

TEAP Decision XXVII/4 Task Force Update Report for MOP-28

by

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Decision XXVII/4

To prepare a report for consideration by the 37th OEWG meeting, and thereafter an updated report to be submitted to the 28th MOP, that would:

- a) Update, where necessary, and provide new information on alternatives to ozone-depleting substances, including not-in-kind alternatives, based on the guidance and assessment criteria provided in subparagraph 1 (a) of decision XXVI/9, and taking into account the most recent findings on the suitability of alternatives under high-ambient temperatures, highlighting in particular:
 - i. the availability and market penetration of these alternatives in different regions;
 - ii. the availability of alternatives for replacement and retrofit of refrigeration systems in fishing vessels, including in small island countries;
 - iii. new substances in development that could be used as alternatives to ODS and that could become available in the near-future;
 - iv. the energy efficiency associated with the use of these alternatives;
 - v. the total warming impact and total costs associated with these alternatives and the systems where they are used;
- b) Update and extend to 2050 all the scenarios in the Decision XXVI/9 report.

Decision XXVII/4 Task Force

CO-CHAIRS

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- Bella Maranion (USA, TEAP Co-chair)
- Roberto Peixoto (Brazil, RTOC Co-chair)

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Approach on the response to Decision XXVII/4

- At OEWG-37, a first report was presented (only R/AC)
 - Updates on alternatives based on Decision XXVI/9 report
 - Information on research studies on alternatives under high ambient temperature (HAT) conditions
 - Extension of mitigation scenarios to 2050
- At OEWG-38, a second report was presented
 - Further updates to the R/AC sector information based on informal discussions at OEWG-37
 - Responds to other parts of decision XXVII/4, including information on alternatives to refrigeration systems on fishing vessels
 - Further updates on the HAT information and on scenario assumptions for various sectors

Approach on the response to Decision XXVII/4 (2)

- For MOP-28, the TF's third, update report, takes into account discussions during OEWG-38 and
 - Responds to comments on high ambient temperature criteria (Chapter 5);
 - Responds to comments on scenarios, providing further information related to HFC production
 - Provides updated tables for total, new manufacturing, and servicing demand (Annex 4; Chapter 6)
 - Provides new and updated information on the availability of alternatives for foam blowing (Chapter 7) and on the availability of alternatives for MDIs and aerosols (Chapter 8).

R/AC update on refrigerants and technologies

- Refrigerants and blends information remains unchanged
- International Electro-technical Commission (IEC) and the International Organization for Standardisation (ISO) are the organisations for refrigeration standards
 - Both include refrigerant safety (definitions and charge limits) and maintenance procedures (safe practices, avoiding leaks of refrigerants)
 - The text of a “standard” related to refrigerating systems safety is produced by a Working Group, a sub-committee of the Technical Committee of either ISO or IEC
- For widely-recognized national standards (e.g., ASHRAE, UL and SAE from the US), efforts to harmonise with international standards, as appropriate

R/AC update on refrigerants and technologies: standards

- Strong focus on enabling climate friendly refrigerants in both ISO/TC86/SC1 or IEC/TC61
- **ISO/TC86/SC1**
 - Re-evaluating the charge limits for flammable refrigerants
 - Focus to date has been on the A2L safety class (e.g. the lower flammability refrigerants)
 - Focus is increasing on the A2 and A3 safety classes (e.g. HFC-152a, HCs)
- **IEC/TC61**
 - Considers display cabinets to allow for larger charges of flammable refrigerants
 - A2L and A3: Work started in 2015, projected new standard by 2018
 - Considers domestic and light commercial air-conditioning and heat-pumps to allow for larger charges of flammable refrigerants
 - A2L: Work started in 2011; projected new standard by 2018-2019
 - A3: Work started in 2015; projected new standard change by 2021?

Alternatives testing at HAT conditions

- Within the discussion of HAT design considerations (section 5.1) is provided a limited review of a preliminary proposal discussed by parties at OEWG-37 to define HAT countries
 - Uses a data base giving temperature measurements in many countries (i.e., weather stations) in the world
 - The HAT criterion is an average of at least two months per year (over 10 consecutive years) of a peak monthly average temperature above 35°C
 - TEAP notes that in this possible approach, variation of all the above parameters might result in certain changes; however, the TF made no further technical assessment of this proposal (which is still under discussion by parties)

BAU and mitigation demand scenarios: update

- Scenarios remain the same as in the June 2016 TEAP XXVII/4 Task Force Report to OEWG-37, based on the same existing regulations considered in that report
- The chapter also contains the following changes and additions:
 - Additional information on the production of various HFCs important for R/AC, foam blowing, fire protection, MDIs and aerosols sectors (section 6.3).
 - A comparison of estimated production with the global calculated demand;
 - Annex 4 contains updated tables for total, new manufacturing, and servicing demand.

Foams

- A new chapter presents information on alternative foam blowing agents which updates the information in the XXV/5 report in 2014 for the various types of foam, specified for the various application sectors
- Also, detailed information is provided on the consumption of blowing agents in BAU and mitigation scenarios for both non-Article 5 and Article 5 parties in this sector.

