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**PAPER ON THE STARTING POINT FOR SUSTAINED AGGREGATE REDUCTIONS BASED
ON DISCUSSIONS AT THE 91ST MEETING IN THE CONTACT GROUP ON THE COST
GUIDELINES FOR THE PHASE-DOWN OF HFCS (DECISION 91/64(a))**

Introduction

1. At its 91st meeting, the Executive Committee considered the development of the cost guidelines for the phase-down of HFCs in Article 5 countries: draft criteria for funding including consideration of operationalizing paragraph 24 of decision XXVIII/2,² and agreed to continue its discussions on the matter in a contact group, in line with previous practice.³

2. The contact group discussed scenarios for the starting point based on a presentation prepared by the Secretariat and requested the Secretariat to prepare a paper to provide an analysis of issues related to the starting point discussed by the contact group at the 91st meeting, building on the illustrative examples presented to the group. The analysis should be based on a nationally aggregated starting point rather than including as options a starting point that was specified by blend or substance. The analysis should also consider a mechanism to take account of the replacement of high-global-warming-potential (GWP) by lower-GWP HFC alternatives. Accordingly, the Executive Committee decided to request the Secretariat to prepare for the 92nd meeting a paper on the starting point for sustained aggregate reductions based on the discussions that took place at the 91st meeting in the contact group on the cost guidelines for the phase-down of HFCs (decision 91/64(a)). The Secretariat prepared the present document in line with that decision.

Issues raised in illustrative examples considered at the 91st meeting

3. Two of the main issues identified during the discussion at the 91st meeting was the need to ensure that the flexibility provided to Article 5 countries through paragraph 13 of decision XXVIII/2 was maintained and that, unlike with previous control measures that phased out ozone depleting substances, the

¹ UNEP/OzL.Pro/ExCom/92/1

² UNEP/OzL.Pro/ExCom/91/62

³ UNEP/OzL.Pro/ExCom/91/72

phase-down of HFCs allows the phase-in of lower-GWP HFCs. In addition, while the ozone depletion potential of the three most consumed HCFCs varied within a factor of 2, the range of GWP of HFCs is more than an order of magnitude, which means that small reductions in the consumption of some HFCs could more than offset large increases in consumption of other HFCs.

4. In particular, a single, nationally aggregated starting point measured in metric tonnes (mt) could provide certainty in the total HFC consumption eligible for funding, noting that the levels of funding for HFC phase-down are being determined in terms of dollars per kilogram (kg) reduced and that the reductions from the starting point would also be in metric kg. However, such an approach would be inconsistent with past practice of using the same units for the starting point for sustained aggregate reductions as used to consider compliance with the Montreal Protocol targets. Moreover, a single starting point in mt may not take into consideration the flexibility agreed in paragraph 13 of decision XXVIII/2, including that Article 5 countries could meet their Montreal Protocol phase-down targets by phasing in lower-GWP HFCs. This could result in circumstances where an Article 5 country may, in subsequent stages of its Kigali HFC implementation plan (KIP), need to reduce its HFC consumption without assistance from the Multilateral Fund if the country had insufficient remaining HFC consumption eligible for funding.

5. A single, nationally aggregated starting point measured in carbon dioxide equivalent (CO₂-eq) tonnes is consistent with past practice of using the same units for the starting point as used to consider compliance with the Montreal Protocol targets and would provide Article 5 countries with flexibility in implementing their HFC phase-down, including the adoption of lower-GWP HFCs. However, for non-low-volume-consuming (non-LVC) countries, the total consumption eligible for funding would be uncertain during implementation as the reductions from the starting point would be in CO₂-eq tonnes, but such reductions could include increased consumption of lower-GWP HFCs in mt and the levels of funding for HFC phase-down are being determined in terms of dollars per kg reduced, leading to a lack of predictability of long-term funding needs. In addition, the same Article 5 country would receive less funding to meet its compliance obligations by reducing its consumption of HFCs than by phasing in lower-GWP HFCs, potentially providing an unintended incentive for the phase-in of lower-GWP HFCs. Moreover, for Article 5 countries with HFC consumption in both the manufacturing and servicing sectors, there is a risk that consumption at ineligible manufacturing enterprises (e.g., non-Article-5-owned, established after the cut-off date) and ineligible consumption (e.g., due to exports to non-Article-5 countries) would be “transferred” to the servicing sector, undermining the sustainability of the phase-down achieved in the servicing sector as such increased consumption could again be funded under the country’s phase-down. These issues are addressed in the mechanism described in paragraphs 8 to 15 below.

