

Technology and Economic Assessment Panel

Emerging Issues of Interest to Parties

Bella Maranion, TEAP Co-chair

12th Ozone Research Managers Meeting

TEAP 2024

Member	Party	Members	Party
Bella Maranion (Co-chair)	US	Sergey Kopylov	RF
Marta Pizano (Co-chair)	COL	Roberto Peixoto	BRA
Ashley Woodcock (Co-chair)	UK	Fabio Polonara	IT
Omar Abdelaziz	EGY	Ian Porter	AUS
Paulo Altoe	BRA	Rajan Rajendran	IN
Suely Carvalho	BRA	Helen Tope	AUS
Adam Chattaway	UK	Dan Verdonik	US
Sukumar Devotta	IN	Helen Walter-Terrinoni	US
Takeshi Eriguchi	JP	Jianjun Zhang	PRC
Ray Gluckman	UK	Shiqiu Zhang	PRC
Marco Gonzalez	CR		

Technical Options Committees

Flexible & Rigid
Foams

Fire Suppression

Medical &
Chemical

Methyl Bromide

Refrigeration, Air
Conditioning, &
Heat Pumps

TEAP and its Technical Options Committees (TOCs) bring together the experience and expertise of nearly 150 experts from over 30 countries

2022 ASSESSMENT

2022 Assessment Report

Decision XXXI/2 of the Montreal Protocol requested TEAP quadrennial assessment to consider:

- a) **Technical progress in the production and consumption sectors** in the transition to technically and economically feasible and sustainable alternatives and practices that minimize or eliminate the use of controlled substances in all sectors;
- b) **The status of banks and stocks of controlled substances** and the options available for managing them so as to avoid emissions to the atmosphere;
- c) **Challenges** facing all parties to the Montreal Protocol in implementing Montreal Protocol obligations and maintaining the phase-outs already achieved, especially those on substitutes and substitution technologies, including challenges for parties related to feedstock uses and by production to prevent emissions, and potential technically and economically feasible options to face those challenges
- d) The impact of the phase-out of controlled ozone-depleting substances and the phase down of HFCs on **sustainable development**;
- e) Technical advancements in developing alternatives to HFCs suitable for usage in countries with **high ambient temperatures**, particularly with regard to energy efficiency and safety.

Key Messages: ODS

- Actions under the Montreal Protocol support continued progress in consumer, commercial, industrial, agricultural, medical and military sectors, with ODS no longer consumed in many applications worldwide.
 - The phase-out of HCFC-22 in non- Article 5 (non-A5) parties is essentially complete and progressing in A5 parties.
 - For almost every foam application, commercially available alternatives are used.
 - In methyl bromide, phase out of controlled, non-QPS uses, is virtually complete.
 - In sterilization, controlled substances are likely no longer used.
 - In aerosols, alternatives are available for almost all uses.
 - For refrigeration, air conditioning and heat pumps, alternative zero ODP refrigerants are available for all sectors.
 - The quantity of banks in A5 parties will exceed those in non-A5 parties by the early 2030s; timely efforts to establish effective EOL management capacity would have a significant impact, given the predicted size and growth of banks in larger industrialised A5 parties.

Key Messages: HFCs

- The planned HFC consumption phase-down under the Kigali Amendment, as well as national and regional regulations, are driving industry towards lower-GWP HFC alternatives or not-in-kind technologies, particularly in RACHP and foam applications.
- This presents challenges in finding the best solution for each application, considering factors such as flammability, toxicity, availability, and operating conditions.
- Restricting the growth of products containing high-GWP and energy-inefficient RACHP equipment would reduce both the servicing tail of unwanted high GWP refrigerants, and energy demand.
- Supply shortages of low-GWP alternatives in some sectors coincided with increasing global demand. While these supply issues are less severe now, insufficient supply to meet new regulatory mandates could delay transition away from HFCs.

EMERGING ISSUES

MOP-35 Decisions

- Decision XXXV/6: Updated information on very short-lived substances (VSLS)
- Decision XXXV/8: Feedstock uses
- Decision XXXV/9: Abating emissions of CTC
- Decision XXXV/7: Emissions of HFC-23 (for MOP-36)

Decision XXXV/6: Updated information on very short-lived substances

To request the TEAP, in cooperation with the SAP, to include in its 2024 progress report, for consideration by the Open-ended Working Group of the Parties to the Montreal Protocol at its forty-sixth meeting:

- a) **Updated information on very short-lived substances**, including their ozone-depleting potential and the impact of each of the very short-lived substances on the stratospheric ozone layer, in quantifiable terms;
- b) **Information on alternatives to very short-lived substances** in the main applications for which they are currently used, including information on availability, technical feasibility, economic viability, safety and sustainability.

