several sections focused on PFAS and the potential impact that incoming PFAS regulations might have on issues relating to the Montreal Protocol.

The rising contribution of F-gases to persistent PFAS pollution warrants a more thorough consideration of the need to regulate PFAS and alignment with the climate and broader environmental goals of the Protocol.

Concerns are growing around the widespread contamination of the environment with PFAS.[22] PFAS are a broad class of fluorinated chemicals with diverse applications and varying properties. Many F-gases – including some HCFCs, HFCs, HFOs and all PFCs – are PFAS according to the Organisation for Economic Co-operation and Development (OECD) definition.[23] It has been estimated that F-gas applications account for more than half of total PFAS emissions.[24]

For some PFAS, such as perfluorooctanoic acid (PFOA), there is well-documented evidence of bioaccumulation and toxicity, but for most PFAS, including F-gases and related substances, far fewer studies have been carried out and there are still major gaps in our knowledge.[25]

For the ultra-short chain PFAS trifluoroacetic acid (TFA), which is the breakdown product of many F-gases, the available evidence indicates it does not bioaccumulate in mammals and has low toxicity at environmental concentrations.[26] Nonetheless, significant evidence gaps remain, including around the impacts of chronic low-dose exposure.[27]

The EEAP has concluded that TFA poses a negligible risk to human health and the environment.[28] However, a common feature of PFAS is their environmental persistence and many scientists believe this is a cause for concern, even in the absence of evidence that substances are toxic or bioaccumulative.[29] To avoid unnecessary risks to

people and the environment, the precautionary principle must be followed and emissions of persistent pollutants must be avoided.

In light of the ubiquitous nature of PFAS, the ongoing evidence gaps and the environmental persistence, class-based approaches to PFAS regulation – which would restrict the use of all PFAS, rather than taking a chemical-by-chemical approach – have been proposed.[30]

The TEAP report seems to suggest that this approach to PFAS regulation would put the Montreal Protocol's climate goals at risk.[31] EIA, however, asserts that such risks could be mitigated through careful governance and an accelerated transition to technologies using non-fluorinated alternatives, which are increasingly available for most ODS and HFC applications.[32] Furthermore, a class-based approach that allows for essential use exemptions in niche applications, where a substance may still be required, is a tried-and-tested approach pioneered by the Montreal Protocol.

The issue of F-gases and PFAS is receiving increasing attention around the world and some parties are already considering ambitious PFAS restrictions that would impact many F-gases.[33] It is therefore incumbent on the Montreal Protocol to address this issue in a comprehensive way. To date, the TEAP and the EEAP have disregarded, in EIA's view, the strong scientific case that has been made for such an approach, the ongoing scientific debate around TFA, and the valid and myriad concerns of many in the scientific community about PFAS F-gases.

The continued promotion of PFAS substances is at odds with the precautionary principle, which is a cornerstone of the Montreal Protocol. EIA urges parties to take a precautionary approach to the use of PFAS and avoid their use where alternatives are available.

HFOs

Unsaturated halocarbons, known as hydrofluoroolefins (HFOs), are being promoted as sustainable alternatives to ODS and HFCs in many applications.

The environmental health, and societal risks associated with HFOs are often overlooked, questioned or minimised in discussions around HFO suitability and sustainability. HFOs do have lower GWP and ODP than previous generations of F-gases, but they contribute, indirectly, to climate change and ozone depletion due to emissions of high GWP and ODP species during production and atmospheric breakdown.[34]

Many HFOs are also a source of persistent PFAS pollution.[35] Uptake of HFOs has been hampered by high costs and supply issues, particularly in A5 parties, and there are issues relating to the use of HFC-HFO blends as well as concerns that HFOs may facilitate the illegal use of and trade in HFCs, complicating enforcement and leading to the continued use of high GWP HFCs.[36]

Article 10A of the Montreal Protocol states that: "Each Party shall take every practicable step, consistent with the programmes supported by the financial mechanism, to ensure (a) that the **best available, environmentally safe substitutes and related technologies** are expeditiously transferred to parties operating under paragraph 1 of Article 5; and (b) that the transfers referred to in subparagraph (a) occur under **fair and most favourable conditions**".[37]

EIA believes that HFOs fail to meet the requirements of Article 10A, especially given the availability of non-fluorinated alternatives and not-in-kind technologies for many applications.

