OEWG 46 FINAL

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Summary of the 46th meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer: 8-12 July 2024

Concern about the impacts of certain synthetic chemicals on the Earth's protective ozone layer and the effects of ozone depletion on human health and the environment have been at the center of the Montreal Protocol on Substances that Deplete the Ozone Layer since its adoption in 1987. Over 35 years later, the Protocol is often lauded as the most successful multilateral environmental agreement, having managed to phase out the worst ozone depleting substances, while also addressing hydrofluorocarbons (HFCs), which have climate harming impacts, through the adoption of the Kigali Amendment.

Scientific assessments underpin the actions of parties, enabling them to respond to new and emerging challenges to the health of the ozone layer. At the 46th meeting of the Open-ended Working Group (OEWG 46), delegates benefited from the work of the Protocol's Scientific Assessment Panel, Environmental Effects Assessment Panel, and Technology and Economic Assessment Panel. Their reports informed discussions on the items on the agenda for this meeting, with parties relying on the Panels' experts to make progress on the draft decisions that will be further discussed at the 36th Meeting of the Parties to the Protocol (MOP 36) in late October 2024. These draft decisions relate to:

- further strengthening Montreal Protocol institutions by addressing illegal trade;
- avoiding unwanted imports of energy inefficient products and equipment;
- the need for additional information on very short-lived substances;
- feedstock uses of controlled substances;
- measures to support the sustainable management of recovered, recycled, or reclaimed halons;
- measures to facilitate the transition to metered-dose inhalers with low-global-warming-potential propellants or other alternative products;
- enhancing regional atmospheric monitoring of controlled substances;
- a possible compliance deferral for Article 5, group 2 parties, related to access to climate-friendly cooling and refrigeration equipment; and
- strengthening the enabling environment to enhance energy efficiency in the cooling sector while implementing the Kigali Amendment.

Delegates agreed to defer discussion on how best to report on emissions from HFCs to MOP 36. However, they decided against further discussions on additional funding to support countries seriously affected by the coronavirus (COVID-19) pandemic at MOP 36, noting this issue did not have the support of most parties.

The wide range of issues considered at this session pointed to reflections on the continued health of the Montreal Protocol. How will the parties fund monitoring sites to bridge information gaps?

In this Issue

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How is the Protocol managing implementation challenges? Should it take on new substances, which may or may not have ozone-depleting potential? How will parties address threats posed by illegal trade and trade in soon-to-be obsolete equipment? The discussions initiated at OEWG 46 point to a robust debate ahead at MOP 36, with the end goal of ensuring the continued health of the ozone layer, people, and planet.

OEWG 46 convened in Montreal, Canada, from 8-12 July 2024, with over 400 registered participants. The meeting was preceded by a one-day workshop presented by the Climate and Clean Air Coalition, which addressed among other things, lifecycle refrigerant management, and featured a number of side events

A Brief History of the Ozone Regime

Concerns that the Earth's stratospheric ozone layer could be at risk from chlorofluorocarbons (CFCs) and other anthropogenic substances first arose in the early 1970s. At that time, scientists warned that releasing these substances into the atmosphere could deplete the ozone layer, hindering its ability to prevent harmful ultraviolet (UV) rays from reaching the Earth. This would adversely affect ocean ecosystems, agricultural productivity, and animal populations, and harm humans through higher rates of skin cancers, cataracts, and weakened immune systems. In response, a UN Environment Programme (UNEP) conference held in March 1977 adopted a World Plan of Action on the Ozone Layer and established a Coordinating Committee to guide future international action.

Vienna Convention: Negotiations on an international agreement to protect the ozone layer were launched in 1981 under the auspices of UNEP. In March 1985, the Vienna Convention for the Protection of the Ozone Layer was adopted. It calls for cooperation on monitoring, research, and data exchange, but does not impose obligations to reduce the use of ozone-depleting substances (ODS). The Convention has 198 parties, which represents universal ratification.

Montreal Protocol: In September 1987, efforts to negotiate binding obligations to reduce ODS usage led to the adoption of the Montreal Protocol, which entered into force in January 1989. The Montreal Protocol introduced control measures for some CFCs and halons for developed countries (non-Article 5 parties). Developing countries (Article 5 parties) were granted a grace period, allowing them to increase their ODS use before taking on commitments. The Protocol has 198 parties.

Since 1987, several amendments and adjustments have been adopted, adding new obligations and additional ODS and adjusting existing control schedules. Amendments require ratification by a certain number of parties before they enter into force; adjustments enter into force automatically. All amendments except the newest, the Kigali Amendment, have been ratified by 197 parties.

Key Turning Points

London Amendment and Adjustments: At the second MOP, held in London, UK, in 1990, delegates tightened control schedules and added ten more CFCs to the list of ODS, as well as carbon tetrachloride (CTC) and methyl chloroform. MOP 2 also established the Multilateral Fund (MLF), which meets the incremental costs incurred by Article 5 parties in implementing the Protocol's control measures and finances clearinghouse functions. The Fund is replenished every three years.

Copenhagen Amendment and Adjustments: At MOP 4, held in Copenhagen, Denmark, in 1992, delegates tightened existing control schedules and added controls on methyl bromide, hydrobromofluorocarbons, and hydrochlorofluorocarbons (HCFCs). MOP 4 also agreed to enact non-compliance procedures. It established an Implementation Committee (ImpCom) to examine possible non-compliance and make recommendations to the MOP aimed at securing full compliance.

Montreal Amendment and Adjustments: At MOP 9, held in Montreal, Canada, in 1997, delegates agreed to: a new licensing system for importing and exporting ODS, in addition to tightening existing control schedules; and banning trade in methyl bromide with non-parties to the Copenhagen Amendment.

Beijing Amendment and Adjustments: At MOP 11, held in Beijing, China, in 1999, delegates agreed to controls on bromochloromethane, additional controls on HCFCs, and reporting on methyl bromide for quarantine and pre-shipment (QPS) applications.

Kigali Amendment: At MOP 28, held in Kigali, Rwanda, in 2016, delegates agreed to amend the Protocol to include HFCs as part of its ambit and to set phase-down schedules for HFCs. HFCs are produced as replacements for HCFCs and thus a result of ODS phase-out. HFCs are not a threat to the ozone layer but have a high GWP. To date, 160 parties to the Montreal Protocol have ratified the Kigali Amendment, which entered into force on 1 January 2019.

Recent Meetings

COP 12/MOP 32: Due to the COVID-19 pandemic, the first part of the 12th meeting of the Conference of the Parties to the Vienna Convention (COP 12) and MOP 32 convened online from 23-27 November 2020. Delegates addressed only those issues deemed essential, including the replenishment of the MLF for 2021-2023. Parties authorized the Secretariat to arrange an extraordinary MOP in 2021 to take a decision on the final programme and budget for 2021-23. MOP 32 also addressed: critical-use exemptions for methyl bromide for 2021-2022; compliance and data reporting issues; and membership of the Montreal Protocol bodies and Assessment Panels.

ExMOP 4: The Fourth Extraordinary MOP to the Montreal Protocol (ExMOP 4) and OEWG 43, held on 21, 22 and 24 May 2021, convened online due to the COVID-19 pandemic. ExMOP 4 agreed to facilitate payments to the MLF to ensure its continued functioning during 2021. Parties agreed that any contributions made in advance of the 2021-2023 replenishment decision should count toward future contributions and should not affect the overall level of the replenishment or the agreed level of contributions by parties.

COP 12/MOP 33: This combined meeting convened virtually from 23-29 October 2021, with a high-level segment on the last day. The meeting took key decisions related to monitoring of controlled substances and energy efficiency, and delegates requested the Assessment Panels to determine what would be needed to increase the monitoring capacities in regions where capacity is limited or altogether absent.

Delegates also continued work on low-GWP and energy-efficient technologies. The meeting considered two draft decisions, which addressed trading of soon-to-be obsolete technologies that could be a threat to the future implementation of the Kigali Amendment and broadening the list of sectors required to implement more energy-efficient technologies. The meeting also adopted 18 decisions on administrative and technical matters, including: replenishment of the MLF; financial reports and budgets of the trust funds for the Vienna Convention and Montreal Protocol; compliance and reporting;

membership of Montreal Protocol bodies; and recommendations of the Ozone Research Managers of the Vienna Convention.

ExMOP 5 and OEWG 44: The Fifth Extraordinary MOP to the Montreal Protocol (ExMOP 5) and OEWG 44 convened in Bangkok, Thailand, from 11-16 July 2022. ExMOP 5 adopted decisions on the replenishment of the MLF for the triennium 2021-2023 and extension of the fixed-exchange-rate mechanism to the 2021-2023 replenishment. OEWG 44 addressed issues including terms of reference for a study of MLF replenishment needs in the 2024-2026 triennium; energy efficiency; ongoing emissions of CTC; potential restructuring of TEAP's Technical Options Committees (TOCs); and a proposal from African states to address the dumping of inefficient refrigeration and air-conditioning appliances.

MOP 34: At this meeting, held in Montreal, Canada from 31 October – 4 November 2022, delegates discussed and adopted decisions related to, among others: illegal import of certain refrigeration, air-conditioning, and heat pump products and equipment; identification of gaps in the global coverage of atmospheric monitoring of controlled substances and options for enhancing such monitoring; collecting data to understand potential impacts of the COVID-19 pandemic on HFC consumption in developing countries; strengthening institutional processes with respect to information on HFC-23 by-product emissions; and strengthening the Protocol's institutions, including for combating illegal trade.

