Investing in the Montreal Protocol to Tackle the Climate Crisis

EIA Briefing to the 45th Open-Ended Working Group of the Montreal Protocol, 3-7 July, 2023

According to the Intergovernmental Panel on Climate Change (IPCC), "deep, rapid and sustained reductions" of fluorinated greenhouse gases (F-gases) alongside rapid reductions of CO_2 emissions are needed if we are to have any chance of limiting warming to 1.5°C or even 2°C.[1]

Emissions of ozone-depleting substances (ODS – CFCs, halons, HCFCs) and hydrofluorocarbons (HFCs) are currently responsible for around 11 per cent of the increased global radiative forcing that has occurred since 1750, equivalent to a rise in global surface temperature of 0.13°C.[2]

As the 45th Open-Ended Working Group of the Montreal Protocol (OEWG45) meets in Bangkok, the world is already witnessing profound changes and challenges due to climate change.

The Montreal Protocol has already made a significant contribution to mitigating climate change through the phase-out of ODS and promises more with the Kigali Amendment to phase down HFCs. However, several challenges exist which, if faced with adequate political will and financial investment, can be resolved in a way that will enable the Montreal Protocol to achieve much more.

This briefing outlines the analysis and recommendations of the Environmental Investigation Agency (EIA) on the agenda items to be discussed at OEWG45.

Agenda item 4: Report of the Technology and Economic Assessment Panel on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2024-2026 (Decision XXXIV/2)

The financial needs of the Montreal Protocol have never been greater. During the upcoming 2024-26 triennium, Article 5 (A5) Parties will for the first time, confront simultaneous requirements under both the HCFC phase-out schedule (including a 67.5 per cent reduction of consumption in 2025) and the HFC phase-down (including a consumption freeze in 2024 for most A5 Parties and the introduction of mandatory HFC-23 by-product destruction).

Meanwhile, there are options to undertake actions to enhance energy efficiency and end-of-life recovery and disposal, among other initiatives. If ever there was a time to significantly boost investment in the Montreal Protocol, this is it, especially given how cost-effective the Montreal Protocol has proven to be.

The Replenishment Task Force (RTF) estimates total funding requirements to replenish the Multilateral Fund (MLF) for the 2024-26 triennium to be between $974.5 million and $1,018.2 million (see Table 1).[3] This is the highest ever assessment of funding requirements from the RTF, reflecting the dual phase-out/phase-down and additional responsibilities that Article 5 Parties are taking on.

2024-2026 TRIENNIUM	**Low-end**	**High-end**
SUBTOTAL - HCFC Activities (including energy efficiency)	**$ 363,911,000**	**$ 363,911,000**
SUBTOTAL - HFC Activities (including gender mainstreaming activities, project preparation, enabling activities and energy efficiency funding window)	**$ 475,491,000**	**$ 519,142,000**
SUBTOTAL - Funding Window on EOL/Disposal	**$ 13,590,000**	**$ 13,590,000**
SUBTOTAL - IS & Standard Activities	**$ 121,581,000**	**$ 121,581,000**
GRAND TOTAL	**$ 974,573,000**	**$ 1,018,224,000**

Table 1: RTF assessment of the 2024-26 replenishment

Historically, the negotiated replenishments of the MLF for each of the previous 10 trienniums have been about half the estimated budget identified by RTF for the upcoming 2024-26 triennium (see Table 2).

Triennium	**Approved**	**Carry-over**	**Interest accrued**	**Total MLF Budget**
1994-1996	$ 455,000,000	$ 55,000,000	N/A	$ 510,000,000
1997-1999	$ 466,000,000	$ 74,000,000	N/A	$ 540,000,000
2000-2002	$ 440,000,000	$ 35,700,000	N/A	$ 475,700,000
2003-2005	$ 474,000,000	$ 76,000,000	$ 23,000,000	$ 573,000,000
2006-2008	$ 400,400,000	$ 59,600,000	$ 10,000,000	$ 470,000,000
2009-2011	$ 400,000,000	$ 73,900,000	$ 16,100,000	$ 490,000,000
2012-2014	$ 400,000,000	$ 34,900,000	$ 15,100,000	$ 450,000,000
2015-2017	$ 437,500,000	$ 64,000,000	$ 6,000,000	$ 507,500,000
2018-2020	$ 500,000,000	$ 34,000,000	$ 6,000,000	$ 540,000,000
2021-2023	$ 475,000,000	$ 65,000,000	N/A	$ 540,000,000

Table 2: Historical replenishments of the Multilateral Fund (does not include the initial capitalisation of $240 million for 1991-93)

EIA makes the following observations:

- the difference between the low-end and high-end scenarios is due to the potential provision of funding for A5 Parties yet to ratify the Kigali Amendment. Based on the Montreal Protocol's history of universal ratification, EIA believes that funding should be provided on the assumption that ratification will occur, to prevent potential shortfalls during the 2024-26 triennium. Any surplus can be carried over to the 2027-29 triennium.

