

**MONTREAL PROTOCOL
ON SUBSTANCES THAT DEplete
THE OZONE LAYER**



UNEP

**REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL
MAY 2014**

VOLUME 6

**ASSESSMENT OF THE FUNDING REQUIREMENT FOR THE
REPLENISHMENT OF THE MULTILATERAL FUND FOR THE
PERIOD 2015-2017**

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THE PERIOD 2015-2017**

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Foreword

The May 2014 TEAP Report

The May 2014 TEAP Report consists of six volumes:

Volume 1: May 2014 TEAP Progress Report

Volume 2: May 2014 TEAP Essential Use Nominations Report

Volume 3: May 2014 TEAP Critical Use Nominations Report

Volume 4: TEAP Decision XXV/5 Task Force Report on information on alternatives to ODS

Volume 5: TEAP Decision XXV/6 Report on TOC appointment processes, future configurations and the streamlining of annual (progress) reports

Volume 6: TEAP Decision XXV/8 Task Force on the funding requirement for the 2015-2017 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol

- **Volume 1** contains the TOC progress reports, and a chapter “Other TEAP Matters”, discussing the status of (re-) nominations and challenges to the participation of experts, as well as an annex with the list of TEAP and TOC members, status May 2014
- **Volume 2** contains the assessment of the 2014 essential use nominations by the CTOC and the MTOC
- **Volume 3** contains the assessment of the 2014 critical use nominations by the MBTOC
- **Volume 4** is the report of the TEAP Task Force responding to Decision XXV/5 on information on alternatives to ODS in the refrigeration and air conditioning, foams, medical uses, fire protection and solvent sectors
- **Volume 5** contains a description by the TEAP on the TOC appointment processes and their future configurations and the streamlining of the annual (progress) reports in response to Decision XXV/6
- **Volume 6** is the report of the TEAP Task Force responding to Decision XXV/8 on the funding requirement for the 2015-2017 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol.

This is Volume 6, the TEAP XXV/8 Task Force (Replenishment) report.

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Executive Summary

1 Mandate

Consistent with Decision XXV/8 of the Twenty Fifth Meeting of the Parties the Technology and Economic Assessment Panel (TEAP) has prepared a report for submission to the Twenty-sixth Meeting of the Parties, through the Open-ended Working Group at its 34th meeting in 2014, to enable the Twenty Sixth Meeting of the Parties to take a decision on the appropriate level of the replenishment of the Multilateral Fund for the triennium 2015-2017.

The TEAP established a Replenishment Task Force (RTF), co-chaired by TEAP members Lambert Kuijpers and Shiqiu Zhang, to prepare the report. Prior to preparation of the report all Parties to the Protocol were offered the opportunity to provide their views to the Task Force. A draft report was reviewed by the Chief Officer of the MLF Secretariat and his staff. After further review the report was adopted by the TEAP on 30 May 2014.

2 Funding requirement and cost effectiveness

The estimated **total funding requirement** for the replenishment of the Multilateral Fund for the next three triennia for Case 1 and Case 2 is presented in Table ES-1 below.

| Total requirement for replenishment of the Multilateral Fund (US\$ millions) | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| Case 1 (commitment-based phase-out) | 609.5 | 550.6 | 636.5 |
| Case 2 (unfunded phase-out) | 489.7 | 485.8 | 636.5 |

Table ES-1 Total funding requirement for the replenishment of the Multilateral Fund for three triennia (US\$ million)

3 Method of assessment

The total funding requirement was obtained by adding the following cost elements:

- funding for HCFC consumption phase-out activities (including agency support costs, where applicable) based on:
 - existing commitments for stage I HPMPs obtained from MLF Secretariat data
 - estimated costs for new activities for stage II and later HPMPs developed by the Task Force
- funding for production phase-out based on relevant Executive Committee decisions and the endorsed consolidated business plan
- funding for supporting activities, including project preparation and demonstration projects, costs for UNEP's compliance assistance programme, core unit funding for the implementing agencies, operating costs of the MLF Secretariat and Executive Committee and the costs for the Treasurer

- costs were based on historical data from the MLF secretariat and the assumption that current activity levels would be continued.

With regard to clauses 2(b), (c), and (f) of the terms of reference concerning resource allocation (Decision XXV/8), in developing its financial estimates the Task Force took as its primary data and information sources the consolidated business plan of the Multilateral Fund and the activities contained within it, both approved and foreshadowed. Consumption data was drawn from information provided by Article 5 Parties to UNEP under Article 7 of the Protocol. Guidance on funding eligibility and cost-effectiveness was taken from the policies and rules contained in Executive Committee decisions.

Where detailed policies governing funding of future activities were not yet in place, the Task Force assumed a business-as-usual approach and an extension of current policies and rules. Consistent with clause 2(e) of the terms of reference, the Task Force has not speculated on future amendments to these policies and rules.

4 HCFC consumption phase-out

Outline data on HCFC production and consumption and trends in HCFC use by Article 5 Parties is presented in Chapter 3 of this report. More detailed information is available in Annex 1. To achieve an aggregate reduction in HCFC consumption of 35% by 2020, reductions must be realised in the sub-sectors that use HCFC-141b, HCFC-142b and HCFC-22. These are the foam, the refrigeration and air conditioning manufacturing and servicing sectors and, to a lesser extent, the solvent sector.

The HCFC consumption sector forms the largest component of the replenishment. Over the replenishment study timeframe all reductions in HCFC consumption will be achieved through implementation of HPMPs.

The existing annual commitments for both LVC and non-LVC countries have been extracted from Fund Secretariat data and incorporated into the estimated replenishment without amendment.

LVC countries

Most LVC countries have a stage I HPMP that yields a 35% reduction by the year 2020. New commitments for these countries will be needed to achieve a 67.5% reduction by 2025. The funding required for LVC countries for the next stage of their HPMPs has been calculated on the same basis as their stage I HPMP, that is, according to current Executive Committee decisions. It has been assumed that project preparation will take place in the 2018-2020 triennium and that the first tranche will be disbursed in 2020.

Non-LVC countries

The HPMPs for many non-LVC countries are planned for completion in 2015. However, some non-LVC countries have committed to reductions greater than 10%, with stage I HPMPs planned for completion in later years, up to 2018.

It has been assumed that a stage II HPMP will enable the country concerned to meet its 35% HCFC phase-out obligation by 2020. Funding is required to address the difference between the 35% reduction level and the phase-out planned to be achieved in each Stage I HPMP now being implemented. Two cases for determining the phase-out addressed in stage I HPMPs are presented.

In Case 1, the phase-out already addressed is defined by the difference between the baseline for the country and the final maximum level of consumption specified in the agreement governing the stage I HPMP.

In Case 2, the phase-out already addressed is considered to be equivalent to the total of the reductions in consumption for which funding was calculated and has already been provided in the stage I HPMP.

The consumption to be addressed by Stage II HPMPs in Case 1 is between 33% and 57% greater than that required to be addressed in Case 2. Since both cases appear consistent with the rules and policies of the Multilateral Fund and there is no technical basis for differentiating between them, they have been presented as two separate funding options.

5 Consumption analysis

To facilitate the analysis of consumption and the determination of cost effectiveness, countries were divided into four categories or groups:

- Group 1, containing only China, due to its high share of the total Article 5 HCFC consumption,
- Group 2, containing 34 non-LVC countries that have both manufacturing and servicing in the RAC sector
- Group 3, containing 22 non-LVC countries that have only consumption in the servicing sector
- Group 4, containing the LVC countries, which have a consumption level lower than 360 tonnes of HCFCs.

Using Article 7 data, the baseline consumption of each country was determined in metric tonnes for each HCFC chemical consumed. For each non-LVC country with a manufacturing sector, that is, countries in Groups 1 and 2, the remaining amounts of each chemical, in tonnes, for which additional funding will be eligible in stage II HPMPs to meet the 35% Protocol aggregate reduction target was calculated for funding Case 1 and funding Case 2.

A spreadsheet analysis was conducted for each of the Group 1, 2 and 3 countries using the following key inputs:

- eligible consumption as determined above
- a sectoral combination of 50% foam and 50% refrigeration and air conditioning (RAC), in metric tonnes, where there was sufficient consumption in each sector
 - noting that because of differing ODP values this amounted to about 60-70% foam and 30-40% RAC in ODP tonnes
- the inclusion of funding for phase-out of reported consumption in pre-blended polyols in the first two triennia, although this does not form part of the baseline consumption
- HPMP disbursement schedules of 45% - 25% - 25% - 10% over four years based on experience from approved stage I HPMPs
- cost effectiveness factors that have been applied in the calculations for all countries in Groups 1, 2 and 3
 - for foam, cost effectiveness was derived from the large numbers of approved foam projects
 - RAC was further divided into manufacturing and on-site installation based on three typical scenarios for the manufacturing percentages of 55-60%; 40% and 14-20% and the combined cost effectiveness factors calculated for each group

- Group 3 countries have only refrigeration servicing at a cost effectiveness of US\$ 4.5/kg.

For all Group 4 countries, LVCs, that have not so far entered into phase-out obligations after 2020 (the majority of LVC countries), the funding requirement has been calculated using the 2015-2020 financial data for their stage I HPMPs, but applied pro-rata for the required 32.5% level of phase-out to the period 2021-2025.

The total funding requirement in the consumption sector is indicated in the Table ES-2 below.

| Funding requirement | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| Existing obligations LVCs and non-LVCs (see Table 6-1) | 90.06 | 15.01 | 0.30 |
| Pre-blended polyols | 4.32 | 4.32 | |
| New commitments LVCs | | 30.35 | 24.28 |
| Subtotal | 94.4 | 49.7 | 24.6 |
| New commitments non-LVCs (see Table 6-3 and 6-4) | | | |
| Case 1 (commitment based phase-out) | 334.0 | 321.4 | 441.1 |
| Case 2 (unfunded phase-out) | 214.4 | 256.6 | 441.1 |
| Total funding requirement for Consumption sector | | | |
| Case 1 (commitment-based phase-out) | 428.4 | 371.1 | 465.7 |
| Case 2 (unfunded phase-out) | 308.8 | 306.3 | 465.7 |

Table ES-2 Total funding requirement for the consumption sector (HCFCs)

It can be observed that there is a difference of about US\$ 120 million between the funding level of Case 1 and Case 2 for the triennium 2015-2017, and a difference of about US\$ 65 million for the second triennium. The funding calculated for the third triennium is in principle the same, since the differences between Case 1 and 2 can be found in the different commitments for the year 2015, which will each have been addressed before 2020.

6 Funding for production phase-out

Production sector funding has been derived directly from decisions 69/28/(e)(ii) and 70/26(b) of the Executive Committee regarding HCFC production facilities in China. Funding in the first triennium has been assessed according to the 2014 business plan of the Multilateral Fund. Amounts for subsequent triennia correspond to equal amounts of US\$ 21.874 million including support costs, over a 14-year period from 2016 onwards.

The only HCFC produced in Article 5 countries other than China is HCFC-22, production facilities for which exist in 5 other Article 5 countries. However these facilities are all swing plants (except for a small 500 tonnes HCFC-22 capacity plant in the DPR Korea). At its 66th meeting, the Executive Committee decided inter alia “to remove phase-out activities involving swing plants, pending an Executive Committee decision on funding eligibility for swing plants” New guidelines have not yet been addressed and there has been no decision to date to include funding for swing plant projects or project preparation in business plans. Accordingly, no provision for funding for cessation of production in these plants has been incorporated in the estimates.

Estimates for production sector funding for the three triennia appear in Table ES-3 below.

| Production sector US\$ millions | 2015-2017 | 2018-2020 | 2021-2023 |
|--|------------------|------------------|------------------|
| Existing commitments | 50.688 | | |
| Estimated new funding | 21.874 | 65.622 | 65.622 |
| Total | 72.562 | 65.622 | 65.622 |

Table ES-3 Funding for the production sector, existing commitments for 2015-2016 and new funding for the year 2017 and the two triennia thereafter

7 Funding for non-investment and supporting activities

Funding estimates for each element of non-investment and supporting activities appear in Table ES-4 below.

| Element (US\$ million) | 2015-2017 | 2018-2020 | 2021-2023 |
|---------------------------------------|------------------|------------------|------------------|
| Institutional Strengthening (IS) | 23.098 | 25.463 | 23.098 |
| HPMP Stage II and Stage III PRP Costs | 2.800 | 11.500 | TBD |
| Demonstration activities | 10.428 | nil | nil |
| Supporting Activities | | | |
| UNEP CAP | 33.406 | 36.503 | 39.888 |
| Agency Core Unit Costs | 17.578 | 17.950 | 18.329 |
| Secretariat and ExCom | 19.593 | 20.936 | 22.405 |
| Treasurer | 1.500 | 1.500 | 1.500 |
| Total | 108.403 | 113.852 | 105.220 |

Table ES-4 Funding estimates for non-investment and supporting activities for three triennia

Information provided by the MLF Secretariat indicated that no funds will be required in the 2015-2017 triennium for non-HCFC ODS phase-out activities, destruction or technical assistance (other than that provided under the UNEP CAP programme).

The funding requirements for Institutional Strengthening appearing in Table ES-4 were derived from Secretariat projections of the timetable for submission of Institutional Strengthening renewal projects, and on the basis of current levels of funding. The Task Force notes that the funding of institutional strengthening will come up for review by the Executive Committee at its first meeting in 2015.

At its 72nd meeting the Executive Committee approved funding not exceeding US\$ 10 million for demonstration projects for low-GWP alternatives to HCFCs, primarily for the refrigeration and air-conditioning sector, to provide information for the development of stage II HPMPs. In the same decision the Executive Committee approved a maximum of US\$ 100,000 each for four feasibility studies on district cooling. The total amount approved would then be US\$ 10.4 million and would apply to the 2015-2017 triennium (excluding agency support costs at US\$ 28,000).

8 The funding profile

In Case 1 the funding requirement for the first triennium is some 11% or US\$ 60 million greater than for the second triennium. In Case 2, the figures are 1% or US\$ 5 million respectively.

The funding estimate for the third triennium, US\$ 636.5 million, exceeds the requirement for the second triennium by US\$ 86 million (10%) and US\$ 151 million (30%) for Cases 1 and 2 respectively. This occurs primarily because the annual, *pro rata* HCFC phase-out required to meet the 2025 reduction target of 67.5% is some 30% higher than the annual reductions required between 2015 and 2020.

The results of dividing the total HCFC consumption funding requirement equally between the 2015-2017 and 2018-2020 periods appear in Table ES-5 below. In each case, the funding required for the 3rd triennium remains at US\$ 636 million.

| Element | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| Production | 72.6 | 65.6 | 65.6 |
| Supporting and other activities | 108.4 | 113.9 | 105.2 |
| HCFC consumption sector - Case 1 | 399.7 | 399.7 | 465.7 |
| HCFC consumption sector – Case 2 | 307.5 | 307.5 | |
| Total funding requirement – Case 1 | 580.7 | 579.2 | 636.5 |
| Total funding requirement – Case 2 | 488.5 | 487.0 | |

Table ES-5 Total funding requirement for Cases 1 and 2 when the funding for HCFC consumption phase out is distributed equally between the first two triennia

Equal division of all HCFC consumption funding would require deferral of US\$ 28.7 million for HPMP implementation from the first to the second triennium, with a probable consequent need to modify the ‘front loading’ profile typical of current HPMP funding allocations.

