Annex XXXIX

WORKING TEXT ON AGENDA ITEM 8(A): METHODOLOGY USED TO CALCULATE THE CLIMATE IMPACTS FROM THE IMPLEMENTATION OF KIGALI HFC IMPLEMENTATION PLANS

Working text of the recommendation

1. [The Executive Committee decided:

[(a)] To approve the methodology to calculate the climate impacts from the implementation of Kigali HFC implementation plans (KIPs) as described in Annex [XYZ] of the present document and requesting the Secretariat to apply the methodology [for an initial period of three years] [to approved and future KIPs] [on the following understanding:

(i) That the methodology shall be used for generating an aggregated [informational] indicator of climate benefits [for information purposes only], [which remains secondary to the primary objective to assist Article 5 countries in meeting their HFC phasedown obligations; and]][noting that the indicator has no nexus to compliance or funding levels]

(ii) [The indicator has no bearing on the review of KIPs or the level of assistance provided to Article 5 countries;]

(iii) Its application by the Secretariat shall not create additional reporting requirements for Article 5 countries [in their KIP proposals, progress reports, or tranche requests]];

[(b)] [To note that the Secretariat will provide an update, at the **104th** meeting, on future work related to the following:

(i) Further updates to the Multilateral Fund Climate Impact Indicator as described in the document referred to in subparagraph (a);

(ii) An updated methodology referred to in subparagraph (a), taking into account reduced emissions from improved energy efficiency from the implementation of KIPs [, and including a proposal for providing data at the project level]; and

(iii) A possible methodology to account for the phase-in relating to the implementation of HCFC phase-out management plans.]]

(b) [Alt: To request the Secretariat, in consultation with the bilateral and implementing agencies, to prepare a paper for consideration at a future meeting on options for potential future updates to the climate impact methodology, including:

(i) A possible approach to account for climate benefits resulting from improved energy efficiency in the implementation of KIPs; and

(ii) A review of the continued applicability of the assumptions used in the approved methodology including the growth rates for the BAU scenarios.]

(iii) [MCII]

Annex [XYZ]

METHODOLOGY TO CALCULATE THE CLIMATE IMPACTS FROM THE IMPLEMENTATION OF KIGALI HFC IMPLEMENTATION PLANS AS DESCRIBED IN PARAGRAPHS 19-29 OF DOCUMENT UNEP/OZL.PRO/EXCOM/97/26 AND AS AMENDED DURING THE 97TH MEETING

Background

1. While the information related to the impact on the climate from the implementation of HPMPs has been included in respective meeting documents, such information has been limited. For those HPMPs that only included activities in the servicing sector, the Secretariat noted that each kilogram of HCFC-22 not emitted due to better refrigeration practices resulted in the savings of approximately 1.8 CO_2-equivalent (CO_2-eq) tonnes, without providing a cumulative benefit achieved from such reductions from the HCFC phase-out. For HPMPs that included manufacturing conversions, information presented to date only reflected the climate impact from manufacturing conversions for one year, and not the cumulative climate impact over the duration of HPMP implementation. In particular, the reported impact on the climate from manufacturing conversions has been provided in terms of the benefit that would be achieved from the manufacturing in one year with the new technology; for refrigeration and air-conditioning (RAC) manufacturing conversions, the reported impact on the climate as calculated by the Multilateral Fund Climate Impact Indicator (MCII) also includes the reduced emissions from servicing equipment manufactured in one year and from energy-efficiency improvements of that equipment over the lifetime of the equipment.

2. The adoption of the Kigali Amendment added control obligations for HFCs that are measured in CO_2-eq tonnes. Reporting the reductions in consumption and production from HFC phase-down projects supported by the Multilateral Fund will be similarly straightforward as was the case for phase-out projects for ozone-depleting substances (ODSs), with the only substantive difference being the unit of measurement (i.e., CO_2-eq tonnes vice ODP tonnes). In contrast, estimating climate benefits that will be achieved from HFC phase-down projects is fundamentally different. Accordingly, the Secretariat developed a methodology described below that aims to take into account the cumulative benefit of the KIP implementation and ensure equity across Article 5 countries.