- during the last replenishment, RTF provided indicative funding requirements for the 2024-26 triennium, estimating the range between $759 million and $811 million, depending on the ratification status of A5 Parties.[4] Since then, certain additional initiatives have been agreed that will require additional funding. These are identified by the RTF as $11 million for energy efficiency under the HCFC phase-out, $20 million for a funding window for energy efficiency under the HFC phase-down, $13.5 million for a funding window for end-of-life management and disposal and $13.5 million for gender mainstreaming. Taken together with the direction of the cost guidelines, where some costs and sectors are tentatively agreed to at higher levels than under previous cost guidelines while others are still unagreed, the range for negotiations for the 2024-26 triennium seems reasonable.

- EIA encourages further exploring potential synergies between the HCFC phase-out and HFC phase-down, particularly with respect to transitioning to ultra-low-GWP alternatives relying on natural refrigerants. This would avoid unnecessary climate impacts, such as prolonged use of mid- and lower-GWP HFC blends (and the industrial emissions associated with their production including that of their feedstocks), as well as unnecessary environmental impacts, such as the proliferation of per- and poly-fluoroalkyl substances (PFAS). Moreover, EIA urges Parties to consider how to further expand on Decision XIX/6(11b), which requires the ExCom to give priority to "*Substitutes and alternatives that minimize other impacts on the* ***environment****, including on the climate*" [emphasis added] to avoid locking in unsustainable and harmful technologies such as hydrofluoroolefins (HFOs).

In conclusion, while acknowledging that the range of estimates is significantly higher than previous years, EIA urges non-A5 Parties to consider a substantial increase in the replenishment over previous years.

EIA reminds Parties that action under the Montreal Protocol has time and again been demonstrated to be among the most cost-effective climate mitigation available to the world. Investment in the treaty is critical to ensure the Montreal Protocol stays on course, delivers on new initiatives and successfully implements the Kigali Amendment without phasing in environmentally harmful technologies.

Agenda Item 5: Strengthening Montreal Protocol institutions, including for combating illegal trade (decision XXXIV/8)

After the illegal production and use of CFC-11 was identified in 2018, Parties to the Montreal Protocol were quick to respond, initiating a variety of studies to examine the Protocol's institutions and mechanisms to better understand how to avoid similar situations in the future. This has highlighted a broad set of shortcomings that must be addressed and new challenges that will arise as the Protocol takes on additional HFC controls.[5]

These have been considered for several years now at meetings of the Montreal Protocol, including the Executive Committee to the Multilateral Fund and the Implementation Committee, and will be further considered at OEWG45.

Parties must now decide on a structured time-bound way forward, taking into account the discussions to date as well as those that will occur at OEWG45 and during the workshop on strengthening the Montreal Protocol.

EIA recommends that Parties agree a roadmap to undertaking a comprehensive evaluation of the institutions and processes of the Montreal Protocol, with a view to agreeing on concrete measures to tackle each issue raised, including as a priority:

- gaps in the global atmospheric monitoring of controlled substances
- the compliance review mechanism
- monitoring and reporting, including licensing systems and transparency
- capacity-building and finance
- exempt uses and unexpected emissions
- illegal trade and enforcement.

The items listed under 'overarching thoughts and challenges' in Section B of Annex II of the report of the 44th OEWG[6] should be developed to form a set of guiding principles to contextualise and inform the discussion and any resulting processes.

The overarching goal should be to strengthen the effectiveness of the Protocol's monitoring, reporting, verification, and enforcement mechanisms to sustain the achievements of the Montreal Protocol and meet the new challenges of the HFC phase-down, securing its standing as the most successful multilateral environmental agreement.

Agenda Item 6(b) Illegal import of certain refrigeration, air-conditioning and heat pump products and equipment (Decision XXXIV/4)

The export of outdated ODS- and HFC-based products and equipment to third countries – or dumping – contributes unnecessarily to emissions into the environment. This includes used products and equipment with short remaining lifetimes (and often no remaining lifetimes) and new products and equipment relying on high-GWP HFCs and blends, both of which are particularly problematic in countries with limited resources and capacity for containment and recovery, as well as energy-inefficient products and equipment.