The second triennium contains funding for both Cases 1 and 2 corresponding to initial funding for stage III HPMPs in 2020. This allocation is typical of the submission and approval timescale for stage I HPMPs and provides the maximum time for compliance with the 2025 phase-out target. If stage III HPMPs were not funded until 2021, the third triennium funding requirement would exceed that of the second triennium by US\$ 368.2 million and US\$ 433 million for Cases 1 and 2 respectively, as indicated in Table 10-2 of Chapter 10.

| Element | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| Production | 72.6 | 65.6 | 65.6 |
| Supporting and other activities | 108.4 | 113.9 | 105.2 |
| HCFC consumption sector - Case 1 | 311.0 | 311.0 | 638.3 |
| HCFC consumption sector – Case 2 | 221.8 | 221.8 | |
| Total funding requirement – Case 1 | 492.0 | 490.5 | 809.1 |
| Total funding requirement – Case 2 | 402.8 | 401.3 | |

Table ES-6 Total funding requirement for Cases 1 and 2 when the funding for HCFC consumption phase out associated with the 2020 target is distributed equally between the first two triennia while funding associated with stage III HPMPs is deferred to 2021

The Task Force also examined a further option of deferring all HCFC consumption funding associated with the 2025 reduction target until 2021 in the 3rd triennium, as described above, then dividing the remaining HCFC consumption funding associated with the 2020 reduction target equally (para. 2(d) of the terms of reference). The results appear in Table ES-6 below. While the total funding requirement for the

first two triennia is almost equal for both Case 1 and Case 2, funding for the third triennium exceeds the funding for the second triennium by US\$ 319 and US\$ 408 million, respectively.

The option of undertaking an 80% phase-out in the foam sector additional to that needed to comply with the 2020, 35% reduction target was also examined. Additional foam sector phase-out would (a) take advantage of the ready availability of low GWP alternatives and (b) potentially contribute to lowering the funding estimate for the third triennium by reallocation to the first and second triennia. The results appear in Tables 10-3 and 10-4. While the third triennium funding was reduced significantly, those reductions were in general accompanied by comparable increases in first triennium funding levels.

9 Additional resources to gradually avoid high-GWP alternatives

In order to determine an indicative amount for a gradual conversion to low-GWP from ODS, three possibilities have been considered.

During the 1990s around 6,300 tonnes of HFC-134a were phased in as a result of the conversion from CFC-12 in domestic and commercial refrigeration projects. The cost of a second conversion to hydrocarbons could be around US\$ 40 million at US\$ 6.4 per kg. Production capacity of nearly 1 million MAC units was also converted. Using the same cost effectiveness value, the cost of second conversions for MAC facilities would be \$6.4 million. The total cost estimate for second conversions in refrigeration could be around US\$ 46.4 million which is equivalent to some US\$ 8 million per year over two triennia.

An increase in the funding available for the servicing sector from US\$ 4.5 to US\$ 6.5/ kg has been considered to assist with management of refrigerants with varying levels of flammability and the requisite lubricants. Applying this increase to non-LVC countries would imply additional funding of about US\$ 4 million per year. For LVC countries, there are greater uncertainties however an indicative figure, based on a 40% increase in servicing funding, would be an additional US \$3 million per year.

The additional costs of HPMPs have been estimated for countries with air conditioning manufacture if all conversions were to low-GWP refrigerants. Dependent on the percentages of servicing and manufacturing in the country the average cost effectiveness might increase by about 25% to some US\$ 9.81/kg. The total cost to the Fund would be around US\$8 million per year.

In total, the additional amounts involved in the three activities mentioned above would be about **US\$ 23 million** per year over at least two triennia, a total of some **US\$ 138 million**, as a first indicative amount to gradually phase out high-GWP alternatives to ODS. In this way one could address the avoidance of consumption of about 10,000 tonnes of high-GWP alternatives.

The Task Force has given broad consideration to the funding requirements for a gradual phase-down of all high-GWP alternatives taking into account the report by the TEAP on Decision XXV/5. Using as a basis the TEAP report finding that consumption of high-GWP substances for manufacturing may be in excess of 180,000 tonnes per year, using a cost effectiveness of US\$ 6-18 per kg and without taking into account any multinational operations, if that manufacturing sector was considered for conversion to low-GWP alternatives, it would yield a total funding estimate of US\$ 1080-3240 million for manufacturing conversion during a certain period of conversions.

1 Introduction

1.1 Terms of Reference

Decision XXV/8 of the Twenty Fifth Meeting of the Parties requests, in its paragraph 1, the Technology and Economic Assessment Panel (TEAP) to prepare a report for submission to the Twenty-sixth Meeting of the Parties (November 2014), and to present it through the Open-ended Working Group at its 34th meeting, to enable the Twenty-sixth Meeting of the Parties to take a decision on the appropriate level of the 2015-2017 Replenishment of the Multilateral Fund.

1.2 Scope and Coverage

The text of Decision XXV/8 is as follows:

Recalling the parties' decisions on previous terms of reference for studies on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol,

Recalling also the parties' decisions on previous replenishments of the Multilateral Fund,

1. To request the Technology and Economic Assessment Panel to prepare a report for submission to the Twenty-Sixth Meeting of the Parties, and to present it through the Open-ended Working Group at its thirty-fourth meeting, to enable the Twenty-Sixth Meeting of the Parties to take a decision on the appropriate level of the 2015–2017 replenishment of the Multilateral Fund;
2. That, in preparing the report referred to in the preceding paragraph, the Panel should take into account, among other things:
 - (a) All control measures and relevant decisions agreed upon by the parties to the Montreal Protocol and the Executive Committee, in particular those related to the special needs of low-volume and very-low-volume-consuming countries as well as small- and medium-size enterprises, and decisions agreed upon by the Twenty-Fifth Meeting of the Parties and the Executive Committee at its seventieth and seventy-first meetings insofar as those decisions will necessitate expenditure by the Multilateral Fund during the period 2015–2017;
 - (b) The need to allocate resources to enable all parties operating under paragraph 1 of Article 5 of the Montreal Protocol to maintain compliance with Articles 2A–2E, 2G and 2I of the Protocol;
 - (c) The need to allocate resources to enable all parties operating under paragraph 1 of Article 5 to maintain or meet 2013, 2015 and 2020 compliance obligations in respect of Articles 2F and 2H of the Protocol, taking into account the extended commitment provided by parties operating under paragraph 1 of Article 5 under approved hydrochlorofluorocarbon phase-out management plans;
 - (d) Dividing the funding related to the 2020 target applicable to hydrochlorofluorocarbon consumption and production in an appropriate manner including but not limited to one scenario that divides the funding related to the 2020 target applicable to HCFC consumption equally between the 2015-2017 and 2018-2020 replenishments;
 - (e) Rules and guidelines agreed upon by the Executive Committee at all meetings, up to and including its seventy-first meeting, for determining eligibility for the funding of investment projects and non-investment projects, including but not limited to institutional strengthening;
 - (f) The need to allocate sufficient resources to the activities in the servicing sector in stage II of hydrochlorofluorocarbons phase out management plans (HPMPs) through technical assistance such as recovery, training and other necessary activities;

3. As a separate element to the funding requirement estimated in paragraph 2 of the present decision, the Panel should provide indicative figures for additional resources that would be needed to enable parties operating under paragraph 1 of Article 5 to gradually avoid high-GWP alternatives to ODS taking into account the availability of safe, environmentally friendly, technically proven and economically viable technologies;

4. That, in preparing the report referred to above, the Panel should consult widely all relevant persons and institutions and other relevant sources of information deemed useful;

5. That the Panel shall strive to complete the report referred to above in time to enable it to be distributed to all parties two months before the thirty-fourth meeting of the Open-ended Working Group;

6. That the Panel should provide indicative figures for the periods 2018–2020 and 2021–2023 to support a stable and sufficient level of funding, on the understanding that those figures will be updated in subsequent replenishment studies.

Decision XXV/8 is directly related to Decision XIX/6 on Adjustments for Annex C, Group I substances (HCFCs), which mentions in several of its paragraphs:

“The Parties agree to accelerate the phase-out of production and consumption of hydrochlorofluorocarbons (HCFCs), by way of an adjustment in accordance with paragraph 9 of Article 2 of the Montreal Protocol and as contained in the annex to the present decision, on the basis of the following:

- 1. For Parties operating under paragraph 1 of Article 5 of the Protocol (Article 5 Parties), to choose as the baseline the average of the 2009 and 2010 levels of, respectively, consumption and production; and*
- 2. To freeze, at that baseline level, consumption and production in 2013;*
- 3. For Parties operating under Article 2 of the Protocol (Article 2 Parties) to have completed the accelerated phase-out of production and consumption in 2020, on the basis of the following reduction steps:*
 - (a) By 2010 of 75 per cent;*
 - (b) By 2015 of 90 per cent;*
 - (c) While allowing 0.5 per cent for servicing during the period 2020–2030;*
- 4. For Article 5 Parties to have completed the accelerated phase-out of production and consumption in 2030, on the basis of the following reduction steps:*
 - (a) By 2015 of 10 per cent;*
 - (b) By 2020 of 35 per cent;*
 - (c) By 2025 of 67.5 per cent;*
 - (d) While allowing for servicing an annual average of 2.5 per cent during the period 2030–2040;*
- 5. To agree that the funding available through the Multilateral Fund for the Implementation of the Montreal Protocol in the upcoming replenishments shall be stable and sufficient to meet all agreed incremental costs to enable Article 5 Parties to comply with the accelerated phase-out schedule both for production and consumption sectors as set out above, and based on that understanding, to also direct the Executive Committee of the Multilateral Fund to make the necessary changes to the eligibility criteria related to the post-1995 facilities and second conversions;*
- 6. To direct the Executive Committee, in providing technical and financial assistance, to pay particular attention to Article 5 Parties with low volume and very low volume consumption of HCFCs;*
- 7. To direct the Executive Committee to assist Parties in preparing their phase-out management plans for an accelerated HCFC phase-out;*

8. *To encourage Parties to promote the selection of alternatives to HCFCs that minimize environmental impacts, in particular impacts on climate, as well as meeting other health, safety and economic considerations;*
9. *To agree that the Executive Committee, when developing and applying funding criteria for projects and programmes, and taking into account paragraph 6, give priority to cost-effective projects and programmes which focus on, inter alia:*
- (i) *Phasing-out first those HCFCs with higher ozone-depleting potential, taking into account national circumstances;*
 - (ii) *Substitutes and alternatives that minimize other impacts on the environment, including on the climate, taking into account global-warming potential, energy use and other relevant factors;*
 - (iii) *Small and medium-size enterprises.”*

The XXV/8 Task Force report was prepared on the basis of the Terms of Reference cited above.

The first draft of the report was discussed via e-mail contacts; a second, more complete draft was developed via email contacts and skype calls. A semi-final draft was composed for discussions during the (annual) TEAP meeting in Montreal, May 2014.

1.3 Composition of the Task Force

The TEAP established a Replenishment Task Force (RTF) to prepare the report following Decision Decision XXV/8. The composition of the Task Force is as follows:

- ❑ Lambert Kuijpers (The Netherlands, co-chair TEAP, co-chair RTOC);
- ❑ Shiqiu Zhang (China, senior expert member TEAP);
- ❑ Richard Abrokwa-Ampadu (Ghana, former UNMLF Secretariat Officer)
- ❑ Marco Gonzalez (Costa Rica, former Ozone Secretariat Executive Secretary)
- ❑ Tony Hetherington (Canada, former UNMLF Secretariat Deputy Chief Officer)
- ❑ Alistair McGlone (UK, consultant)
- ❑ Erik Pedersen (Denmark, member HTOC);

Consulting members were:

- ❑ Daniel Colbourne (UK, member RTOC)
- ❑ Sukumar Devotta (India, member RTOC)
- ❑ Tetsuji Okada (Japan, member RTOC)
- ❑ Miguel Quintero (Colombia, co-chair FTOC)
- ❑ Paulo Vodianitskaia (Brazil, member RTOC)
- ❑ Rick Williams (USA, member FTOC)
- ❑ Allen Zhang (China, member FTOC)

The Replenishment Task Force was co-chaired by Lambert Kuijpers and Shiqiu Zhang.

1.4 Consultation and Review Process

In December 2013, RTF members attended the Executive Meeting (ExCom-71) in Montreal, and conducted a large number of interviews (15) with Parties, members or co-opted members of the Executive Committee, as well as with the Implementing Agencies. A summary is given in Annex 2 to this report.

The Ozone Secretariat, via its website, invited Parties to respond by 20 January 2014 to a questionnaire prepared by the RTF. By the end of January 2014, the RTF had received 33 responses from Article 5 (24)

and non-Article 5 Parties (9), as well as from Implementing Agencies and other stakeholders (4). A summary of the responses is given in Annex 2 to this report.

An external review of the draft report was conducted by the MLF Secretariat staff and discussed with the Task Force at the TEAP meeting in Montreal, 5-9 May 2014.

A semi-final draft of the report was discussed by the TEAP during its Montreal meeting. Suggestions for the finalisation of the report were given to the Task Force. Subsequently the Task Force worked on the composition of a final draft, which was circulated by email to the TEAP for endorsement.

1.5 The Structure of the 2014 Replenishment Report following Decision XXV/8

The structure of the 2014 TEAP Replenishment Task Force Report is as follows:

The Executive Summary is presented first in this report, with separate parts referring to the separate chapters.

Chapter 1, “Introduction”, presents the Terms of Reference, the establishment of the XXV/8 Task Force as well as the consultation and review processes for preparing this report.

Chapter 2, “Comparison of the previous replenishment estimate with 2012-2014 outcomes” describes the previous replenishments of the Multilateral Fund, looks back at the funding assessments made in the 2012-2014 replenishment report, and compares these with the funding for HPMPs Stage I that were approved in 2012-2013 and are contained in the 2014 endorsed Consolidated Business Plan.

Chapter 3, “HCFC production and consumption”, describes the Article 5 patterns in consumption of the different HCFCs. It refers to Annex 1, which describes production and consumption data for the three relevant HCFC chemicals. The Annex also mentions specific production data for Article 5 countries.

Chapter 4, “Methodology for determining funding requirements”, describes the overall funding model and its components. In particular, it explains the methodology for analysis of the funding requirements for HPMPs including existing commitments for stage I HPMPs, developments for stage II HPMPs, as well as the projected developments after 2020. It presents considerations on what would be the remaining consumption to be phased out for the 35% reduction target in 2020, and discriminates between two Cases, Case 1 being defined as the “commitment-based case”, and Case 2 as the “unfunded eligible consumption case”.

Chapter 5, “Modelling the HPMP approach”, explains how calculations have been made for LVCs and, via an extensive spreadsheet analysis, for three different groups of non-LVC countries. It also elaborates on the impact of funding disbursement schedules. It describes how cost effectiveness values for foams and for refrigeration and air conditioning were developed for subsequent use when making estimates of the costs of stage II HPMPs, and for calculating the indicative funding requirement for the triennium after 2020.

Chapter 6, “Results of funding requirement calculations in the consumption sector”, presents subtotals of funding requirements for existing commitments for LVC and non-LVC countries, as well as the future commitments for LVCs and non-LVCs, separately for Cases 1 and 2.

Chapter 7, “Funding for the production sector”, gives the best estimates of the Task Force for the funding of HCFC production phase-out in China in the next triennia.

Chapter 8, “Funding requirements for non-investment and supporting activities for the 2015-2017 replenishment period and beyond”, gives the funding requirement for remaining (non-HCFC) ODS phase-out commitments, ODS destruction, technical assistance, demonstration projects and Institutional Strengthening for the period 2015-2017 as well as the funding requirement for supporting activities including Core Unit costs, costs for the Compliance Assistance Programme (CAP), the Secretariat and the Executive Committee, as well as for the Treasurer for 2015-2017, and for the two triennia beyond.

Chapter 9, “Total Funding Requirement” presents the total funding requirement for the replenishment of the Multilateral Fund for the triennium 2015-2017, as well as for later triennia. It considers both agreed production funding, consumption funding and funding for supporting activities. It again considers separately the Case 1 and 2 consumption funding scenarios. Funding stability across all three triennia in the study is analysed. The analysis includes consideration of the costs of phasing out extra foam consumption in the first two triennia.

Chapter 10 examines several options for additional stabilisation of the funding profile across the three triennia. It considers dividing the funding relating to the 2020 target for HCFC consumption equally between the first two triennia. It explains the reason for including in the second triennium, 2018-2020 both funding for preparation of, and the first funding tranche for stage III HPMPs. It sets out the financial implications of deferring this funding to the year 2021, i.e., to the third triennium. It also estimates the financial impact on all three triennia of addressing HCFC phase-out additional to the 2020 reduction target through targeting an 80% phase-out in the foam sector in either Group 1 and Group 2 countries together or Group 2 countries separately. It provides a brief overview of the disbursement schedule for the HCFC production sector in China.