Analysis

6. Different approaches can be used to address the issues identified in paragraphs 3 to 5 and raised at the 91st meeting. The Executive Committee may decide to define the starting point as the HFC baseline for consumption or less, with the starting point measured in CO₂-eq tonnes and with reductions from a country’s remaining consumption eligible for funding calculated in CO₂-eq tonnes, on the understanding that:

- (a) The conversion of enterprises that fall within the meaning of paragraph 18(e) of decision XXVIII/2 would be eligible for funding if necessary to meet the final HFC phase-down step irrespective of whether the country concerned has sufficient remaining consumption eligible for funding for the conversion, as long as such enterprises meet all other agreed eligibility requirements (e.g., non-Article-5 ownership, exports to non-Article-5 countries, etc.), including those specified in paragraph 18(e); and
- (b) The mechanism proposed below in paragraphs 8-15 to take account of the replacement of high-GWP by lower-GWP HFC alternatives would be implemented.

7. In determining an appropriate level for the starting point, the Executive Committee may wish to consider that the HFC control schedule is a phase-down and not a phase-out, and that the final phase-down “tail” differs between group 1 and group 2 countries.⁴ Article 5 countries do not have an obligation to phase-out their consumption in that final phase-down “tail;” accordingly, assistance from the Multilateral Fund may not be required to phase out that consumption.

Possible mechanism to take account of the replacement of high-GWP by lower-GWP HFC alternatives

Non-LVC countries with consumption in the servicing sector only

8. For non-LVC countries with consumption in the servicing sector only, the following mechanism could be used to take account of the replacement of high-GWP by lower-GWP HFC alternatives:

- (a) The agreed cost-effectiveness for the servicing sector would be converted from US \$/kg to US \$/CO₂-eq tonne based on the country’s HFC consumption in the baseline years. See Annex I for the step-by-step process used for this conversion; and
- (b) Reductions from the country’s remaining consumption eligible for funding are accounted for in CO₂-eq tonnes, with funding determined based on the product of those reductions and the calculated cost-effectiveness in US \$/CO₂-eq tonne for the country.

9. This mechanism would ensure (a) certainty on the total HFC consumption eligible for funding; (b) the same cost effectiveness in US \$/kg for all countries, while noting that the cost effectiveness in US \$/CO₂-eq tonne may vary across countries as it would depend on the HFCs consumed by a country during the baseline years; and (c) that a country would receive the same funding to meet a specified reduction target in CO₂-eq tonnes irrespective of whether it did so by phasing in lower-GWP HFCs, by reducing its consumption of high-GWP HFCs, or some combination thereof.

Non-LVC countries with consumption in the servicing and manufacturing sectors

10. For non-LVC countries with consumption in both the servicing and manufacturing sectors, the following mechanism could be used to take account of the replacement of high-GWP by lower-GWP HFC alternatives:

- (a) The agreed cost-effectiveness for the servicing sector would be converted from US \$/kg to US \$/ CO₂-eq tonne based on the country’s HFC consumption in the servicing sector in the baseline years, as was the case for non-LVC countries with consumption in the servicing sector only;
- (b) Funding for the servicing sector would be determined by the product of the reductions in CO₂-eq tonnes to be achieved in the servicing sector and the calculated cost-effectiveness in US \$/ CO₂-eq tonne for the servicing sector for the country concerned;
- (c) Conversions in the manufacturing sector would result in reductions from the country’s remaining consumption eligible for funding in CO₂-eq tonnes based on the enterprise’s

⁴ Article 5 group 1 countries would need to phase down 80 per cent of the HFC baseline by their final control step in 2045, while Article 5 group 2 countries would need to phase down 85 per cent of their HFC baseline by their final control step in 2047.