The environmental threats posed by ODS and HFCs, and by PFAS such as PFOA, were not acted on until significant harm had already occurred and some of the tactics and arguments being used to promote HFOs echo those which delayed the phase-out of earlier generations of fluorinated substances.

Given the availability of non-fluorinated alternatives for most F-gas applications, there is no need to repeat history by transitioning to yet another generation of fluorochemicals. EIA urges parties to take a precautionary approach to HFOs.

Agenda item 5: Feedstock uses of controlled substances (Decision XXXVI/5)

Feedstocks

Fluorochemical production is a significant source of ODS and HFC emissions, contrary to the erroneous assumptions underpinning the exemption of feedstock production and use from control under the Montreal Protocol.

EIA has estimated that annual production-related emissions of controlled substances could be as high as 491.94 million tonnes of CO_2-equivalent ($MtCO_2e$), roughly equal to the annual emissions of 130 coal-fired power stations.[38] About 197 $MtCO_2e$ of these emissions are linked to the use of controlled substances as feedstocks, the production of which has increased 66 per cent during the past decade.[39]

EIA is seriously concerned that the lack of transparency around fluorochemical manufacturing is now hindering parties from taking informed decisions on issues related to production. Despite two recent decisions around feedstock uses of controlled substances (Decision XXXV/8, requesting updated information from the TEAP on feedstock emissions and best practices for their abatement and Decision XXXVI/5, inviting parties to share information on their national procedures for managing feedstocks), minimal progress has been made and parties are yet to consider if and how the feedstock exemption should be amended.[40]

In its latest report, the TEAP could once again only present broad ranges for the quantities of many controlled substances used as feedstock. Estimated production ranges of between 10,000-100,000 or 100,000-100,000,000 tonnes, for potent ODS, some of which have been phased out for a decade and a half, are simply not an acceptable basis for decision-making under the Protocol.[41]

Meanwhile, Decision XXXVI/5 received only six responses from parties, despite 20 parties having reported feedstock use between 2019-23, and some of the world's largest producers failing to respond entirely.

This is a clear demonstration that reliance on voluntary measures and reporting is insufficient if parties are serious about maintaining the Montreal Protocol's legacy of environmental protection.[42]

EIA strongly encourages parties to consider how they can proactively support the implementation of best practices related to feedstock management in all producing countries, including through measures such as pilot projects and/or the integration of activities into Article 5 countries' KIPs.

Meanwhile, we urge all parties to prepare for consideration of how they will limit the feedstock exemption in light of the TEAP's 2026 Quadrennial Assessment Report, which will include an assessment and evaluation of "process agents and feedstock uses for which the use of controlled substances is no longer required and identification of alternative pathways and technologies that can replace these uses, taking into account costs and other environmental and economic considerations".[43]

HFC-23 emissions

Inherently bound to the wider issue of fluorochemical production and transparency, and of significant concern, are ongoing emissions of HFC-23. Based on atmospheric monitoring, emissions of HFC-23 were 206 $MtCO_2e$ in 2023, five times higher than the level of emissions reported by parties in 2021 (the most recent year for which a complete set of emissions reports is available).[44]

This gap between top-down atmospheric measurements and bottom-up reported data suggests that the Kigali Amendment's HFC-23 by-product destruction requirement is not being faithfully executed by all parties.[45] Adam *et al.* (2024) concluded that the discrepancy between observed and reported emissions must indicate "a continued and substantial under-reporting of HFC-23 emissions from HCFC-22 production", raising serious questions about compliance and oversight of the Protocol.[46]

Although HCFC-22 production has been identified as the primary source of HFC-23 emissions, it is nonetheless important to recognise that other sources do exist and that they remain comparatively poorly understood.

EIA looks forward to the updated SAP and TEAP reports requested by Decision XXXVI/3 and suggests that, in addition to HCFC-22 production, particular attention is paid in those reports to PTFE production. A recent study in China

suggests that PTFE production may be a larger source of HFC-23 emissions than previously believed, indicating a specific need for more information around the geographic locations and scales of PTFE production as well as up-to-date information on abatement technologies in place in PTFE facilities and reported emissions.[47]

Ongoing HFC-23 emissions and the unacceptable gap between top-down observed and bottom-up reported figures serve to highlight systemic flaws in the Montreal Protocol's monitoring, reporting, verification and enforcement mechanisms.