At this meeting, delegates also adopted the terms of reference for the study on the MLF replenishment for 2024-2026, opening the door for TEAP to establish the Replenishment Task Force (RTF) to prepare for the replenishment negotiations at MOP 35.

OEWG 45: At this meeting, which took place from 2-7 July 2023 in Bangkok, Thailand, delegates delved into the quadrennial reports prepared by the Scientific Assessment Panel (SAP), the Environmental Effects Assessment Panel (EEAP) and TEAP. They also addressed issues, including: illegal import/export of obsolete equipment; stratospheric aerosol injection; adjustments to the Protocol and its Kigali Amendment; emissions of HFC-23; and VSLS with ozone-depleting potential (ODP).

There was an extensive discussion on the report of the TEAP RTF on the replenishment of the MLF for the triennium 2024-2026. The report estimated the replenishment need at approximately USD 1 billion, which would be the highest level ever. Delegates requested the Task Force to prepare a supplementary report addressing a list of elements for additional analysis.

MOP 35: At this meeting, which took place from 22-27 October 2023 in Nairobi, Kenya, parties adopted the largest ever replenishment of the MLF for the implementation of the Protocol, just shy of USD 1 billion. Delegates took decisions on, *inter alia*, lifecycle refrigerant management (LRM); stratospheric aerosol injection; the impacts of the COVID-19 pandemic on HFC baseline consumption for certain parties; energy efficiency; and VSLS. They also took decisions on feedstock uses of methyl bromide; the import and export of prohibited cooling equipment, to address the long-standing issue of dumping; and further strengthening Protocol institutions, including for combating illegal trade. They agreed to defer discussion on a potential roadmap to end illegal trade in controlled substances to the next meeting of the Montreal Protocol's OEWG.

OEWG 46 Report

On Monday, OEWG Co-Chair Miruza Mohamed (Maldives) opened the meeting. Megumi Seki, Executive Secretary, Ozone Secretariat, led delegates in a moment of silence in memory of Patrick McInerney (Australia) and Jacques Monlolamon Glaï (Côte d'Ivoire).

Seki drew attention to the Secretariat's increased efforts to raise the profile of the Protocol and develop synergies with other multilateral environmental agreements (MEAs). She noted experts from the Montreal Protocol are also lending their knowledge to the negotiation of a plastic pollution treaty as well as the talks on the science-policy panel on chemicals, waste and pollution, among others. On the work of the OEWG at this session, she pointed to the Technology and Economic Assessment Panel (TEAP) report on lifecycle refrigerant management (LRM), and the estimates provided for the cost of additional stations to monitor emissions of controlled substances under the Protocol. Seki then introduced Pablo Moscoso de la Cuba as the Ozone Secretariat's new legal officer, replacing Gilbert Bankobeza, who has retired.

In plenary on Thursday morning, Executive Secretary Seki, seconded by GRENADA, drew attention to the invaluable contribution of Bernhard Siegele, Proklima Programme Manager, German Agency for International Cooperation (GIZ), to the development and implementation of various MLF projects across the globe and lauded his commitment to the ozone family. Delegates wished him well in his new position within GIZ.

Organizational Matters: On Monday, KYRGYZSTAN requested adding, under Other Matters, an item on "avoiding unwanted imports of energy inefficient products and equipment." Delegates adopted the agenda (UNEP/OzL.Pro.WG.1/46/1/Rev.1, and Add.1) with this addition. They also agreed to the organization of work (UNEP/OzL.Pro.WG.1/46/2, Add.1, and Add.2), which delegates referred to throughout the meeting.

TEAP and SAP Presentations and Discussions

On Monday, Co-Chair Mohamed introduced the agenda item on the consideration of TEAP's 2024 Progress Report, prepared with the Scientific Assessment Panel (SAP), in response to decisions adopted at MOP 35 on very short-lived substances (VSLS) (decision XXXV/6), feedstock uses of controlled substances (decision XXXV/8), and emissions of CTC (decision XXXV/9).

Stephen Montzka, SAP Co-Chair, noted that unlike emissions of long-lived halocarbons (which are controlled substances) that efficiently deliver almost all of their chlorine to the stratosphere, only a fraction of emitted VSLS reaches the stratosphere, augmenting stratospheric chlorine and ozone depletion. He also provided updated information on dichloromethane (DCM) and CTC since the 2022 Scientific Assessment of Ozone Depletion Report, noting there is new information in the TEAP report on 2021 and 2022 emissions of these substances.

With regard to VSLS, Helen Tope, Co-Chair, Medical and Chemicals Technical Options Committee (MCTOC), highlighted that many chlorinated hydrocarbons are not controlled under the Montreal Protocol, but are monitored by atmospheric scientists, and include DCM, chloroform, ethylene dichloride (EDC), trichloroethylene (TCE), and perchloroethylene (PCE). Each of these chemicals is used as feedstocks, and some also have considerable emissive solvent use.

Providing an update on the emissions of controlled substances from feedstock production, Tope stated that in 2022, total production and import reported for feedstock uses of ODS was 1,943,134 metric tonnes, a significant increase compared to 2021. She informed delegates that the list of alternatives to ODS and HFC feedstocks has not changed significantly from previous reports. She noted ongoing use of a range of ODS and HFC feedstocks, even where the alternative hydrochlorofluoroolefins (HCFOs) are technically feasible and economically viable, suggests there are insufficient incentives for industry to move to non-ODS or non-HFC feedstocks for a range of applications.

On CTC emissions, Tope reported that, in 2022, production increased to 358 kilo tonnes (ktonnes), an 11.9% increase from 2021 production of 320 ktonnes. She said most of the CTC production growth is from consumption in the HFC and hydrofluoroolefins (HFO)/HCFO sector. She noted MCTOC is unaware of alternatives to CTC or alternative processes that would not disturb the isomer distribution of the major HFOs and HCFOs, and would welcome information on technical feasibility, economic viability, and safety of such alternatives from parties that have carried out such analyses.

General discussion: In response to questions from CANADA, the EU, SENEGAL, the US, and KUWAIT, TEAP members noted that their focus on five VSLS was due to the high volume particularly of DCM, as well as because there is publicly available information on these particular substances. They welcomed all relevant information from parties that could also be used in future quadrennial reports. TEAP stated they have no knowledge of one-way cylinders for the transport of feedstock, and requested parties to submit any information on one-way cylinders. TEAP also noted they had incorporated the guidelines from the Intergovernmental Panel on Climate Change (IPCC) for production emissions for CTC.

The Panel welcomed any expertise and information on VSLS from parties, noting these substances are not controlled under the Protocol.

Very short-lived substances (VSLS): On Monday, OEWG Co-Chair Mohamed opened the discussion on VSLS. A number of parties, including INDIA, LESOTHO, SAUDI ARABIA, and MALAYSIA, called on SAP and TEAP to provide more quantified information on uses and emissions in their next reports, including a detailed mapping of alternatives. KENYA noted these substances are used as feedstocks for production of other chemicals and pose a threat to human health and asked the SAP and TEAP to consider whether they should be controlled under the Montreal Protocol. The US noted the role of the SAP and TEAP is to provide scientific information and it is up to the parties to take the necessary actions.

MALAYSIA noted production and consumption of VSLS are linked to production of polyvinyl chloride (PVC) and regulation could have significant impacts on the economy.

CANADA noted it would be useful to have more information before the 2026 quadrennial assessment, which would only be considered by the parties in 2027. He explained there is increasing information on VSLS in scientific literature. He said that it is important to understand what alternatives are available, and to narrow down the VSLS to those that have emissive rather than feedstock uses, proposing to submit a proposal requesting information on VSLS of potential concern for the ozone layer, including recent production, consumption, and emission levels, ODP if available, and relative contribution to ozone depletion. The US, AUSTRALIA, and the EU supported further discussions on a possible decision, with the US suggesting establishment of a contact group.

The RUSSIAN FEDERATION said since more than 90% of VSLS are used as feedstock, there are no atmospheric emissions and they do not have an impact on the ozone layer. He said a clear scientific basis is needed before an entire group of substances can be controlled under the Montreal Protocol, adding further consideration of this matter is futile.

CHINA reiterated the impact of VSLS on the ozone layer is small and parties need to wait for further information to have a better understanding and do more effective work. Referring to the precautionary principle, the EU stated that Article 2.1 of the Vienna Convention obliging parties to reduce activities that have a negative effect on the ozone layer is also applicable to VSLS, and supported more work on this issue. There is a need for more information, he added, but it would be important to avoid the use of VSLS where good alternatives exist. AUSTRALIA said it is important to keep the VSLS emissive uses under review because they do affect the ozone layer, but it may be worth having more information before the 2026 quadrennial assessment.

On Monday evening, CANADA, on behalf of Australia, the EU and Switzerland, introduced a draft decision on additional information on VSLS (UNEP/OzL.Pro.WG.1/46/CRP.3). OEWG Co-Chair Mohamed suggested, and delegates agreed, to establish a contact group, co-facilitated by Bruna Veríssimo Lima Santos (Brazil) and Heidi Stockhaus (Germany), to advance discussions on the conference room paper (CRP).

The group met Monday evening, Wednesday and Thursday, debating issues including a request to TEAP, at either OEWG 47 or 48, to: provide updated information on DCM, trichloromethane, dichloroethane, TCE, and PCE, including their emissive solvent and feedstock uses and growth trends for the past five years; and also identify "other high-volume" anthropogenic and/or halogenated VSLS not mentioned in TEAP's 2024 progress report with "quantifiable" emissions that could reach the lower stratosphere, "along with methodology adopted for such assessment, growth trends for the past five years, their ODP and impact on the stratospheric ozone layer in quantifiable terms."