In response to the concerns expressed by Ghana on behalf of the African Group, both the US and EU have advanced provisions in proposed domestic regulations to prohibit the export of used and new products and equipment containing HFCs above certain GWP thresholds.[7] EIA believes that Parties should institutionalise an anti-dumping framework within the Montreal Protocol, which could contain the following elements: (i) empowering the Ozone Secretariat to monitor the trade in outdated HFC-based products and equipment and report periodically on developments; (ii) urging exporting Parties to adopt export prohibitions and to notify the Ozone Secretariat of measures adopted; (iii) urging importing Parties to adopt import restrictions, including potentially as part of their Kigali Implementation Plans (KIPs) and to notify the Ozone Secretariat; and (iv) adopting an early warning system to combat illegal dumping.

Agenda Item 7: Identification of gaps in the global coverage of atmospheric monitoring of controlled substances and options for enhancing such monitoring.

Report by the Secretariat on information on enhancing global and regional atmospheric monitoring (decision XXXIII/4)

Decision XXXIII/4 requested the Secretariat, in consultation with the TEAP, SAP and Ozone Research Managers, provide information on enhancing global and regional atmospheric monitoring for OEWG-45.[8] The Secretariat's report notes that ground stations located 100km to 1,000km downstream from emissions source regions capable of taking high-frequency measurements are currently the best strategy to monitor these gases, due to the insufficient sensitivity of space-based measurements and the cost of long-term aircraft measurements, which are better suited to focused monitoring. The feasibility and suitability of locating a permanent ground-based measurement site to take high-frequency measurements can be tested by taking flask samples.

The cost of establishing high-frequency observations at a pre-existing station is approximately $400,000, with annual operating costs of $150,000-350,000, depending on personnel costs. Weekly flask sampling costs approximately $15,000 for equipment, with annual costs of $25,000 for analysis and shipping, while daily sampling increases initial costs to $100,000 and annual costs to $90,000.

The scientific community is pursuing a regional flask-sampling effort under the European Union-funded pilot project. A simulation analysis conducted by the Massachusetts Institute of Technology has identified several possible locations for flask-sampling measurements in Article 5 Parties: Armenia, Bangladesh, China, India, Maldives and Morocco. Taking into account various factors, the initial flask-sampling is now being undertaken on Bhola Island, Bangladesh, with implementation by Bristol University in cooperation with the University of Dhaka. Data is expected to become available in the coming months, which will provide information necessary to inform next steps including consideration of expanding the efforts to other parts of the globe.

EIA recommends that the Parties give serious consideration to supporting and financing expanded global atmospheric monitoring capacity.

Industrial Emissions: Tackling Feedstocks and By-Products

Mounting scientific evidence points to significant uncontrolled emissions of ODS and HFCs, primarily linked to industrial sources including feedstocks and by-products of fluorochemical production (see summary in Table 3). It is imperative that the Montreal Protocol takes swift action to mitigate these emissions by ensuring full implementation of obligations to control by-product HFC-23 emissions and re-examining the premise of "insignificant" emissions from production, which exempts feedstocks and process agent uses from production and consumption controls.

According to the Technology and Economic Assessment Panel (TEAP), the total reported production of ODS has increased since 2002 due to the production of feedstocks, offsetting production for emissive end uses.[9] This trend coincides with the rising emissions linked to the production of controlled substances, either as by-products or as feedstocks for the production of HFC, HFOs and related fluoropolymers.

Chemical	**Description**	**100-yr GWP (WMO, 2022)**	**Estimated emissions (Gg/yr)**	**CO_2-equivalent emissions ($MtCO_2$-eq/year)**	**Observation Year(s)**	**Reference**
CFC-11	Illegal production & use	6,410	23.20	148.71	2014-2016	Lickley *et al*. (2021)
CFC-12	Illegal production & use	12,500	18.30	228.75	2014-2016	Lickley *et al*. (2021)
HCFC-133a	Byproduct in HFC production	378	2.30	0.87	2016-2019	Vollmer *et al*. (2021)
HCFC-31	Byproduct in HFC production	85	0.71	0.06	2016-2019	Vollmer *et al*. (2021)
HCFC-132b	Likely byproduct in HFC production	332	0.97	0.32	2016-2019	Vollmer *et al*. (2021)
HFC-23	Byproduct emissions	14,700	17.20	252.84	2019	WMO (2022)
CTC	Feedstock and other production processes	2,150	18.60	39.99	2019	WMO (2022)
HCFC-22	Feedstock emissions during TFE, PTFE, HFP, fluoropolymer production	1,910	21.40	40.87	2019	WMO (2022)
CFC-112a	No known use	3,550		0.10	2020	Western *et al*. (2023)
CFC-113a	Byproduct (e.g. HFC-125 production), intermediate (HFC-134a), feedstock	3,930		14.00	2020	Western *et al*. (2023)
CFC-114a	Byproduct (HFC-125 production), intermediate (HFC-134a prodn)	7,410		6.00	2020	Western *et al*. (2023)
CFC-115	Byproduct (eg HFC-125 production)	9,630		14.30	2020	Western *et al*. (2023)
CFC-13	No known use	16,300		12.00	2020	Western *et al*. (2023)
PFC-318 (cC_4F_8)	Byproduct in PTFE and HFP production	10,200	2.50	25.50	2020	WMO (2022)
SO_2F_2 (sulfuryl fluoride)	Replacement for MeBr	4,390	2.90	12.73	2020	WMO (2022)
Total				**797.05**		