EIA firmly reminds all parties of their obligation to capture and destroy HFC-23 by-product emissions from all production processes. We further note that, even in facilities operating state-of-the-art abatement technology, failures and interruptions can and do still result in HFC-23 emissions which must, at the very least, be monitored and faithfully reported.[48]

Nitrous oxide – a threat to ozone layer recovery

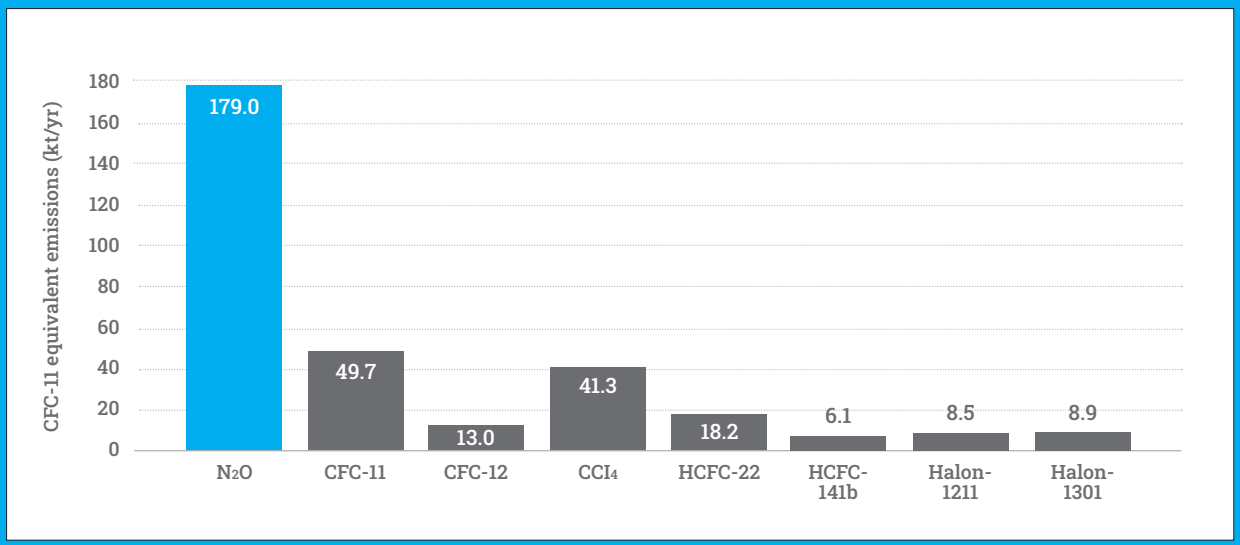
Emissions of nitrous oxide (N_2O) have increased by 40 per cent since 1980 and, without mitigation, will undermine both ozone recovery and climate targets while driving major public health impacts through elevated ultraviolet (UV) exposure and degraded air quality.

With annual ODP-weighted emissions already equivalent to the combined emissions of all controlled ODS, N_2O is now the single greatest threat to the stratospheric ozone layer.

Despite being listed in Annex I of the Vienna Convention, N_2O has long been overlooked by the Montreal Protocol. The recently released Global N_2O Assessment outlines how mitigation is both technically and economically feasible across all major emission sources.[49] Notably, it highlights industrial sources, particularly emissions from nitric and adipic acid production, as "low-hanging fruit" for immediate abatement. To effectively eliminate these emissions, cost-effective and proven technologies already exist and the Montreal Protocol is uniquely well-positioned to lead in this space, building on its experience regulating industrial by-products such as HFC-23.

The credibility of the Montreal Protocol depends on its continued responsiveness to emerging issues and EIA urges parties not to ignore the growing threat posed by N_2O. To protect the Protocol's legacy, detailed assessments are needed from the SAP and the TEAP, providing parties with the scientific and technical basis to make informed decisions on future mitigation action.