In plenary on Friday, Co-Facilitator Santos reported on the progress of the group. OEWG Co-Chair Mohamed proposed, and delegates agreed, to forward the CRP to MOP 36.

Feedstock uses of controlled substances: On Monday, OEWG Co-Chair Ralph Brieskorn (Netherlands) introduced the discussion on this item. INDIA called for more information on additional uses of feedstocks, and on the impact of emissions of feedstock uses as well as alternatives for these uses.

AUSTRALIA, with the EU and NORWAY, expressed concern about the 40% increase of feedstock uses over the last five years, as related emissions are one of the top threats to the recovery of the ozone layer, and noted they would present a proposal on this matter during the week.

The EU underscored the need to take action based on the TEAP report, including training of personnel, best practice in distribution, transport, and production, and the use of and information on alternatives. SWITZERLAND asserted that assumptions that emissions from feedstocks are negligible were outdated and called for a contact group discussion.

The FEDERATED STATES OF MICRONESIA (FSM) expressed alarm that feedstocks are used in plastic production and underscored that reducing feedstocks would reduce plastic pollution.

CHINA underlined that feedstock uses are not controlled under the Protocol but called for TEAP to provide more information, including on alternatives and preventing emissions from leakages. BRAZIL also noted that feedstock uses are not controlled under the Protocol and cautioned against prejudging discussions under other bodies. SAUDI ARABIA called for clarity on whether the discussion was on feedstock uses or emissions from feedstocks.

CANADA, the EU, NORWAY and others called for discussion in a contact group. CANADA stressed the Protocol would not necessarily control feedstock uses but called for further clarifications; pointed to TEAP's observations on relevant best practices; and called for consideration of activities to minimize the use of controlled substances as feedstock.

The US highlighted that reporting is required for controlled substances produced for feedstock uses under the Protocol and called on parties to ensure all respective production amounts are indeed reported.

On Wednesday morning, AUSTRALIA introduced a draft decision on feedstock uses of controlled substances (UNEP/OzL.Pro.WG.1/46/CRP.4), co-sponsored by Canada, Norway, and Switzerland. They reiterated concern about increased emissions of controlled substances from feedstock uses and proposed an approach to promote best practice, including guidance produced with a small MLF envelope. INDIA, supported by BAHRAIN and ARGENTINA, opined that there was no need to reopen discussions on this issue. The EU, the US, LESOTHO, and SAUDI ARABIA indicated readiness to engage. OEWG Co-Chair Brieskorn established an informal group, co-facilitated by Michel Gauvin (Canada) and Leslie Smith (Grenada).

This group met on Thursday, with Co-Facilitator Smith noting that the group would consider both the draft decision on feedstock uses as well as additional concerns related to CTC emissions. On the former, delegates highlighted the need for more information on both the extent of growth of emissions from feedstocks and alternatives available for different processes. TEAP explained that, although they had not performed retroactive emissions calculations, emissions from production had been increasing as production had increased over time (from 80,000 tonnes for production for feedstock use in 2002 to 2 million tonnes in recent years), and these emissions were compounded with higher rates of emissions from older production facilities. TEAP shared that information on alternative processes is limited because of commercial confidentiality, and proposed that parties could work with commercial entities to understand these alternatives. Some countries reiterated their views that emissions from feedstock uses are insignificant, stating their preference to close discussion on this issue. While others dissented, TEAP noted a definition of "insignificant" would need to come from the parties.

In plenary on Friday, Co-Facilitator Gauvin noted progress in discussions. OEWG Co-Chair Brieskorn proposed, and delegates agreed, to forward the CRP to MOP 36.

CTC emissions: On Monday, OEWG Co-Chair Mohamed opened discussions on this item. INDIA, SWITZERLAND, NORWAY, the EU, and AUSTRALIA noted that CTC is primarily used as a feedstock and options for parties to minimize emissions in feedstock uses should be explored. They agreed this agenda item could be merged with the item on feedstocks. AUSTRALIA further noted the discrepancy between top-down and bottom-up CTC emissions has been discussed for a decade and does not require much more focus. OEWG Co-Chair Brieskorn concluded that, in the future, CTC emissions will be addressed as part of discussions on feedstocks.

Lifecycle Refrigerant Management

On Monday, the Co-Chairs of the TEAP Task Force on LRM, Hilde Dhont and Roberto Peixoto, presented the report, noting it addressed four main issues related to leakage prevention as well as recovery, recycling, reclamation, and destruction (RRRD) of refrigerants:

- technologies;
- obstacles and challenges;
- costs and climate and ozone benefits; and
- policies, incentive schemes such as producer responsibility schemes, good practices, and lessons learned.

The TEAP report found that technologies are available but not accessible to all Article 5 parties. The Panel reported there are policy, economic, and accessibility obstacles and challenges associated with effective LRM. They further noted if a phase-out/phase-down regime creates a shortage of refrigerants and leads to price increases, then refrigerant recovery may increase. However, if the supply of newly-produced refrigerants remained plentiful, other policy and economic measures may be required.

They shared that the report also found that mandatory and voluntary LRM policies and programmes are currently implemented in many parties with varying levels of effectiveness. However, they highlighted that establishing a data collection system by parties could inform their decision making for optimal LRM strategies. TEAP further noted the cost effectiveness of LRM could not be assessed.

Regarding opportunities, the Panel reported: LRM practices can be a key component of refrigerant emissions reductions; LRM can achieve emissions reductions beyond those from strict Kigali Amendment compliance; and LRM may be the key tool for some parties to achieve Kigali Amendment compliance.

In the ensuing discussion, KUWAIT asked the Task Force why LRM is now considered a key compliance factor for the Kigali Amendment when it was not discussed during the negotiations and noted that when there is a leakage in high ambient temperature (HAT) countries, it is often too hot on the roof for technicians to carry out equipment maintenance. NIGERIA emphasized effective LRM is critical to the successful implementation of the HFC phase-down, but Article 5 parties face challenges from lack of access to technologies and lack of capacity. CANADA asked how the ozone and climate benefits were estimated in the report and if the Task Force could provide estimates on focus areas as a starting point for LRM programmes. ARGENTINA highlighted the country's reclamation and recycling centers and noted the prohibitive cost of the latest equipment.

In response to questions and comments from BAHRAIN, BENIN, JAPAN, and GRENADA, the Task Force underlined the importance of LRM, noting the report had been produced in eight weeks and would be refined with time. On the challenges for HAT countries, the Task Force reported the analysis was based on consumption in countries where data was available. On the cost of reclamation equipment, TEAP noted these estimates came from Task Force and external experts, noting parties could provide additional

data on the costs they have encountered for equipment on the market. The Panel also noted the report had highlighted the need for continuous training and awareness campaigns on LRM.

In response to a question from SOUTH AFRICA on the choice between leak prevention or RRRD, the Task Force said that based on theoretical modeling, leakages represent 40% of emissions and RRRD represents 60%, but it may depend on the banks and types of refrigerants. On the challenges for low volume-producing countries, as outlined by GRENADA and FSM, TEAP said the two biggest challenges are reclamation and destruction.

The US noted the need to ensure continued training of technicians to prevent refrigerant leaks, among others. The EU drew attention to the establishment of use-banks to incentivize reclamation and reuse of refrigerant gases.

Responding to KENYA and the EU, TEAP noted there has been a global shortage of identifiers and highlighted that the Task Force was aware of examples of refrigerant deposit systems in action.

OEWG Co-Chair Brieskorn closed this agenda item, noting the pre-MOP workshop, which is scheduled for 27 October 2024 in Bangkok.

Enhancing the Global and Regional Atmospheric Monitoring of Controlled Substances

Delegates addressed this issue in plenary on Monday and Tuesday. Paul Newman, Steering Committee for the EU-funded pilot project on the regional quantification of emissions of controlled substances, and Sophia Mylona, Ozone Secretariat, presented the outcomes of the February 2024 online workshop on gaps in the global coverage of atmospheric monitoring of controlled substances and options to enhance such monitoring. This workshop was held in response to MOP decision XXXV/14 and the reports are contained in documents UNEP/OzL.Pro.WG.1/46/2/Add.1 and UNEP/OzL.Pro.WG.1/46/INF/4.

Noting gaps in monitoring around the world, Newman discussed two different types of monitoring: flask sampling and high-frequency measurement. He stressed the need to take advantage of synergies with existing scientific and non-scientific infrastructure, noting the commonalities and differences between monitoring ODS and greenhouse gases. He outlined the steps for setting up a monitoring station, noting the total cost of on-site measurements (high frequency station) is between USD 456,000 and USD 1,245,000 and for flask sampling it could range between USD 50,000 and USD 1,245,000. He noted these are highly variable due to facility, personnel, shipping, and other costs.

With regard to options for funding, Mylona described a step-by-step approach for both flask sampling and high-frequency measurement, as well as modest and aggressive expansion alternatives for a five-year period. She listed the funding sources explored, including:

- the existing General Trust Fund for Financing Activities on Research and Systematic Observations relevant to the Vienna Convention (GTF) and the Montreal Protocol trust fund;
- external funds from organizations active in emissions monitoring (such as the Global Environment Facility (GEF) and its chemicals and waste focal area, the World Meteorological Organization (WMO), the Green Climate Fund, and the Comprehensive Nuclear-Test-Ban Treaty Organization); and
- philanthropic institutions (such as the Bezos Earth Fund and Bill and Melinda Gates Foundation).