HFC consumption (in mt and converted to CO₂-eq tonnes).⁵ Funding for those conversions would be determined in line with past practice,⁶

- (d) To ensure the sustainability of the reductions achieved in the servicing sector and to avoid transferring ineligible consumption from the manufacturing sector to the servicing sector, the Executive Committee should consider the following:
 - (i) Consumption at ineligible manufacturing enterprises (e.g., non-Article-5-owned, enterprises established after the cut-off date, etc.) and ineligible consumption (e.g., due to exports to non-Article-5 countries) that was included in the starting point would be deducted from the country's remaining consumption eligible for funding. Article 5 countries and bilateral and implementing agencies would make best efforts to identify any such ineligible enterprises and ineligible consumption when the first stage of the KIP for the country was proposed, and would continue to seek to identify and report any such enterprises and consumption thereafter; and
 - (ii) HFC consumption in the manufacturing sector that was included in the starting point and that was phased out would be deducted from the country's remaining consumption eligible for funding irrespective of whether that phase-out was achieved with assistance from the Multilateral Fund.

11. The difficulty in identifying ineligible enterprises, ineligible consumption, and manufacturing enterprises included in the starting point that had converted without assistance from the Multilateral Fund will vary across countries. The risk that such enterprises, consumption, and conversions would not be identified despite the best efforts of Article 5 countries is smaller for countries with smaller manufacturing sectors. While Article 5 countries with larger manufacturing sectors will be able to identify some such enterprises, consumption, and conversions, particularly those associated with large enterprises, the Secretariat considers it likely that Article 5 countries and the relevant agency will, notwithstanding best efforts, be unable to identify all such enterprises, consumption, and conversions, particularly for smaller enterprises. As large enterprises typically account for a larger share of a country's consumption than smaller enterprises, the risk that consumption at ineligible enterprises, ineligible consumption, and consumption at manufacturing enterprises that converted without assistance from the Multilateral Fund would be "transferred" to the servicing sector is limited. Furthermore, past experience in the HCFC phase-out has been that many Article 5 countries' HCFC consumption has fallen more rapidly than their remaining consumption eligible for funding. Such a situation may also occur for HFCs, which would further limit the risk of such "transfer;" however, the risk is not zero.

LVC countries with consumption in the servicing sector only

12. For HCFCs, the Executive Committee determined funding for LVC countries with consumption in the servicing sector only, in a different manner than for non-LVC countries. In particular, given the special conditions in LVC countries, funding was agreed at a higher level than for non-LVC countries and was determined based on the target to be met by the Article 5 country concerned and the country's HCFC consumption in the servicing sector in the baseline years, in line with the tables in decision 60/44(f)(xii) and decision 74/50(c)(xii). Except in those cases where the starting point was subsequently adjusted by the Executive Committee, the country's starting point was not relevant in determining funding for LVC countries with consumption in the servicing sector only. This simplified approach provided LVC countries with additional flexibility and allowed the Executive Committee to continue to provide the agreed levels of

⁵ For example, an enterprise that phased out 10 mt of R-410A would result in a reduction in the country's remaining consumption eligible for funding of 20,875 CO₂-eq tonnes.

⁶ Past practice in the manufacturing sector is that funding is the eligible incremental costs (in US \$) or, if a cost-effectiveness threshold for the sector was established, the lower of the product of the enterprise's consumption (in kg) and the agreed cost-effectiveness threshold (in US \$/kg) or the eligible incremental costs.

funding even when the country's consumption fell below the country's remaining consumption eligible for funding, thereby helping ensure sustained reductions.