Figure 1: *Ozone-depleting potential-weighted global anthropogenic emissions of nitrous oxide compared with those of gases controlled under the Montreal Protocol in 2016. Nitrous oxide is the largest ozone-depleting potential weighted emission, roughly equal to the sum of all other controlled substances. Source: Global Nitrous Oxide Assessment.*



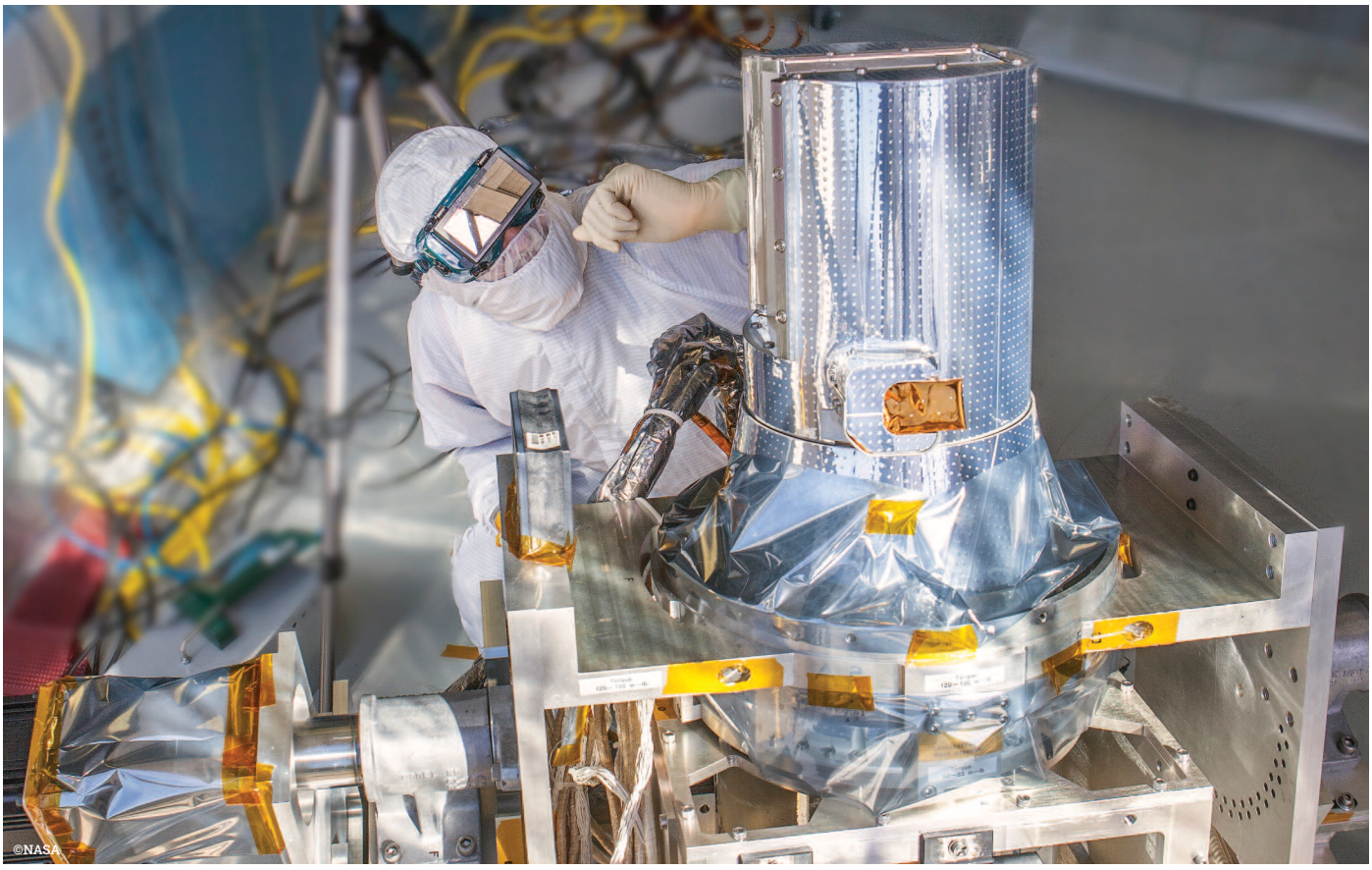
Agenda item 6: Enhancing regional atmospheric monitoring of substances controlled by the Montreal Protocol (Decision XXXVI/1)

Unexpected emissions of CFC-11 revealed in 2018 have prompted ongoing discussions about the need to improve atmospheric monitoring capabilities over the past several years. Such monitoring capability is vital to monitoring compliance and enabling parties to act when unexpected emissions occur.