In the ensuing discussion, the EU called for greater clarity on all the available funding avenues and options. The US queried the geographical scope of, and assessment needed for, existing and future monitoring locations. BRAZIL requested more information on the number of stations, successful approaches in other forums, the extent of fixed costs, and the wide range of cost estimates.

Newman and Mylona referred to costs accrued under existing networks for comparison, i.e. the Advanced Global Atmospheric Gases Experiment (AGAGE) and the US National Oceanic and Atmospheric Administration (NOAA) networks. They stated that three to five—in the best case ten—carefully located monitoring stations would improve the data situation, including in South America in particular. They also illustrated how Decision VC VI/2 leaves flexibility to expand the funding of monitoring from ozone and UV radiation to controlled substances. They reiterated that using existing or defunct monitoring stations would tremendously reduce the cost compared to building new stations.

The US preferred drawing funds from the MLF and the GTF. KUWAIT asked how to prioritize locations of the monitoring stations. He agreed funding should come from the MLF, but also asked about possibilities for co-financing and the role of MLF implementing agencies. He noted concerns with third parties engaging with or publishing the data collected from the new stations. NIGERIA asked for clarification on the regions with monitoring gaps in Africa. JAPAN supported cost-sharing, in-kind contributions, use of existing facilities, and collaboration and synergies with other organizations to ensure cost-effectiveness.

In response, the Steering Committee prioritized addressing emissions sources and how to close the global monitoring gaps, and then determining if the proposed location is workable. They suggested a steering or scientific committee can make these determinations.

LEBANON recommended considering other funding options and asked how the committee will respond to scientific advances, and how to facilitate data sharing and collaboration to avoid duplication of efforts. CHINA said for Article 5 countries the development of the science requires funding, data, quality control, and monitoring capacity, and called for a step-by-step approach. INDIA asked if there were other methods for atmospheric monitoring and supported funding under the Montreal Protocol and the MLF.

The Steering Committee underlined the importance of mapping monitoring stations, noting the GEF is setting up labs to monitor persistent organic pollutants (POPs) and mercury. On data sharing, they said it is almost impossible to publish in scientific journals if the data is not public, highlighting that both AGAGE and NOAA data is public and freely available. They also described the pros and cons of using aircraft and satellite monitoring.

Highlighting that these discussions have been ongoing for years, CANADA supported a step-by-step approach, including a transfer of funds from the MLF and the GTF for initial activities to support one or two monitoring sites. He anticipated the need to carry out additional discussions, including on the additional burdens this work would place on the Assessment Panels and the Ozone and MLF Secretariats.

GUINEA asked for clarification on the effects of climatic change on monitoring. KENYA pointed to a monitoring station on Mount Kenya, and called for clarification on why the monitoring stations in Africa were excluded from the monitoring map.

NORWAY preferred using existing monitoring infrastructure as far as possible, pointing to the WMO. INDONESIA drew attention to his country's strategic location and called for new monitoring stations to be established in Indonesia.

Newman noted high quality meteorological observations are taken into account in global monitoring of ODS, adding that ODS observations are not routinely made in Africa, although greenhouse gas observations have been made on Mount Kenya in the past. He highlighted that the new climate observatory on Mount Mugogo in Rwanda, which will be able to provide ODS observations, is not yet fully operational.

Responding to AUSTRALIA, CAMEROON, and the RUSSIAN FEDERATION, the Steering Committee explained how flask sampling with analysis in an external laboratory is more cost effective than onsite high frequency monitoring for measuring larger intervals. They confirmed that collaboration with the WMO and other organizations at existing locations would save funding and provide scientific synergies. AUSTRALIA expressed a preference for a step-by-step approach and inclusion of top-down inverse modelling in the list of monitoring requirements.

On Wednesday in plenary, the US introduced a draft decision on enhancing regional atmospheric monitoring of controlled substances (UNEP/OzL.Pro.WG.1/46/CRP.7). The draft decision proposed a step-by-step approach to: request the Secretariat to transfer funds from the Montreal Protocol Trust Fund to the GTF to evaluate the suitability of potential monitoring sites; request the Secretariat to map possible locations for monitoring sites; invite parties to request the GTF Advisory Committee to evaluate potential sites by taking five specific suitability criteria into consideration and to add atmospheric monitoring to the regulatory framework; and request the MLF Executive Committee (ExCom) to consider a funding modality to support a limited number of monitoring pilot projects.

The EU, INDIA, KUWAIT, and NORWAY described the draft as a good starting point to address a very complex issue, with AUSTRALIA and BRAZIL highlighting that the draft addressed some of their concerns. Delegates established a contact group, co-facilitated by Liana Ghahramanyan (Armenia) and Alessandro Giuliano Peru (Italy).

The contact group met on Wednesday, Thursday and Friday and completed a first reading of the operative paragraphs of the draft decision. They broadly agreed to transfer an as-yet undetermined amount of funds from the Montreal Protocol Trust Fund to the GTF for the specific purpose of funding projects to evaluate the suitability of potential monitoring sites. They discussed at length whether the GTF terms of reference need to be amended. Delegates also sought to clarify the process for identifying appropriate sites, partnerships, in-kind contributions, data-sharing, and reporting.

In plenary on Friday, delegates agreed to forward the CRP to the MOP.

Presentation of the 2024 TEAP Progress Report

On Tuesday, TEAP members presented key findings from the 2024 Progress Report (Volume 1), Evaluation of 2024 critical-use nominations for methyl bromide and related issues – interim report (Volume 2), and the Decision XXXV/11 Task Force report on LRM (Volume 3), focusing on those topics not considered under other agenda items.

The Flexible and Rigid Foams Technical Options Committee (FTOC) noted successful transition from HFCs and HCFCs for most foam types and that supply chain recovery continues for foam-blowing agents and other raw materials. However, he noted, foam blowing agent prices have increased since the COVID-19 pandemic, there is continued use of HFC-245fa blends in Article 5 parties due to the cost of HFO/HCFO alternatives, and flammable foam blowing agents and those with different toxicity create different safety concerns for end users and foam manufacturers, especially in small and medium-sized industries.

The Fire Suppression Technical Options Committee (FSTOC) said they are not aware of any new fire suppression alternatives to halons, HCFCs, or high-GWP HFCs. They said there is uncertainty over how the proposed per- and poly-fluoroalkyl substances (PFAS) definitions and regulations will impact the transition away from high-GWP HFCs. They also noted there is confusion about the intent of the Protocol in relation to halon management and said parties must reinforce the message that halon use is not banned, only the use of newly manufactured halons in fire suppression.

The Methyl Bromide Technical Options Committee (MBTOC) announced only one critical use application in 2025 from Canada for strawberry runners, noting Canada plans to phase out use by 2026. Overall, over 99.9% of the 62,000 tonnes of methyl bromide has been reportedly phased out and the remaining 8-10,500 tonnes is now the focus. He said technically and economically feasible alternatives are available for about 40% of the current QPS uses. Yet, there is some concern that methyl bromide is being used for unreported controlled use, indicating non-compliance.

The Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee (RTOC) informed participants that the Committee's 2026 Assessment report will focus on cold chain and comfort cooling and heating applications and equipment. He reported on how the adoption of lower-GWP refrigerants continues to grow in the refrigeration, air conditioning and heat pumps (RACHP) sector, highlighting that vehicle electrification requires holistic vehicle thermal management, which includes battery cooling. He added that passive cooling, higher energy efficiency standards, and faster phase down of climate warming refrigerants could avert up to 60% of the predicted direct and indirect CO2-equivalent emissions from the cooling sector by 2050.

The MCTOC reminded participants of the complex process of developing lower-GWP pressurized metered-dose inhalers (pMDIs) and other delivery systems for treating asthma and chronic obstructive pulmonary disease. With new forms of manufacturing, new clinical trials, and new regulatory approvals needed, the first lower GWP pMDIs may not reach the market in Article 5 and non-Article 5 countries until 2026. She also gave an update on how policy uncertainties on PFAS risk delaying decisions on the selection of alternatives to ODS and high GWP HFCs, and the associated investments.

General discussion: Delegates thanked TEAP for their work on this report. In response to BAHRAIN, TEAP noted HCFC-141b is a good foam blowing agent alternative, even in HAT countries. Responding to NIGERIA, they clarified that halons 1211 and 2402 should not be destroyed and noted there are halon recycling companies that will facilitate the shipment of these substances for them to be reused. On KUWAIT's question on "good" technology options, they noted this refers to those that are available and accessible. TUNISIA requested additional information for low-GWP alternatives for home air conditioning units.

The EU registered disagreement with the proposal to slow the rollout of heat pumps to wait for lower-GWP alternatives to become

available on the market, noting that rolling them out is likely to spur innovation towards lower-GWP technologies.

TEAP responded to questions from delegations about the toxicity of methyl bromide and safety of pMDIs (SAUDIA ARABIA), the availability and affordability of alternatives to controlled substances and the use of hydrocarbons in sprays (ARGENTINA), the data on and penetration of certain halons in Article 5 parties and standards for refrigerant blends used in RACHP (INDIA), and the impact of the change of emissions factors on the level of emissions (US). TEAP emphasized they continue to keep a watch on alternatives to controlled substances for their toxicity, established standards, and formulations. They clarified that from the estimated introduction of low-GWP pMDIs on the market in 2026, it will take several years for full market penetration. They further explained the plausibility of their estimates for halon-1301 emissions from feedstock production and use.

