TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL (TEAP)

2026 Progress Report

TEAP Co-chairs:
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48th OEWG
Bangkok, 13-17 July 2026

OUTLINE OF PRESENTATION

- Sector updates
- PFAS updates
- Follow-up on Decision XXXV/20: Options for organization of the TEAP and its Technical Options Committees (TOCs)
- TEAP procedures and organizational matters

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2026 TEAP REPORTS

- The 2026 TEAP Report consists of four volumes:
  Volume 1: TEAP 2026 Progress Report (for OEWG-48)
  - Sector updates (Decisions IV/13 and XI/17)
  - TEAP procedures, organizational matters, and matrix (Decision XXXI/8)
  - Decision XXXV/20: Options for organization of the TEAP and its Technical Options Committees (TOCs)
  - Decision XXXVI/2: Life-cycle refrigerant management (LRM)
  - Decision XXXVI/6: Developments regarding metered-dose inhalers (MDIs) with low-global warming potential propellants
- Volume 2: TEAP May 2026: Assessment of the Funding Requirement for the Replenishment of the MLF for the Period 2027-2029
- Volume 3: TEAP September 2026: Response to Decision XXXVII/2: Emissions of HFC-23 (for MOP 38)
  Volume 4: TEAP September 2026: Supplement to the May 2026 TEAP Replenishment Task Force Report (for MOP 38)

TEAP MEMBERSHIP 2026

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TEAP acknowledges the contributions of over 150 volunteer experts working on its TOCs and TSBs

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COMMON ACRONYMS

- A5 : Article 5 parties
- Non-A5: Non Article 5 parties
- HCFC: Hydrochlorofluorocarbon
- HFC: Hydrofluorocarbon
- HFO: Hydrofluoro-olefin
- HCFO: Hydrochlorofluoro-olefin
- HC: Hydrocarbon
- GWP: Global warming potential
- SMEs: Small and Medium Sized Enterprises
- VOCs: Volatile Organic Compounds

TEAP 2026 PROGRESS REPORT

Fire Suppression TOC (FSTOC)

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FSTOC 2026 PROGRESS REPORT

- The FSTOC is not aware of any new fire suppression/extinguishant agents under active development. If an agent is identified, it will take at least 10 years for full commercialization.
- The status of halon alternatives in civil aviation is unchanged. Both engines and cargo compartments are still reliant on halon 1301
- The HFC phasedowns are putting price pressure on the higher-GWP HFCs used in fire suppression, which are the only halon alternatives in some applications
- Inert gases are increasingly being used as HFC alternatives in some parties but they require more space and are heavy. Very high-pressure systems (up to 300x atmospheric pressure) can reduce the weight and space requirements. However, the capabilities for refilling high pressure fire suppression systems are not available in many parties, especially A5 parties.
- The inability to refill a fire suppression system, following a discharge or leakage, undermines the system's viability

TEAP 2026 PROGRESS REPORT

Decision XXXVII/4: Halon availability and global distribution of halon banks

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Decision XXXVII/4 requests:

… that the Ozone Secretariat liaise with the secretariat of the International Civil Aviation Organization on the matter of fire suppression agents controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer and facilitate the exchange of information between the Technology and Economic Assessment Panel, through its Fire Suppression Technical Options Committee, and the relevant International Civil Aviation Organization technical committees and working groups in order to allow the Panel to:

a) Better assess the future use of and need for halons in civil aviation, making use of, among other things, available data on the locations of the maintenance, repair and overhaul operations authorized to service halons, data on future fleet evolution and estimates regarding aircraft in operation with different types of halon fire protection systems;

b) Submit a report on halon availability and the global distribution of halon banks, based on the above-mentioned activities, to the parties in advance of the forty-eighth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol;

RESPONSE TO DECISION XXXVII/4

- Civil aviation installed quantities are still increasing and projected to grow for the foreseeable future. Current aircraft designs in production will rely on halon 1301 for at least 50 years, well beyond the FSTOC projected run-out date
- The FSTOC halon 1301 global emissions model continues to compare well with emissions derived from atmospheric measurements through 2024, when considering a 26% emission rate of feedstock production
  - Allows the run-out date estimate to match FSTOC modeled global emissions from 2015 – 2024
- International Civil Aviation Organization (ICAO) Resolution A-42: *Encourages* States, with ICAO, to liaise with UNEP Ozone Secretariat, and FSTOC, to **assess** global halon reserves and support the sustainable management of existing halon banks, including an essential use nomination for halon1301 in aircraft cargo compartments
- In response to Decision XXXVII/4 and Resolution A42-11, FSTOC continues working with ICAO bodies to obtain better data to refine the run-out date
- This update is based on the latest aviation data provided by ICAO bodies / aviation industry, oil and gas, nuclear power plants and shipbreaking

Approach 1: Set emission rates except for aviation

Available Bank, tonnes	Set Emission Rates	Derived Aviation emission %	Run-out date
4,170 - 9,296	0.15% for Japanese systems 1 – 2% for Oil and Gas 0.1% for Reserves 2 -3% for other installed uses	10% - 15%	2031 – 2039 2035 ± 4

Approach 2: Set emission rates except for other installed systems

Available Bank, tonnes	Set Emission Rates	Derived Installed Systems emission %	Run-out date
5,279 - 8,313	0.15% for Japanese systems 1 – 2% for Oil and Gas 0.1% for Reserves 8.5% - 12% for Aviation	2 - 4%	2033 – 2037

RESPONSE TO DECISION XXXVII/4 (3)