13. If the Executive Committee continues this practice for HFCs, as reflected in the tables being considered by the Executive Committee in the working text on the analysis of the level and modalities of funding for the HFC phase-down in the refrigeration servicing sector contained in Annex XXXI of document UNEP/OzL.Pro/ExCom/91/72, the starting point will continue not to be relevant in determining funding for LVC countries with consumption in the servicing sector only. Accordingly, the Executive Committee could consider not to define a starting point for LVC countries with consumption in the servicing sector only.

14. Funding for LVC countries with consumption in the servicing sector only would be determined by the table for LVC countries in the HFC cost guidelines and the target the country would meet. Projects to reduce the country's HFC consumption would not result in reductions from the country's remaining consumption but would instead be reflected in reductions in the target(s) the country concerned would need to meet. Such countries would continue to receive the agreed level of funding irrespective of whether their consumption fell below the country's target, thus continuing the practice used by the Executive Committee in the HCFC phase-out to provide those countries additional flexibility.

LVC countries with consumption in the servicing and manufacturing sectors

15. For LVC countries with consumption in both the manufacturing and servicing sectors, a starting point would be required. Conversions in the manufacturing sector would be handled in the same manner as non-LVC countries with manufacturing. Funding for the servicing sector would be determined based on the table for LVC countries in the HFC cost guidelines and the national target to be achieved minus the phase-out achieved in the manufacturing sector. The reduction in the country's remaining consumption eligible for funding (in CO₂-eq tonnes) would thus be the difference between the country's HFC baseline and the national target to be achieved.

Alternative approach

16. As reflected in paragraph (b) of the working text on the starting point contained in Annex IV of document UNEP/OzL.Pro/ExCom/92/45, different views have been expressed on an appropriate level for the starting point. If the Executive Committee is not ready to decide on an appropriate level, an alternative to the above approach would be:

- (a) To consider not to define a level for the starting point at the present meeting, and to use the mechanism to take account of the replacement of high-GWP by lower-GWP HFC alternatives outlined above for the HFC phase-down; and
- (b) To consider the level for the starting point at the second meeting of 2029, noting that the first reduction step for group 1 countries was 1 January 2029 and the level of HFC growth⁷ of those countries would be known.

Additional considerations

17. In the HCFC phase-out, the Executive Committee decided in a few instances to adjust the starting points of Article 5 countries to take into account the demonstrated non-representative nature of the consumption data used to establish the starting point for reasons such as stockpiling, national economic difficulties, policy changes in how consumption was calculated, and/or other causes (e.g., excessive leakage rates in refrigeration equipment still in operation). For other Article 5 countries, the HCFC consumption

⁷ The level of HFC growth refers to the increase in HFC consumption beyond the HFC component of the HFC baseline.

reported after 2010 was substantially lower than the established HCFC baseline, suggesting that their HCFC consumption during the baseline years had been overestimated. In such cases, countries either agreed to additional reductions from their remaining consumption eligible for funding or to revise their HCFC starting points. The Executive Committee could continue to use this practice in the case of HFCs, except for LVC countries with consumption in the servicing sector only as such countries would have neither a starting point nor remaining HFC consumption eligible for funding. Instead, in such cases, the Executive Committee could on a case-by-case basis consider whether to adjust the country's level of eligible funding based on the extent of the non-representative nature of the HFC consumption included in the baseline years and whether that extent would change the country's funding category.

18. During its earlier discussions on the starting point, the contact group had *inter alia* considered the inclusion in the starting point of HFCs contained in pre-blended polyols. In addition, at the 82nd meeting, the Executive Committee agreed to consider, during the development of cost guidelines for the phase-down of HFCs in Article 5 countries, how an enterprise's interim use of high-GWP technology that was not the approved low-GWP technology should be treated in relation to a country's starting point for sustained aggregate reductions in HFC consumption (decision 82/55). The Executive Committee may wish to consider those matters at a future meeting.