BRAZIL asked the MBTOC to ensure that in addition to the technical aspects, regional availability and regional difficulties are taken into account, especially noting that fumigation with other substances often takes much longer than with methyl bromide. He also noted that PFAS regulations could slow progress, but much uncertainty remains. CANADA asked about the specific applications that need halon 1301 and said he thought the reported numbers for feedstock uses seem high.

ZIMBABWE asked MBTOC to share experiences with methyl bromide disposal. TRINIDAD AND TOBAGO expressed concern about contrary reports on the health and environmental impacts of PFAS and trifluoroacetic acid (TFA) because of the continued need for cooling, and asked for clarification on how to address HFOs, PFAS, and TFA.

MBTOC responded that parties may want to address QPS uses of methyl bromide where policies do not exist. In response to Canada's question about feedstock uses of halon 1301, they said the reported numbers were the result of modeling, which is not exact.

The EEAP responded on the toxicology and risk of PFAS and TFA, noting a lot of the studies on animals have been done on a laboratory scale, but they continue to assess increased toxicity for animals and humans. There is a lot of uncertainty on measurements and the source and transport from the atmosphere to water bodies.

Regarding a question on electric vehicles, they noted that batteries present a challenge because the EEAP has to look at the cooling and heating of battery cabins, and this requires a holistic view. They also thanked Egypt for their commentary on obtaining experts, noting it is now much more difficult to get travel funding for scientists. OEWG Co-Chair Mohamed thanked TEAP for their report.

Nominations for critical-use exemptions for methyl bromide for 2025: On Tuesday, OEWG Co-Chair Mohamed opened discussions on this item. CANADA introduced their nomination for use of methyl bromide for fumigating strawberry runners by one grower on Prince Edward Island, noting this is the final request for this exemption, as this use will be phased out by 2025.

VENEZUELA underlined that, although there are alternatives to methyl bromide, the country may need to use this substance in the future due to the trade sanctions placed on the country.

The EU noted that, for Canada's nomination, there were still concerns for QPS uses in cases where there are alternatives, and noted with concern that there are still non-QPS uses for which methyl bromide is applied. AUSTRALIA welcomed Canada's progress for non-QPS uses and advised that a methyl iodide-chloropicrin blend had been approved for strawberry runners in the country in 2023, but noted more certainty will be provided on this ongoing trial at MOP 36. They wondered whether there was a need for individual MBTOC reports on critical uses and called for any reporting from this TOC to be part of the larger TEAP report. OEWG Co-Chair Mohamed took note of the discussion.

Energy efficiency: On Tuesday, OEWG Co-Chair Brieskorn introduced this item. INDIA and other delegations welcomed the creation of the MLF funding window for energy efficiency projects. FSM described how energy efficiency considerations were even more important since a rapidly warming world is increasing the need for equitable access to cooling equipment. They proposed that practical guidance for energy efficiency be developed for use by national ozone units. The US urged the OEWG to seize the momentum for enhanced cooperation with RACHP manufacturing countries to promote energy efficiency. MALAYSIA shared priorities in its Kigali HFC Implementation Plan and, with the EU, urged TEAP to continue updating its reporting.

BARBADOS reiterated the need for technical and financial support for domestic activities relating to energy efficiency. GRENADA highlighted the minimum energy performance standards for new cooling equipment adopted by the Caribbean Community and suggested that the eligibility for MLF funding be expanded to include renewable energy initiatives, as too much cooling equipment is still run on fossil fuels. AUSTRALIA noted that low-GWP and energy efficient cooling equipment is available in all sectors, but not yet in all countries. KUWAIT raised awareness of the circumstances of HAT countries and the challenges from cooling equipment rapidly degrading in extreme heat conditions.

On Friday in plenary, GRENADA and FSM introduced a draft decision on strengthening the enabling environment to enhance energy efficiency in the cooling sector while implementing the Kigali Amendment (UNEP/OzL.Pro.WG.1/46/CRP.10). They said this draft reflects the views expressed in plenary earlier in the week and calls for further enabling the National Ozone Units and Implementing Agencies to develop a robust pipeline of high-quality project proposals that address energy efficiency when phasing down HFCs. The draft also addresses the upcoming MLF ExCom discussions on providing additional support for this purpose.

BARBADOS, SENEGAL, the US, KUWAIT, NIGERIA, ARMENIA, and the EU supported discussing this draft further at the MOP. The US noted the MLF ExCom will further discuss the USD 100 million window focused on the manufacturing sector to achieve climate benefits under the Kigali Amendment and this draft decision should take those discussions into account. Delegates agreed to forward this CRP to the MOP for further discussion.

Panel membership: In their presentation, TEAP illustrated how the Panel continues to implement its terms of reference, including an annual full disclosure of interests. They welcomed the latest MLF replenishment, highlighting what is needed for TEAP to manage its considerable workload, including retaining current expertise, recruiting new volunteers, and increasing financial support for face-to-face meetings. They confirmed that TEAP is working to consider its response to decision XXXV/20 on options for the organization of TEAP and its TOCs ahead of OEWG 47 in 2025.

EGYPT commented on the challenge of finding experts to volunteer for the TOCs and, with BARABDOS, asked parties to consider financial assistance to qualified experts from Article 5

countries, noting there were many scientific experts, but parties needed to find the right way to reach them and ask them to volunteer.

On Tuesday, OEWG Co-Chair Brieskorn said the MOP needs to replace or reappoint TEAP members whose terms expire at the end of 2024. He noted that no nominations had been received and called on interested parties to consult with each other and TEAP.

Climate-friendly Alternatives for Metered-dose Inhalers

On Tuesday, OEWG Co-Chair Mohamed introduced this agenda item (UNEP/OzL.Pro.35/12, para. 251). The EU explained they had requested adding the use of alternative substances in metered-dose inhalers (MDIs) to the OEWG's agenda at MOP 35. They noted new low-GWP propellants are being introduced to the market as early as 2025 or 2026 with the intention of switching all MDIs by 2030. Since industry is moving forward, they said the Montreal Protocol needs to support the relevant approval processes and work together for a smooth transition and to ensure accessibility and affordability of alternatives. They said they would be submitting a CRP on this item.

INDIA said the proposed alternatives needed trials and an approval process, and parties need to understand more about the alternatives in Article 5 countries. CUBA, a producer of MDIs, stated there is a need to wait for the findings of all of these different trials in humans, noting he still had many questions on the nature of the technological changes and if low-GWP MDIs had the capacity to meet global demand. He called for further studies.

SWITZERLAND said the transition to low-GWP propellants must be considered but underscored the need for a better understanding of the evolution of the technology. The US noted that, in the past, this issue was left in the hands of the parties as to how to prioritize HFC phase downs, adding that this is a complex transition with cost, capacity, and health implications, and discussions may be premature.

CANADA expressed support for activities that lead to the transition to lower-GWP MDIs but said any discussion on this issue needed to account for the priority to maintain availability and access to critical medications for patients. Despite activities underway in the private sector, he argued, there should be no big hurry for most parties to undertake this transition, adding any transition has to be as smooth as possible.

On Wednesday, the EU introduced a draft decision on measures to facilitate the transition to MDIs with low-GWP propellants or other alternative products (UNEP/OzL.Pro.WG.1/46/CRP.6), to ensure greater cohesion in the transition to climate-friendly alternatives. He pointed to the need for awareness raising on these alternatives, and coordination between industry, the health sector, and governments in preparation for this transition.

CANADA, TUNISIA, and the EU supported further discussions in a contact group, which could also consider relevant issues related to TEAP reports. TUNISIA called on parties to make use of the alternatives proposed in the CRP. INDIA and BRAZIL reiterated the difficulties faced by Article 5 countries in accessing such alternatives, with INDIA, the RUSSIAN FEDERATION, and the US stating that discussions on this issue would be premature.

Delegates agreed to establish a contact group, co-facilitated by Idris Abdullahi Ishaka (Nigeria) and Henry Wöhrnschimmel (Switzerland). The group met on Thursday and Friday to discuss the CRP, with some delegations reiterating their concerns about the availability of these alternatives in developing countries.

The EU, as the proponent of the CRP, pointed to dry-powder inhalers and aqueous soft-mist inhalers as propellant-free alternatives to MDIs, and shared information on the new low-GWP propellant MDIs, which he noted would be on the global market in 2025. Some delegates called for more information from TEAP, expressing concern that the draft decision called on the Protocol to take a stand on choices for medical remedies. Many highlighted that discussions on the specifics of this issue may be premature, as the alternatives have not yet been launched and thus cannot be assessed, while also pointing to national-level actions on this issue.

TEAP noted that while alternatives are environmentally friendly, they need to consider a transition process, underlining that current pMDIs have the same therapeutic benefits and are more affordable, especially in developing countries. Some delegations called to reframe the issue in terms of the HFC phase down. The group then considered alternative text that calls on parties to promote continued coordination between national environmental and health authorities to raise awareness of the HFC phase down already underway and progress in the development of new MDI products using low-GWP propellants, recognizing the need to ensure patient access to critical health remedies. The alternative text also proposed revisiting this issue no later than 2027, in light of the Panel's 2026 quadrennial assessment report, requesting TEAP to continue monitoring and updating parties on relevant developments. Delegates supported working on the basis of the alternative text.

In plenary on Friday, delegates agreed to forward the CRP, as modified, to the MOP.

Future Availability of Halons and their Alternatives

On Tuesday, OEWG Co-Chair Mohamed introduced this item, pointing to Canada's submission of a CRP on measures to support the sustainable management of recovered, recycled, or reclaimed halons (UNEP/OzL.Pro.WG.1/46/CRP.5). CANADA introduced the CRP, noting the 2022 Quadrennial Assessment had highlighted threats to the future availability of halons for enduring uses. He underlined the need to address the destruction of halon banks and highlighted the need to provide clarity on the importance of recovered, recycled, or reclaimed halons, specifically halon 1301.