Table 3: Emissions of ODS and greenhouse gases linked to fluorochemical production.

Unexplained HFC-23 emissions: HCFC-22 feedstock and TFE/HFP production for fluoropolymers

The 2022 Scientific Assessment of Ozone Depletion notes that HFC-23 emissions are as much as eight times greater than expected (15,900 ± 900 tonnes/yr in 2018) and predicted to increase with the growing feedstock production of HCFC-22, which produces HFC-23 as a by-product.[10] HCFC-22 is by far the most significant feedstock used, with 713,536 tonnes reported in 2020 alone and 97 per cent of this used to produce tetrafluoroethylene (TFE) and hexafluoropropene (HFP) used in fluoropolymer production.[11] The production of TFE/HFP also generates by-product emissions of PFC-318, which has a global warming potential of 10,200. The MCTOC report points out that emissions from TFE/HFO production, if unabated, are significantly higher than estimated emissions from HCFC-22 production. HCFC-22 and HFP are also used as feedstocks to produce HFO-1234yf.

Other potential sources of HFC-23

The 2022 MCTOC Assessment Report outlines initial information about other potential sources of HFC-23 by-product emissions from production of various HFCs, including HFC-32, HFC-125 and HFC-143a.[12] Additional information on potential sources and chemical pathways of HFC-23 emissions and best practices available to control these emissions will be provided by the TEAP later this year in response to Decision XXXIV/7 and discussed at MoP35.

Unexplained emissions of CFCs and HCFCs

Unexplained emissions of five CFCs (CFC-113/a, CFC-114/a, CFC-112/a, CFC-13 and CFC-115) have been found to be increasing, with their 2020 emissions equivalent to 47 ± 5 million tonnes CO_2.[13]

Emissions of several of these are linked to production of HFC-125 and/or HFC-134a.[14] CFC-113a emissions were the fastest growing, increasing 244 per cent between 2010–20 (2.5 ± 0.4 ODP-Gg yr−1 in 2020) and emissions of CFC-112a increased by 169 per cent over the same period.[15] A 2021 study reporting on unexpected emissions of three HCFCs, including newly discovered HCFC-132b in the atmosphere, further demonstrates the need to detect and monitor substances in the atmosphere and to identify their sources.[16] There are no known end uses for HCFC-132b, HCFC-133a or HCFC-31, yet global emissions for all three compounds show a generally increasing trend over the past two decades, with mean values for 2016-19 of 970 tonnes/yr for HCFC-132b, 2,300 tonnes/yr for HCFC-133a and 710 tonnes/yr for HCFC-31.

Carbon tetrachloride

The 2022 Scientific Assessment of Ozone Depletion indicates that atmospheric carbon tetrachloride (CTC) continues to decline more slowly than expected, pointing to potential underestimates of feedstock production and use.[17] SAP notes that increasing usage of CTC could roughly double abundances of CTC in 2100 compared to a baseline scenario.[18]

According to the MCTOC Report, CTC production has increased in recent years to a peak of 318 ktonnes in 2019, due mainly to growing demand for CTC use as feedstock to HFCs and HFOs/HCFOs and to perchloroethylene (PCE).[19] PCE is subsequently used to produce HFC-125 and CFC-113 as a feedstock to chlorotrifluoroethene (CTFE) as well as CFC-113a, trifluoroacetic acid (TFA) used in pesticides and HFO-1336mzz.[20] According to TEAP, the increase of more than 30 ktonnes CTC in feedstock use to produce HFCs and HFOs can be in large part be explained by the consumption by two large new HFO-1234yf plants in the US.[21]

The MCTOC report also identifies a potential new source of unreported CTC from production of the vinyl chain (production of ethylene dichloride (1,2-dichloroethane, EDC) to vinyl chloride monomer (VCM) to polyvinyl chloride (PVC)), which occurs on chlorine producing sites, distinct from chloromethane production.[22]