➤ For OEWG-46

Decision XXXV/8: Feedstock uses

To request the TEAP, in cooperation with the SAP as appropriate, to provide in its 2024 progress report an update on the emissions from feedstock production, as by-products and from feedstock use of controlled substances, including the following:

- a) **Sources of such emissions**, including percentage increases with respect to increased production of controlled substances to be used for feedstock applications;
- b) **A comparison of estimates of annual global emissions of controlled substances by species** based on bottom-up calculations and estimates made by the SAP on the basis of atmospheric observations;
- c) **Methodology adopted for estimating the emissions**;
- d) **Updated information on alternatives**, including information on technical feasibility, economic viability, safety and sustainability;
- e) **Information on best practices and technologies for minimizing emissions.**

➤ For OEWG-46

Decision XXXV/9: Abating emissions of carbon tetrachloride

To request the TEAP, in consultation with the SAP, to provide in its 2024 progress report an update on the emissions of carbon tetrachloride, including the following:

- a) **Emissions by source categories**, including emissions as a percentage of total production of carbon tetrachloride with a description of the methodology used by the Panel;
- b) **Updated information on alternatives** for carbon tetrachloride use as feedstock applications including information on technical feasibility, economic viability, safety, and sustainability;
- c) **Updated information on best practices and technologies for minimizing carbon tetrachloride emissions.**

➤ For OEWG-46

Decision XXXV/7: Emissions of HFC-23 (1)

- 1. To request the SAP to provide an update on HFC-23 emissions** into the atmosphere and atmospheric concentrations to supplement the information in the 2022 quadrennial assessment report, including by reflecting any new information regarding atmospheric monitoring and atmospheric modelling, with its underlying methodology, including in quantifiable terms, with respect to such emissions, and taking into account information reported under paragraph 3 *ter* of Article 7 by all parties that manufacture Annex C, Group I and/or Annex F substances, and to prepare a report on the matter to the Thirty-Sixth Meeting of the Parties to the Montreal Protocol

➤ For MOP-36

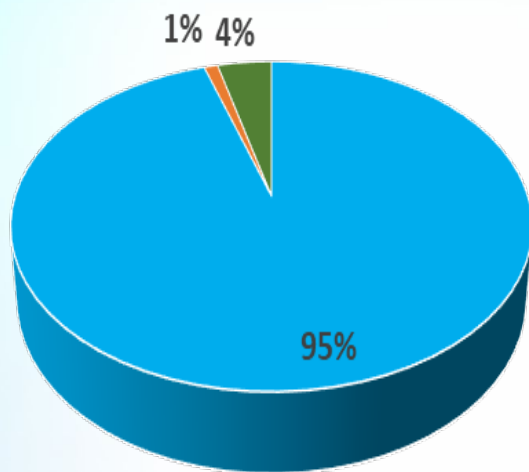
Decision XXXV/7: Emissions of HFC-23 (2)

2. To request the TEAP to prepare a report to the 36th Meeting of the Parties containing information regarding:
 - a) **The quantity of HFC-23 being consumed, by country and by sector;**
 - b) **Updated estimates on the amounts of HFC-23 generated at and emissions from HCFC-22 production facilities** including methodology with respect to such emissions. In preparing this information, the TEAP should take into account information reported under paragraph 3 ter of Article 7 by all parties that manufacture Annex C, Group I and/or Annex F substances, as well as information from other sources;

➤ For MOP-36

TEAP September 2023 Report:

Chemical pathways used to produce Annex C, Group I, or Annex F substances that may generate HFC-23 as a by-product



- HCFC-22 production
- Other Annex C HCFCs and Annex F HFCs production
- Other chemical pathways including eg TFE/HFP production

Contribution to estimated total global HFC-23 by-product generation.

Estimated global generation of HFC-23 as a by-product is around 25,000 tonnes per year for the range of chemical pathways considered in this report.

SAP/TEAP MOP-35 Side Event:

Compilation of information on amounts of HFC-23 emissions from sources considered in this report (tonnes)

Reported emissions from HCFC-22 production (A7 and UNFCCC) (2021)	2572
Potential emissions from other HCFC-22 plant waste streams	100 to 1000
Impurity released from HCFC-22 bank (2020)	40
Estimated emissions from TFE/HFP manufacture	100 to 1000
Electrochemical fluorination (2020)	10 to 100
Emissions from use as feedstock (2021)	10
Fire protection emissions (2022)	50
Low temperature refrigerant emissions (2021)	10 to 100
Semiconductor and electronics manufacture emissions (2021)	90
Total reported and estimated emissions from all sources	3000 to 5000
Emissions from atmospheric monitoring (2020)	16500
Gap between atmospheric monitoring and reported/estimated emissions (2021)	10000 to 12000
Emissions from atmospheric monitoring (2021)	15000
from the presentation by Steve Montzka at OEWG Slide 18	

ORM11 Recommendations Remain Relevant

- Monitoring the success of the Kigali Amendment requires the atmospheric evolution of HFC concentrations to be monitored. It is essential that good geographic coverage of high-quality, systematic measurements is obtained to allow sectoral and regional emission information to be inferred.
- Expanded coverage by global monitoring stations necessary for deriving regional emissions to include new species and parameters, e.g. emerging ODS replacements, short-lived halogenated chemicals, and tracers for atmospheric circulation. i.e., CFC-11.
- Expand “bottom-up” research and information on banks, production facilities, product usage, equipment retirement, etc. could help refine TEAP modelling of emission expectations, and inform the positioning of future observing stations. This includes encouraging the submission of such information from Parties (in-country analyses of past and future markets, consumption, sales, appliance lifetimes, etc.) to enhance the coordination of the SAP and TEAP in their work.