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Helen is co-chair of the Medical and Chemicals Technical Options Committee, and a member of the Technology and Economic Assessment Panel since 1995, providing technical advice on medical and chemicals uses of controlled substances to the Montreal Protocol.

Ms. Helen Tope

Co-Chair Medical and Chemical TOC of the Montreal Protocol

WEBINAR SERIES

CLOSING THE LOOP: ENVIRONMENTALLY SOUND MANAGEMENT OF END-OF- LIFE ODS AND HFC

TEAP assessment of destruction technologies for EOL ODS/HFCs within the Montreal Protocol

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UNIDAD TÉCNICA OZONO
Colombia



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Disclaimer

- Accepted invitation to speak as Co-Chair, Medical and Chemicals Technical Options Committee (MCTOC).
- Views expressed reflect consensus reports of the Technology and Economic Assessment Panel of the Montreal Protocol and the MCTOC.
- I am *not* speaking in a personal professional capacity, as a consultant with Planet Futures.

Overview

- Destruction technologies within the Montreal Protocol.
 - Why are destruction technologies approved by the Montreal Protocol?
- The assessment and approval of destruction technologies by the Montreal Protocol.
 - How are destruction technologies assessed and approved by the Montreal Protocol?
 - Destruction and Removal Efficiency is the key criterion for the Montreal Protocol
 - Other pollutants are important considerations for national/local governments
- Destruction technologies approved by the Montreal Protocol.
- Review of the list of destruction technologies by the Montreal Protocol.

Why are destruction technologies approved by the Montreal Protocol?

- Environmentally sound destruction of surplus or contaminated end-of-life ODS/HFCs avoids unnecessary emissions and helps protect the stratospheric ozone layer and/or the climate and is encouraged by the Montreal Protocol.
- The Montreal Protocol does not mandate the destruction of ODS or Annex F Group I HFCs. The exception is HFC-23 (Annex F, Group II) generated in manufacturing facilities, from which emissions must be destroyed to the extent practicable using technologies approved by the Montreal Protocol.

Why are destruction technologies approved by the Montreal Protocol? (2)

- The Protocol's definition of 'production' of controlled substances subtracts the amounts destroyed from the amounts produced. The use of destruction technologies approved by parties applies to the amounts of controlled substances destroyed and accounted for within the Protocol's definition of 'production'.
- The Protocol also allows parties to produce an amount of controlled substance almost equivalent to the quantity destroyed with technology listed as approved, within the same year as destruction, and within the same group of substances.

Approval of Destruction technologies by the Montreal Protocol

- The Montreal Protocol has taken decisions to approve destruction technologies for the purposes of its production data reporting requirements.
- The list of destruction technologies has been updated over time by the Montreal Protocol as a result of the assessment of technologies and new technical information becoming available.
- The Montreal Protocol asks the Technology and Economic Assessment Panel to provide its technical assessment and recommendations.
- The most recent updated list of approved destruction technologies is included in Annex II to the 30th Meeting of the Parties.

When is it relevant to use approved destruction technologies?

- Adoption of destruction technologies varies by country, depending on the need for destruction, national regulations, local air quality requirements, availability of technology, and viability of the market for destruction.
- Using a destruction technology approved by the Montreal Protocol is relevant if a party is interested in accounting for destroyed amounts of controlled substances for reporting production or for destroying HFC-23 within the Montreal Protocol.

When might it not be necessary to use approved destruction technologies?

- For a party not interested in accounting for destroyed amounts of controlled substances for the Montreal Protocol, or not destroying HFC-23, a destruction technology that meets minimum local regulatory standards and provides acceptable ODS/HFC destruction efficiencies would be a suitable choice.
- There might be circumstances where it is important to choose technology that maximises destruction efficiencies or to account for destroyed ODS/HFC wastes, e.g., for voluntary carbon markets. But this does not necessarily need to be an approved destruction technology, except for HFC-23 and in countries mandating technologies approved by the Montreal Protocol.

How are destruction technologies assessed and approved by the Montreal Protocol?

- TEAP has assessed destruction technologies in 1992, 1995, 2002, 2005, 2011, and 2018. Parties approve destruction technologies after considering TEAP's advice.
- TEAP developed and uses technical performance criteria for its assessment.
- Criteria serve as a benchmark for comparison purposes and are not intended as standards for pollutant emissions, which are matters for governments and operators, nor do they necessarily meet internationally accepted emissions guidance for pollutants, such as those adopted by the Basel Convention.
- Destruction and Removal Efficiency (DRE) is a measure of the efficiency of destruction. DRE is calculated by subtracting the mass of a chemical released in stack gases from the original amount of chemical fed into the system, as a percentage of the original amount.
- Costs (plant, maintenance, operation, cost per kg) and economic feasibility are not considered.

Destruction and Removal Efficiency is the key criterion for the Montreal Protocol

- In the preamble to the Montreal Protocol's decision XXX/6, parties:
 - Noted that destruction and removal efficiency is the criterion considered in parties' approval of destruction technologies.
 - Suggested that parties also consider TEAP's other technical advice on emissions of substances other than controlled substances in the development and implementation of their domestic regulations.

TEAP Assessment and advisory Criteria

- Basis of recommendation for approval is DRE, which is a minimum of 99.99% for concentrated sources and 95% for dilute sources (e.g., foams)
- Advisory Criteria – maximum advisory levels of emissions and minimum technical capability:
 - Halogenated dioxins and furans
 - Other pollutants: acid gases (HCl, HF, HBr/Br₂), particulate matter (total suspended particles), and carbon monoxide (CO)
 - Technical capability, where the technology has demonstrated destruction on at least a pilot scale or demonstration scale, and for which the processing capacity is no less than 1.0 kg/hr of the substance to be destroyed, whether ODS or a suitable surrogate.

TEAP Assessment and advisory Criteria

Performance Qualification	Units	Concentrated Sources	Diluted Sources (e.g., foams)
DRE	%	99.99	95
Dioxins/furans	ng- ITEQ/Nm ³	0.2	0.5
HCl/Cl ₂	mg/Nm ³	100	100
HF	mg/Nm ³	5	5
HBr/Br ₂	mg/Nm ³	5	5
Particulates (TSP)	mg/Nm ³	50	50
CO	mg/Nm ³	100	100

Other considerations

- The approval of a destruction technology does not guarantee that local emissions requirements will be met on a specific facility.
- There may be other concerns or emissions of interest to governments at their national or local levels.
- Waste ODS/HFCs may be classified as hazardous wastes, with additional requirements imposed through legislation.
- Waste ODS/HFCs may be subject to international reference guidance (such as adopted by the Basel Convention) in terms of emissions performance, including more comprehensive measures of destruction efficiency, other potential emissions, and sources of emissions and monitoring.
- General technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants, UNEP/CHW.14/7/Add.1/Rev.1, Para 161, May 2019,
<http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/TechnicalGuidelines/tabid/8025/Default.aspx>.

Destruction technologies approved by the Montreal Protocol

- Approved destruction technologies are grouped into three categories:
 - Thermal oxidation
 - Plasma technologies
 - Conversion (non-incineration) technologies
- They are approved according to:
 - Technology type
 - Annex and Group of controlled substance
 - Concentrated sources or dilute sources

Review of the list of destruction technologies by the Montreal Protocol

- Decision XXX/6 requests the Technology and Economic Assessment Panel to assess destruction technologies listed as not approved or not determined, and any other technologies, and provide advice to the Montreal Protocol.
- This review will now occur as part of MCTOC's 2022 Assessment Report.

Go ahead!



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Thanks for your attention

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