Report by the TEAP on chemical pathways in which substantial emissions of controlled substances are likely to occur (decision XXXIV/5)

The decision XXXIV/5 TEAP report identifies 24 chemical pathways in which substantial emission of controlled substances are likely: CFC-113, CFC-113a, CFC-114, CFC-115, CTC, HCFC-22, HCFC-124, HCFC-141b, HCFC-142b, HFC-23, HFC-32, HFC-125, HFC-134a, HFC-125, HFC-143a, HFC-152a, HFC-245fa, HFC-227ea, 1,1,1-trichloroethane. The estimated mean emissions per tonne of production range from 1-10 per cent by weight for a majority of pathways.

The report points to significant gaps in the understanding of the sources of emissions from these pathways, including:

- a lack of data on the exact global capacity and production by chemical pathway
- a lack of data on quantities for chemical pathways producing or using non-controlled substances, which fall outside Article 7 reporting
- actual emissions and locations of production facilities are not reported
- average global generation and mean emission rates by chemical pathway are not accurately known
- emission rates are likely to vary over time depending on a range of factors including feedstock impurities and feedstock feed rations, catalyst condition and composition, operation of mitigation and destruction steps and use of emergency release points
- emission abatement controls including treatment and destruction technologies vary by plant, process and are not accurately known
- additional processes or chemical pathways for which controlled substances are potentially generated but not yet identified.

TEAP identifies best practices to control emissions including optimising plant design, equipment, operation, maintenance; instrumentation and monitoring of process and

emissions; training and instruction for plant operators; periodic mass balancing; technologies for destruction or for separation and chemical transformation to treat unwanted co-products or by-products and abate their emissions. In addition, regulatory controls to provide the economic framework to ensure any or all of the above emissions mitigation measures are implemented by operators and to require emissions and other reporting.

In terms of emissions monitoring and national reporting requirements, TEAP notes that emission rates can be complex and difficult to determine and that fugitive emissions (e.g. leaks from pipework, flanges, etc.), as opposed to process emissions, are not well suited to continuous monitoring and usually must be estimated through mass balancing flows in and out of the process.

In general the allocation of increased resources toward determining emissions typically results in higher completeness, accuracy and reliability of resulting data and a more accurate determination of emissions. TEAP also notes that national regulations requiring reporting on emissions often rely on incomplete data on production rates, making it difficult to derive accurate emissions factors.

Conclusions

It is imperative that Parties prioritise expansion and comprehensive coverage of atmospheric monitoring while also advancing improved bottom-up monitoring data and reporting to inform the actions and potential control measures required to address significant unexplained emissions.

To secure ozone and climate protection, the Montreal Protocol must address all significant emission sources of controlled substances, including from facilities producing or using them as feedstocks and by-products. This includes the use or by-production of controlled substances in the production of other substances that are not controlled substances under the Montreal Protocol, such as HFOs, TFA, TFE/HFP, CTFE and others. Parties should continue to discuss and evaluate potential means of improving the gaps in data, reporting and emissions monitoring processes for industrial facilities using the chemical pathways identified as likely to result in significant emissions.

Agenda Item 10: Potential impacts of the Covid-19 pandemic on hydrofluorocarbon consumption for Group 1 Parties operating under Paragraph 1 of Article 5 decision XXXIV/13) and proposed adjustment to the Montreal Protocol.

According to the HFC phase-down schedules agreed under the Kigali Amendment, Group 1 Parties operating under Paragraph 1 of Article 5 (Group 1 A5s) will freeze their HFC growth in 2024 at a baseline level and achieve a 10 per cent reduction from this level in 2029. This will be followed by three more phase-down steps to a plateau of 80 per cent below the baseline in 2045.[23]

Ahead of OEWG45, Cuba has submitted a proposed adjustment to the Montreal Protocol that seeks to provide alternative approaches for Group 1 A5 Parties calculating their HFC consumption baselines ahead of the 2024 freeze.[24]

EIA analysis of reported data shows that insufficient evidence is available to suggest that HFC consumption was sufficiently impacted by the COVID-19 pandemic to warrant an across-the-board adjustment to Kigali baselines. However, EIA urges Parties to work together to ensure flexibility is available to countries where the need is apparent.