3. Article 5 countries' HFC baseline for compliance includes both an HFC component, the HFC consumption in the baseline years,[1] and an HCFC component, equivalent to 65 per cent of the HCFC baseline consumption. All KIPs approved so far have included targets to ensure that the Article 5 country concerned is in compliance with the Montreal Protocol; however, few KIPs have included a final target that is below the country's most recently reported HFC consumption. If climate benefits were estimated based on the country's most recent consumption, almost all KIP stages approved so far would have an estimated climate disbenefit, which would not reflect the emissions that were avoided from the implementation of the KIP. Moreover, this would not reflect the agreement reached by the Parties in determining the HFC baseline for compliance, which allowed Article 5 countries' consumption to grow, including due to the possible phase-in of HFCs from the phase-out of HCFCs. Accordingly, the methodology to estimate the climate benefits from the implementation of KIPs is based on the emissions avoided relative to BAU scenarios.

Development of business-as-usual scenarios

4. The methodology proposed by the Secretariat uses two BAU scenarios to capture the range of likely avoided HFC consumption. HFC consumption is used as a proxy for emissions, given that all consumption is assumed to result in emissions eventually; the methodology makes no assumption about when the emission takes place. Accordingly, the term "avoided emissions" can be understood to be equivalent to "avoided

[1] 2020 to 2022 for group 1 Article 5 countries and 2024 to 2026 for group 2 Article 5 countries.

consumption." Since Montreal Protocol control measures result in consumption reductions, those control measures result in sustained aggregate reductions that result in cumulative benefits.

5. Rather than using consumption as a proxy for emissions, methodologies also exist that estimate emissions of refrigerants based on a detailed inventory of a country's bank of installed equipment and, where relevant, level of manufacturing of HFC-based equipment in the country, as well as emission factors from other sectors (e.g., firefighting, aerosols and solvents). The IPCC recommends three different assessment tiers depending on, inter alia, whether inventory data are available over multiple years and whether country-specific uncertainty estimates are available for each source category estimate, with tier 1 being the simplest and least work-intensive assessment, and tier 3 the most data- and work-intensive.[2] Estimating the avoided emissions using an emissions inventory-based approach would not only require an initial emissions inventory, but the KIP proposal would also have to specify how the inventory is expected to change over the course of the KIP, including *inter alia* how the installed equipment bank would change, and emissions of HFCs from that bank based on servicing practices improved under the KIP. Considerable additional resources would need to be provided to agencies to include such information when they prepare KIPs, to Article 5 countries to enable the collection of the necessary data and to maintain the emissions inventory, and to the Secretariat to review such information.

6. The BAU scenarios proposed depend on the initial HFC consumption during baseline years and estimated consumption growth, as follows:

(a) BAU Scenario Low: Calculated using the HFC component of the baseline multiplied by a growth rate of 3 per cent. This represents the lowest initial consumption from which growth can be calculated as it reflects a country's HFC consumption in its baseline years; and

(b) BAU Scenario High: Calculated using the HFC component of the baseline multiplied by a growth rate of 3.5 per cent, plus the average HCFC consumption during the country's HFC baseline years. This represents a higher initial consumption from which growth can be calculated as it considers remaining HCFC consumption that could still result in additional HFC consumption from the HCFC phase-out, where that HCFC consumption is assumed to gradually convert to HFCs over a five-year period.

7. In its reports, the Scientific Assessment Panel (SAP) has used world-avoided scenarios to evaluate the impact of the Montreal Protocol on climate. The world-avoided scenario is an idealized counterfactual scenario and typically assumes that uncontrolled ODSs would have increased at a rate of 3.0 to 3.5 per cent per year in the absence of the Montreal Protocol based on expected growth in gross domestic product (GDP) and market analysis; a sustained rate of emissions of ODSs of 3.0 to 3.5 per cent per year should be viewed as only one of many possible world-avoided scenarios, which could also include scenarios with varying assumptions about future GDP growth.[3] The methodology has been shared with a member of the SAP and his views were taken into account in its development.