Chapter 11 presents a discussion on “Gradually phasing-out high GWP alternatives”. It considers the practices so far in foam phase-down and presents estimates of possible cost effectiveness in the refrigeration and air conditioning sectors, if additional measures were taken to avoid high GWP alternatives. It presents an option for estimating the costs for a certain amount of high GWP alternatives that will be gradually phased down by looking at a number of different elements. It also refers to the XXV/5 Task Force report where it concerns the total costs estimates for the manufacturing phase-out of high GWP alternatives, based on estimates of the total HFC consumption in Article 5 countries in the year 2015.

Annex 1 presents the elaboration on HCFC data for production and consumption.

Annex 2 gives a summary of the interviews and of the responses to the questions submitted by Parties.

2 Comparison of the previous replenishment estimate with the 2012-2014 outcomes

2.1 Achievements to date

The Multilateral Fund has been replenished seven times since its initial capitalisation of US\$ 200 million for the period 1991-1993. The replenishments were as indicated below (with the amounts decided including the carry-over in brackets)¹:

| | | |
|--------------|--------------------|-----------------------|
| ▪ 1994-1996 | US\$ 455 million | (US\$ 510 million); |
| ▪ 1997-1999 | US\$ 466 million | (US\$ 540 million); |
| ▪ 2000-2002* | US\$ 440 million | (US\$ 475.7 million); |
| ▪ 2003-2005 | US\$ 474 million | (US\$ 573 million); |
| ▪ 2006-2008 | US\$ 400.4 million | (US\$ 470 million); |
| ▪ 2009-2011 | US\$ 400 million | (US\$ 490 million); |
| ▪ 2012-2014 | US\$ 400 million | (US\$ 450 million). |

All UN member states are parties to the Montreal Protocol, and to several of its amendments. Since its inception, the Multilateral Fund has supported some 148 Article 5 Parties by providing US\$ 3.04 billion (including support costs) in project funding and capacity building to phase-out 277,806 ODP tonnes in consumption and 185,462 ODP tonnes in production of ODSs. The total income of the Fund stands at US\$ 3.20 billion as of April 2014.

Key achievements are:

- contributions to the Multilateral Fund amount to about 92.5% of pledges, up to the end of 2013
- all decisions by the Executive Committee have been taken by consensus
- 148 Article 5 Parties have received financial assistance
- 145 National Ozone Units have been established and are receiving funding
- 9 Regional / Sub-regional Networks encompassing all Article 5 Parties have been established
- financial assistance has been provided to phase-out 100 percent of the baseline consumption of CFCs, halons, TCA and CTC
- financial assistance has been provided to phase-out about 87% of the MB baseline consumption
- a majority of Parties has served as members or co-opted members of the Executive Committee
- in addition to the activities of the four Implementing Agencies, many projects have been carried out through bilateral co-operation provided by non-Article 5 countries.

In regard to HCFCs:

- 138 Article 5 Parties have received approval and funding for implementation of stage 1 HPMPs, of which 52 are non-LVC Parties;
- of these, 9 HPMPs for LVC countries include commitments to achieve all HCFC control measures under the Protocol plus full phase-out before 2030

¹ after 2002, replenishment amounts include the interest earned by the Fund

- 102 HPMPs have commitments to meet the 2020 control measures and the remaining 27 will meet the 2015, 10 percent reduction step;
- policy guidance for the approval of project preparation funding and project implementation funding for Stage II HPMPs was agreed by the Executive Committee at its 71st and 72nd Meeting;
- The first project preparation funding for Stage II HPMPs was approved by the Executive Committee at its 72nd Meeting in May 2014 for about twenty Article 5 Parties.

2.2 Funding comparison

Table 2-1 below presents the estimates for the funding requirements developed in the 2011 TEAP Replenishment Task Force report (TEAP XXII/3 TF report, UNEP , 2011) and compares them with the actual and projected levels of approved Multilateral Fund commitments entered into for the four year period 2011-2014, (referred to in the table as ‘expenditure’) The projected expenditure is based on actual funding approved by the Executive Committee for the years 2011 to 2013 and the expenditure for 2014 proposed in the consolidated 2014 business plans of the Fund endorsed by the Executive Committee at its 72nd Meeting in May 2014. The comparison is based on the four-year period 2011-2014 to correspond with the four-year analysis period used in the previous report.

| Funding Elements for 2011- 2014 <i>(including agency support costs where appropriate)</i> | Estimate for 2011-2014 from 2011 RTF report (US\$ million) | 2011-2014 Expenditure (2011- 2013 actuals plus (2014 business plan) (US\$ million) |
|--|---|---|
| Commitments for non-HCFC phase-out | 2.36 | 2.39 |
| Commitments for MB phase-out in consumption and production | 11.2 | 12.82 |
| Destruction | 9.00 | 12.65 |
| Preparation of stage II HPMPs | 4.80 | 10.68 |
| Existing commitments for HPMPs (for LVCs and non-LVCs) and individual HCFC phase-out projects ¹ | 40.8 | 40.59 |
| New HPMPs ² | 316.98 | 412.79 |
| Production closure ² | 173.47 | 49.63 |
| Supporting Activities ³ | 127.08 | 119.69 |
| Total | 685.69 | 661.25 |

Table 2-1 Comparison between estimated and actual expenditure for the four-year period 2011-2014

Notes

1. Based on actual approvals at the 63rd meeting plus anticipated approvals for the remainder of 2011 as per the Consolidated Business Plan for 2011.
2. Based on the average of Task Force 2011-2014 scenarios for new HPMPs and HCFC production
3. Includes *Institutional Strengthening, Technical Assistance, UNEP's CAP, Implementing Agency Core Unit Costs, costs for the Secretariat (incl. ExCom meetings) and Treasurer*

More significant differences between the estimates in the previous replenishment report (TEAP XXII/3 TF report, 2011) and actual 2011-2014 expenditure in the relevant expenditure categories are discussed in the following sections.

Commitments for non-HCFC phase-out

With the exception of methyl bromide (see below), activities to phase-out the production and consumption non-HCFC ozone depleting substances are virtually complete. Actual triennium expenditure of US\$ 2.39 million was similar to the estimated figure of US\$ 2.36 million.

Commitments for MB phase-out in consumption and production

The 2011 estimate of US\$ 11.2 million was developed on the basis of the 2011 business plan that contained provision for tranches of approved consumption phase-out projects in six countries and an approved production phase-out project in one country. The additional expenditure of US\$ 2.08 million arose from new MB projects for Algeria, Sudan and Tunisia not foreshadowed in business plans at the time of preparation of the previous report.

Destruction

On the basis of previous Executive Committee decisions and the contents of the 2011 business plan, the TEAP RTF report in 2011 contained an estimate that nine full demonstration projects for ODS destruction could be expected in the 2012-2014 triennium. Along with already programmed expenditure in 2011, the total cost estimated for 2011-2014 was US\$ 9.00 million. Subsequently, 15 generally smaller demonstration projects were submitted and approved and 5 were included in 2014 business plans in this period at a total cost of US\$ 12.65 million.

Preparation of stage II HPMPs

At the time of preparation of the previous replenishment study, all Article 5 countries had received funding for preparation of stage I HPMPs. Since the stage I HPMPs for most LVC countries extended to 2020 or beyond, it was estimated that a total of some 60 non-LVC and larger consuming LVC countries would require project preparation funding for stage II HPMPs in 2014 and 2015 so that they could commence implementation following substantive completion of their stage I projects. An allocation of US\$ 4.8 million was estimated to meet this requirement in 2014. As proved to be the case with stage I HPMPs, countries and implementing agencies progressed more quickly than anticipated in the previous report (TEAP XXII/3 TF report, 2011) and funding requests totaling US\$ 10.68 million for 38 countries have been included in the business plan for 2014, of which some 21 were approved at the 72nd Executive Committee meeting.

New HPMPs

The 2011-2014 funding requirement for HCFC consumption sector phase-out was assessed using six scenarios. These scenarios encompassed HPMPs with three variations in the composition of sub-sector reduction packages and three levels of reductions from baseline consumption. The scenarios were selected because they represented the spectrum of HPMPs that had been approved at that time, recognising that too few HPMPs had been approved to enable models of a 'typical' HPMP to be developed. If the comparison between the report's findings and actual expenditure is based on the average of the six scenarios, as presented in the above table, then the actual 2011-2014 expenditure of US\$ 412.79 million for new HPMPs (i.e. HPMPs not approved at the time of preparation of the last report) is some 30.2 percent higher than the estimated figure of US\$ 316.98 million. However, the actual level of expenditure falls within the upper estimate of US\$ 471.3 million. It is also highly consistent with the assessment that greater reductions in baseline consumption would give rise to higher cost scenarios. In this regard, while most of

the HPMPs from non-LVC countries committed to achieve a 10% baseline reduction, the costs of most of the HPMPs were based on a phase-out of between some 15% and 30%.

Production Closure

In the 2011 replenishment study the Task Force noted that at the time there was little policy guidance or data on which to base a production sector analysis and that technical audits had not yet been carried out. Accordingly the Task Force based production sector estimates on the experiences from the CFC production phase-out, estimates in the MLF business plans and information on levels of production. Importantly, it was further assumed that reductions in the levels of production would occur in parallel with reductions in consumption and that funding for the reductions to meet 2015 targets would be required in the 2012-2014 triennium. Based on experience with CFC plant closure, the Task Force used US\$ 3/kg as the basis of cost estimates.

Using the same six scenarios developed for estimating costs for new HPMPs, the average total cost estimate for the production sector for the comparison period 2011-2014 was US\$ 173.47 million. Noting that the Executive Committee decided at its 69th Meeting to approve in principle funding of up to US\$ 385 million for HCFC production phase-out in China, the actual expenditure on the HCFC production sector in the period 2011-2014 will consist of the first two agreed tranches of the China HCFC production sector phase-out at total cost of US\$ 49.63 million, including agency support costs.

Supporting activities

Actual expenditure for supporting activities is some US\$ 7.4 million (6.2%) lower than estimated. The estimate was based on consultations with the Fund Secretariat and represented the business as usual scenario. However in most of the support cost categories, modest savings were realized throughout the four-year period. These ranged from Executive Committee decisions to approve increases for inflation at lower than the historical 3% figure (CAP and Core Unit costs) to savings in Secretariat/ExCom costs and a small reduction in Institutional Strengthening expenditure. In regard to IS it should be noted that this does not represent any decrease in IS support, but simply that a number of IS renewal requests anticipated in the review period are expected to be delayed beyond the end of 2014. There was one item not included in the estimate, namely a global technical support project (US\$ 1.5 million) primarily to provide funding support for the mandatory technical audits of HPMPs.

2.3 Concluding Observations

The average level of funding estimated by the Task Force for the period 2011-2014 with a 10 percent spread covered a range of between US\$ 390.2 million and US\$ 477 million. Upper and lower estimates ranged between US\$ 245.2 million and US\$ 653.5 million dependent principally on (i) the methodology adopted for assessing the likely cost and phasing for stage I HPMPs in the absence, at the time, of complete guidelines; and (ii) the cost and disbursement schedule of the HCFC production phase-out in China, in a similar absence of relevant audited data and guidelines. Subsequently the Parties decided at their 23rd Meeting to adopt a total level of replenishment of the Multilateral Fund of US\$ 450 million for the 2012-2014 triennium. Together with programmed expenditure of US\$ 252.7 million for the year 2011 (on which the 2011 RTF report was based), this indicated an available level of funding for the Multilateral Fund of US\$ 702.7 million for the period 2011-2014.

As can be seen from Table 2-1, this figure is not inconsistent with the average of the assessment scenarios presented in the previous report of US\$ 685.69 million. However, the distribution of funds across project categories differed, principally in the split between new HPMP activities and the HCFC production sector. It is evident that implementing agencies, on behalf of Article 5 Parties, lost no time in preparing and

submitting HPMPs. It is also apparent that the structure of the HPMPs submitted was weighted more towards the high-cost scenarios than anticipated in the previous report, due in part to higher than anticipated reductions from the baseline consumption being used to establish project costs.

On the other hand, the Executive Committee decided on a funding distribution for the commencement of the China HCFC production phase-out plan that provided some US\$ 120 million less than the 4-year estimate presented by the RTF in its previous report (TEAP, 2011) using reductions in production equal to those in the consumption sector and linear funding per kg phased-out. Noting that production sector funding is based on compensation for plant closure, rather than costs per kg for reducing production levels, this illustrates the challenges faced in estimating funding requirements when in reality the project cost in this sector is determined through a process of negotiation.

3 HCFC production and consumption

This chapter provides some background information on the trends in Article 5 HCFC production and consumption. Detailed HCFC production and consumption data are provided in Annex 1 to this report.

3.1 Trends in HCFCs use in Article 5 Parties

Eight HCFCs are produced and consumed globally, namely, HCFC-123, HCFC-124, HCFC-141b, HCFC-142b, HCFC-22, HCFC-225, HCFC-225ca, HCFC-225cb. Weighted by ODP, 99.8% of the total Article 5 HCFC consumption consists of HCFC-141b, HCFC-142b and HCFC-22. This implies that, in order to achieve a reduction of 35% by 2020, the HCFC consumption reduction has to be realised in the sub-sectors that use HCFC-141b, HCFC-142b and HCFC-22. These are the foam, the refrigeration and air conditioning manufacturing and servicing sectors and, to a lesser extent, the solvent sector.

Table 3-1 Various HCFC chemicals used in Article 5 Parties in tonnes and ODP-tonnes for the years 2005-2012 (the number of countries that report consumption of the different HCFCs are given in the fourth column)

Note: the countries include the Republic of Korea, Singapore and the United Arab Emirates

| Substance | ODP | Weight | Nr of Parties | 2005 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------------|-------|------------|---------------|--------|--------|--------|--------|--------|--------|
| HCFC-123 | 0.02 | tonnes | 56 | 1627 | 1979 | 2164 | 2556 | 2568 | 3262 |
| | | ODP tonnes | | 33 | 40 | 43 | 51 | 51 | 65 |
| HCFC-124 | 0.022 | tonnes | 47 | 201 | 317 | 1498 | 1044 | 904 | 550 |
| | | ODP tonnes | | 4 | 7 | 33 | 23 | 20 | 12 |
| HCFC-141b | 0.11 | tonnes | 82 | 61680 | 94273 | 103860 | 113288 | 124148 | 123678 |
| | | ODP tonnes | | 6785 | 10370 | 11425 | 12462 | 13656 | 13605 |
| HCFC-142b | 0.065 | tonnes | 64 | 9027 | 26842 | 33783 | 32457 | 30236 | 24830 |
| | | ODP tonnes | | 587 | 1745 | 2196 | 2110 | 1965 | 1614 |
| HCFC-22 | 0.055 | tonnes | 136 | 258676 | 332330 | 381517 | 408982 | 390124 | 434734 |
| | | ODP tonnes | | 14227 | 18273 | 20983 | 22494 | 21457 | 23910 |
| HCFC-225 | 0.07 | tonnes | 16 | 433 | 104 | 55 | 6 | 30 | 66 |
| | | ODP tonnes | | 30 | 7.3 | 3.8 | 0.4 | 2.1 | 4.6 |
| HCFC-225ca | 0.025 | tonnes | 8 | 75 | 93 | 58 | 83 | 82 | 31 |
| | | ODP tonnes | | 1.9 | 2.3 | 1.4 | 2.1 | 2.1 | 0.8 |
| HCFC-225cb | 0.033 | tonnes | 4 | 115 | 8 | 19 | 23 | 17 | 33 |
| | | ODP tonnes | | 3.8 | 0.3 | 0.6 | 0.7 | 0.6 | 1.1 |

3.1 Production in Article 5 Parties

For the purpose of determining the HCFC funding requirement, the Task Force has divided Article 5 Parties into 4 separate groups (see chapter 4). The remaining production of HCFCs by the 4 groups of Article 5 Parties is discussed below.

Only a small number of Article 5 Parties produce HCFCs. Production of HCFC-141b and -142b took place in one Article 5 Party only (China). HCFC-22 is mainly produced in China and constitutes about 85-90% of the total. This has been steadily increasing between 2008 and 2012. There are **five** other Article 5

Parties producing HCFC-22, which are all in Group 2 (Argentina, DPR Korea, India, Mexico and Venezuela). They produce about 10-15% of the total, where production decreased as of 2009 (see Table 3-2).