- It is important to note that in 1993 and 1994, the HTOC, evaluated EUNs and found the following, **which the FSTOC believes remains valid in the near term**:
- *"…there were no nominations that could satisfy the requirement that halons are not available in sufficient quantity and quality from existing stocks of banked or recycled halons."* per Decision IV/25
- **In support of ICAO Resolution A42-11** and the global nature of civil aviation servicing, parties may wish to consider determining what, if any, changes may be needed to the Essential Use Nomination (EUN) and Evaluation Processes, given that most, if not all, parties will be unable to determine their annual civil aviation needs for aviation safety.
- Work in progress:
  - Member State / Party letter
  - Additional emission data
  - MROs (aircraft service centers)

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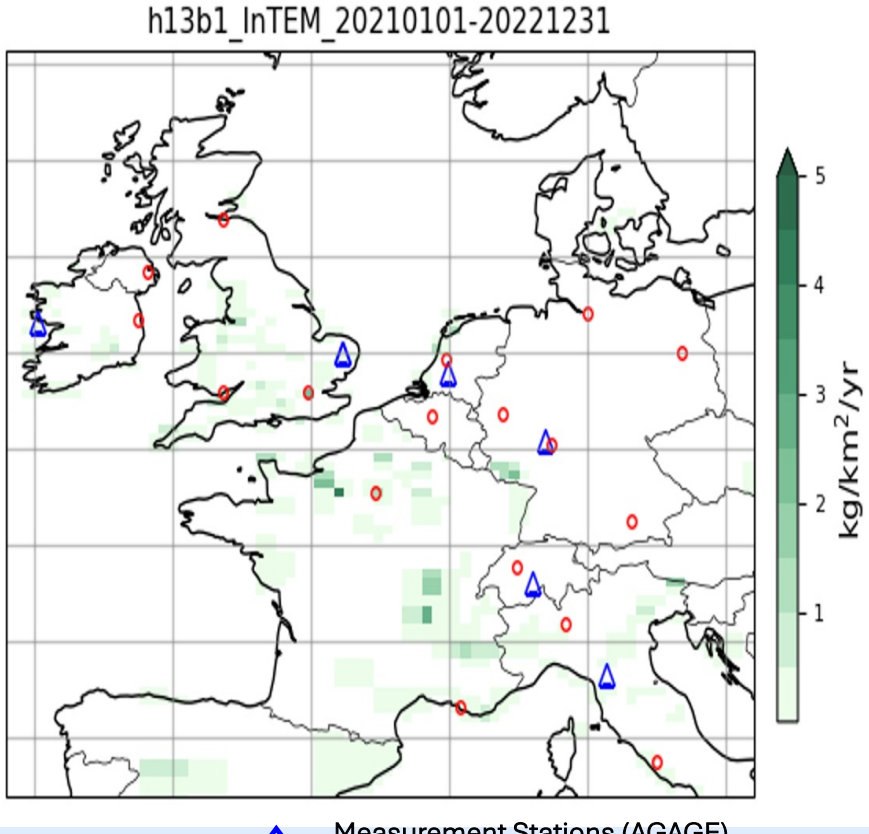
MRO LOCATIONS AND HALON 1301 EMISSION "HOT-SPOTS"



Measurement Stations (AGAGE)

Major Cities

TEAP 2026 PROGRESS REPORT

Flexible & Rigid Foams TOC (FTOC)

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FTOC 2026 PROGRESS REPORT

- Successful transitions are underway for foam blowing agents (FBAs) from HCFCs in A5 parties, and from high-GWP HFCs in non-A5 parties and some A5 parties.
  - There is emphasis on avoiding adoption of high-GWP HFCs where possible.
  - Regulation and supply phase-down are driving transitions.

- Manufacturers of HFO / HCFOs have increased capacity to meet the demand for lower GWP FBAs that is expected to result from regulations.
- There have been improvements in the development and availability of additives, co-blowing agents, equipment and formulations.

FOAM BLOWING AGENT ECONOMICS CONTINUE TO DRIVE SELECTION, BLENDING AND LOADING

Competition is reducing costs of new FBAs and co-blowing agents in both A5 and non-A5 parties.

- Significant effort to optimise the foam characteristics and costs of new FBAs and foam systems through blends and new additives.
- Continued use of HFC-245fa blends in A5 parties due to cost of HFO/HCFO alternatives and there are no regulatory limits yet in many parties.
- Significant costs to requalify foams with new FBA blends.

Many companies have elected to transition away from fluorinated FBAs due to cost of HFCs, HFOs, and HCFOs, provided the foams can still meet insulation performance and other criteria

Non-fluorocarbon components (e.g., Hydrocarbon (HC), methylal, methyl formate, and methylene chloride) are blended with fluorocarbons (FCs) to reduce costs

HEALTH AND SAFETY CONSIDERATIONS OF NEW FBAS

FBAs which are flammable or are toxic create new safety concerns for workers at system houses and foam manufacturers (especially SMEs), as well as for end-users.

Hydrocarbon FBAs are increasing.

- Some SMEs have reportedly adopted HC FBAs without adequate safety measures (non-sparking tools and practices, electrical upgrades etc.)
- VOC restrictions may limit HC use, both in manufacturing sites and end uses

1,2 dichloroethylene (1,2-DCE) use in PU foam is currently being reviewed by at least one party in view of toxicity. Indoor air quality studies show ambient 1,2-DCE concentrations for years after installation of spray foam.