8. Subsequent to discussions at the 97th meeting, it was agreed to use a 3 per cent and a 3.5 per cent nominal growth rate in HFC consumption for all Article 5 countries, consistent with the low-and high-end of the growth rate used by the SAP. The Secretariat does not propose using the BAU scenario included in KIP proposals submitted by agencies because doing so would result in differing growth rates across Article 5 countries and would raise concerns about equity. For example, using a country-specific growth rate would result in lower estimated climate benefits for an Article 5 country with a lower expected growth in GDP than one with higher expected growth. Furthermore, using the BAU scenarios provided by agencies as part of

[2] https://www.ipcc.ch/site/assets/uploads/2019/12/19R_V0_01_Overview.pdf
[3] World Meteorological Organization (WMO). *Scientific Assessment of Ozone Depletion: 2022*, GAW Report No. 278, 509 pp.; WMO: Geneva, 2022.

their KIP proposals could incentivize agencies to propose higher growth rates than would otherwise be applicable.

9. The estimated range of avoided emissions from the implementation of the KIP is the difference between the high and low BAU scenarios and the target for that year specified in the KIP Agreement, noting that the target could be a lower value than that specified under the Montreal Protocol. In order to ensure that the methodology captures the emission reductions to be achieved from the reductions in consumption, benefits are integrated over 10 years, where the final target of stage I of the KIP is used for the years subsequent to the date completion of the stage. If HFC consumption under a BAU scenario in a given year is below the target specified for that year, the avoided emissions for that year are set to zero. In order to provide information on the possible long-term benefits of KIP implementation, which more easily shows the benefits of early action, the benefits through 2050 can be provided for informational purposes.

10. Subsequent to discussions at the 98th meeting, it was agreed to apply the methodology on an aggregated basis, whereby the Secretariat would report at each meeting, in the document on the Overview of issues identified during project review, the aggregated climate impacts expected from the implementation of KIPs considered at that meeting; meeting documents presenting an individual KIP would not include information on the climate impact of that KIP. Any Article 5 country that wishes to have the calculation of the climate impact from the implementation of its KIP could request the Secretariat to provide its Government with this calculation.

11. For example, the aggregated climate benefits of the 85 stage I KIPs approved since 2023, using the methodology described in paragraphs 6 and 9 above, are summarized in table 1, where the low BAU scenario is based on a 3 per cent growth rate of the HFC component of the baseline and the high BAU scenario is based on a 3.5 per cent growth rate plus the average HCFC consumption during HFC baseline years.

Table 1: Aggregated climate benefits of approved stage I of KIPs in 2023-2025

Year of KIP approval	Total KIP funding approved in principle (US $)	10-year climate benefits (CO_2-eq tonnes)	
		Low BAU scenario	High BAU scenario
2023	49,806,903	196,500,928	688,234,811
2024	31,510,336	561,364,651	919,779,247
2025	35,256,880	184,499,754	628,980,073
Total	**116,574,119**	**942,365,333**	**2,236,994,131**

12. The methodology accounts for neither the GWP of substances not controlled under the Montreal Protocol that may be phased in during the HFC phase-down, nor the GWP of substances that are not HFCs that may nonetheless be phased out as part of the HFC phase-down.[4] The former results in an overestimate of the avoided emissions, while the latter results in an underestimate. The methodology also does not account for the use patterns of HFCs that may differ across climate zones and economies, which can in turn affect the expected growth in HFC consumption and when HFCs that are consumed are expected to be emitted to the atmosphere, nor for possible increased heatwaves or other climatic effects.

[4] For example, R-508B consists of 46 per cent HFC-23 and 54 per cent PFC-116, and has a GWP of 12,802; however, the calculated consumption from that blend only reflects the GWP of HFC-23, resulting in an effective GWP under the Kigali Amendment of 6,808. Similarly, R-401A is a blend consisting of 53 per cent HCFC-22, 13 per cent HFC-152a, and 34 per cent HCFC-124, and has a GWP of 1,182.48; however, for the purposes of calculated consumption, the GWP of the blend is 16.12.