Conclusion

19. The proposed mechanism that takes account of the replacement of high-GWP by lower-GWP HFC alternatives would allow a single starting point in CO₂-eq tonnes to be used and ensure that Article 5 countries have flexibility in how they phase down their HFC consumption, and would provide the same funding to an Article 5 country irrespective of whether it chose to meet its compliance obligations by reducing its consumption of HFCs, by phasing in lower-GWP HFCs, or some combination thereof. The proposed mechanism would also provide certainty in the total HFC consumption eligible for funding, and thus allow non-Article-5 countries to better understand and plan their funding obligations. Further, the mechanism would help all countries ensure the sustainability of the phase-down achieved and limit the "transfer" of ineligible consumption from the manufacturing sector to the servicing sector.

20. A starting point would not be needed for LVC countries with consumption in the servicing sector only. For other Article 5 countries, the starting point could be established as the HFC baseline for consumption or less, subject to the understanding listed in paragraph 6 of the present document. Alternatively, if the Executive Committee is not ready to establish a level for the starting point at the present meeting, it could consider an appropriate level in 2029 and agree to use the proposed mechanism for the HFC phase-down.

Recommendation

21. The Executive Committee may wish:

- (a) To note the paper on the starting point for sustained aggregate reductions in HFC consumption (decision 91/64(a)) contained in document UNEP/OzL.Pro/ExCom/92/46; and
- (b) To consider the information contained in the document referred to in sub-paragraph (a) above in the context of its discussions on the starting point for sustained aggregate reductions in HFC consumption.

Annex I

STEP-BY-STEP GUIDE TO CONVERT US \$/kg TO US \$/CO₂-eq TONNE IN THE SERVICING SECTOR

1. As part of a mechanism that could be used to take account of the replacement of high-GWP by lower-GWP HFC alternatives, the agreed cost-effectiveness for the servicing sector would be converted from US \$/kg to US \$/CO₂-eq tonne based on the country's HFC consumption in the baseline years, calculated using the following values:

- (a) Consumption of each HFC (mt): HFC₁ = a, HFC₂ = b, ..., HFC_n = n
- (b) Consumption of total HFCs (mt) = a + b + ... + n
- (c) GWP value of HFCs: HFC₁ = GWP₁, HFC₂ = GWP₂, ..., HFC_n = GWP_n
- (d) The agreed cost-effectiveness of the servicing sector (US \$/kg) = X

2. To convert the cost-effectiveness of the servicing sector (X) in US \$/kg to US \$/CO₂-eq tonne, the total funding for the servicing sector (US \$) would be divided by the country's HFC consumption (CO₂-eq tonnes), where:

$$1 \text{ mt} = 1,000 \text{ kg}$$

$$\text{Total funding for the servicing sector (US \$)} = 1,000X \cdot (a + b + \dots + n)$$

$$\text{Consumption (CO}_2\text{ - eq tonnes)} = a \cdot GWP_1 + b \cdot GWP_2 + \dots + n \cdot GWP_n$$

3. Therefore, the cost-effectiveness of the servicing sector in US \$/ CO₂-eq tonne is:

$$\text{Cost effectiveness}_{\text{servicing sector}} \text{ (US \$ / CO}_2\text{ - eq tonne)} = \frac{\text{Total funding for the servicing sector (US \$)}}{\text{Consumption (CO}_2\text{ - eq tonnes)}}$$

$$\text{Cost effectiveness}_{\text{servicing sector}} \text{ (US \$ / CO}_2\text{ - eq tonne)} = \frac{1,000X \cdot (a + b + \dots + n)}{(a \cdot GWP_1 + b \cdot GWP_2 + \dots + n \cdot GWP_n)}$$

4. For example, if a country consumes 120 mt of R-410A and 160 mt of HFC-134a in the servicing sector:

$$\text{Cost effectiveness}_{\text{servicing sector}} = \frac{1,000X \cdot (280)}{(120 \cdot 2,087.5 + 160 \cdot 1,430)} = \frac{280,000X}{479,300} \text{ US \$ / CO}_2\text{ - eq tonne}$$