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Methyl Bromide TOC (MBTOC)

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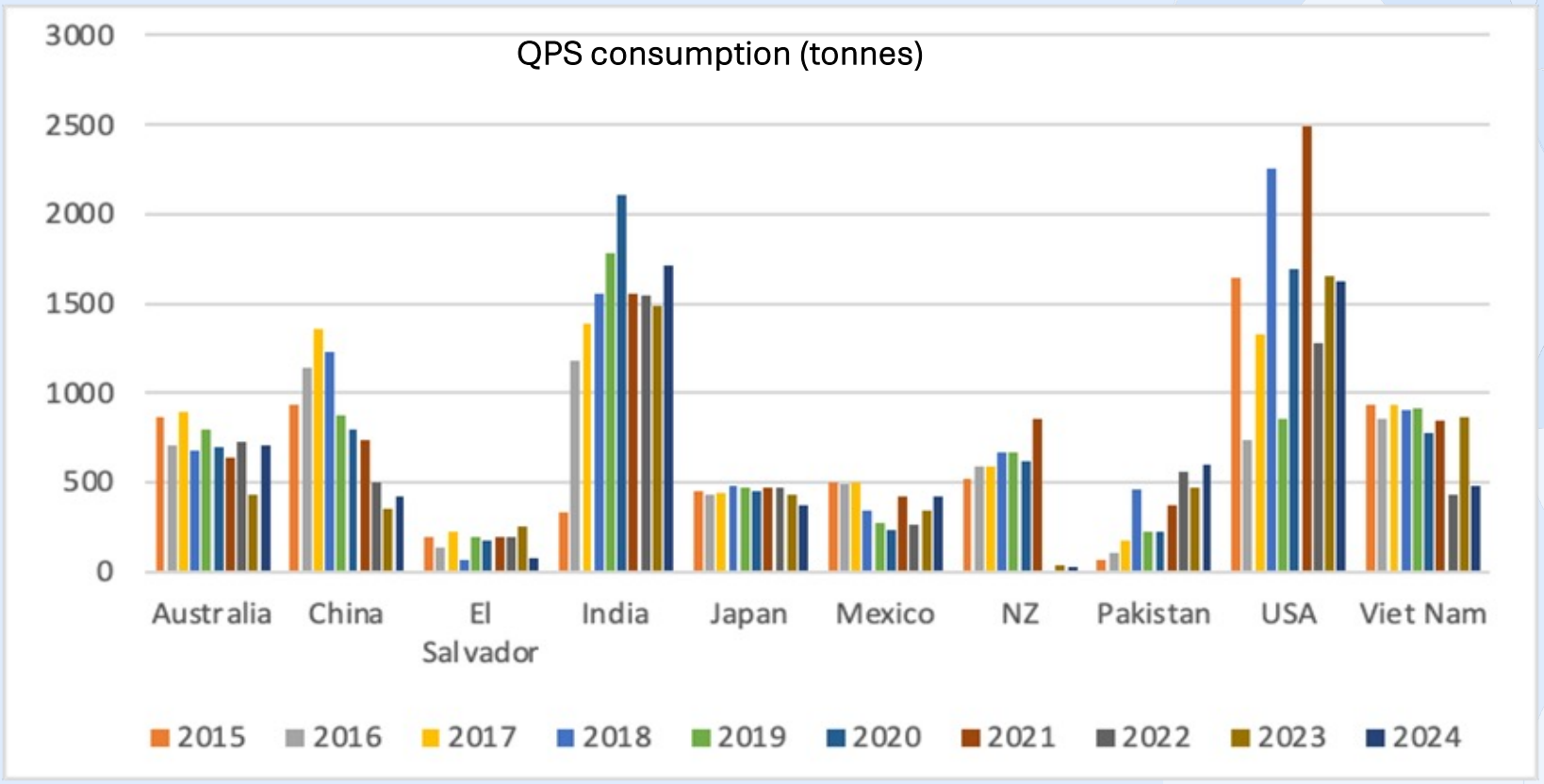
MBTOC 2026 PROGRESS REPORT

- Phase out of methyl bromide (MB) for controlled non-quarantine and pre-shipment (non-QPS) uses was completed with the last critical use nomination (CUN) received in 2025. No new CUNs received in 2026
- Together with the MB phase out achieved prior to the CUN process, 62,000 tonnes of MB have been phased out globally over 30 years.
- Latest reported global production of MB for QPS (in 2024) was 8,935 tonnes, 900 tonnes greater than QPS consumption in that year.
- Atmospheric concentrations of MB have stopped declining as QPS uses and emissions continue unabated.
- Improved accuracy of reported data is essential for TEAP to be able to compare bottom-up and top-down estimates of MB emissions.
- MB is highly toxic to humans, and increasingly subject to controls for occupational exposure. Several parties are introducing stringent reductions in permitted workspace exposure concentrations for MB which will impact future QPS uses (e.g. increased monitoring, larger buffer zones, etc.).

MB QPS USE: TREND IN LAST DECADE

The top 10 major user parties of MB for QPS by amount (shown below) account for 88% of global use. India and the US account for over 40%, New Zealand and China have sharply reduced consumption, whilst India and Pakistan have increased consumption considerably.



QPS USE – EXEMPTED FROM MP CONTROLS

- Quarantine (Q): MB use for specific quarantine pests will likely be required in the long-term in many jurisdictions. Over 6,000 tonnes of MB are emitted from these uses, but these can be avoided.
- Pre-shipment (PS): Virtually all PS uses (~3000 tonnes) have effective alternatives to MB. (e.g., hot and cold temperatures, irradiation, phosphine, ethyl formate, hydrogen cyanide, ethane dinitrile) and are safer for humans, the environment, and the products being treated.
- Parties may wish to consider how to:
  - Reduce emissions from all QPS uses
  - Limit MB exemptions for preshipment (PS) uses to encourage uptake of effective alternatives
  - Focus on Q uses to ensure effective alternatives can be developed
  - Improve accuracy of reporting of MB volumes for Q versus PS uses

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Medical & Chemicals TOC (MCTOC)