OEWG Co-Chair Mohamed proposed, and delegates agreed, to establish a contact group, co-facilitated by Ali Tumayhi (Saudi Arabia) and Andrew Clark (US), which met on Wednesday and Thursday.

In the contact group, delegates discussed a call for parties that restrict the import and/or export of recovered halons to review their regulations to facilitate the transboundary movement of recovered halons for recycling and reclamation in those countries that are able to do so to avoid new production. Some called for clarity on how to avoid creating a black market or encouraging illegal trade. Others drew attention to the importance of the sustainable management of halon banks, and the need for the draft to reflect this. The group also considered a request to parties for information on feedstock production and use on related emissions of halon 1301 to the Secretariat by mid-March 2025, with TEAP noting this information could point to some sources of excess emissions.

The group addressed most of the operative paragraphs of the draft decision. Discussions focused on how to prepare for the risk of reduced access to halons and refraining from any deliberate destruction of halons unless they cannot be returned to an acceptable level of purity for subsequent reuse. Delegates also discussed

whether parties should submit information on feedstock production and use and, if available, on related emissions of halon 1301.

On Friday in plenary, OEWG Co-Chair Mohamed proposed, and delegates agreed, to forward the CRP to the MOP for further discussion.

Possible Compliance Deferral for Article 5, Group 2 Parties

OEWG Co-Chair Brieskorn introduced this item on Wednesday. TEAP presented the main insights and conclusions from their technical review of alternatives to HFCs relevant to Article 5, group 2 parties (HAT countries). The Panel focused on the RACHP sector since this sector is responsible for about 80% of the global GWP-weighted HFC consumption. TEAP reiterated the 2022 finding that lower-GWP alternatives to the popular high-GWP HFCs are available for most RACHP applications (with exceptions in transport refrigeration and ultra-low temperature systems), but there is limited access to alternatives for some Article 5 parties. TEAP concluded that from all technical review criteria, only the "technically proven" requirement was a distinguishing criterion for accessibility to refrigerants for HAT countries. The Panel deferred to parties to consider whether any changes to HFC phase down schedules for group 2 parties were needed.

KUWAIT, SAUDI ARABIA, and BAHRAIN asked questions relating to the challenges of access to low-GWP refrigerants and technology in HAT countries, noting the TEAP report does not always reflect the reality on the ground where temperatures can rise to more than 50°C in the summer, much higher than when the Kigali Amendment was negotiated. INDIA and CANADA also raised questions on limited accessibility of new technologies and whether there were other alternatives than those contained in the report, respectively.

In response, TEAP said the report is based on the information they were able to gather based on time constraints and the limited commercial information available. They said the technology is feasible and available in all markets. TEAP said the challenges faced in HAT countries, including the application of technology, are also faced by other Article 5 parties under the Kigali Amendment.

On flammability of low-GWP alternatives, TEAP said when these refrigerants were first introduced, there was concern about flammability, but industry now knows how to handle the technology, which is safe for operation in residential air conditioning units. On concern about flammability in mobile air conditioning units, he noted the technologies have been used by most automotive manufacturers for a number of years, there is no concern, and there is no technical reason that the technology cannot be used globally.

In response to CANADA, TEAP noted they had focused on alternatives already on the market. A more comprehensive list was posted in the 2022 Assessment Report, but the current report focused on group 2 countries. Finally, TEAP noted that HAT countries have been quite active and have moved forward on adoption of low-GWP technologies. Indicating a willingness to prepare a draft decision on this issue and calling for the establishment of a contact group, INDIA underlined the need to consider the particular challenges of HAT countries in adopting new technologies.

KUWAIT lamented that TEAP had mentioned the energy efficiency pilot project while ignoring the information within the Kigali HFC Implementation Plans and underlined the need for more information on the availability of some of the refrigerants proposed for use in HAT countries.

BAHRAIN stressed the report was not representative of the realities in HAT countries, reiterated that these countries were ready to adopt technically proven, financially feasible alternative technologies, and called for the report to take into account relevant in-country expertise.

The EU welcomed the report, noting it indicates technical barriers that have policy solutions, and said it was open to considering a CRP on this issue.

The US noted the key findings of the report include the fact that there is no singular pathway for all countries, and highlighted further requests to TEAP to provide information to the parties, including through the quadrennial assessment in 2026 and the five-year assessment in 2027. They called on delegations to wait until a relevant CRP was posted to make a decision on further discussions.

On Thursday morning in plenary, INDIA and BAHRAIN introduced a draft decision on possible compliance deferral for Article 5, group 2 parties (UNEP/OzL.Pro.WG.1/46/CRP.9), co-sponsored by Bahrain, Kuwait, Qatar, and Saudi Arabia. The draft reiterated the specific challenges for group 2 countries posed by unprecedented heatwaves and a significant rise in summer temperatures. The proponents then outlined the request to TEAP to provide, in its annual progress report, a sectoral and regional update on alternatives to HFCs including on challenges, supply chain issues, transition pathways, and costs.

BRAZIL and FSM supported the proposal, referring to challenges with the accessibility of alternatives to HFCs in all Article 5 countries. CANADA, AUSTRALIA, and the US also supported a discussion of the CRP, indicating that elements of the requested reporting, such as scope, timing, and TEAP resources, would need to be addressed. A contact group was established, co-facilitated by Cornelius Rhein (EU) and Ana Maria Kleymeyer (FSM).

The contact group met on Thursday and Friday. Delegates focused on the concerns of group 2 countries about the lack of access to appropriate technologies to meet the demand for low-GWP gases in cooling and refrigeration equipment. Some argued TEAP already provides some of the information requested. The proponents said they needed information specific to group 2 countries. Delegates also questioned whether the draft's title reflected its content. The proponents agreed to meet with TEAP before the contact group reconvened. They subsequently reported back that the request to the Panel to provide information on "pathways" for promoting adoption in Article 5 countries was not within the remit of the Panel. They proposed to instead request TEAP to provide "suggestive options."

TEAP noted they already provide information on market structure, including supply chain issues related to alternative technologies, and pointed to the two forthcoming TEAP reports in 2026 and 2027 that will address the calls for information on challenges and barriers to the availability, accessibility, and adoption of alternatives, with a particular emphasis on group 2 parties. They noted the reports will also address standards for alternative refrigerants as well as equipment, taking into consideration the capacity of equipment in different countries.

Some delegates proposed requesting TEAP to provide the information in either the 2026 quadrennial assessment report or the 2027 annual progress report, noting HAT countries would be expected to use this information to prepare for the 2028 HFC freeze, as specified under the Kigali Amendment. One delegation called for this information to be included in TEAP's next progress report,

noting this would facilitate compliance for the concerned countries. Some preferred not to specify how group 2 countries would use this information. Other delegations reiterated concerns that there were too many requests to TEAP, calling to extend the timelines for requests to TEAP on this issue. Some called for a new proposal to clarify the requests and timelines for the Panel.

In plenary on Friday, delegates agreed to forward this CRP to the MOP for further discussion.

Strengthening Montreal Protocol Institutions, including Combating Illegal Trade

On Wednesday, OEWG Co-Chair Mohamed introduced this agenda item. The Secretariat presented information provided by parties on illegal trade practices and approaches taken by national authorities to identify and address such cases. The EU presented a draft decision on the next steps in further strengthening Montreal Protocol institutions (UNEP/OzL.Pro.WG.1/46/CRP.1), which requests the Secretariat to: prepare a guidance document on licensing systems; provide further analysis on the compilation of illegal trade cases; and convene an expert meeting to reflect on the functioning of the Protocol's compliance mechanism.

SWITZERLAND suggested that some processes under the Protocol may need updating. BRAZIL, CANADA, and INDIA queried whether a guidance document was the best way forward and asked for further details on the organization of an expert meeting. The US cautioned against engaging external experts at this stage. MALAYSIA observed that combating illegal trade was becoming more challenging as substances are increasingly blended.

CAMEROON, SENEGAL, and TUNISIA reiterated the importance of dealing with illegal trade in a comprehensive way, with GUINEA adding that institutional systems needed to be strengthened, and BENIN requesting that the need for capacity building should not be overlooked. Delegates agreed to establish a contact group, co-facilitated by Shontelle Wellington (Barbados) and Jana Mašíčková (Czechia).

The contact group met on Wednesday, Thursday, and Friday. It first heard an explanation by the Secretariat of how it could draft guidance documents for adoption by the MOP. The Secretariat also suggested that an *ad hoc* working group of legal and other experts could propose changes to the Protocol's non-compliance procedure for consideration by the MOP.

Parties then discussed the intent and outline of the draft decision but could not find common ground. The proponent of the draft decision and supporting parties stated they wanted to ensure continued reporting on cases of illegal trade of controlled substances on an annual basis, and that a workshop could consider options for enhancing the non-compliance procedure. Others cautioned against duplication of existing processes and expressed concern about an underlying focus on cases of potential non-compliance as well as the procedure to address them.

After the entire draft decision was put in square brackets, the proponent informed delegates that they would revise the draft decision for discussion at MOP 36, taking into account all concerns expressed.

In plenary on Friday, delegates agreed to forward the CRP to the MOP for further discussion.