Table 3-2 Production of the three main HCFCs in Groups 1 and 2 Parties (Article 7 reporting, UNEP, February 2014) for the period 2008-2012 (kilotonnes)

| Group and Chemical | 2008 | 2009 | 2010 | 2011 | 2012 |
|---------------------------|-------------|-------------|-------------|-------------|-------------|
| Group 1-HCFC-141b | 81.3 | 91.9 | 98.9 | 111.9 | 117.1 |
| Group 1-HCFC-142b | 22.7 | 24.9 | 30.4 | 27.1 | 22.2 |
| Group 1-HCFC-22 | 263.7 | 298.6 | 311.4 | 326.7 | 364.6 |
| Group 2-HCFC-22 | 59.7 | 66.0 | 60.2 | 46.1 | 41.5 |

* The Republic of Korea has not been considered in this table. During the years 2007-2009 the Republic of Korea reported zero production of the chemicals HCFC-141b and HCFC-142b

4 Methodology for determining funding requirements

4.1 Overall funding model

Replenishment of the Multilateral Fund can be thought of as having three main funding components, namely HCFC consumption, the HCFC production sector and supporting and other activities. These components are illustrated in Table 4-1 below together with the elements of each category and the funding cases on which the overall estimates were based.

| | | | |
|---|---|-----------------------------|-------------------------------------|
| <i>HCFC consumption phase-out</i> | <i>Existing Commitments</i> | <i>LVCs</i> | |
| | | <i>Non-LVCs</i> | |
| | | | |
| | <i>New Commitments</i> | <i>LVCs</i> | |
| | | <i>Non-LVCs</i> | <i>Case 1</i> |
| | | | <i>(Commitment-based phase-out)</i> |
| | | | <i>Case 2</i> |
| | | <i>(Unfunded phase-out)</i> | |
| <i>HCFC production phase-out²</i> | <i>HCFC production (China)</i> | | |
| <i>Supporting and other activities</i> | <i>Non HCFC phase-out (if any)</i> | | |
| | <i>Destruction (if any)</i> | | |
| | <i>Demonstration projects</i> | | |
| | <i>Technical assistance (if any)</i> | | |
| | <i>Project preparations HPMPs</i> | | |
| | <i>Institutional strengthening</i> | | |
| | <i>UNEP compliance assistance programme</i> | | |
| | <i>Agencies' core unit costs</i> | | |
| | <i>Secretariat and Executive Committee</i> | | |
| | <i>Treasurer</i> | | |

Table 4-1 Components of the overall replenishment funding requirement

In relation to supporting and other activities, the Task Force examines Multilateral Fund Secretariat data to establish business as usual funding requirements. The Task Force consults the Secretariat on any known changes as reflected in business plans or decisions of the Executive Committee that would affect funding requirements. In general, the category of supporting and other activities does not require spread-sheet modelling and does not give rise to alternative funding options or scenarios. The analysis of funding needs for supporting and other activities can be found in Chapter 8.

The HCFC consumption sector forms the largest component of the replenishment. With the exception of some stand-alone demonstration projects implemented at the beginning of HCFC phase-out activities, all

² No provision has been made for production sector phase-out compensation for the other four Article 5 Parties that produce HCFC-22. The production occurs in swing plants that were compensated for CFC production closure. While the Task Force received comments on this issue, it is not aware of any existing policies or Executive Committee decisions on which funding eligibility could be based.

reduction in the consumption of HCFCs in Article 5 countries is being achieved by means of HPMPs. All but 7 Article 5 Parties have already received funding for Stage I HPMPs, which are currently being implemented. Over the replenishment study timeframe of 2015 to 2023, HPMP funding will therefore consist of established commitments for already approved HPMPs and new, as yet unspecified funding for stage II and anticipated stage III HPMPs to enable compliance with the 2020 and 2025 HCFC control measures. The funding requirement for already approved HPMPs is fully documented and available from Fund Secretariat data. Thus, one of the main areas for analysis in this study is the funding requirement for anticipated new HPMPs.

New HPMPs will be prepared for both LVC and non-LVC countries and both categories have been the subject of analysis. For LVCs, HPMP funding has been specified by the Executive Committee according to a range of HCFC consumption levels (Decision 60/44). Additional detail on the assessment of funding for LVC countries can be found in Section 4.2 below.

HPMP funding requirements for non-LVC countries have been assessed individually using a spreadsheet analysis. The methodology used is outlined in Section 4.3.

The only controlled substances as defined by the Montreal Protocol now being produced in Article 5 countries are HCFCs. Some 90% of all HCFC production takes place in China. The remainder occurs in 4 other Article 5 countries in swing plants that have already received funding from the Multilateral Fund to phase-out production of CFCs. The discussion of funding requirements for the production sector can be found in Chapter 7.

4.2 Methodology for analysis of HPMP funding requirements in LVC countries

Virtually all LVC countries have a stage I HPMP that yields a 35% reduction by the year 2020. Some LVC countries have committed to a complete phase-out and will receive funding tranches even after 2020. The amounts are known from the agreements, and can be added for the separate triennia as existing commitments.

The funding required for LVC countries for the next stage of their HPMPs, to achieve a 67.5% reduction target, has been calculated on the same cost basis used for the stage I HPMP. This implies that the total LVC funding for the next stage – extending to 2025 - will be slightly smaller than the stage 1 funding since it is based on a 32.5% phase-out versus 35% in stage I. It is assumed that project preparation takes place before 2020, and that the funding disbursement is spread over the period 2020-2025 (with normally the last 10% tranche in 2025 or after completion in 2026).

Even though the large number of LVC countries receive in total a relatively small percentage of the overall funding requirement, analysis has confirmed that funding estimates are consistent with the existing Executive Committee decisions

4.3 Methodology for analysis of new HPMP funding requirements in non-LVC countries

In principle a stage I HPMP was intended to reduce aggregated HCFC consumption in a country to 90% of the (2009-2010) baseline, a stage II HPMP is intended to reduce the aggregated consumption further, to 65% of the baseline. A possible future (2020) stage III HPMP would reduce consumption to 32.5% of the baseline. The guidelines approved for the preparation of stage II HPMPs maintain the structure of HPMPs approved for stage I. The funding calculations that involve stage II and stage III HPMPs are made against this background.

Consistent with the above, the HPMPs for many non-LVC countries are planned for completion in 2015. However, some non-LVC countries have committed to reductions much larger than 10%, with stage I HPMPs planned for completion in later years, up to 2018. The methodology for determining additional funding requirements for stage II and later HPMPs takes account of the planned completion dates of the stage I HPMPs of all non-LVC Parties.

4.4 Levels of consumption phase-out to be addressed in stage II HPMPs

It is assumed in this analysis that the primary objective of Stage II HPMPs will be to enable the country concerned to meet its 35% HCFC phase-out obligation by 1 January 2020. The basis for calculation of the funds required by non-LVC countries will therefore be the difference between the 35% level and the phase-out addressed in the stage I HPMPs now being implemented.

4.4.1 Case 1

All the stage I HPMP Agreements entered into by the Executive Committee specify the maximum allowed HCFC consumption in the relevant country in the year 2015. The agreements entered into by the highest consuming non-LVC countries generally specify a maximum equivalent to the 10% reduction mandated by the Protocol. In these cases the reductions in consumption to be achieved in stage II HPMPs are therefore an additional 25% of the baseline HCFC consumption of the relevant country.

Many non-LVC countries have committed to reductions greater than 10% after 2015. In these cases the stage II HPMP will address the difference, if any, between a 35% baseline reduction and the final reduction commitment specified in the HPMP.

In Case 1, it has been assumed that the cost of stage II HPMPs will be based on the additional HCFC phase-out required to progress from the final maximum consumption level specified in the agreement governing the stage I HPMP to the level of consumption corresponding to a 35% baseline reduction in 2020.

4.4.2 Case 2

In Decision 35/57 the Executive Committee established the principle that funding for projects and activities should produce sustainable, permanent aggregate reductions in the consumption of a country. On this basis, it is valid to assume that the objective of a stage II HPMP is to provide funding for reductions in HCFC consumption additional to those reductions for which funding has already been provided in the stage I HPMP. HPMPs specify in detail the quantities of each HCFC to be addressed in each sub-sector together with the level of funding for the relevant activity. These individual quantities, when expressed as a total figure in ODS tonnes, represent the level of phase-out for which funding has been approved in each HPMP. For most non-LVC countries the total phase-out for which funding has been approved exceeds the 10% reduction target in 2015 and also the maximum allowed HCFC consumption specified in the Agreement with the Executive Committee.

The funding required for stage II HPMPs can in this case be based on a phase-out comprised of the difference between the total of the reductions in HCFC consumption used to determine cost of the approved stage I HPMP and the level of consumption corresponding to a 35% baseline reduction in 2020.

4.4.3 Concluding remarks

As indicated numerically in Chapter 5 (Modelling the HPMP approach), the consumption to be addressed by stage II HPMPs from non-LVCs in Case 1 is between 33% and 57% greater than that required to be addressed in Case 2 (because the phase-out used to calculate stage I HPMP funding levels was

correspondingly greater than the phase-out required to achieve the 10% reductions typically committed to in the Agreements). Since both cases are consistent with the rules and policies of the Multilateral Fund and there is no technical basis for differentiating between them, they are presented as two separate funding options in this study.

It should be noted that in each case the target to be achieved in the year 2020 is a 35% reduction. For that reason the funding requirement after 2020 should not be different for the two options.

5 Modelling the HPMP approach

5.1 Consumption analysis

To achieve greater accuracy and to facilitate the calculation of the funding requirement for a variety of scenarios, it is necessary to analyse the consumption of a country on a sector by sector basis for those sectors in which the significant parts of the consumption occur. These objectives cannot be achieved effectively if the total consumption of a country is examined on a pure ODP basis (due to the varying ODP values for the separate HCFCs in question). Furthermore, the overall costs of an HPMP depend on the combination of sectors that are addressed and these are necessarily different for the different countries and at different stages of the HCFC phase-out process.

In the paragraphs below the following parameters will be dealt with:

- The group distribution of countries;
- How to establish the composition of a reduction “package” in a stage II HPMP;
- The impact of the funding disbursement parameter;
- Issues concerning cost effectiveness.

5.2 Groups of countries

Country funding requirements are calculated on the basis of four groups:

- Group 1 contains only China, due to its high share of the total Article 5 HCFC consumption,
- Group 2 contains 34 non-LVC countries that have both manufacturing and servicing in the RAC sector
- Group 3 contains 22 non-LVC countries that only have consumption in the servicing sector
- Group 4 contains the low volume consuming countries (LVCs), which have a consumption level lower than 360 tonnes (of HCFCs).

In conducting the various analyses for the different countries, they are numbered on the basis of their baseline HCFC consumption (expressed in ODP tonnes)

5.3 Principles governing funding calculations

The baseline of each country, determined as the average of the 2009 and 2010 consumption in ODP tonnes, is obtained from Article 7 data as reported to UNEP. The baseline then is re-calculated to metric tonnes for each of the relevant HCFCs using disaggregated, HCFC specific data, which are also reported under Article 7.

For non-LVC countries with a manufacturing sector, that is Groups 1 and 2, as a first step, the following calculation is performed:

- In Case 1, the amount in tonnes of each HCFC chemical for which phase-out funding has been provided, is calculated. Each Party’s phase-out commitment is examined. Should the sum of the quantities of each HCFC for which phase-out funding has been provided be larger than the country’s phase-out commitment, then the difference, for each individual HCFC, is added to the quantity of HCFCs for which new funding is required. This yields the remaining amounts of each chemical, in tonnes, for which additional funding will be eligible in the stage II HPMPs to meet the Protocol requirement for a reduction in aggregated consumption of 35% by 2020.

- In Case 2, the amounts in tonnes of each HCFC chemical for which phase-out funding has been provided are subtracted from the baseline. This again yields the remaining amounts of each chemical, in tonnes, for which additional funding will be eligible in stage II to meet the Protocol requirement for a reduction in aggregated consumption of 35% by 2020.

The remaining consumption in ODP tonnes to be addressed to meet the 2020 reduction target for the two cases is given below.

| Remaining consumption (ODP t) | Case 1 | Case 2 |
|-------------------------------|--------|--------|
| Group I | 4454 | 3358 |
| Group II | 2048 | 1304 |

For both cases, the disbursement of approved funds under HPMP stage I can be obtained from Multilateral Fund Secretariat data.

As a next step³⁴, for the calculation of phase-out and funding for the stage II HPMPs for Group 1 and 2 only, a choice needs to be made about the quantities of HCFCs that should be addressed in the foam sector and in the refrigeration manufacturing and servicing sector. This does not apply to Group 3 and 4 since countries in those groups have consumption only in the servicing sector. The overall package so composed should result in a reduction of 35% in 2020. Calculations are made assuming equal amounts in tonnes in both foams and in refrigeration and air conditioning (manufacturing and servicing) to be phased out, wherever the individual sectors are sufficiently large. This results in a larger percentage phase-out in foams expressed in ODP tonnes (60-70%) than in refrigeration manufacturing and servicing (30-40%), due to the high ODP of HCFC-141b. It should be noted here that most XPS applications will require a certain amount of both HCFC-142b and HCFC-22 to be approved (in some cases XPS is being blown using HCFC-22 only).

For refrigeration and air conditioning in a country that has a manufacturing sector, the percentage of manufacturing in the total can vary substantially. Data made available by the Fund Secretariat show that Group 1 and Group 2 countries have three different consumption characteristics: (a) countries with a manufacturing percentage of 55-60%, (b) countries with a manufacturing percentage of about 40%, (c) countries with a manufacturing percentage of 14-20% (countries with a small manufacturing sector, or countries where the manufacturing sector has already been addressed to a large degree in projects). The above has an impact on the cost effectiveness factors to be applied (see below), and the three types of countries are dealt with separately in the spreadsheet calculations. The percentages used are based upon data from the years 2011-12; these data may change in the years after 2012, dependent on the way manufacturing and/or servicing is being addressed in a country. Normally, the on-site installation of commercial equipment is considered under servicing, in that case contributing to an increase in the servicing percentage. However, it is virtually impossible for the Task Force to separate the HCFC-22 consumption used for on-site installation from the total amount of HCFC-22 reported as servicing for a country.

³ According to Decision 60/44(a) no manufacturing capacity established after 21/9/2007 will be considered for funding. From Multilateral Fund Secretariat information, any enterprises included in stage I HPMPs and later found ineligible have been withdrawn and replaced by eligible enterprises. The Task Force has assumed that this will also be the case for stage II and later HPMPs.

⁴ Wherever the Task Force has had reliable information on foreign (multinational) ownership, this fraction has been taken into account in determining costs on a country by country basis in the spreadsheet calculations.

In the various calculations it is assumed that all pre-blended polyols will be approved for phase-out in the two triennia 2015-2017 and 2018-2020. It should be noted that the HCFC-141b imported in preblended polyols is not considered to be a controlled substance and is not part of the baseline consumption of a country.

The Task Force assumes that funding will be provided for stage III HPMPs, commencing in the year 2020, to achieve the target reduction of 67.5% by 2025. This is assumed to be additional to the final tranche of the stage II HPMP funding, also to be paid in the year 2020, at the closure of the HPMP stage II project. It is noted that by addressing a large portion of the HCFC-141b and HCFC-142b foam consumption in the triennia 2015-2017 and 2018-2020, additional reductions in stage III HPMPs will be based more on refrigeration and air conditioning sector projects than foams, at higher levels of cost per kg.

The uncertainty in the funding requirement calculated for the stage III HPMP will be greater than for the first two triennia. However, this will also be very much dependent on the country, its specific consumption pattern, efforts of multinationals that have converted their manufacturing, and any changes to the cost effectiveness of alternatives in the refrigeration and air conditioning that may occur towards the year 2020.