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MCTOC 2026 PROGRESS REPORT: PRODUCTION FOR FEEDSTOCK USES

- The use of controlled substances as feedstock in the manufacture of other chemicals is not subject to the control measures of the Montreal Protocol.
- Total reported ODS production and import for feedstock uses was 1.95 million tonnes in 2024 compared to 1.97 million tonnes in 2023 (including process agents).
- Since 2020, the increase in ODS as metric tonnes is mainly due to the increased use of HCFC feedstocks, such as HCFC-22, with lower ODPs.
- Reported production for feedstock uses in ODP tonnes was at a maximum in 1993 (712,170 ODP tonnes), and a minimum in 1998 (328,902 ODP tonnes). In 2022, the quantity peaked at 684,711 ODP tonnes, less than the maximum in 1993.
- The reported amounts of HFCs produced for feedstock use increased from 183,539 tonnes in 2023 to 211,326 tonnes in 2024, mainly due to HFC-152a.

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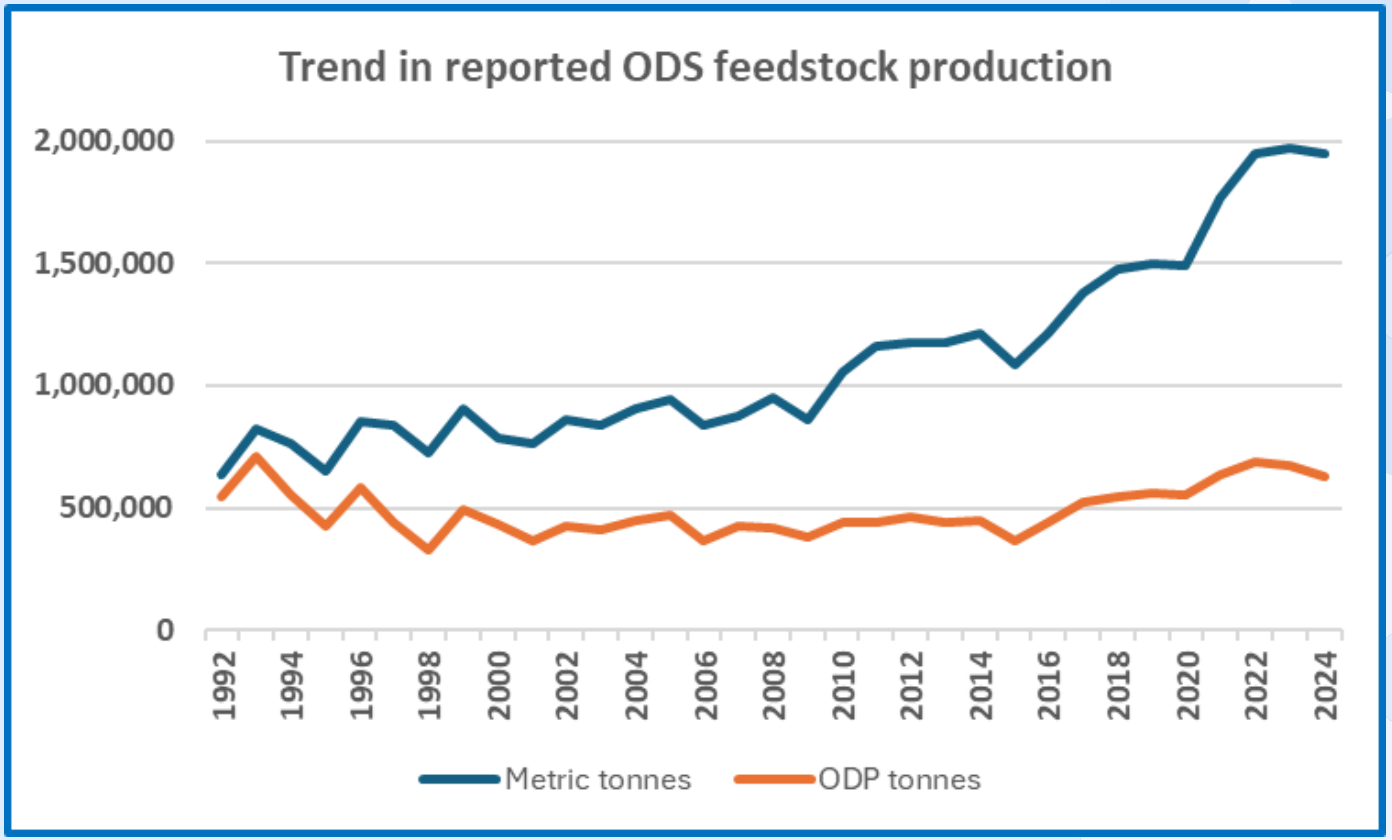
TRENDS IN REPORTED ODS FEEDSTOCK PRODUCTION 1992 - 2024



PARTIES' DECISIONS ON DESTRUCTION TECHNOLOGIES

- The Montreal Protocol does not mandate destruction of controlled substances, except for HFC-23 generated in manufacturing facilities.
- Destruction technologies are approved by parties for purposes of reporting amounts of controlled substances destroyed within the definition of production used under the MP.
- Parties have taken several decisions to approve destruction technologies. Over time, the list of destruction technologies approved by parties has been updated, with the current list in Annex II of the report of MOP-30 and as modified by Decision XXXV/5.
- Decision XXXV/5, parties are invited to submit information to the Ozone Secretariat relevant to a review of destruction technologies.
- Decision IV/11, TEAP is requested to evaluate technology submissions and prepare recommendations for consideration by the parties to the Montreal Protocol at their annual meeting.