The original approach agreed under the Kigali Amendment (herein referred to as Option A) set HFC consumption baselines according to the following formula, calculated in tCO_2-eq:

Option A: Average calculated level of HFC consumption for 2020-22, plus 65 per cent of HCFC consumption baseline.[25]

Noting concern that the COVID-19 pandemic resulted in "economic contraction and reduced imports of refrigerant gases" during the baseline years of 2020-22, Cuba has proposed two alternative approaches to make the selection of baseline years more flexible (herein referred to as Option B and Option C, respectively):

Option B: Average calculated level HFC consumption for 2018-19 plus a 20 per cent increase, plus 65 per cent of HCFC consumption baseline.[26]

Option C: Average calculated level HFC consumption for 2015-19 (with the option of choosing the average of that period's three "best years") plus a 20 per cent increase, plus 65 per cent of HCFC consumption baseline.[27]

Cuba's proposed adjustment is intended to provide flexibility to Group 1 A5s whose HFC consumption was reduced during 2020-22 due to effects related to the COVID-19 pandemic. Based on Decision XXXIV/13, Parties that believed that "reduced consumption of HFCs during the baseline years … could hinder their ability to comply with the freeze in the consumption of HFCs in 2024 under the Kigali Amendment" were invited to submit 2022 consumption data to the Ozone Secretariat to be considered at OEWG-45.[28]

With the concern raised by Cuba in mind, EIA has analysed the available data, which is presented here with recommendations on the adjustment proposal.

Analysis of HFC consumption during the period 2019-22

EIA compiled HFC consumption data covering the whole of the 2019-22 period for 80 A5 countries (79 in Group 1, and 1 Group 2), supplementing the data reported in response to decision XXXIV/13 with Article 7 and Country Programme data.[29]

To assess the extent to which the COVID-19 pandemic may have led to reduced consumption in the current baseline years, EIA compared the 2019 HFC consumption data reported by these 80 countries to their average HFC consumption across 2020-22. The available data represents an incomplete picture of A5 HFC consumption, as roughly one-third of A5 countries (including several of those with the largest annual CO_2-eq consumption) have not reported data covering the entire period 2019-22.

EIA's analysis revealed that overall HFC consumption across these 80 A5 Parties increased by 10 per cent between 2019 and 2020-22.[30] Driving this overall increase was the recorded growth in consumption among the majority of A5 countries for which sufficient data is available, with 46 of 80 countries (57.5 per cent) recording increased HFC consumption between 2019 and 2020-22. Based on reported levels of HFC consumption in 2019, these increases ranged from as little as two per cent to as much as 5,310 per cent.

Nonetheless, EIA's analysis did show that, in 38 countries, average 2020-22 consumption was less than 10 per cent higher than it had been in 2019. Of these 38 countries – 34 of which saw a decrease in consumption between 2019 and 2020-22 – seven have clarified to the Ozone Secretariat that they are concerned about the impact of the COVID-19 pandemic on HFC consumption in their baseline years, while another seven clarified to the Secretariat that they are not concerned.

Overall, despite below average growth in a minority of countries, the analysis shows that the COVID-19 pandemic did not decrease the capacity of all Group 1 A5 countries to consume and procure HFCs. In fact, within the 22 lowest-consuming A5 countries (those with average 2020-22 consumption under 100,000 tCO_2-eq) average HFC consumption increased by 14 per cent between 2019 and the baseline years.[31] Given that there does not appear to be a clear impact of the COVID-19 pandemic on HFC consumption in even a majority of countries, EIA believes that an adjustment, which would amend the Kigali Amendment for all A5 Parties, is not an appropriate measure to take.

Analysis of the proposed approaches

Aside from the insufficient evidence to support the need for an adjustment, the baseline calculation formulas outlined in the proposal are ultimately unworkable due to the lack of necessary data.

Option C relies on the availability of reliable HFC consumption data since 2015, something which only one Group 1 A5 country has recorded and submitted to the Ozone Secretariat.

In the absence of Article 7 HFC consumption data (or equivalent Country Programme data) pre-dating 2019, it is unclear what data could be practicably considered for the period of 2015-18.

Option B, although more workable than Option C, suffers from a similar problem. Only 45 Group 1 A5 countries have provided sufficient HFC consumption data to allow calculation of their Option B baselines as outlined in the proposed adjustment.

Of these 45 countries, EIA has calculated that the Option B approach would result in a higher baseline for 24 and a lower baseline for 19 countries (two countries have not yet submitted HFC consumption data for 2022 so their Option A baseline cannot be calculated for comparison).[32]

Only nine of the 24 countries that would be granted higher baselines under this approach have explicitly clarified to the Ozone Secretariat that they are concerned about the impact of COVID-19, while five have clarified that they do not have such concerns.[33] Meanwhile, five of the 19 that would receive lower baselines have clarified that they are concerned, and three have clarified that they are not.