5.4 Funding non-LVCs; disbursement schedules

The funding disbursement schedule is a parameter that can be easily varied in the spreadsheet calculations. In principle one has to take into account that the practice established in approved Stage I HPMPs is “front loading”. In most cases there are four tranches. The highest amount, 50-70% of the total, is being disbursed in the first two years. All these amounts are known, have been analyzed in one spreadsheet and are listed as “existing funding commitments”.

For stage II HPMPs, the funding calculations in this report assume a distribution ratio of 40% -25% -25% -10% over four subsequent years. This implies less “front loading” of the funding than has been observed so far in most stage I HPMP project approvals. It would be possible to change the schedule to 50% -20% -20% -10% in four subsequent years, but this does not have a significant effect on the calculation of the funding requirements for the first two triennia.

It should be noted that even if there was no “front loading” the share of the total funding requirement in the first triennium would be greater than the share in the second triennium. This occurs because almost all projects start before 2017, the project cycle is typically four years, and the two triennia span six years. The “front loading” exacerbates this trend.

In the case of approvals assumed to start in 2020 for stage III HPMPs, a four-year disbursement schedule of 40% -25% -25% -10% has again been used.

5.5 Cost effectiveness

Cost effectiveness of an HCFC project consists of the incremental investment and operating costs divided by the quantity of HCFC chemicals to be phased out by the project, expressed in US\$ per kg. Cost effectiveness numbers for foams and commercial refrigeration, as well as for refrigeration servicing have certain threshold values established by decisions of the Executive Committee. The experience so far is that projects have rarely been approved at cost effectiveness levels higher than the established threshold value for any sector, although for several projects part of the 25% supplement has been used, as specified in ExCom Decision 60/44 (f)(iv). The cost effectiveness used in the calculations is an average of the cost effectiveness determined from approved projects. It is noted that projects in the stationary air conditioning sub-sector do not have an overall cost effectiveness threshold.

In the model, cost effectiveness factors have been applied in the calculations for all countries in groups 1, 2 and 3. For the foam sector, cost effectiveness factors have been derived directly from the large number of approved foam projects (both HCFC-141b and XPS foam products), after discounting a small number of extremes (either very cheap or very expensive projects) where cost effectiveness factors were affected by special circumstances. While comparatively fewer projects have been approved in the refrigeration and air conditioning, the number of projects approved still provides a reasonable statistical basis for establishing funding requirements in the next triennia, using these cost effectiveness factors.

In the case of foams, the values in the table below were derived from a large number of projects implemented in Article 5 countries as part of stage I HPMPs. These values have been used to establish the funding requirements in the various triennia after 2014.

| CE (US\$/kg) | Group 1 country | Group 2 countries |
|--------------|-----------------|-------------------|
| PUR | 5.32 | 6.35 |
| XPS | 3.84 | 3.20 |

In the case of refrigeration, the situation is more complex. The amounts of HCFC-22 reported by a country can be for (1) XPS manufacturing, (2) refrigeration and AC manufacturing, and (3) refrigeration and AC servicing. Assuming that the amounts of HCFC-22 for XPS production can be deducted from the total HCFC-22 consumption reported by a country, the calculations for the manufacture and refrigeration and AC service sector are thus relatively straightforward.

For both Group 1 and Group 2 countries it has been assumed that in the refrigeration and AC sector certain amounts will be approved for servicing, including the installation and charging of commercial refrigeration equipment. Even though the funding levels of approvals for converting the refrigeration and AC manufacturing sector in non-LVC countries have been relatively small up to now, this sector has been addressed to a significant degree in assessment of the funding needs for stage II HPMPs in order to avoid the creation of a large HCFC-22 servicing tail.

As described above, countries in groups 1 and 2 can have three different consumption characteristics, namely, those with about 60% of the consumption in AC manufacturing and the rest in servicing (type a), those with about 40% in manufacturing (type b) and those with about 20% in manufacturing (type c).

The cost effectiveness for refrigeration servicing is fixed at US\$ 4.5 per kg. An average cost effectiveness of 10.1 US\$ per kg has been calculated for manufacturing sector conversion from recent stage I HPMP project approvals. This value is an average derived from projects applying R-410A, HFC-32 or low GWP chemicals in the AC sector. Using these values an overall cost effectiveness can be calculated for each country type, using the respective ratios of manufacturing to servicing in the three types of countries, as indicated below.

| Non-LVC Country Group | | Cost effectiveness (US\$/kg) |
|-----------------------|---------------------|------------------------------|
| Group 1 | Type a (60% manuf.) | 7.86 |
| Group 2 | Type a (60% manuf.) | 7.86 |
| | Type b (40% manuf.) | 6.74 |
| | Type c (20% manuf.) | 5.62 |
| Group 3 | (only servicing) | 4.50 |

Table 5-1 Cost effectiveness factors for refrigeration and air conditioning for different types of countries in the different groups; manufacture for AC to mix of refrigerants at US\$ 10.1/kg

If one takes the conversion costs for low GWP refrigerants only, for the small number of projects approved, the cost effectiveness has varied between about 10.2 and 16.5 US\$/kg in recent years, for which an average of 13.35 US\$/kg can be derived. Should one combine this with servicing in a country with a manufacturing sector, it would yield cost effectiveness factors as given in the table below.

| Non LVC Country Group | | Cost effectiveness |
|-----------------------------|---------------------|--------------------|
| Group 1 | Type a (60% manuf.) | 9.81 |
| Group 2 | Type a (60% manuf.) | 9.81 |
| | Type b (40% manuf.) | 8.04 |
| | Type c (20% manuf.) | 6.27 |
| Group 3 | (only servicing) | 4.50 |

Table 5-2 Cost effectiveness factors for refrigeration and air conditioning for different types of countries in the different groups; manufacture for AC to low GWP only at US\$ 13.35/kg

Values increase by 10-25%, dependent on which percentage is assumed for manufacture (the highest percentage for the highest manufacture percentage).

6 Results of funding requirement calculations in consumption sector

6.1 Existing funding obligations

In the first instance, funding obligations exist for the Multilateral Fund for stage I HPMP agreements, which were concluded in 2011-2014. Most of these HPMPs were agreed in the years 2011 and 2012.

The existing funding obligations for the consumption sector for the three triennia 2015-2017, 2018-2020 and 2021-2023, for both LVC and non-LVC countries are given in Table 6-1.

| Existing funding obligations (US\$ million) | 2015-2017 | 2018-2020 | 2021-2023 |
|---|--------------|--------------|-------------|
| LVC countries | 10.13 | 4.59 | 0.30 |
| Non-LVC countries | 79.93 | 10.42 | |
| Total | 90.06 | 15.01 | 0.30 |

Table 6-1 Existing funding obligations (in US\$ million) for LVC and non LVC countries for three triennia.

Agreements have been concluded with all but 2 LVC and 5 non-LVC countries on the funding for a stage I HPMP. For non-LVC countries, stage I HPMPs generally provide for a 10% reduction in HCFC consumption by 2015.

Funding obligations for these HPMPs after 2014 appear in the above table. For LVC countries stage I HPMPs provide as a minimum for a 35% reduction in HCFC consumption by 2020; several LVC countries have gone further than 35% and have committed in their stage I HPMP agreements to realize a complete phase-out in the years 2025 or 2030. Funding obligations after 2014 for these LVC HPMPs also appear in the above table.

For the 7 countries that do not have agreements in place, estimates have been added to the 'existing agreements' category and are assumed to follow the format of the majority of LVC and non-LVC countries, that is, to run until 2020 with a phase-out of 35%.

These estimates have been extrapolated from data for existing agreements.

6.2 New funding requirements for LVCs

For all LVC countries that have not so far entered into phase-out obligations after 2020 (the majority of LVC countries), the amounts have been calculated for the countries based upon the data for 2015-2020, but applied pro-rata for the required 32.5% level of phase-out to the period 2021-2025, by which time countries should achieve a 67.5% reduction. The funds shown for the triennium 2018-2020 are assessed as being required for approval in 2020 as the start of the next stage of LVC HPMPs to address the 32.5% phase-out requirement. These data are shown in Table 6-2 below.

| New funding obligations (US\$ million) | 2015-2017 | 2018-2020 (For next stage of LVC HPMPs) | 2021-2023 |
|---|-----------|---|-----------|
| LVC countries, <i>new</i> | nil | 30.35 | 24.28 |

Table 6-2 *Estimates for new commitments for LVC countries for the period 2020-2023 (the year 2020 and the triennium 2021-2023)*

It will be clear that the total amounts of funding associated with reductions in consumption in LVCs are considerably smaller than the total funding levels for non-LVCs. Variation of the assumptions and parameters for calculating the funding requirements in LVC countries will have a relatively small impact on the total funding requirement.

The Task Force received comments from many LVC countries concerning the challenges that would be faced in moving successfully towards the 35% reduction target by 2020 and further reductions in the last of the three triennia under consideration. These challenges, as presented to the Task Force, included the regional availability and economic feasibility of alternatives, especially those with a low-GWP, the development of the necessary institutional measures to support phase-out in the servicing sector and the direct financial implications of front loading that reduced available funds in the later years of stage I HPMPs to very modest levels. While it would be possible in principle to make broad assessments as to whether these challenges could, or should be addressed through additional funding, the Task Force has not pursued this option. Guidance from decisions of the Executive Committee is clear as to eligibility and levels of funding available for stage I HPMPs, and the terms of reference for the Task Force indicate that funding assessments should be based on this guidance.

6.3 New funding requirements for preblended polyols

HCFC-141b is used in preblended polyols in certain Article 5 countries. The quantities of HCFC-141b imported in preblended polyols are not included in baselines or obligated or committed reductions. Nonetheless, the funding for phase-out of HCFC-141b imported in preblended polyols before 2015 has already been included as part of approved HPMPs. The Task Force assumes that this practice will continue during the next one or two triennia. Therefore, the calculations in this report have been based on the assumption that all HCFC-141b imported in preblended polyols will be addressed in the two triennia 2015-17 and 2018-2020. The remaining amount of HCFC-141b in imported preblended polyols after 2014 is estimated to be 1,268 tonnes (139.51 ODP tonnes). It could be phased out with the same cost effectiveness as HCFC-141b foam projects i.e. US\$ 6.35/kg. The timing of the phase-out of HCFC-141b imported in preblended polyols does not have significant implications for the overall levels of replenishment, amounting to a total of **US\$ 8.6 million**.

6.4 New funding requirements for non-LVCs

Non-LVC funding requirements have been estimated for new commitments in the triennia 2015-2017 and 2018-2020, (stage II HPMPs). A broader estimate for new commitments to meet the additional 32.5% phase-out required in the year 2025, for which it is assumed that stage III HPMPs will be approved, has also been prepared. In this regard it has been assumed that the first funding tranches of stage III HPMPs will be approved in 2020, that is, within the triennium 2018-2020. Since the 35 percent phase-out target expected to be addressed by stage II HPMPs must be met by 1 January 2025, it is assumed that activities to address the 1 January 2025 phase-out will commence during 2020 (with project preparation during 2018-2019). As well as being consistent with the timing of project preparation and approval of Stage I and (anticipated) stage II HPMPs, inclusion of the first tranches of funding for stage III HPMPs in the year

2020 assists significantly in promoting more stable, consistent funding levels across succeeding triennia (see further considerations in Chapter 9).

The funding calculated for the years 2020 and beyond is likely to be less accurate than for the first two triennia, since the funding for the remaining AC projects, foams etc. has been based on existing “business as usual” cost effectiveness figures, while, in fact, the average may change downwards (if, as is likely, technology becomes cheaper) or upward (in the situation where phase-out in smaller companies has to be addressed). However, on the basis of previous levels of approvals, estimates on non-eligible multinational operations, funding disbursement schedules etc., the reliability of the estimates for the post-2020 (stage III HPMP) funding is still considered to be reasonable. A disbursement schedule of 40%-25%-25%-10% has been selected for HPMPs approved for funding in this period.

As foreshadowed in Chapter 4, in order to determine the funding requirement for the non-LVCs, two main cases have been analysed.

6.4.1 Case 1

Case 1 is based on the phase-out commitments entered into by countries in their stage I HPMP agreements. In this case funding is calculated for phase-out amounts corresponding to the difference between the stage I HPMP phase-out obligation (commitment) and a 35 percent reduction in the relevant baseline. This has been done for three scenarios with slightly different disbursement schedules.

| Funding requirement US\$ millions | 2015-2017 | 2018-2020 Stage II HPMPs | 2020 Stage III HPMPs | 2018-2020 Total (Stage II plus Stage III HPMPs) | 2021-2023 |
|--|------------------|---------------------------------|-----------------------------|--|------------------|
| Case 1 | | | | | |
| Disbursement schedule (percent) | | | | | |
| 1. 40-25-25-10 | 334.0 | 180.2 | 141.2 | 321.4 | 441.1 |
| 2. 50-20-20-10 | 359.6 | 154.4 | 141.2 | 295.7 | 441.1 |
| 3. 30-30-30-10 | 308.4 | 205.9 | 141.2 | 347.2 | 441.1 |

Table 6-3 Estimated non-LVC funding requirements for the triennia 2015-2017 and 2018-2020, for different disbursement schedules, for Case 1. The funding requirement calculated for 2020 (for the HPMP stage III as of 2020) has been added to the 2018-2020 HPMP stage II value. Values for the 40-25-25-10% disbursement schedule have been further used in this report.

6.4.2 Case 2

Case 2 is based on the remaining level of unfunded consumption that has to be phased out to achieve a 35% reduction by the year 2020. The unfunded consumption is determined by deducting from the baseline consumption of the country the consumption addressed in the HPMP as the basis for calculating the level of funding approved in the stage I agreement. The unfunded consumption case requires less phase-out to be funded than required in Case 1, because, for all Article 5 countries, HPMP funding levels were calculated using phase-out amounts greater than those committed to in the stage I HPMP agreements to meet the (2015) 10% reduction step. Calculations have again been made on the basis of a number of funding disbursement schedules.

| Funding requirement US\$ millions | 2015-2017 | 2018-2020 Stage II HPMPs | 2020 Stage III HPMPs | 2018-2020 Total (Stage II plus Stage III HPMPs) | 2021-2023 |
|--|------------------|---|-------------------------------------|--|------------------|
| Case 2 | | | | | |
| Disbursement schedule (percent) | | | | | |
| 1. 40-25-25-10 | 214.4 | 115.4 | 141.2 | 256.6 | 441.1 |
| 2. 50-20-20-10 | 230.9 | 98.9 | 141.2 | 240.1 | 441.1 |
| 3. 30-30-30-10 | 197.9 | 131.9 | 141.2 | 273.1 | 441.1 |

Table 6-4 Various non-LVC funding requirements for the triennia 2015-2017 and 2018-2020, for different disbursement schedules, for Case 2, the remaining unfunded consumption. The funding requirement calculated for 2020 (for the HPMP stage as of 2020) has been added to the 2018-2020 HPMP stage II value. Values for the 40-25-25-10% disbursement schedule have been further used in this report.

6.5 Total funding requirements for the consumption sector

One can derive the total consumption sector funding requirements for the two triennia 2015-2017 and 2018-2020 by adding (1) the existing commitments for LVCs and non-LVCs, (2) the funding requirement for HCFC-141b imported in preblended polyols, (3) calculated new funding requirements for LVCs in the year 2020 (to be added to the triennium 2018-2020) and for the triennium 2021-2023, (4) calculated new funding requirements for non-LVCs in the year 2020 (to be added to the triennium 2018-2020) and for the triennium 2021-2023, and (5) calculated new funding requirements for non-LVCs for the first two triennia as summarized in the following paragraph. Table 6-5 presents the various components as well as the total.