TEAP EVALUATION OF DESTRUCTION TECHNOLOGIES

- According to decision XXX/6 preamble, TEAP evaluates destruction technologies based on destruction and removal efficiency.
- TEAP also provides technical advice about emissions of other pollutants and the technical capability of destruction technologies.
- TEAP evaluation is according to technical performance assessment guidance and advisory criteria outlined by MCTOC in 2022 TEAP Progress Report, Volume 1.

DESTRUCTION TECHNOLOGIES: CANADA SUBMISSION

- Canada submitted information to the Ozone Secretariat regarding a patented Steam Plasma Arc technology for evaluation by TEAP.
- MCTOC evaluated the technology on behalf of TEAP and provided its evaluation and recommendation in TEAP's progress report for parties' consideration.
- Although this technology appears technically similar to previously approved argon and nitrogen plasma arc technologies that can also use steam, MCTOC considers this technology to be a distinct category in the listing of approved technologies.
- Data submitted for this technology is for a more limited range of controlled substances than those approved for other approved plasma arc technologies.
- Parties may wish to consider that the technology, Steam Plasma Arc, proposed by Canada be approved for destruction of concentrated sources of Annex A Group 1, Annex C Group 1, Annex F Group 1 controlled substances for the purposes of the Montreal Protocol.

TEAP 2026 PROGRESS REPORT

Decision XXXVI/6: Developments regarding MDIs with low-GWP propellants

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DECISION XXXVI/6: DEVELOPMENTS REGARDING METERED-DOSE INHALERS WITH LOW-GLOBAL WARMING POTENTIAL PROPELLANTS

Decision XXXVI/6 from the 36th Meeting of the Parties reads,

Noting with appreciation the work done by the [TEAP] and tits [MCTOC], as reflected in the 2022 quadrennial report of the Panel and the 2023 progress report of the Committee, in relation to [MDIs],

Noting the range of issues and potential challenges identified by the [MCTOC] that could emerge in the transition away from [high-GWP] propellants currently used in [pMDIs],

Recalling that the Kigali Amendment…is not prescriptive about which uses of [HFCs] parties should phase down first,

Recognizing that access to [MDIs] represents a public health concern and should be preserved from critical shortages and abrupt price increases,

And requests the TEAP:

….to continue to provide in its annual progress reports updated information on [low-GWP MDI] propellants and to complement its 2026 quadrennial assessment report with timely information, including on the availability, technical feasibility, economic viability, safety, and market penetration of those propellants in parties operating under paragraph 1 of Article 5…and in parties not so doing;

DECISION XXXVI/6: MDI UPDATE

- Pressurised metered-dose inhalers (pMDIs), dry powder inhalers (DPIs), aqueous soft mist inhalers (SMIs), and other delivery systems, such as nebulisers, all play a role in the treatment of asthma and chronic obstructive pulmonary disease.
- pMDIs globally are estimated to account for about 70% of all doses prescribed.
- The transition from high- to lower GWP propellants in pMDIs presents many challenges in addition to the key objectives of ensuring safety and efficacy of the new inhalers, including:
  - the context of global environmental legislation;
  - the continuity and stability of supply of pharmaceutical grade HFCs;
  - the continued availability and affordability of alternative devices;
  - regulatory approval and launch of lower GWP pMDIs;
  - and patient acceptability.

DECISION XXXVI/6: GLOBAL DEVELOPMENTS IN TRANSITION

- Two pharmaceutical-grade lower GWP propellants, HFC-152a and HFO-1234ze(E), are in research and development for a range of drugs in pMDIs. Both needed.
- At least ten companies globally have indicated they are developing pMDIs containing lower GWP propellants, HFC-152a and/or HFO-1234ze(E), including:
  - Three companies in India and one in Bangladesh.
  - Several generics manufacturers in Latin America.
- Two companies in China have initiated development of propellant HFO-1234ze(E) manufacture.
- After major effort, the first pMDI containing HFO-1234ze(E) has launched in the United Kingdom (UK). pMDIs containing HFO-1234ze(E) have now also been approved for patient use in Australia, Europe and New Zealand. Another two pMDIs have been filed for approval in the UK.
- Three additional products have successfully completed clinical studies with the intention to obtain marketing authorisation.
- Three major pharmaceutical companies are involved in these developments.

DEC. XXXVI/6: POTENTIAL CHALLENGES WITH TRANSITION IN LMICS

- Respiratory professionals remain concerned about persistent gaps in access and affordability of treatments that affect low- and middle-income countries (LMICs) in A5 markets.
- Small changes in the price of inhalers can have a disproportionate impact on patients in these settings, making even modest cost increases a significant barrier to respiratory care.
- These challenges have prompted continued advocacy by professional and patient organizations to improve registration, strengthen supply chains, and promote fair and sustainable pricing for better overall healthcare outcomes in LMICs.
- In context of HFC transition, SMEs in LMICs are particularly vulnerable; without access to technology licenses, investment for scale-up, or regulatory expertise, many could struggle to transition to lower GWP formulations, further widening global inequalities.
- Consolidation or partnerships with larger contract manufacturing organizations may be a viable way for SMEs to supply their markets while keeping essential inhalers accessible and affordable.
- Existing suppliers in India and China can provide security of supply for pharmaceutical-grade HFC-134a in LMICs to allow transition. HFC phase-down schedules and competing RACHP sector demand create supply and price risks for pharmaceutical-grade HFC-134a.

TEAP 2026 PROGRESS REPORT

Refrigeration, Air Conditioning & Heat Pumps TOC (RTOC)

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CROSS-CUTTING TOPICS

- The growing global demand for refrigeration, air conditioning, and heat pump (RACHP) systems creates a dual climate challenge from both direct refrigerant leakage and indirect electricity consumption, requiring comprehensive lifecycle assessments.
- Reducing cooling and heating loads through passive measures such as insulation and shading is the most critical first step, capable of cutting cooling demand and energy consumption by approximately 30% and reducing the amount of refrigerant needed, enabling Kigali compliance.
- There is no single "ideal" refrigerant; selection requires balancing multiple factors, including environmental impact, legal and regulatory obligations, safety requirements, performance, materials compatibility, component availability, affordability, and access to competent technicians.
- Seven new blends were approved last year and are listed in Table 6.1 of the PR.