Regional scale monitoring is essential for quantifying and attributing regional emissions, but gaps in the global monitoring network, which parties have been aware of since their identification in 2021, continue to persist, hampering efforts to attribute emissions to particular sources.[50]

Recently, this has been re-emphasised by the unexpected emissions of HFC-23; although regional scale monitoring has pinpointed China as a significant source of underreported HFC-23 emissions, a large portion of the emissions gap cannot be attributed to a particular source because of a lack of regional scale monitoring in key regions.[51]

In recent years, parties have received further information from the Secretariat and SAP on options for expanding regional monitoring capacities and how such activities might be financed.[52] Decision XXXVI/1 requested the Ozone Secretariat, in consultation with the Advisory Committee of the General Trust Fund, to organise activities to evaluate the suitability of potential sites for monitoring regional emissions of controlled substances, including mapping possible locations based on existing monitoring facilities.[53] At the 37th Meeting of the Parties (MoP37), the Advisory Committee is due to report on these activities and the Ozone Secretariat plans to update on its cost estimates and options for long-term financing associated with enhancing atmospheric monitoring.



NASA's Stratospheric Aerosol and Gas Experiment (SAGE) III instrument measures greenhouse gases in the atmosphere.

The Advisory Committee has been expanded to ensure it has the relevant expertise for this work.[54] Although it is yet to start its work on evaluating the suitability of potential sites, progress has been made under a EU-funded pilot project on regional quantification of emissions of substances controlled under the Montreal Protocol, with nine potential monitoring sites identified.

Activities carried out so far under the project have highlighted the importance of careful selection of monitoring sites and of in-country assistance and expertise. The project has also further demonstrated the benefits of high-frequency measurements for quantification of regional emissions.[55] It should be noted that the previous cost estimates are not significantly greater for high-frequency on-site sampling compared to flask sampling ($456,000-1,245,000 and $195,000-1,300,000).[56]

Also planned at MoP37 is the report of the MLF Executive Committee on its consideration of a funding modality to support a limited number of pilot projects to enhance regional atmospheric monitoring. At ExCom96, the Executive Committee requested the MLF Secretariat to prepare draft guidelines for the implementation of pilot projects, a template agreement between the Executive Committee and the Article 5 country concerned for pilot projects, and information on the potential for the World Meteorological Organization to take on a role as implementing agency for pilot projects.[57] The ExCom will also consider establishing a funding window at the 98th meeting for three pilot projects to enhance regional atmospheric monitoring.

EIA supports the recommendation for funding of $10 million and strongly urges the consideration of further augmenting available resources.[58]

EIA welcomes the progress made so far in expanding and developing regional monitoring capabilities and encourages parties to continue engaging constructively to ensure that sufficient resources are made available. EIA hopes to see, within the next few years, a significant expansion in the number of regional monitoring sites, finally closing the key gaps in the current global network.

EIA also urges all Parties to ensure that all data, whether from new or existing sites, is transparently shared in a timely manner.

Finally, EIA also encourages parties and the Advisory Committee to consider innovative and potentially more cost-effective approaches to atmospheric monitoring, given the expansion of technologies to monitor emissions and atmospheric concentrations.

This expanded scope should consider a layered approach of ground, aerial and space-based monitoring to close all gaps identified and identify sources of emissions effectively.

Agenda item 7: Further strengthening the Montreal Protocol institutions (Decision XXXVI/9)

Article 4B of the Montreal Protocol requires parties to establish and implement licensing systems for the import and export of new, used, recycled and reclaimed controlled substances.

When the Protocol was amended in 1997 to include the requirement for a licensing system, Decision IX/8 agreed that the licensing system should assist collection of sufficient information to facilitate compliance with reporting requirements and decisions of the parties, as well as assist parties in the prevention of illegal traffic of controlled substances.

However, there is no provision for confirmation, review or oversight in respect of the licensing systems themselves, other than in the context of MLF agreements with Article 5 parties where a light review of the implementation of the licensing, quota, import/export control and monitoring system is carried out as part of verification in the consumption sector.[59]

Ten years after licensing systems were established, with illegal trade continuing to undermine the achievements of the Protocol, Decision XIX/12 listed eight specific measures that parties may consider implementing to improve implementation and enforcement of their licensing systems in order to combat illegal trade in ODS more effectively, based on an ODS tracking study which had been prepared by EIA and Chatham House at the request of the parties.[60]

In response to Decision XXXVI/9, the Secretariat has provided an updated document summarising common features of licensing systems in operation in 100 parties to the Montreal Protocol. Based on Article 4B, Decision XIX/12 and other decisions and discussions of the parties, an effective licensing system includes the following key features and functions:

- addresses import and export of controlled substances, including exempt uses and used, recycled and reclaimed substances
- establishes import and export quotas on a per-shipment basis with unique identification numbers
- collects sufficient information to enable compliance with reporting
- assists in the prevention of illegal trade, including through prior notification and cross-checking between exporting and importing countries, and private-sector partners
- enables monitoring of transit movements, including through duty-free zones
- bans or controls the use of non-refillable containers
- establishes minimum labelling and documentation requirements
- facilitates collaboration with customs and all relevant agencies
- provides for training and awareness-raising activities and the collection and analysis of data on operational effectiveness.