The new commitments for non-LVCs to fund stage II HPMPs in 2015-2017 and 2018-2020 are given for Case 1 and Case 2 (taken from Tables 6-3 and 6-4). More than 70% of the funding calculated for the first two triennia arises from the phase-out requirements of the Group 1 country, China (the percentage is slightly higher for Case 1 than for Case 2).

| Funding requirement | 2015-2017 | 2018-2020 | 2021-2023 |
|--|------------------|------------------|------------------|
| Existing obligations LVCs and non-LVCs (see Table 6-1) | 90.06 | 15.01 | 0.30 |
| Pre-blended polyols | 4.32 | 4.32 | |
| New commitments LVCs | | 30.35 | 24.28 |
| Subtotal | 94.4 | 49.7 | 24.6 |
| | | | |
| New commitments non-LVCs (see Table 6-3 and 6-4) | | | |
| Case 1 (commitment based phase-out) | 334.0 | 321.4 | 441.1 |
| Case 2 (unfunded phase-out) | 214.4 | 256.6 | 441.1 |

Table 6-5 Consumption sector funding requirements for the triennia 2015-2017, 2018-2020 and 2021-2023. These include the existing commitments, the funding for conversion of HCFC-141b imported in preblended polyols, the new commitments for LVC countries and the new commitments estimated for non-LVCs (Case 1 and 2)

Table 6-6, derived from Table 6-5, presents the **total** funding requirements in the consumption sector for the three triennia 2015-2017, 2018-2020 and 2021-2023, for Case 1 and Case 2.

| Total funding requirement | 2015-2017 | 2018-2020 | 2021-2023 |
|-------------------------------------|------------------|------------------|------------------|
| Consumption sector | | | |
| Case 1 (commitment-based phase-out) | 428.4 | 371.1 | 465.7 |
| Case 2 (unfunded phase-out) | 308.8 | 306.3 | 465.7 |

Table 6-6 Total funding requirements in the consumption sector for the triennia 2015-2017, 2018-2020 and 2021-2023 for Case 1 and Case 2

It can be observed that that there is a difference of about US\$ 120 million between the funding level of Case 1 and Case 2 for the triennium 2015-2017, and a difference of about US\$ 65 million for the second triennium. The funding calculated for the third triennium is in principle the same, since the differences between Case 1 and 2 can be found in the different commitments for the year 2015, which will each have been addressed before 2020.

7 Funding requirement for the production sector

The Executive Committee has decided that “total compensation for the entire China HCFC production sector does not exceed US\$ 385 million, inclusive of all project costs, excluding agency support costs” (Decision 69/28(e) (ii)). Further, “the administrative fee for the World Bank for the HPMP in China should be 5.6 per cent for the total duration of China’s HPMP” (Decision 70/26(b)). This includes all HCFC production activities in China other than those used for (non-controlled) feedstock purposes. It is understood that the US\$ 385 million is planned to be disbursed over a period of 18 years (2013-2030), which would amount to US\$ 21.389 million per year, if evenly distributed.

The only HCFC produced in Article 5 countries other than China is HCFC-22, production facilities for which exist in 4 other Article 5 countries⁵. These facilities are all swing plants. In this regard, at its 66th meeting, the Executive Committee decided inter alia “to remove phase-out activities involving swing plants, pending an Executive Committee decision on funding eligibility for swing plants, on the understanding that requests for such activities could be reintroduced into the business plans of the implementing agencies after the Executive Committee had agreed on the HCFC production sector guidelines, as appropriate” (Decision 66/5(a)(v)). The agreements for production closure in certain countries contain specific provisions clarifying that no additional resources would be available for HCFC production closure. In summary, the guidelines for the HCFC production sector are still under consideration and there has been no decision to include swing plant funding to-date in the guidelines or to include funding for project preparation in business plans. Accordingly, no provision for funding for cessation of production in these plants has been incorporated in the estimates. In this regard it is noted that the Task Force was informed that certain Article 5 countries would be further investigating the provision of funding from the Multilateral Fund for the closure of their HCFC-22 plants⁶.

In the years 2013 and 2014, annual tranches of US\$ 24 and 23 million (without support costs) were funded for the production phase-down in China. The 2014 consolidated business plan of the Multilateral Fund endorsed at the 72nd Meeting includes provision for continued, annual approvals of this amount under the in-principle agreement with China for the HCFC production sector. Therefore, for the years 2015 and 2016 annual tranches of US\$ 24 million (US\$ 25.344 million including support costs) can be considered as existing commitments for the triennium 2015-2017.

| Production sector (US\$ million) | 2015-2017 | 2018-2020 | 2021-2023 |
|--|------------------|------------------|------------------|
| Existing commitments | 50.688 | | |
| Estimated new funding | 21.874 | 65.622 | 65.622 |
| Total | 72.562 | 65.622 | 65.622 |

Table 7-1 Funding for the production sector, existing commitments for 2015-2016 and new funding for the year 2017 and the two triennia thereafter

⁵ This does not include the HCFC-22 production plant (at a baseline production of 27.6 ODP tonnes) in the DPR of Korea, which is not a swing plant.

⁶ Eligibility of the funding for one line in the HCFC-22 swing plant in Mexico is still being discussed by the Executive Committee and has therefore not been considered here (see paras 14-19 of the Report of the Production Sector Sub-group from the 72nd Executive Committee Meeting)

For the period after 2016 (14 years), there would be remaining an amount of US\$ 290 million (without support costs). Assuming an equal level of funding each year this implies a requirement for US\$ 20.714 million per year (US\$ 21.874 million including support costs), for 2017 and for the years beyond.

Estimates for the existing commitments and new funding can be found in Table 7-1 **above**.

8 Funding requirements for non-investment and supporting activities for the 2015-2017 replenishment period and beyond

This chapter refers to the funding requirement for the phase-out of production and consumption of Methyl Bromide (MB) and CFCs, ODS destruction, technical assistance, demonstration projects and supporting activities in Article 5 countries for 2015-2017 and the following two triennia.

8.1 Non-HCFC ODS phase-out commitments

8.1.1 *Production and consumption phase-out (Methyl Bromide (MB), CFC and trichloroethane (TCA))*

Information provided by the Multilateral Fund Secretariat indicated that no funds will be required in the 2015-2017 triennium for non-HCFC (CFC, MB and TCA) ODS phase-out activities in the Article 5 countries.

8.1.2 *Other activities (ODS destruction and technical assistance)*

8.1.2 (a) *ODS destruction*

The last ODS destruction projects were submitted to the 72nd Meeting in May 2014. They were approved with the exception of one project, consideration of which was extended to the 73rd Meeting. These approvals will have no impact on the replenishment of the Fund in subsequent years.

8.1.2 (b) *Technical Assistance*

No funding requirement was indicated for technical assistance activities that fall outside the CAP programme and other supporting activities.

8.1.3 *Institutional Strengthening*

From MLF Secretariat information the funding committed for IS projects in 2015-2017 is a total of US\$ 6.911 million each year for the years 2015 and 2017, and US\$ 9.276 million for the year 2016, for a total of US\$ 23.098 million for the triennium. Agency support costs of US\$ 0.706 million are included in this amount (with the exception of UNEP, that does not receive support cost for IS as it is covered by the CAP agreement).

The institutional strengthening funding has been determined on the basis that it will be provided as stand-alone project and not as part of an HPMP servicing plan. To date, very few Parties have elected to include IS funding in an HPMP.

In line with its Decision 61/43(b)⁷ the funding of institutional strengthening will come up for review by the Executive Committee at the first meeting in 2015.

⁷ To maintain funding for institutional strengthening (IS) support at current levels, and to renew IS projects for the full two-year period from the 61st Meeting, taking into account decisions 59/17 and 59/47(b) that allowed Article 5 Parties to submit their IS projects as stand-alone projects or within their HCFC phase-out management plans, and to review continued IS funding at those levels at the first meeting of the Executive Committee in 2015.

8.2 HPMP preparation in the 2015-2017 triennium

Stage II HPMPs will continue to be prepared in 2015-2017. Funding will be required for 37 mostly larger HCFC consuming countries. The same levels of funding are assumed as for stage I consistent with the guidelines adopted by the Executive Committee in decision 71/42. Stage II HPMPs will deal with reductions beyond the 2015, 10% reduction step and could incorporate either accelerated or total phase-out. US\$ 4.081 million (including support costs) was approved by the Executive Committee for stage II HPMP preparation at the 72nd meeting and US \$6.9 million is assumed for submission to the 73rd meeting. Thus a total of US\$ 2.8 million including support cost would be required for stage II HPMP preparation in the 2015-2017 triennium to cater for those countries which might not have received funding during the 2012-2014 triennium. About 70% (US\$ 1.96 million) of the funding requirement will be in the first year of the triennium (2015).

8.3 Demonstration projects in the 2015-2017 triennium

Pursuant to decision XXV/5 of the Parties, at its 72nd meeting the Executive Committee decided to consider at its 75th and 76th meetings proposals for demonstration projects for low-GWP alternatives to HCFCs within a specific framework. The total funding for these projects would not exceed US\$ 10 million. In the same decision the Executive Committee invited bilateral and implementing agencies to provide proposals for feasibility studies, including business cases for district cooling, no later than the 75th meeting. The Executive Committee approved a maximum of US\$ 100,000 each for four feasibility studies. The total amount approved would then be US\$ 10.4 million plus support costs of US\$ 28,000 for the feasibility studies.

8.4 Funding requirements for supporting activities

This section presents the funding requirements for supporting activities for the 2015-2017 triennium, classified as follows:

- (1) UNEP's Compliance Assistance Programme (CAP);
- (2) Core Unit funding for Implementing Agencies;
- (3) Secretariat and Executive Committee; and
- (4) Treasurer.

8.4.1 The CAP: Personnel Costs, Clearing-house and Information Exchange Activities (UNEP)

As an Implementing Agency of the Multilateral Fund, UNEP implements clearing-house and information exchange activities such as global information exchange, and the regional networking of National Ozone Officers. UNEP also implements institutional strengthening projects for some Article 5 countries, mainly LVCs. UNEP has brought its information dissemination, personnel, subcontract, training, equipment and premises components together in a "Compliance Assistance Programme", CAP. CAP has been functioning since the beginning of 2003.

The UNEP CAP costs for 2015-2017 are budgeted at US\$ 30.931 million with agency support cost of US\$ 2.474 million for a total of US\$ 33.406 million. This includes annual increases of 3% consistent with the limit specified by the Executive Committee⁸ and agency support cost of about 8% where applicable.

⁸ The 2014 CAP was approved at the 71st Meeting with an increase for inflation of only 2% but the 3% limit has not at this stage been changed.

8.4.2 Core Unit funding for the Implementing Agencies

The current administrative cost regime provides for the staffing levels of UNDP, UNIDO and the World Bank to be maintained by core unit funding, which is additional to agency fees of 7% applied to projects with a cost of US\$ 250,000 and above (including Institutional Strengthening and project preparation costs) and 9% for projects below US\$ 250,000. The core unit costs were initially set at US\$ 1.5 million. Core unit costs for the 2015-2017 triennium have been estimated assuming 0.7% annual increase according to the current administrative regime. Therefore the core unit costs for the three implementing agencies are estimated at US\$ 5.819 million for the year 2015 increasing to US\$ 5.859 million and US\$ 5.900 in 2016 and 2017 respectively, totaling US\$ 17.578 million over the triennium (2015-2017).

8.4.3 Operating costs of the MLF Secretariat and the Executive Committee

The funding required for the operating costs of the MLF Secretariat, including the monitoring and evaluation task and the Executive Committee was determined through consultations with the MLF Secretariat. As in the past, no major change is expected to the level of the operating budget except for a 3% annual increase for the salary component to take into account the annual salary steps payable under the UN administrative system. Thus for the costs of the MLF Secretariat and the Executive Committee an amount of US\$ 6.389 million is estimated for the year 2015 increasing to US\$ 6.530 in 2016 and US\$ 6.674 in 2017 for a total amount of US\$ 19.593 million for the three-year period 2015-2017.

8.4.4 Costs for the Treasurer

The costs for the Treasurer are budgeted at US\$ 0.5 million per year for a total funding requirement of US\$ 1.5 million for the 2015-2017 triennium.

8.5 Funding requirements for HPMP preparation, Institutional Strengthening and supporting activities for the triennia 2018-2020 and 2021-2023

8.5.1 Preparation of stage II and III HPMPs during the 2018-2023 triennium

As indicated in Table 8-1 below the following amounts were estimated as the funding requirements for the preparation of HPMP stages subsequent to stage I for Article 5 Parties.

| Triennium | Estimated funding requirement (US\$ million) |
|-----------|---|
| 2015-2017 | 2.8 |
| 2018-2020 | 11.5 |
| 2021-2023 | n.a. |

Table 8-1 Estimated funding requirements for HPMP preparation in the triennia after 2014

The above is described in section 8.2 above and in sections 8.5.1 (a) to 8.5.1 (c) below.

8.5.1 (a) Funding requirements for preparation of stage II HPMPs in 2018-2019

Information provided by the Fund Secretariat indicates that the stage I HPMPs of 85 Article 5 countries, comprising 69 LVC and 16 non-LVC countries, continue beyond 2015 to meet the 35% HCFC reduction step by 2020. Based on the guidelines approved by the Executive Committee at the 71st meeting for preparation of stage II HPMPs (Decision 71/42) it is assumed that these countries would be requesting funding for preparation of the next stage of their HPMPs. This will be stage II for them but will address the requirement to meet the 67.5% HCFC reduction step by 2025. The stage I HPMP agreements for these countries stipulate that the HPMPs will be completed by the end of 2019. Hence it is assumed that funding for the next stage of the HPMPs would be requested around 2018 and 2019. On the basis of

information provided by the Fund Secretariat pertaining to funding eligibility of the countries for preparation of stage II of the HPMPs the amount of US \$5.987 million was estimated as the funding requirement for the preparation of stage II HPMPs. This is made up of US \$3.854 million and US \$2.133 million for LVC and non-LVC countries respectively.

8.5.1 (b) Funding requirements for preparation of stage III HPMPs in 2018-2019

It is expected that most of the larger volume HCFC-consuming Article 5 countries that will be receiving funding in 2014 or later for the preparation of stage II HPMPs to meet the 35% reduction step would also complete those HPMPs by the end of 2019. Thus assuming the provisions in the guidelines for stage II HPMPs continue to apply, it would be expected that countries in this category would also be requesting funding for preparation of stage III HPMPs around 2018-2019 to meet the 67.5% reduction step by 2025. It is also assumed that most of the activities in stage III HPMPs would address HCFC consumption in the refrigeration servicing sector, which would call for a lower level of funding for preparation than in the first two stages. Hence about 40% of the total amount estimated for these countries for preparation of stage II HPMPs was estimated as an indicative funding requirement for preparation of stage III. This amounts to approximately US \$5.5 million.

8.5.1 (c) Funding requirements for preparation of stage III/stage IV of HPMPs in the 2021-2023 triennium

It would be expected that countries that complete stage II or stage III HPMPs (depending on the category of country) relating to the 67.5% reduction step would consider requesting funding to meet the 97.5% reduction step in 2030. Once again, assuming the provisions in the guidelines for stage II HPMPs continue to apply, such requests could be made by countries in 2023-2024, i.e. at the end of 2021-2023 triennium and the beginning of 2024-2026 triennium. Performance of stages II and III of the HPMPs will determine the need and levels of funding for further stages of HPMP preparation beyond these stages for LVC and non-LVC countries. Thus at the moment available information is not adequate to enable forecast of funding requirement for later stages of the HPMPs with any degree of confidence. Thus it is recommended that estimation of funding requirements to be included in the 2021-2023 triennium for the preparation of stages of HPMPs that would be implemented in 2025 and beyond be considered at a later time.

8.5.2 Institutional Strengthening

The Institutional Strengthening component remains the same every two years if the funding is not changed by Executive Committee decisions. While there will be a funding review in this period, previous reviews have left funding levels unchanged. The indicative costs for 2018-2010 triennium will therefore be US\$ 24.707 million with support cost of US\$ 0.756 million for a total US\$ 25.463 million, and for the 2021-2013 triennium, US\$ 22,392 and support cost of US\$ 0.706 million for a total amount of US\$ 23.098 million⁹.

8.5.3 Supporting Activities

8.5.3 (a) UNEP Compliance Assistance Programme (CAP)

The indicative allocations for CAP are as follows: US\$ 33.799 million and US\$ 2.704 million support cost for a total of US\$ 36.503 for the 2018-2020 triennium; and US\$ 36.934 million and US\$ 2.955 million

⁹ The Task Force received comments from several Article 5 countries to the effect that Institutional Strengthening funding had not received the same consideration for inflation as, for instance, agency core unit costs and the CAP. However the Task Force considers that its terms of reference require it to present estimates based on current Executive Committee policies and decisions.

support cost for a total of US\$ 39.888 for the 2021-2023 triennium. As with allocations for previous triennia 3% annual increase and 8% support cost have been applied, where applicable.