CROSS-CUTTING TOPICS (CONTD.)

- Strengthening of national systems for collecting RACHP-related data would improve modelling accuracy on RACHP banks, consumption and emissions, and enable evidence-based mitigation
- Safety standards continue to be updated to include more types of systems as well as improve safety.

Table 6.2 Summary of current status of selected RACHP safety standards

Standard	Scope	Latest Status	Key Developments
ISO 5149 (series)	All RACHP systems	Under revision	Inclusion of new risk mitigation concepts (e.g., releasable charge, updated test methods)
IEC 60335-2-40	ACs, HPs	Under revision	Expanded provisions for flammable refrigerants, charge limits, mitigation measures
IEC 60335-2-89	Commercial refrigeration appliances	Under revision	Inclusion of split systems, small cold rooms using flammable refrigerants
ISO 14903	Component/system integrity	Revised (2025)	Updated methods for leak tightness qualification

COMFORT COOLING AND HEATING

- Extreme weather events and increased urbanisation in HAT countries increase demand for cooling equipment and associated direct and indirect emissions.
- Reducing energy consumption is key in comfort cooling, with a global trend toward inverter compressors (for variable capacity). This technology remains under-represented in many A5 and some non-A5 parties.
- Integrated systems for combined heating and cooling, common in larger district size heating and cooling applications, can improve overall energy efficiency by 30-50% and reduce CO_{2e} emissions by replacing fossil fuel heating.

THE COLD CHAIN AND NOT-IN-KIND TECHNOLOGIES

- In commercial refrigeration: significant shift away from R-404A toward CO_2 particularly in lower ambient temperature countries like those in Europe. In other regions, lower GWP A2L refrigerants are being adopted along with CO2 and HC-290 in small charge systems.
- In industrial refrigeration, ammonia is preferred and CO_2 adoption is growing.
- Transport refrigeration faces slower transition due to safety, infrastructure, and long equipment lifecycles.
- Except for absorption and adsorption, non-vapour compression (not-in-kind) technologies remain at emerging or research and development stages.

DECISION XXXVI/2: LIFE-CYCLE REFRIGERANT MANAGEMENT

Decision XXXVI/2 from the 36th Meeting of the Parties reads,

Taking note with great appreciation of the 2024 report of the T{TEAP] prepared in response to decision XXXV/11,

Taking into consideration the discussions and presentations at the workshop on [LRM] held on 27 October 2024,

Cognizant of the ongoing work by parties following decision 91/66 of the Executive Committee of the Multilateral Fund…establishing a funding window to support the preparation of national inventories of banks of used or unwanted controlled substances and a plan for the collection, transport and disposal of such substances, including consideration of recycling, reclamation and cost-effective destruction,

And requests the TEAP:

…. to include updated relevant information on [LRM] in its 2025 and subsequent progress reports, including the 2026 quadrennial assessment report, taking into account discussions at the Thirty-Sixth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer;

DECISION XXXVI/2: LRM UPDATE

- Servicing is critical to achieving both ozone protection and climate mitigation
  - Effective installation and proactive servicing enhance system efficiency, safety, and longevity.
  - Rigorous refrigerant management directly reduces emissions, energy use, and lifecycle costs.
- Servicing, however, faces a deepening skills gap
  - There is chronic shortage of trained technicians due to retirement of experienced technicians, insufficient training programmes and slow entry of new professionals.
  - Technicians also need to be incentivised to recover refrigerant rather than release.

DECISION XXXVI/2: LRM UPDATE

- In the transition to lower GWP, flammable refrigerants (A2L and A3 refrigerants) are now mainstream
  - Safe handling requires specialised training in plume dispersion, ventilation, and leak detection, plus access to calibrated, explosion-proof tools.
  - Standards exist for safe use of flammable refrigerants, but enforcement is uneven.
  - Without enforcement of safety measures, the risk of accidents increases, potentially undermining confidence in lower GWP technologies.
- Growth in IoT, and digitalisation have turned equipment into data-rich assets - Technicians now read real-time sensor data, moving from reactive calls to predictive and proactive maintenance.
  - Hence, there is a need to retrain existing staff and new entrants on hybrid curriculum blending mechanical and electronics.

DECISION XXXVI/2: LRM UPDATE

- LRM has become an important policy tool supporting the Kigali Amendment through refrigerant inventory tracking, leak prevention, reclamation, and destruction.
  - LRM could reduce refrigerant emissions in 2050 by ~50% under a Kigali-compliant scenario.
  - The EU, Japan, the USA are examples of parties with LRM policies, but their effectiveness depends on strong reverse supply chains, including refrigerant recovery, reclamation, and destruction.
  - New Zealand is moving toward a new regulated product-stewardship and destruction scheme.
  - Challenges remain in developing economies and small island states, where limited and diffuse reclamation and destruction capacity, weak cylinder return systems, and insufficient technician training constrain effective implementation.
- The 2026 RTOC AR will provide information on RACHP servicing and LRM.