Foams Update on Blowing Agents and Technologies

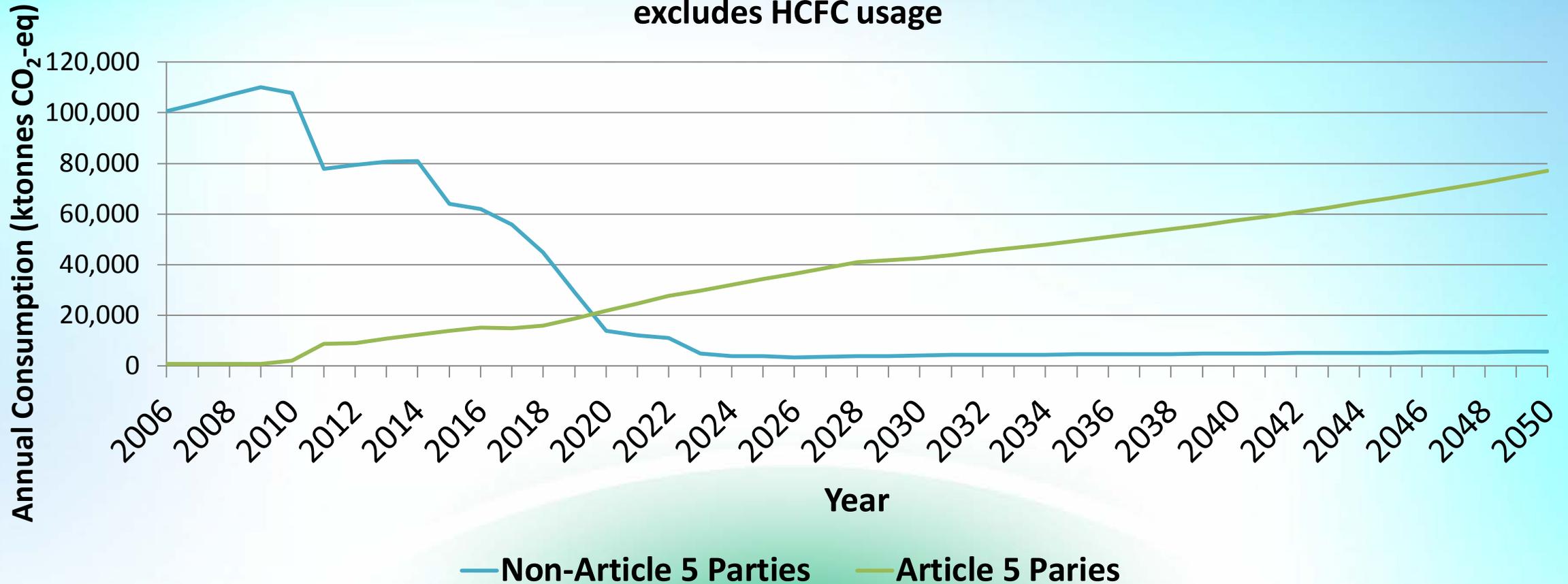
- No additional information on new blowing agents since the XXV/5 report in 2014.
- Hydrocarbons (HCs) remain the major alternative for many foam sectors for large or medium enterprises and where local regulations permit.
- Oxygenated hydrocarbons such as methyl formate and methylal are generally seen as less flammable than HCs and are used as an alternative to HCs (although this is dependent on local codes).
- HFOs and HCFOs may be used in blends to balance cost and performance, however developments are still ongoing.
- HFOs and HCFOs are becoming increasingly available commercially with additional production capacity under construction.

Foams BAU and mitigation scenarios

- The major change from the XXV/5 report in 2014 for reporting on the BAU is the adoption of regulations in non-Article 5 parties.
- The calculation of the BAU with regulations demand assumes entry into force of regulations including the EU F-gas and US EPA (2015) regulations.

BAU for foam blowing agents in A5 and nA5 parties

Comparative BAU scenarios for foam applications
excludes HCFC usage



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MDIs and Aerosols

- A new chapter (update of chapters in the XXVI/9 TF report, September 2015) presents brief background on technologies, an update of information on alternatives, and BAU scenarios for the HFC demand for 2015-2050 in metered dose inhalers (MDIs) and aerosols.
- Aerosols include non-MDI medical, consumer and technical aerosols.

MDIs and Aerosols

- Metered dose inhalers for asthma/COPD use HFC-134a and HFC-227ea (approx. 10,000 tonnes/year).
- A business as usual scenario estimates *total cumulative* HFC demand between 2015-2050 to be 990 Mt CO₂-eq. (~30 Mt CO₂-eq./year)
- Both HFC MDI and DPI alternatives are available for all key classes of drugs used in the treatment of asthma/COPD.
- Completely avoiding HFC MDIs is not yet technically or economically feasible because:
 - There are economic impediments in switching from HFC MDIs to multi-dose DPIs for salbutamol;
 - A minority of patients cannot use available alternatives to HFC MDIs.

MDIs and Aerosols

- Aerosols sector analysis includes consumer, technical and non-MDI medical aerosols.
- Global HFC for aerosols is estimated as 44 ktonnes in 2015 (15 ktonnes HFC-134a and 29 ktonnes HFC-152a).
- A business as usual scenario for global HFC demand (HFC-134a and HFC-152a) in aerosols is presented for the period from 2015 to 2050, with *total cumulative* HFC demand estimated as ~740 Mt CO₂-eq. (~20 Mt CO₂-eq. per year).
- Lower GWP options and NIK alternatives, where suited for the purpose, are available for HFC propellants and solvents. There may be challenges in adopting lower GWP options, which may not always be feasible in some markets or for some products.