Looking more broadly at the Option B approach, EIA also does not accept that "a 20% increase" represents a proportionate increase to 2018-2019 HFC consumption. As outlined earlier in this document, the average growth in HFC consumption experienced by A5 countries between 2019 and 2020-22 was 10 per cent. EIA sees no justification for an artificially ascribed rate of growth of 20 per cent. Furthermore, given the high degree of flexibility already built into the HFC baseline calculation through the inclusion of the 65 per cent of HCFC consumption baseline component, itself designed to account for HFC growth as the HCFC phase-out progresses, EIA does not believe that a further proportional increase is justified.

EIA is concerned that the proposed adjustment would allow countries whose consumption was not significantly impacted by effects relating to the pandemic to seek higher baselines than those originally agreed to under the Kigali Amendment. More than half of the countries that expressed concern to the Secretariat about the effect of the pandemic on their baseline years recorded increases in their consumption between 2019 and 2020-22, including two countries whose 2020-22 average represented an increase of more than 100 per cent, based on their 2019 consumption.[34] This illustrates a clear risk that the proposal could lead to the opportunistic adoption of higher baselines which, far from addressing any unfair impact of COVID-19, would in fact compound the issue of unfairness.

Conclusions

EIA's analysis clearly indicates that HFC consumption was not significantly impacted across all A5 countries – or even all low-consuming A5 countries – as contended by the

proposed adjustment. Further, there is a substantial lack of data that both hinders the feasibility of the proposed Option B and Option C approaches and undermines the ability of countries to demonstrate a causal link between the COVID-19 pandemic and any reduced consumption in 2020-22.

Critically, therefore, EIA does not believe there is sufficient evidence for an adjustment to the Protocol at this time, given it would weaken the Kigali Amendment and decelerate the HFC phase-down. Indeed, current science demonstrates that the HFC phase-down schedule needs to be accelerated to meet global climate targets.[35] From EIA's perspective, the feasibility of an acceleration is somewhat evident from an analysis of the 90 Parties with 2022 consumption and baseline data. If a six per cent annual growth in HFC CO_2e consumption from 2022 is assumed, only half of the Parties would need to take action to meet phase-down steps prior to 2029. A similar trend is seen in non-A5 Parties.[36]

EIA acknowledges that in some Group 1 A5 countries there was a reduction in HFC consumption, or a lack of expected growth, between 2019 and the 2020-22 baseline years. Although it is not possible to definitively attribute this to the effects of the pandemic from the available data, these years of reduced consumption could potentially lead to challenges complying with the HFC phase-down schedule. As such EIA accepts that it may be appropriate to allow Group 1 A5 countries that demonstrate reduced consumption between 2020-22 some means of flexibly addressing the additional challenge they face.

With this in mind, but noting the issues raised in relation to the proposed adjustment, EIA recommends that an alternative solution is sought to assist countries that can demonstrate a significant reduction in their average consumption during 2020-22 compared to the pre-pandemic period. This could, for example, involve concerned countries seeking country-specific decisions allowing them the flexibility to select their baseline years on an individual basis if certain conditions are met, such as providing evidence of the negative impacts of the COVID pandemic on consumption, and subject to the availability of sufficient data, rather than through a blanket adjustment. Alternatively, it could involve the provision of additional funds and resources to such countries, ensuring they have the necessary support to accelerate their phase-down steps in the near future.