TEAP 2026 PROGRESS REPORT

Per- and poly-fluoroalkyl substances (PFAS): Emerging policies and sector information

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PFAS BACKGROUND

- In public discourse, the term “PFAS” has become broadly equated with the term “forever chemicals”, which incorrectly implies long-term adverse impacts. There is a misconception that all PFAS and their breakdown products are persistent, bioaccumulative, toxins (PBTs).
- Two examples of long chain PFAS which are PBTs i.e perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). PFOA and PFOS are prohibited in many jurisdictions and under the Stockholm Convention.
- PFOA and PFOS are not directly relevant to the Montreal Protocol, but they have driven broad regulations that could impact the availability of Montreal Protocol controlled substances and their alternatives.
- Montreal Protocol controlled substances and their alternatives are not PBTs.
- Trifluoroacetic Acid (TFA) is a breakdown product of some HFCs and HFOs, and is considered a PFAS under some, but not all definitions.
- TEAP is coordinating with EEAP and SAP on the scope of information on this topic to be covered by each panel’s assessment for 2026.

PFAS DEFINITIONS DETERMINE REGULATIONS AND THEIR IMPACT

- Individual PFAS chemicals have different toxicity, environmental impacts, and breakdown products
- Contrasting regulatory approaches in different jurisdictions arise from the use of different PFAS definitions
  - Classifying chemicals based on chemical structure (not impact on health / environment), may result in a non-discriminatory ban of a broad range of chemicals, including Montreal Protocol controlled substances and alternatives
  - Focus on specific PFAS with known PBT properties (e.g., PFOA and PFOS) excludes Montreal Protocol controlled substances and alternatives
- Jurisdictions that adopt broad bans may limit available or planned alternatives to Montreal Protocol controlled substances

BROAD PFAS REGULATIONS: IMPLICATIONS FOR MONTREAL PROTOCOL

- Montreal Protocol controlled substances and their alternatives, as well as certain fluorinated materials (e.g., polymers) used in foam (e.g., insulation), fire suppression (e.g., in aircraft), refrigerants used in RACHP, aerosols, medical aerosols (e.g., MDIs), solvents, electronic manufacturing, and magnesium production, may be affected by proposed and enacted regulations that incorporate broad PFAS definitions, including:
  - Fluoropolymers (e.g., PTFE/Teflon) are widely used in equipment (e.g., compressors, valves, seals) and products (e.g., MDIs). Any restrictions may negatively impact the use of all refrigerants (including CO2, ammonia and propane), fire suppressants, foam blowing agents, aerosols etc.
  - Some Fluorocarbons that are needed to meet Montreal Protocol phase out and phase down obligations
- The uncertainty arising from broad regulations and potential exemptions/timing are delaying progress in investment in transition, and could impact the Kigali timetable

FSTOC - IMPACTS OF POSSIBLE PFAS REGULATIONS

- Civil Aviation
  - Civil aviation is quite concerned that the leading cargo compartment alternative is not viable for the long term , as it contains 2-BTP, which is a PFAS under some definitions
  - ICAO Resolution A42-11 removed the 2024 mandate to not use halon 1301 in cargo bays of entirely new aircraft designs
- Other Fire Suppression Sectors
  - A potential halon and high-GWP HFC replacement, HB-55, has been withdrawn
  - In some parties, uncertainty arising from proposed PFAS regulations, has led to continued or even an increased use of HFC-227ea, slowing down transition to FK-5-1-12, which can impact Kigali Amendment Obligations. An example is in nuclear power plants that continue to install HFC-227ea and not transition to FK-5-1-12.

IMPACT OF BROAD PFAS REGULATIONS: FOAMS/BLOWING AGENTS

- There is no single perfect FBA. There are advantages and disadvantages for every FBA option, which vary for each end-use of foams and for different foam manufacturing methods and location. FBAs acceptable in one application to meet foam structural or insulation requirements may not be acceptable for other uses.
- The number of FBA blends is increasing as manufacturers work to reduce costs while still achieving desired performance. Reducing available alternatives will make the already complex FBA selection process more challenging.
- Some companies and other stakeholders are delaying decisions regarding selection of fluorinated alternatives to HFCs and HCFCs because of uncertainty about how HFO/HCFO alternatives might be limited by proposed regulations.

IMPACT OF BROAD PFAS REGULATIONS: MEDICAL AND CHEMICAL

- Aerosols, pressurised metered-dose inhalers (pMDIs), solvents, semi-conductor and other electronics manufacturing, and magnesium production could be impacted.
- Estimated global consumption of HFC propellants in pMDIs and other aerosols was 56,000 tonnes in 2021.
- Both manufacturers and patients will need to transition to lower GWP pMDIs because Annex F HFCs are being phased down under the Kigali Amendment.
- 50% of global pMDIs are made in Europe where regulations are proposed to limit availability of HFCs from 2030 onwards.
- Two new pharmaceutical-grade lower GWP propellants, HFC-152a and HFO-1234ze(E). Both needed.
  - HFC-152a ~ 10% of carbon footprint of HFC-134a; Annex F HFC under Kigali phase-down; not PFAS.
  - HFO-1234ze(E) < 1% of carbon footprint of HFC-134a and HFC-152a; under broad PFAS definitions.
- Transition is underway. Uncertainty about long-term availability of lower GWP propellants and range of options.
- DPIs, SMIs, and nebulisers provide suitable options for many, but not all, patients.
- There are over one billion patients with asthma and COPD whose health requires protection through continued availability of a range of affordable, accessible, and effective inhaled medications.