8.5.3 (b) Agency Core Unit Costs

Assuming the present funding arrangement continues, the replenishment for the Agency core unit costs for 2018-2020 will be US\$ 17.950 million and for 2021-2023 it will be US\$ 18.329 million

8.5.3 (c) MLF Executive Committee and Secretariat costs

Assuming a 3% increase annually, the funding requirements for the MLF Executive Committee and Secretariat for 2018-2020 will be US\$ 20.936 million and for 2021-2023 will be US\$ 22.405 million.

8.5.3 (d) Treasurer costs

The current agreed costs for the treasurer of US\$ 500,000 per year are not based on actual costs but are notional reimbursements to UNEP negotiated between UNEP and the Executive Committee. It is assumed that the costs will remain the same for the following triennia. Therefore the amount of US\$ 1.5 million per triennium will continue to be budgeted for the treasurer for the following two replenishment periods 2018-2020 and 2021-2023.

Table 8-2 Total costs (in US\$ million) for preparation of stages II and III of HPMPs, IS and supporting activities for the periods 2015-2017, 2018-2020 and 2021-2023 based upon current agreed percentage growth for CAP and Core Unit Costs and stable biennial funding for Institutional Strengthening and non-changing costs for the Treasurer over the period 2015-2021 (including support costs where applicable)

| Element US\$ millions | 2015-2017 | 2018-2020 | 2021-2023 |
|---------------------------------------|------------------|------------------|------------------|
| Institutional Strengthening (IS) | 23.098 | 25.463 | 23.098 |
| HPMP Stage II and Stage III PRP Costs | 2.800 | 11.500 | TBD |
| Demonstration activities | 10.428 | nil | nil |
| Supporting Activities: | | | |
| UNEP CAP | 33.406 | 36.503 | 39.888 |
| Agency Core Unit Costs | 17.578 | 17.950 | 18.329 |
| Secretariat and ExCom | 19.593 | 20.936 | 22.405 |
| Treasurer | 1.500 | 1.500 | 1.500 |
| Total | 108.403 | 113.852 | 105.220 |

9 Results for the total funding requirement

The total funding requirement for the various triennia can be calculated by adding the following components:

- Funding for production phase-out
- Funding for non-investment components, supporting activities
- Funding for HCFC consumption phase-out activities: existing commitments from stage I HPMPs and new activities for stage II and later HPMPs.

9.1 Funding for production phase-out

From chapter 7, the amounts as given below can be taken for the production phase-out in the three subsequent triennia.

| | 2015-2017 | 2018-2020 | 2021-2023 |
|--------------|---------------|---------------|---------------|
| Total | 72.562 | 65.622 | 65.622 |

Table 9-1 Funding for production phase-out for three triennia (US\$ million)

9.2 Funding for supporting activities

The estimated funding for Institutional Strengthening and all other elements, including, *inter alia*, demonstration projects, project preparation and support activities, as developed in Chapter 8, is given in the table below.

| Element | 2015-2017 | 2018-2020 | 2021-2023 |
|-------------------------------|----------------|----------------|----------------|
| Institutional Strengthening | 23.098 | 25.463 | 23.098 |
| Demonstration activities | 10.428 | 0 | 0 |
| PRP and supporting activities | 74.877 | 88.389 | 82.122 |
| Total | 108.403 | 113.852 | 105.220 |

Table 9-2 Funding Institutional Strengthening and other activities for three triennia (US\$ million)

9.3 Funding for HCFC consumption phase-out activities

In Chapter 6, the total estimated funding required for HCFC consumption phase-out activities was derived. It was based on (1) existing and new commitments for LVC countries and (2) phase-out of HCFC-141b imported in preblended polyol, (3) existing commitments for non-LVC countries and new commitments for non-LVC countries, for which two funding cases were developed. The estimated total HCFC consumption phase-out funding requirement is indicated in the table below for Case 1 and Case 2.

| HPMP activities | 2015-2017 | 2018-2020 | 2021-2023 |
|-------------------------------------|-----------|-----------|-----------|
| Consumption sector | | | |
| Case 1 (commitment-based phase-out) | 428.4 | 371.1 | 465.7 |
| Case 2 (unfunded phase-out) | 308.8 | 306.3 | 465.7 |

Table 9-3 Funding for consumption phase-out for three triennia (US\$ million)

9.4 Total funding requirement

The estimated **total funding requirement** for the replenishment of the Multilateral Fund for the next three triennia for Case 1 and Case 2 is the sum of the amounts indicated in sections 9-1, 9-2 and 9-3 above. It is presented in Table 9-4 below.

| Total requirement for replenishment of the Multilateral Fund (US\$ millions) | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| | | | |
| Case 1 (commitment-based phase-out) | 609.5 | 550.6 | 636.5 |
| Case 2 (unfunded phase-out) | 489.7 | 485.8 | 636.5 |

Table 9-4 Total funding requirement for the replenishment of the Multilateral fund for three triennia (US\$ million)

In total, the funding requirement for Case 1 is US\$ 185 million higher than for Case 2. US \$ 120 million of this occurs in the first triennium, 2015-2017 and US \$ 65 million in the second triennium, 2018-2020. It can be estimated that 70% of this higher funding level arises from the HCFC consumption and production phase-out requirement in Group 1, China.

10 Considerations on the funding profile

Based on a technical assessment as outlined in the report thus far, in Case 1 the funding requirement for the first triennium is some 11% or US\$ 60 million greater than that for the second triennium. In Case 2, the figures are 1% or US\$ 5 million respectively.

The funding estimate for third triennium, US\$ 636.5 million, exceeds the requirement for the second triennium by US\$ 86 million (10%) and US\$ 151 million (30%) for Cases 1 and 2 respectively. The uncertainties inherent in looking this far ahead have been outlined earlier in this report. However a significant factor contributing to the increased level of funding is that the annual, *pro rata* HCFC phase-out required to meet the 2025 reduction target of 67.5% is some 30% higher than the annual reductions required between 2015 and 2020. All other things remaining equal, for instance cost-effectiveness levels, it can be expected that consumption sector costs will be correspondingly higher from the year 2020 onwards, when, as has been assumed in this report, HPMPs directed towards achieving the 2025 target start to receive funding.

It is apparent from Table 9-4 that for Case 2 the estimated funding levels in the first and second triennia are virtually identical. The replenishment levels thus conform to the requirements of the terms of reference (paragraph 6 of Decision XXV/8 concerning smoothing of the funding profile). For Case 1, the second triennium estimate exceeds the first by US\$ 59.4 million. For the same overall level of funding across the first two triennia, a stable profile would be at a level of US\$ 580.4 million. This would be achieved by delaying US\$ 29.8 million from the first to the second triennium.

The following four sections elaborate on factors that are available to influence the difference between the funding levels in the three triennia.

10.1 Dividing funding for HCFC consumption phase-out equally between the first two triennia

The Task Force examined the option of dividing all funding for HCFC consumption assessed as being required in the first and second triennia equally between the two replenishments. The requirements for the production sector and for supporting and other activities for the first two triennia appear in Tables 9-1 and 9-2 above. Those for the HCFC consumption sector appear in Table 9-3. If these consumption sector figures are averaged across the two triennia, and added to the other funding categories, the total funding estimate for Cases 1 and 2 is obtained, as indicated in Table 10-1 below.

| Element | 2015-2017 | 2018-2020 | 2021-2023 |
|---|--------------|--------------|--------------|
| Production | 72.6 | 65.6 | 65.6 |
| Supporting and other activities | 108.4 | 113.9 | 105.2 |
| HCFC consumption sector - Case 1 | 399.7 | 399.7 | 465.7 |
| HCFC consumption sector – Case 2 | 307.5 | 307.5 | |
| Total funding requirement – Case 1 | 580.7 | 579.2 | 636.5 |
| Total funding requirement – Case 2 | 488.5 | 487.0 | |

Table 10-1 Total funding requirement for Cases 1 and 2 when the funding for HCFC consumption phase out is distributed equally between the first two triennia.

For Case 1 funding, an equal division of consumption sector funds requires that US\$ 28.7 million be delayed from the first to the second triennium. Since the funding is all for HPMP implementation, and if the early submission of projects, typical of stage I HPMPs, continues, this implies that for stage II HPMPs there could be a requirement to modify the ‘front loading’ funding profile used in most HPMPs approved to date. For Case 2 funding, consumption sector funds in the first and second triennia are almost identical and meet the ‘equal division’ criteria without significant amendment.

In Section 10.2 below, consideration is given to the funding profile in the situation where funding for Stage III HPMPs, intended to address the 2025 control measure, is deferred until 2021, that is, to the 3rd triennium. Within this scenario and consistent with paragraph 2(d) with the terms of reference, a further option to balance the remaining funding for the 2020 HCFC consumption phase-out across the first two triennia is also presented.

10.2 Commencement date of funding for stage III HPMPs

As indicated in Chapters 5 and 6, the second triennium contains funding of US\$ 141.2 million for both Cases 1 and 2 corresponding to initial funding for stage III HPMPs in 2020. The second triennium also contains funding for LVCs to commence their stage III HPMPs at US\$ 35.7 million in the year 2020. This funding is directed towards meeting the 2025 HCFC reduction targets and does not contribute directly to achievement of the 2020 reduction target. The assumption that funding for stage III HPMPs would commence in 2020, not 2021 has been made on two grounds. Firstly it represents business as usual based on the timing of approvals for stage I HPMPs and proposed stage II HPMPs, with funding for the latter being included in the 2014 business plan. Secondly, this assumption was made to facilitate the commencement by Article 5 Parties of activities to achieve the 67.5% HCFC consumption reduction requirement by 1 January 2025 without a one-year delay between stage II HPMPs, planned to achieve the 35 % phase-out requirement by 1 January 2020, and stage III HPMPs. As indicated in the introduction to this chapter, annual phase out requirements to meet the 2025 reduction target are 30 percent greater than those required in the period 2015-2020.

If this assumption had not been made, and stage III funding was instead deferred until 2021, the total estimated funding requirements across the three triennia for Cases 1 and 2 would be as indicated in Table 10-2 below. In this situation, the funding requirement for the 3rd triennium would exceed that for the 2nd triennium by US\$ 436 million and US\$ 495 million, respectively for Case 1 and Case 2. The funding requirement for the 1st triennium would exceed that for the second by US\$ 236 million and US\$ 175 million for Cases 1 and 2 respectively.

| Total funding requirement (US\$ million) | 2015-2017 | 2018-2020 (Without Stage III HPMP funding in 2020) | 2021-2023 (First tranche of Stage III HPMPs in 2021) |
|---|------------------|---|---|
| Case 1 (commitment based phase-out) | 609.5 | 373.0 | 809.1 |
| Case 2 (unfunded phase-out) | 489.7 | 314.2 | 809.1 |

Table 10-2 Total funding requirement from Table 9.4 if the first tranches for stage III HPMP were deferred until the 2021-2023 triennium.

The Task Force also examined the option of deferring all Stage III HPMP funding until 2021 in the third triennium, and simultaneously balancing the remaining funding to enable achievement of the 2020 HCFC consumption target equally between the first two triennia. The results of this analysis are presented in

Table 10-3 below. Total funding requirements for the 1st and 2nd triennia are almost equal. For Case 1 and Case 2 respectively, the 3rd triennium exceeds the funding requirement for the 2nd triennium by US\$ 319 and US\$ 408 million.

| Element | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| Production | 72.6 | 65.6 | 65.6 |
| Supporting and other activities | 108.4 | 113.9 | 105.2 |
| HCFC consumption sector - Case 1 | 311.0 | 311.0 | 638.3 |
| HCFC consumption sector – Case 2 | 221.8 | 221.8 | |
| Total funding requirement – Case 1 | 492.0 | 490.5 | 809.1 |
| Total funding requirement – Case 2 | 402.8 | 401.3 | |

Table 10-3 Total funding requirement for Cases 1 and 2 when funding for Stage III HPMPs is delayed until the third triennium and the remaining funding for HCFC consumption phase out is distributed equally between the first two triennia.

10.3 Funding additional phase-out in the foam sector in the first two triennia

In HPMPs approved thus far, priority has been given to phase-out activities in the foam sector. There are sound practical reasons for consideration of further activities in the foam sector (additional to what has been incorporated in Case 1 and 2 on the basis of the composition of HPMPs approved to date). Firstly, low-GWP alternatives are available for virtually all uses in this sector at economically viable costs. Secondly, as has been requested in paragraph 6 of Decision XXV/8, additional funding for foam activities in the first two triennia would contribute to a further smoothing of the funding profile across three triennia.

The investigation of extra foam phase-out has been conducted as an addition to the basic requirement of HPMPs to meet the Montreal Protocol 35% consumption phase-down target by 2020 in the RAC and foam sector. That is, it would lead to additional phase-out in the foam sector by 2020 in countries where the extra foam phase-out will be possible given their foam HCFC consumption levels. The extra foam phase-out does not substitute for phase-out in the RAC sector, which is kept at the same level as in the Case 1 and Case 2 described. Given the fact that more HCFCs are phased out by 2020 than the 35% target in this case, this leads to the assumption that less will have to be phased out in order to achieve the 67.5% reduction by 2025 (leading to a lower funding requirement for HPMPs after stage II).

The funding implications of additional phase-out in the foam sector have been analysed country-by-country (for non-LVC countries) on the basis of an 80% phase-out of foam sector consumption. Countries where foams have already been phased out under existing agreements, or where a foam phase-out is needed in order to comply with the 35% reduction in 2020 have not been included. The analysis has been conducted for both Case 1 and Case 2 funding options and, in each case, both including and excluding the Group 1 country, China in the exercise. In the calculations, the cost effectiveness factors for the foam sector have been used as given in chapter 5 (and as used in all Case 1 and 2 calculations). It is expected that an 80% phase-out process would lead to the phase-out of the vast majority of eligible foam operations.

The total triennia funding requirements if additional foam sector phase-out was included in stage II HPMPs as outlined above are presented separately for Case 1 and Case 2 in Tables 10-3 and 10-4 respectively.

| Total Funding requirement (US\$ millions) | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| Case 1 | | | |
| 80% phase-out in the foam sector (countries expected to have foam consumption in 2020) (excl. Group 1, China) | 654.2 | 555.8 | 574.1 |
| 80% reduction for all countries (including Group 1, China) | 757.0 | 578.2 | 446.8 |

Table 10-3 Various total funding requirements (in US\$ million) for the triennia 2015-2017 and 2018-2020 for 80% foam phase-out in countries where there would still be consumption in 2020 (following Case 1). Funding requirements are presented both excluding and including the Group 1 country, China. The funding requirement calculated for 2020 (for the HPMP stage assumed to start as of 2020) has been added to the 2018-2020 stage II HPMP number. The disbursement schedule 40-25-25-10% has been used in both calculations.

| Total Funding requirement (US\$ millions) | 2015-2017 | 2018-2020 | 2021-2023 |
|---|------------------|------------------|------------------|
| Case 2 | | | |
| 80% phase-out in the foam sector (countries expected to have foam consumption in 2020) (excl. Group I, China) | 534.6 | 491.0 | 574.1 |
| 80% reduction for all countries (including Group I, China) | 637.4 | 513.4 | 446.8 |

Table 10-4 Various total funding requirements (in US\$ million) for the triennia 2015-2017 and 2018-2020 for 80% foam phase-out in countries where there would still be consumption in 2020 (following Case 2). Funding requirements are presented both excluding and including the Group 1 country, China. The funding requirement calculated for 2020 (for the HPMP stage assumed to start as of 2020) has been added to the 2018-2020 stage II HPMP number. The disbursement schedule 40-25-25-10% has been used in both calculations.