Emissions of HFC-23: Potential Changes to Reporting Form 3 for Reporting on HFC-23

On Wednesday, the Secretariat presented the document containing potential changes to reporting Form 3 (UNEP/OzL.Pro.WG.1/46/3), explaining it contains two options to amend Form 3 to enable parties to report instances where HFC-23 is generated, destroyed, or maintained as stocks. He noted, following consultations with parties:

- an extra proposal to refer to both intentional production and unintentional by-production was included;
- the two options are identical regarding the information to be reported, but differ in terms of layout;
- Option 1 has an additional sub-row in the form while Option 2 proposes adding an annex to Form 3; and
- separating the HFC-23 feedstock from other uses was addressed by a footnote to distinguish between non-emissive and emissive uses.

INDIA, supported by the US and CANADA, proposed discussion in a contact group. The Secretariat asked to participate in the discussion since there may be errors requiring correction in the instructions pertaining to the form.

The US and the EU asked for clarification on the relationship between this new form and existing reporting forms, how to differentiate it from the critical use exemption and essential use exemption forms, and whether the reporting would cover both generated as well as imported HFC-23.

The Secretariat responded they did consider the linkages between the forms on destruction and reporting emissions. The only new aspect they introduced was on production, focusing on what is produced, what is used, and what remains at the end of the year. He explained that imports should be reported in data Form 1; and noted that destruction is reported in Form 4, explaining this form is different from the exemption forms, as exemptions are not taken into account since the priority is on tracking stocks in storage.

CANADA noted the instructions to the Secretariat were not clear and said they were not sure what added value there would be in keeping track of these stocks, noting the reporting framework would only provide information from producing countries.

OEWG Co-Chair Mohamed tasked an informal group, co-facilitated by Martijn Hildebrand (Netherlands) and Obed Meringo Baloyi (South Africa), to discuss this issue.

In the informal group, some participants noted the inconsistency in the instructions on three different reporting forms (Forms 3, 4, and 6), which could cause confusion to parties. Others supported modifying Form 3 to report on opening stocks at the beginning of the year and closing stocks that have not been incinerated/destroyed at the end of the year. Some participants called for further clarity on the three forms, pointing to the fact that Form 3 also addresses reporting on HFC-23 that is captured for all uses alongside HFC-23 that is captured for destruction. One delegation offered to draft a paper for consideration at MOP 36.

In plenary on Friday, delegates agreed to defer further discussions to the MOP.

Proposal by Cuba on Additional Funding to Support Countries Seriously Affected by the COVID-19 Pandemic

On Wednesday, CUBA presented a draft decision on the provision of additional funding to support countries seriously affected by the coronavirus (COVID-19) pandemic and listed in decision XXXV/16 (UNEP/OzL.Pro.WG.1/46/CRP.8). He noted the draft requests the MLF ExCom to provide additional funds to the eight

parties listed in decision XXXV/16 to meet their HFC consumption reduction targets. He explained that Cuba's HFC reduction baseline was lowered due to the reduced HFC consumption during the COVID-19 pandemic, which resulted in an obligation to reduce the country's HFC consumption by a challenging 42% rather than 10% compared to the pre-pandemic year. The proposal was supported by GRENADA, SAINT LUCIA, BARBADOS, and SRI LANKA, who referred to: similar challenges in their countries; a risk of market disruption in the cooling sector; and an opportunity to help ease the situation *via* access to leapfrog technologies such as hydrocarbons.

While expressing sympathy to affected parties, several delegations were reluctant to reopen the discussions that led to decision XXXV/16. CANADA highlighted that this decision deferred by two years any consideration of the compliance status of the eight listed parties. The US and AUSTRALIA referred to their own similar baseline challenges and suggested that HFC reduction obligations be addressed in Kigali HFC Implementation Plans and licensing systems, in particular. The EU, supported by JAPAN, stated that the effects of decision XXXV/16 needed to be evaluated before being revisited. Given the differing views, delegates agreed to consult informally in the margins of the meeting.

On Friday in plenary, CUBA reported that they had only been able to informally consult with two parties, since delegates were engaged in contact group meetings, and were thus unable to report any further developments to the CRP. He requested forwarding the draft decision to the MOP, as originally submitted. The US opposed, noting that no follow-up discussions had been conducted as requested by the OEWG Co-Chairs.

While expressing regret for the lack of time to consult, OEWG Co-Chair Brieskorn informed Cuba that this draft decision did not have the necessary support to be forwarded to MOP 36.

Other Matters

On Wednesday, KYRGYZSTAN, supported by the RUSSIAN FEDERATION, introduced their draft decision on avoiding unwanted imports of energy inefficient products and equipment (UNEP/OzL.Pro.WG.1/46/CRP.2), inviting those parties that do not want to import energy-inefficient products and equipment from any source to inform the Secretariat, on a voluntary basis, and requesting the Secretariat to maintain a list of those parties. KYRGYZSTAN said this would contribute to the implementation of the Kigali Amendment, noting the draft decision does not address dumping or illegal trade, but rather the introduction of inefficient energy technologies.

The US, supported by CANADA, asked if this could be an opportunity to update an existing list of parties that have restrictions on the import of controlled substances and appliances. KUWAIT and GHANA expressed interest in further discussions. ARMENIA called on parties to bear in mind that energy inefficiency means different things in different countries. Delegates agreed to establish a contact group for further discussions, co-facilitated by Morane Godfrin (France) and Linda Kosgei (Kenya).

The contact group met on Thursday and Friday. It first heard further explanation by the proponent on the rationale and outline of the draft decision. He clarified that inefficient equipment is defined as equipment not compliant with national minimum energy performance standards and other energy efficiency-related regulations. Respective alternative text was then added to the draft decision, together with clarifications that the equipment would need to contain or rely on controlled substances.

Delegates were unable to agree on the proposed amendments. In plenary on Friday, delegates agreed to forward the CRP to MOP 36 for further discussion.

Closing Plenary

On Friday during the closing plenary, delegates heard progress reports from the contact groups and adopted the meeting report (UNEP/OzL.Pro.WG.1/46/L.1 and Add.1), with editorial amendments from the EU and Australia.

In closing remarks, OEWG Co-Chair Brieskorn described the meeting as "good, full, and fruitful." He highlighted that the Working Group had achieved a greater understanding on the issues under discussion and called on parties to use the intersessional period to think of solutions that could be considered at the COP/MOP. Brieskorn closed the meeting at 6:31 pm.

A Brief Analysis of OEWG 46

At its core, the Montreal Protocol is about health□the health of the atmosphere, the environment, humans, and all living things. Since the Protocol's entry into force 35 years ago, parties have phased out 98% of ozone depleting substances (ODS) globally compared to 1990 levels. The Protocol has saved millions of people each year from skin cancer. Furthermore, by ensuring the health of the earth's protective ozone layer, the Protocol protects aquatic and terrestrial resources, which in turn protect food supplies and the economies of countries and sectors that rely on those resources.

The Montreal Protocol also has a significant impact on the fight against climate change. From 1990 to 2010, the treaty's control measures were estimated to have reduced greenhouse gas emissions by the equivalent of 135 gigatons of carbon dioxide, the equivalent of 11 gigatons a year. The decline in ODS emissions due to the Protocol is set to avoid global warming by about 0.5 – 1°C by 2050. Another 0.3 – 0.5°C of avoided warming by 2100 is estimated due to the phase down of hydrofluorocarbons (HFCs) under the Kigali Amendment to the Protocol.

These successes are due, in large part, to the central role of the Protocol's scientific and technical bodies. These bodies alert parties to latest developments, and challenges, that could affect the health of the ozone layer and the planet. The Open-ended Working Group (OEWG) serves as an effective interface between scientists and policymakers and lays the groundwork for parties to address the key issues necessary for the Protocol to stay ahead of any emerging issues.

This brief analysis will examine how OEWG 46 set the stage for policymakers at the next Meeting of the Parties to the Montreal Protocol (MOP) and the next meeting of the Conference of the Parties of the Vienna Convention (COP), which will be held concurrently in Bangkok, Thailand, later this year, with specific focus on issues related to monitoring, implementation, and potential expansion.

Monitoring the Atmosphere

The Protocol relies on parties' accurate and timely reporting as well as regular and representative verification of reported data through atmospheric sampling. Monitoring atmospheric plumes from emissions regions allows for the modeling of the ozone depleting effects of emitted substances once they reach the stratosphere.

Today's global atmospheric monitoring network has many gaps, especially in Africa and Latin America. This means that large expanses cannot be monitored for the atmospheric presence of ODS. In response to a request from parties, members of the Protocol's Scientific Assessment Panel (SAP) provided information on both flask sampling and high-frequency measurement, detailing the logistics and costs entailed in each monitoring method.

The OEWG agreed these gaps in the monitoring framework must be closed and initiated discussions on a draft decision focusing on site selection criteria and how to fund new monitoring sites. There was convergence towards using the Vienna Convention and Montreal Protocol's own funding mechanisms to evaluate and finance possible locations for monitoring sites, which would require decisions by both the COP and MOP. The fact that the triennial COP takes place this year may be a good omen for swiftly coming to an agreement on this proposal.

However, many questions remain, including the overall funding needs, which are dependent on whether existing, rather than new, monitoring stations can be used, and how the sample analysis will be conducted. Many participants believe a decision on atmospheric monitoring could ensure parties can monitor emissions more comprehensively and provide the necessary data to safeguard and enhance the Protocol's effectiveness.