IMPACT OF BROAD PFAS REGULATIONS: REFRIGERATION, AIR CONDITIONING AND HEAT PUMPS (RACHP)

- The RACHP sector accounts for approximately 90% of global HFCs subject to phase down under the Kigali Amendment. Consequently, refrigerant selection and transition pathways within this sector are central to achieving global climate objectives by phasing down high GWP HFCs and HCFCs.
- Alternatives include HCs, ammonia, CO_2, pure HFOs and HCFOs, as well as blends of lower GWP HFCs with HFOs or HCFOs and with CO_2 or HCs. Each alternative has advantages and limitations. Optimal refrigerant solutions are application specific.
- Non-fluorinated refrigerants can be used safely and effectively in many applications. However, their use is constrained in certain situations by factors such as flammability (e.g., HCs), toxicity (e.g., ammonia), high operating pressures (e.g., CO_2), and especially in medium and large capacity systems, types of applications, densely occupied buildings, retrofit applications, and certain geographic regions.
- Broad PFAS restrictions could

TEAP 2026 PROGRESS REPORT

Decisions XXXI/8: TEAP procedures and organizational matters

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48th OEWG
Bangkok, 13-17 July 2026

BACKGROUND: CURRENT CONFIGURATION AND FUNCTION

- Parties have relied on the TEAP and its TOC experts in all areas of production, consumption and end-use of controlled substances. Today, over 150 volunteer experts serve on the TEAP and its TOCs.
- Expertise is the priority consideration for TEAP and TOCs, and we have generally been successful in recruiting and retaining the balance of voluntary expertise needed to address the issues facing parties.
- The mission of TEAP and its TOCs has evolved as the ODS phase-out and more recently the HFC phase-down have progressed. Accordingly, the membership has also evolved over the years to meet the issues faced by TOCs and the expertise needed to address these.
- TEAP/TOCs pattern of working has changed towards on-line working. This has benefits in terms of cost, organization and continuous working, but consensus requires mutual respect and trust – and it is hard to develop and maintain that essential culture without meeting face to face, especially for new members.
- Annual face to face meetings remain an essential part of TEAP/TOC function and consensus, and in preparing reports in a timely manner for the OEWG and MOP.

TEAP CHALLENGES

TEAP and its TOCs face challenges as they strive to maintain required expertise within gender and geographical balance:

- Securing participation of volunteer experts with independent technical and economic expertise who need to be educated in TEAP's TOR, annual disclosure and conflict of interest requirements, process for consensus, and processes for developing, reviewing, and presenting reports.

- Significant expansion of scope of discussions and decisions taken by parties due to the overlap of the ODS phaseout and HFC phasedown regimes. As a result, TEAP's workload has increased substantially within the same timeframes required for OEWG and MOP documents.

- Substantial attrition of key members through retirement and discontinued support for their participation, with increasing loss of expertise for some of TOCs. Many non-A5 experts do not have funding for travel and subsistence as some parties who do nominate experts do not cover such costs.

- Addressing the funding of travel and subsistence of TEAP/TOC volunteers independent of A5/non-A5 status is critical to the consensus-based process of TEAP's work.

TEAP 2026 PROGRESS REPORT

Decisions XXXV/20: TEAP options for the reorganization of TEAP and its TOCs

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Bangkok, 13-17 July 2026

DECISION XXXV/20

- Dec XXXV/20 asked TEAP “in its progress report prepared ahead of the 47th meeting of the OEWG, provide options on the organization of the TEAP and its TOCs”.
- At an informal group meeting held during the 37th MOP in Nairobi (November 2025), parties requested TEAP to further elaborate on possible options for reorganisation in its 2026 Progress Report.
- TEAP presents some further analysis for the consideration of the parties, particularly on the options preferred by each TOC to address future workload as of 2027. Preferred options reflect current practicalities of managing near-term anticipated changes within the committees over the next few years (i.e., normal attrition, lack of support for participation, recruitment of new members) as well as gaining more experience, for the largest two TOCs, with working through subcommittees structures.
- These options can be revisited in the future as the needs of parties evolve.
- TEAP has also updated its matrix of needed expertise to indicate those areas where gaps have been identified. Nominations from parties to meet the gaps in expertise identified in the matrix would be very helpful to TEAP.

FURTHER CONSIDERATIONS FOR PREFERRED FUTURE TOCS CONFIGURATIONS

- FSTOC believes that the current configuration updated with new/replacement members and identifying an A5 co-chair is the best future configuration to meet the current and future needs of the parties. There have been substantial changes in the fire suppression sector, and in civil aviation and other enduring uses: it is increasingly likely that EUNs will be submitted in the future.
- FTOC believes it is structured and sized appropriately with sufficient expertise to support parties through the remaining transitions of the Montreal Protocol. Once FBA transitions are complete, alternate structures such as reducing the size of the committee or reducing in-person meetings to alternate years may be considered, provided ongoing work on assessments reports can continue to be supported to ensure consensus.
- MBTOC considers that maintaining membership at about 15 - 20 including two co-chairs is the best option, ensuring continuity of expertise and preserving institutional memory. The committee's focus will be on QPS and emissions, but expertise in controlled uses is retained.

FURTHER CONSIDERATIONS FOR PREFERRED FUTURE TOCS CONFIGURATIONS (2)

- MCTOC: the preferred option is to restructure MCTOC with 4 co-chairs and about 40 members in 2 formal subcommittees: (1) Aerosols/Medical and (2) Chemicals. Broad expertise on HFCs and HFOs is currently required especially for the manufacture and supply of bulk propellant. MCTOC considers that other configuration options could be considered in future if it becomes clear that the two subgroups could operate independently with the available expertise, without difficulty or loss of technical balance.

- RTOC: The current structure of the RTOC—comprising a single committee of approximately 40 members and four co-chairs, supported by subcommittees—is functioning very effectively. It fosters strong collaboration and consistently delivers high-quality outputs. the preferred option for RTOC's future configuration is to focus on cross-cutting aspects and general topics relevant to the RACHP sector while continuing with two application subcommittees on (1) Comfort cooling and (2) Cold chain and other applications.

Thank you

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48th OEWG
Bangkok, 7-11 July 2025