Technology and Economic Assessment Panel (TEAP)

Response to Decision XXXIV/5: Identification of gaps in the global coverage of atmospheric monitoring of controlled substances and options for enhancing such monitoring

Medical and Chemical Technical Options Committee (MCTOC)
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Dec XXXIV/5: Identification of gaps in the global coverage of atmospheric monitoring of controlled substances and options for enhancing such monitoring

To request the TEAP to prepare a report for the forty-fifth meeting of the Open-ended Working Group on:

a) Chemical pathways in which substantial emissions of controlled substances are likely;

b) Best practices available to control these emissions;

c) Gaps in understanding the sources of emissions referred to in point (a) above.
Assessment of chemical pathways with “substantial emissions” of controlled substances

- MCTOC assigned chemical pathways into associated global annual production bands and likely emission rates for related controlled substances.
- MCTOC identified chemical production pathways that are likely able to produce “substantial emissions” of controlled substances, i.e., those having a sufficiently high combination of likely emission rate and annual global production.
- MCTOC considered a reasonable threshold for “substantial emissions” to be global emissions greater than 1,000 tonnes of controlled substance per year from a chemical pathway.
Assessment of chemical pathways with “substantial emissions” of controlled substances (2)

- 24 Chemical pathways are considered likely to have “substantial emissions” of controlled substances, i.e., CFC-113, CFC-113a, CFC-114, CFC-115, CTC, HCFC-22, HCFC-124, HCFC-141b, HCFC-142b, HFC-23, HFC-32, HFC-125, HFC-134a, HFC-143a, HFC-152a, HFC-245fa, HFC-227ea, 1,1,1-trichloroethane.

- See Table 5-5, pp. 50-51, 2023 TEAP Progress Report.

- Most production processes will only have substantial emissions of controlled substances when producing controlled substances or using them as feedstocks.

- Any other controlled substances involved in the process will only be produced and then released in much smaller quantities, which may be negligible.
Assessment of chemical pathways with “substantial emissions” of controlled substances (3)

- There are a few notable exceptions where chemical pathways are likely able to produce *substantial emissions* of unwanted by-products:
  - HFC-23 by-production from chloroform to HCFC-22 chemical pathway
  - CTC by-production from methyl chloride to dichloromethane to chloroform chemical pathway
  - CFC-115 by-production from perchloroethylene to HFC-125 chemical pathway.
- There are chemicals pathways with annual emissions of by-products likely to be on the boundary of *substantial emissions* used in this assessment, e.g.,
  - HFC-23 by-production from dichloromethane to HFC-32
  - HFC-23 by-production from HCFC-22 pyrolysis to TFE/HFP (tetrafluoroethylene/ hexafluoropropene).
Best practices available to control emissions

- Optimising plant design, equipment, operation, maintenance
- Instrumentation and monitoring of process and emissions
- Training and instruction for plant operators
- Periodic mass balancing
- Technologies for destruction or for separation and chemical transformation to treat unwanted co-products or by-products and abate their emissions
- Regulatory controls to provide the economic framework to ensure any or all of the above emissions mitigation measures are implemented by operators, and to require emissions and other reporting.
Gaps in understanding the sources of emissions

- There are many gaps in understanding the sources of emissions from chemical pathways with substantial emissions.
- The main reasons are the existing gaps in publicly available data, some of which may be unavailable due to commercial confidentiality.
- As a result, estimations of mean emission rates of controlled substances and annual global production have a high degree of uncertainty.
Gaps in understanding the sources of emissions (2)

- Global capacity and production by chemical pathway are not accurately known.
- Production and feedstock quantities are available for controlled substances under Article 7 reporting, however, might not be available for chemical pathways producing or using non-controlled substances that might emit controlled substances.
- For most production facilities, actual emissions and global locations are not reported by parties.
- Average global generation and mean emission rates of controlled substances by different chemical pathways are not accurately known and likely vary over time.
- While the sources of emissions from chemical pathways and emission rates used in our assessment are likely to be reasonable estimates, they might change over time.