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References

[1] Intergovernmental Panel on Climate Change (IPCC) WGIII. *Climate Change 2022: Mitigation of Climate Change* (2022) p325. Available here
[2] WMO Greenhouse Gas Bulletin No 18. 26 October 2022. Available here.
[3] Technology and Economic Assessment Panel (May 2023). *Volume 3: Assessment of the Funding Requirement for the Replenishment of the Multilateral Fund for the Period 2024-2026*. Page xv. Available here.
[4] Technology and Economic Assessment Panel (September 2021). *Volume 6: Assessment of the Funding Requirement for the Replenishment of the Multilateral Fund for the Period 2021-2023*. Page 67. Available here.
[5] Montreal Protocol Ozone Secretariat (2019). Unexpected emissions of CFC-11: update to the overview provided at the forty-first meeting of the Open-ended Working Group UNEP/OzL.Pro.31/6. Available here.
[6] United Nations Environment Programme (5 August 2022). *Report of the forty-Fourth Meeting of the Open-Ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*. UNEP/OzL.Pro.WG.1/44/4. Section B of Annex II. Available here.
[7] The European Parliament adopted amendments to the proposed EU F-Gas Regulation to apply domestic bans to exports. See Amendment 24 and Amendment 79, available here. The US initiated a proposed rulemaking in 2022 under implementation of the AIM Act, technology transitions regulation, prohibiting the export of products above certain GWP thresholds by January 1st 2026. Available here
[8] OEWG 45-2-Add-2E paras 25-37
[9] MCTOC 2022 Assessment Report, p.1, available here
[10] 2022 Scientific Assessment of Ozone Depletion, p.4., available here
[11] MCTOC 2022 Assessment Report, p.2, available here
[12] MCTOC 2022 Assessment Report, p.2, available here
[13] Western, L.M., Vollmer, M.K., Krummel, P.B. et al. Global increase of ozone-depleting chlorofluorocarbons from 2010 to 2020. Nat. Geosci. 16, 309–313 (2023). https://doi.org/10.1038/s41561-023-01147-w
[14] Western et al. (2023) Ibid.
[15] Western et al. (2023) Ibid
[16] Vollmer, m. K., mühle, J., Henne, S., Young, D., Rigby, m., mitrevski, B., ... & Steele, L. P. (2021). Unexpected nascent atmospheric emissions of three ozone-depleting hydrochlorofluorocarbons. Proceedings of the National Academy of Sciences, 118(5), e2010914118.
[17] 2022 Scientific Assessment of Ozone Depletion, p.17
[18] 2022 Scientific Assessment of Ozone Depletion, p.29
[19] MCTOC 2022 Assessment Report, p.63, available here
[20] MCTOC 2022 Assessment Report, p.65, available here
[21] MCTOC 2022 Assessment Report, p.68, available here
[22] MCTOC 2022 Assessment Report, p.64, available here
[23] A second group of A5 parties (Group 2) do not freeze HFC growth until 2028, with the first reduction step in 2032. This second group comprises 10 countries: Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia and the United Arab Emirates.
[24] Doc UNEP/OzL.Pro.WG.1/45/7
[25] The Montreal Protocol on Substances that Deplete the Ozone Layer, Art. 5 Para. 8 qua. (c). Available here
[26] UNEP/OzL.Pro.WG.1/45/7, Annex II. Available here
[27] UNEP/OzL.Pro.WG.1/45/7, Annex II. Available here
[28] Decision XXXIV/13. Available here
[29] UNEP/OzL.Pro.WG.1/45/4. Available here; Ozone Secretariat, 'Article 7 Country Data'. Available here; UNEP/OzL.Pro/ExCom/92/5. Available here
[30] Across the 80 A5 countries for which there is available data covering the entire 2019-2022 period, the average level of HFC consumption in 2019 was 2,479,636 CO_2-eq t. The average level of HFC consumption amongst this group over the period 2020-2022 was 2,721,961 CO2-eq t. By calculating the percentage change between these two figures, EIA has estimated the average increase between 2019 and 2020-2022 as 9.77%.
[31] Twenty-two A5 countries with data covering all of the period 2019-2022 reported average consumption for 2020-2022 below 100,000 CO2-eq t. The average level of HFC consumption in 2019 for this group was 27,939

CO_2-eq t. The average level of HFC consumption amongst this group over the period 2020-2022 was 31,755 CO_2-eq t. By calculating the percentage change between these two figures, EIA has estimated the average increase between 2019 and 2020-2022 as 13.66%.

[32] UNEP/OzL.Pro.WG.1/45/7, Annex II. Available here and Ozone Secretariat, *Data Centre: Country data*. (accessed June 2023). Available here

[33] In total, 21 countries have clarified that they are concerned about the impact of Covid-19 on their HFC baselines (14 of which have provided sufficient data for their Option B alternative to be calculated). Twelve countries have clarified that they are not concern about the impact of Covid-19 on their HFC baselines (eight of which have provided sufficient data for their Option B alternative to be calculated). UNEP/OzL.Pro.WG.1/45/4, Table 1. Available here

[34] In total, 21 countries clarified to the Ozone Secretariat that they are concerned about the impact of the Covid-19 pandemic on their baseline consumption years. Of these, 12 recorded increases in consumption between 2019 and 2020-2022, 7 recorded decreases, and 2 did not provide sufficient data covering the whole period.

[35] Purohit, P., Borgford-Parnell, N., Klimont, Z. *et al.* Achieving Paris climate goals calls for increasing ambition of the Kigali Amendment. *Nat. Clim. Chang.* 12, 339–342 (2022). Available here.

[36] Of the 14 non-A5 Parties to the Montreal Protocol that have HFC baselines reported on the Ozone Secretariat's website (including the EU), 12 report levels of HFC consumption in 2021 that are already lower than the level required to meet the 40% phase-down step in 2024. Consumption data available here accessed May 2023.