Responding to Challenges

Despite its resounding successes, the Montreal Protocol still has some challenges to overcome. One of these is the limited availability of accessible alternatives to HFCs in developing countries. For some time, Article 5 (developing) countries have sounded the alarm about the lack of affordable and climate-friendly alternatives to HFCs in their countries. As availability is largely dependent on commercial considerations in an open market with often complex supply chains, this is a difficult challenge to overcome, in particular for high ambient temperature (HAT) countries. To compound the problem, the Protocol's Technology and Economic Assessment Panel (TEAP) has concluded that not all HFC-alternatives are "technically proven" to be effective in the increasingly extreme climate conditions in these countries.

Contact group discussions revolved around what further sector and region-specific information is needed from the TEAP to identify pathways to further transition to HFC-alternatives. However, many participants were not sure how to effectively tackle an issue that is heavily dependent on market forces.

Similarly, parties had differing opinions on how to respond to the introduction of climate-friendly alternatives for the propellants in metered-dose inhalers (MDIs), which are used in the treatment of asthma and pulmonary diseases. The question was whether parties need to start working together now for a smooth transition and guarantee accessibility and affordability of alternatives in developing countries, or whether this work should wait until the new alternatives are subjected to the necessary trials and approvals. Whether it is too soon or not soon enough to have this discussion is a question for the MOP to decide.

Another implementation issue left for MOP 36 to consider is life-cycle refrigerant management (LRM). Under a best practice approach, LRM promises substantial avoided emissions of ODS and HFCs through leak and venting prevention, maximized refrigerant recovery, and responsible reclamation and destruction of controlled substances. While the TEAP reported policy, economic, and accessibility barriers to the widespread use of available technologies, HAT countries shared practical considerations regarding "the realities on the ground," pointing out that it is simply too hot to do maintenance and other LRM work during summer months, when temperatures can reach 70°C on the roofs of buildings. Parties will gain further insights at a one-day workshop dedicated to LRM on 27 October 2024, just ahead of the COP/MOP.

Other implementation issues on the agenda included combating illegal trade of controlled substances, where observers noted a degree of distrust unusual in the Montreal Protocol "family." While developed countries wanted to improve licensing systems for the trade of controlled substances, a few developing countries feared this could open the door for a hidden focus on cases of potential non-compliance.

Overall, the implementation challenges of the ODS phase out and HFC phase down were quite visible to scientists and delegates alike. Some observers interpreted this as a good sign that parties are not resting on the laurels of the Protocol's successes, but they recognize the need to head off future challenges at this crucial time when the Kigali Amendment's HFC freeze and phase down for some Article 5 countries has already begun.

Preventative Care

While some parties focused on monitoring and HFC-related issues, others pressed for further expansion of the Montreal Protocol to prevent potential setbacks to the health of the ozone layer. At OEWG 46, these discussions focused on two topics the Protocol does not currently regulate: very short-lived substances (VSLS) that are ODS, and fugitive emissions from feedstock uses of controlled substances.

VSLS are fairly new to the Protocol's agenda, and there are scientific uncertainties about their ozone-depleting potential (ODP). SAP explained that unlike long-lived ODS, only a fraction of emitted VSLS reach the stratosphere, where they augment stratospheric chlorine and deplete ozone for months (rather than decades). Despite their relatively low ODP, VSLS could have an impact on the ozone layer given the high and increasing volume of production, consumption, and emissions of these substances.

Some parties raised concern about potential socio-economic impacts of the Protocol regulating certain VSLS, with a few pointing to VSLS uses in the production of polyvinyl chloride (PVC) plastics. Others believed the impact of VSLS on the ozone layer was negligible, although the science does point to some potential impact. On the other end of the spectrum, one delegation noted this issue fell under the general obligation of parties to the Vienna Convention to reduce activities that have a negative effect on the ozone layer, insisting it must be discussed. OEWG 46 delegates considered a draft decision that requests TEAP to provide more information on additional VSLS, as well as range of ODP estimated by the SAP or peer-reviewed scientific literature for all VSLS they have identified. The draft decision further calls on the TEAP to indicate, for each VSLS identified, the contribution to effective equivalent stratospheric chlorine. This information, to be presented in 2025, could provide answers to questions about the importance of addressing VSLS under the Protocol, and opens the door for more focused decision making on this issue at future MOPs.

Feedstock uses of controlled substances were discussed in relation to reports of unexpectedly high levels of fugitive emissions from chemical production processes, which were originally assumed to be negligible. Divisions on tackling feedstock uses revolved around how the regulation of these increasing emissions would

impact important industrial production processes. Observers opined that a pragmatic rather than regulatory approach may be the most promising path forward: if unnecessary emissions of controlled substances used as feedstocks are avoided or reduced through best practice guidance and exemplary case studies, it would not be necessary to amend the Protocol with specific obligations for the use of feedstocks. MOP 36 will need to decide whether the Australia-led proposal for such a pragmatic approach will be acceptable.

Looking Ahead to COP 13 and MOP 36

While expected differences between developed and developing, especially HAT, countries emerged on some agenda items at OEWG 46, it is the role of this body to focus on the science, technology, and economics, which allows delegations to explore options and identify issues needing additional clarification, largely free from political considerations that could come to the fore at the COP/MOP.

However, while the OEWG confirmed the effectiveness of the Protocol lies in its strong footing in scientific assessment, this meeting also demonstrated that "realities on the ground" cannot be ignored. Delegates acknowledged that measures to protect the health of the ozone layer and the climate system need to take into account the very real socio-economic circumstances in countries with widely differing climatic conditions, and include solutions that are pragmatic, practical, and affordable. After all, the health of billions of people depends on the continued effective implementation and adaptation of the Montreal Protocol.

Upcoming Meetings

IPCC 61: This meeting will be the third meeting of the Intergovernmental Panel on Climate Change's (IPCC) seventh assessment cycle. **dates:** 27 July - 2 August 2024 **location:** Sofia, Bulgaria **www:** ipcc.ch/meeting-doc/ipcc-61

CRC 20: The Rotterdam Convention's Chemical Review Committee (CRC) will consider draft decision guidance documents for chlorpyrifos and mercury and review up to 33 notifications of final regulatory action and four proposals for listing severely hazardous pesticide formulations in the Convention. **dates:** 17-20 September 2024 **location:** Rome, Italy **www:** pic.int

POPRC 20: The Stockholm Convention's POPs Review Committee (POPRC) will consider a proposal to list polyhalogenated dibenzo-p-dioxins and dibenzofurans (PXDD/PXDF) in Annex C to the Convention, and will review the draft risk management evaluation for chlorpyrifos. POPRC also will discuss: information provided by parties and observers on long-chain perfluorocarboxylic acids and related compounds and medium-chain chlorinated paraffins, and POPs in stockpiles, products and articles in use and in wastes. **dates:** 23-27 September 2024 **location:** Rome, Italy **www:** chm.pops.int

Summit of the Future: The event will explore "multilateral solutions for a better tomorrow" and adopt the "Pact for the Future," an action-oriented declaration of solidarity with present and future generations. **dates:** 22-23 September 2024 **location:** UN Headquarters, New York **www:** un.org/en/common-agenda/summit-of-the-future

Workshop on Life-cycle Refrigerant Management: The Ozone Secretariat will convene this workshop in advance of MOP 36 to inform delegations' consideration of this topic. **date:** 27 October 2024 **location:** Bangkok, Thailand **www:** ozone.unep.org/meetings/workshop-life-cycle-refrigerant-management

Montreal Protocol MOP 36/Vienna Convention COP 13: The combined MOP 36 and thirteenth meeting of the Conference of the Parties to the Vienna Convention will discuss issues related to implementing the Convention and the Montreal Protocol on Substances that Deplete the Ozone Layer. **dates:** 28 October - 1 November 2024 **location:** Bangkok, Thailand **www:** ozone.unep.org/meetings/thirty-sixth-meeting-parties

For additional upcoming events, see: sdg.iisd.org

Glossary

CFCs	Chlorofluorocarbons
COP	Conference of the Parties
CRP	Conference room paper
CTC	Carbon Tetrachloride
DCM	Dichloromethane
EEAP	Environmental Effects Assessment Panel
ExCom	Executive Committee of the Multilateral Fund
FSM	Federated States of Micronesia
FSTOC	Fire Suppression Technical Options Committee
GEF	Global Environment Facility
GTF	General Trust Fund for Financing Activities on Research and Systematic Observations relevant to the Vienna Convention
GWP	Global warming potential
HAT	High ambient temperature (countries)
HCFCs	Hydrochlorofluorocarbons
HCFO	Hydrochlorofluoroolefin
HFCs	Hydrofluorocarbons
HFO	Hydrofluoroolefin
LRM	Lifecycle refrigerant management
MBTOC	Methyl Bromide Technical Options Committee
MCTOC	Medical and Chemical Technical Options Committee
MDI	Metered-dose inhaler
MEA	Multilateral environmental agreement
MLF	Multilateral Fund
MOP	Meeting of the Parties
ODP	Ozone depleting potential
ODS	Ozone depleting substances
OEWG	Open-ended Working Group
PCE	Perchloroethylene
PFAS	Per- and polyfluoroalkyl substances
pMDI	Pressurized metered-dose inhaler
QPS	Quarantine and pre-shipment
RACHP	Refrigeration, air conditioning and heat pumps
RRRD	Recovery, recycling, reclamation and destruction
RTOC	Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee
SAP	Scientific Assessment Panel
TCE	Trichloroethylene
TEAP	Technology and Economic Assessment Panel
TFA	Trifluoroacetic acid
TOC	Technical Options Committee
UNEP	United Nations Environment Programme
UV	Ultraviolet
VSLS	Very short-lived substances
WMO	World Meteorological Organization