According to the review, there are significant disparities in the way that parties to the Montreal Protocol are setting up and running licensing systems. This suggests that the guidance adopted through decisions (e.g. Decision VII/9, Decision VIII/26 and Decision IX/8) is insufficient and more robust minimum requirements or modalities for the implementation and operation of a licensing system should be adopted.

It is of concern that only 70 per cent of parties explicitly mention that exports require a licence, given this is a compliance requirement under Article 4B. Moreover, only about one-quarter of the systems reviewed manage transit trade, including transshipment and through free trade zones, despite the importance of these in the global goods trade. For example, 70 per cent of US imports are transhipped via an intermediate country.[61]

It is also concerning that only 25 per cent of countries reviewed operate fully electronic licensing systems which are integrated with customs clearance processes.

The review also notes the increasing relevance of e-commerce in the trade of refrigerants and products containing ODS and HFCs. Import/export-based licensing systems are pivotal in controlling trade in ODS and HFCs; however, the onus on border control means they do not support monitoring of HFCs within the domestic supply chain to the end user. Once smuggled into a country, ODS and HFCs can be traded with no requirement to demonstrate that the substance is legitimately placed on the market and there is no way for enforcement authorities to prove the HFCs are quota-compliant.

E-commerce and online trading platforms offer F-gas smugglers access to large international markets. The ease with which they facilitate trade has increased incentives for illegal F-gas smuggling.

EIA's experience in investigating illegal F-gas trade in Europe reveals that suspected non-quota HFCs are widely available across a range of online trading platforms and websites. For example, in 2023 EIA identified 57 unique online places of sale for HFC gases in Spain, including online marketplaces and e-commerce websites.[62]

Further measures to facilitate tracing of HFCs along the supply chain are therefore essential to prevent illegal trade. Developments in digital tracing methodologies mean it is feasible to use supply chain tracking to ensure that HFCs throughout the distribution network are quota compliant. This is already in place for a number of commodities, such as timber, and could be applied to HFCs.[63]

Disposable cylinders are widely used in the illegal trade of ODS and HFCs. EIA reiterates its position that a global ban on disposable cylinders is necessary to prevent illegal trade and to support lifecycle refrigerant management, reducing emissions from the transport of controlled substances. In the EU, which bans disposable cylinders, enforcement efforts have driven some illegal traders to use cylinders which are technically refillable, but which the traders have no intention of using more than once.

To combat this problem, the EU now defines any containers that are imported or placed on the market without provision having been made for their return for refilling as 'non-refillable' and subject to the ban. Refillable cylinders containing HFCs and HFOs must be accompanied by evidence of a take-back scheme.[64]

EIA urges the parties to develop a process for reviewing licensing systems more systematically, and develop best practice and minimum requirements for licensing systems, which include:

- a fully electronic, per shipment licensing system, linked to customs (e.g. via a single window) which also monitors transit movements (transshipments) of ODS and HFCs (including HFOs), including those passing through duty-free zones, for example, by identifying each shipment with a unique consignment reference number
- all controlled substances, including recycled and reclaimed substances, polyols, and exempted uses such as feedstocks
- consideration of prior-informed consent (PIC) and WCO Advance Cargo Information System
- a ban on disposable cylinders and requirement for a take-back mechanism.

EIA further recommends that parties undertake a review of the available technologies and benefits of national, regional and global supply chain tracking of Montreal Protocol controlled substances.

In addition to preventing illegal trade, such supply chain tracking can significantly enhance data collection and understanding of market dynamics surrounding HFCs and HFC blends, which have been raised by numerous parties in recent discussions at meetings of the Executive Committee of the Multilateral Fund.[65]

Effective ODS and HFC licensing systems are critical to prevent illegal trade, given unprecedented challenges faced by Article 5 partes as the end of the HCFC phase-out approaches concurrent with the beginning of the HFC phase-down.

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