Tables 10-3 and 10-4 show that the additional foam sector phase out will increase the funding in the first triennium 2015-2017. The level of increase is influenced significantly by the inclusion or exclusion of the Group 1 country, China. The second triennium funding requirement is not changed significantly and the funding requirement for the period 2020-2023 for stage III HPMPs decreases in all cases, because a proportion of the necessary funding will have been made available in the first two triennia. The overall level of funding across the three triennia from 2015 to 2023 is more stable with the inclusion of additional foam phase-out in countries other than the Group 1 country, China.

10.4 Modifying the disbursement of funding for phase-out of HCFC production in China

As indicated in Section 7.1, the estimate used in this study for HCFC production phase-out in China is equal annual disbursements of US\$ 21.874 million (including support costs) after the year 2016, until which year funding tranches are committed. Clearly there is scope to influence the balance between triennia funding levels by varying the phasing of production sector funding. However, this would involve a) practical funding requirements in relation to the phase-out process in China, and b) relevant policy

considerations and guidance from the Executive Committee. Since this report is based on existing policy guidance and decisions, no further consideration has been given to options other than the equal annual disbursements as presented.

11 Indicative figures for additional resources to gradually avoid high-GWP alternatives to ODS

Decision XXV/8 mentions in paragraph 3: “As a separate element to the funding requirement estimated in paragraph 2 of the present decision, the Panel should provide indicative figures for additional resources that would be needed to enable parties operating under paragraph 1 of Article 5 to gradually avoid high-GWP alternatives to ODS taking into account the availability of safe, environmentally friendly, technically proven and economically viable technologies”.

The Task Force has interpreted paragraph 3 to require the examination of the following three funding scenarios.

- In the absence of a binding policy to avoid high GWP alternatives to ODS, additional funding resources would be needed to support the choice of low-GWP alternatives in foam, refrigeration and AC conversion projects and servicing, provided safe, viable and proven, and economically feasible technologies are available. In this regard it is also the understanding of the Task Force that gradual avoidance of high GWP alternatives would require an appropriate estimate of the cost effectiveness in the AC sector in particular, and an estimate of the servicing cost parameters.
- A further element that the Parties could consider is the cost associated with a second conversion from HFCs to low GWP alternatives in the refrigeration and mobile air conditioning sectors that the MLF funded in the 1990s.
- At the broadest level it is understood that some Parties consider that costs could be examined for the funding of a gradual phase-down of the consumption of high GWP substances in Article 5 countries, where the consumption is not associated with a previous conversion from ODS to high-GWP alternatives. The Task Force has provided some broad, order of magnitude costs for this scenario, in particular as it relates to the information and estimates provided in the XXV/5 Task Force report.

A brief analysis of the above options is provided hereunder.

11.1 Overview of the HFC situation

Many developed countries started to phase in HFC alternatives during the 1990s. Developing countries started to phase in HFC alternatives in the late 1990s and early 2000s. The demand for HFCs in the year 2014 is estimated to be around 300,000 tonnes in Article 5 Parties, with more or less the same amount in non-Article 5 countries (600,000 tonnes globally). In this regard, the TEAP report on Decision XXV/5 examines the refrigeration and air conditioning and foam sectors for the period 2010-2015, and extrapolates consumption for a BAU and two mitigation scenarios towards 2030.

The demand for HCFCs and HFCs is currently as follows:

- Non-Article 5 countries have a relatively small HCFC consumption for remaining servicing uses
- Non Article 5 countries have a demand of about 300,000 tonnes of HFCs per year, increasing at 1-2% per year.
- Article 5 countries will have a demand for HCFCs in the order of 500,000 tonnes in 2014, which amount will decrease following the accelerated phase-out in Decision XIX/6, and should, in principle, be converted to low-GWP alternatives.

- Article 5 countries have an HFC demand at a level of about 300,000 tonnes in 2014, which is growing at 7-8% per year. It is not related to conversion of HCFC equipment, but is a result of new manufacturing, producing HFC-based equipment mainly in the refrigeration and AC sector.

So far the Multilateral Fund has dealt with a conversion of a large amount of HCFCs mainly in the foam, some in the refrigeration and AC sector. These have been converted to low-GWP options for the largest part, and do therefore not form a significant part of the current HFC demand in Article 5 countries.

11.2 Information specific to the foam and refrigeration sectors in the context of MLF operations

The experience gained from assessment of foam conversion projects in approved HPMPs is that low-GWP alternatives are available for most, if not all uses. There may be a number of XPS applications for which no practical alternatives currently exist, but these can be expected in the coming years. Even if not available in the first triennium, the consumption these XPS applications represent would not constitute an impediment to achievement of the 35% reduction from the baseline by the year 2020. Conversion of these remaining XPS applications could therefore be undertaken under the Multilateral Fund after 2020 when alternatives become commonly available.

In the RAC sector, high-GWP alternatives are mainly used in commercial refrigeration (HFC-134a, R-407C, R-404A), stationary air conditioning (mainly R-410A and R-407C) and in mobile air conditioning (HFC-134a). Since Article 5 countries generally report both the use of HCFC-22 and the conversion to alternatives under ‘servicing’ (since it concerns on-site installation) it is difficult to determine whether the conversion from HCFC-22 involves a conversion to high GWPs (and these operations would fall under the cost effectiveness of US\$ 4.5/kg) and how a possible conversion to low-GWP alternatives can be addressed under the current HPMP experiences of the Multilateral Fund.

All MAC manufacturing in Article 5 countries uses HFC-134a, either in facilities converted from CFC-12, or in new manufacturing equipment, installed during the last 10-15 years. At this stage, the Task Force is uncertain how the use of HFC-134a in MAC manufacturing could be avoided under the current type of operations under the Multilateral Fund, since it would concern non-ODS conversions, which have so far not been taken into consideration. Given the fact that the commercial refrigeration and MAC sectors cannot be addressed in this way, the Task Force considers the conversion of stationary air conditioning equipment manufacture to low-GWP alternatives would constitute one of the first steps in a gradual avoidance of high-GWP alternatives in the RAC sector.

Low-GWP alternatives based on blends of low- and high-GWP refrigerants (with a GWP in the order of 300) may become available progressively in Article 5 countries over the next few years. For these, in the first instance, a cost effectiveness of between US\$ 10/kg and US\$ 16/kg seems reasonable, which would be comparable to the cost effectiveness of conversion of HCFC-22-based equipment to hydrocarbons.

11.3 Funding ODS conversions to avoid high GWP alternatives

In order to determine an indicative amount for a gradual conversion to low-GWP from ODS, three possibilities have been considered.

1. Second conversion of projects that converted to HFC-134a from CFC-12, with support of the Multilateral Fund in the 1990s (domestic and commercial refrigeration mass production, MAC units mass production)
2. Support for servicing in both LVC and non-LVC countries in order to deal with low-GWP refrigerants that are flammable to different degrees
3. An increase in funding for the conversion of stationary AC projects to enable the use of low-GWP refrigerants only.

11.3.1 *Second conversions*

In the 1990s, a large number of domestic and commercial refrigeration projects having both foam and refrigeration components were implemented at a cost effectiveness of US\$ 11-14/kg. Consumption of around 6,300 tonnes of HFC-134a was phased in as a result of the conversion from CFC-12. Assuming a cost effectiveness of about US\$ 6.4/kg for a second conversion to hydrocarbons (similar to the conversion from CFC-12 to HFC-134a), an amount of US\$ 40 million can be calculated. In that same period production capacity of somewhat less than 1 million units per year for mobile air conditioning was converted. Assuming 1 kg per unit (a total of 1,000 tonnes), and a second conversion cost of US\$ 6.4/kg, an amount of US\$ 6.4 million can be determined. The total amount in a second conversions of projects that were addressed under the Multilateral Fund would therefore be US\$ 46.4 million. If these second conversions were implemented over two triennia, this would add additional costs per year of some US\$ 8 million

11.3.2 *Servicing*

In the case of servicing, one may consider an increase from US\$ 4.5 to US\$ 6.5/ kg. The additional funding would assist beneficiaries to deal in an adequate manner with the servicing of low-GWP substances including low-GWP HFCs with varying levels of flammability, together with lubricants suitable for low-GWP HFCs.

Applying this level of increase in service sector funding to non-LVC countries that have a large manufacturing sector (Type (a) countries as described in Section 5.5), the overall RAC cost effectiveness would increase from US\$ 7.86/kg to US\$ 8.66/kg, an increase of 10%. For non-LVCs this would therefore imply an amount of about US\$ 4 million per year.

In the case of LVCs the amount is more difficult to determine. Assuming that a total amount of about US\$ 60 million is required to enable LVC countries to achieve a 35% reduction, furthermore assuming a 40% increase in this amount for more expensive servicing, this would lead to a requirement for about US\$ 24 million. If one would assume that this would apply to the three triennia as of 2014, it would imply an amount of US\$ 9 million per triennium, or about US\$ 3 million per year. It is difficult to estimate the level of consumption involved, but this could well be around 3,000 tonnes per year.

11.3.3 *Air conditioning conversion to low GWP refrigerants*

The cost-effectiveness considered in estimating HPMP costs for both the Case 1 and Case 2 funding options has been US\$ 7.86/kg for large manufacturing countries, based upon a 60% share of manufacturing at an average cost of US\$ 10.1/kg, and a 40% share for the servicing sector at a cost-effectiveness of US\$ 4.5/kg.

On the basis of projects approved so far for low-GWP refrigerants only, an average cost effectiveness of US\$ 13.35/kg can be derived, which would result (when combined with servicing at 40% of the total consumption) in an average cost effectiveness of US\$ 9.81/kg, an increase of about 25%. Increases would be lower for countries with higher servicing percentages.

Calculations have been made with combinations of the two cost effectiveness factors (dependent on the servicing percentage for specific countries). These then give indicative amounts for the additional resources (in US\$ million), with an indicative figure of US\$ 25 million per triennium. This would be around US\$ 8 million per year.

11.3.4 Total amounts addressed and indicative number for funding

In total, the additional amounts involved in the three activities mentioned above would be about **US\$ 23** million per year over at least two triennia, a total of around **US\$ 138** million, as a first indicative amount to gradually phase out high-GWP alternatives to ODS. In this way one could address the avoidance of consumption of about 10,000 tonnes of high-GWP alternatives. This would clearly be a first step within the Multilateral Fund framework, when taking into account the current consumption of high GWP alternatives in Article 5 countries of about 300,000 tonnes (the 10,000 tonnes would be about 3% of the total).

11.4 Consideration of funding requirements for a gradual phase-down of high-GWP substances in Article 5 countries

The TEAP report on Decision XXV/5 provides estimates for the total consumption of high-GWP alternatives (e.g. HFCs) in the year 2015 of about 300,000 tonnes in Article 5 countries, with the major portion used in the refrigeration and air conditioning sector. The analysis in that report indicates that more than 180,000 tonnes of the estimated total in that year is used in manufacturing. A cost effectiveness of US\$ 6-18 per kg might be applicable, as mentioned in the XXV/5 report. Without taking into account any multinational operations, if that manufacturing sector was considered for conversion to low-GWP alternatives. Taking into account the 2015 consumption, manufacturing conversion costs then yield a total amount of US\$ 1080-3240 million. The Task Force is not able to give further considerations to these amounts within the Multilateral Fund framework of enabling compliance with agreed control schedules.

Annex 1 HCFC production and consumption

This Annex serves as a supplement to Chapter 3. The Annex provides background information on the global trends and structures features of HCFC production and consumption, useful for understanding the context of production and consumption for the replenishment study.

A1.1 Global trends of HCFC production and consumption

Eight HCFCs are produced and consumed globally, i.e., HCFC-123, HCFC-124, HCFC-141b, HCFC-142b, HCFC-22, HCFC-225, HCFC-225ca, HCFC-225cb. Globally, the total production and consumption of the three major HCFCs experienced a decrease following by an increasing trend, from 1995 to 2012, due to the phase-out efforts in Non Article 5 Parties, and the fast increase of production and consumption in Article 5 Parties, although each HCFC has its own trend (see Table Annex 1-1, 1-2, 1-3).

This section discussed major three important chemicals: HCFC-141b, HCFC-142b and HCFC-22. The data used for Tables in this Annex are from UNEP (2014), in fact, from February 2014.

A1.1.1 HCFC-141b

The production and consumption of HCFC-141b reached a peak level globally in 2000 with production and consumption 140,000 tonnes and 152,000 tonnes respectively, then reduced sharply to 59,000 tonnes in production and 67,000 tonnes in consumption by the year of 2005 at a reduction of 58% and 56% respectively.

It increased again due to the continuing increasing trends in Article 5 Parties, and came to a production level of 121,000 tonnes and a consumption level of 126,000 tonnes in 2012. There are 4 major producers of HCFC-141b, US, Japan, France and China (Table Annex1-1, and figure 1).

Table A1-1 HCFC-141b Non-Article 5, Article 5 and global production and consumption numbers for 1995, 2000 and 2005-2012 (Article 7 reporting, UNEP, February 2014)

| Year (tonnes) | 1995 | 2000 | 2005 | 2009 | 2010 | 2011 | 2012 |
|-------------------------|--------|--------|-------|--------|--------|--------|--------|
| Production-141b | | | | | | | |
| NA5 | 111319 | 128385 | 11837 | 10436 | 7471 | 6180 | 3722 |
| A5 | 0 | 11975 | 46794 | 91880 | 98857 | 111922 | 117131 |
| Global | 111319 | 140360 | 58631 | 102316 | 106328 | 118102 | 120853 |
| Consumption-141b | | | | | | | |
| NA5 | 105350 | 113724 | 5455 | 7287 | 1911 | 3633 | 2083 |
| A5 | 5629 | 38210 | 61412 | 103860 | 113288 | 124148 | 123678 |
| Global | 110979 | 151934 | 66867 | 111147 | 115199 | 127781 | 125761 |

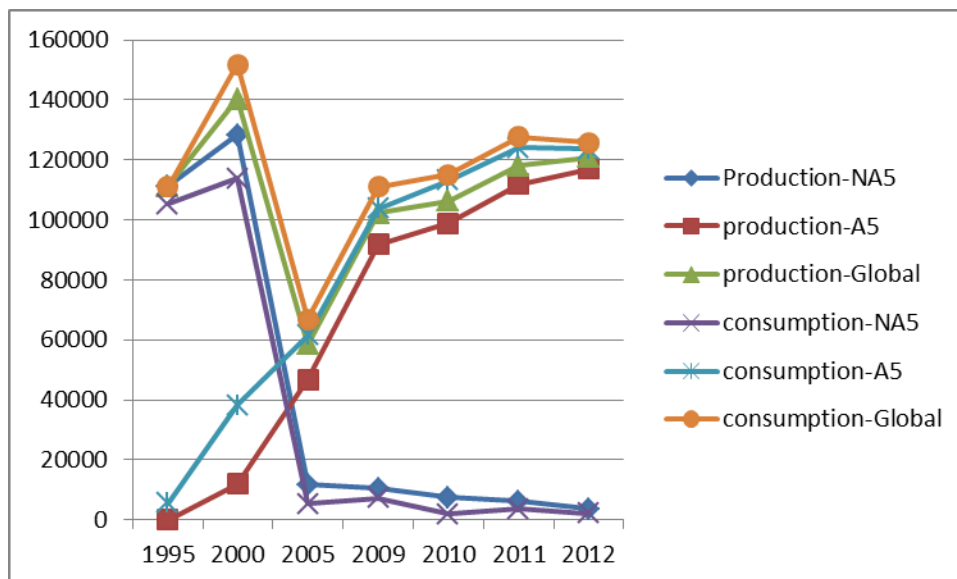


Figure A1-1 HCFC-141b Non-Article 5, Article 5 and global production and consumption numbers for 1995, 2000 and 2005-2012 (Article 7 reporting, UNEP, February 2014)

HCFC-141b production

The production of HCFC-141b was increased sharply in the 1990s in non-Article 5 countries, then reached a maximum of about 130,000 tonnes around 2000, and decreased again, from 10,000 tonnes in 2009, to less than 4,000 tonnes in 2012.

In Article 5 Parties, the HCFC production was low until the turn of the century, then started to increase from about 12,000 tonnes in the year 2000 to 117,000 tonnes in the year 2012; this was almost a continuous increase (in these figures the Republic of Korea is included; however, the Republic of Korea stopped production of HCFC-141b as of 2005-2006).

Production of HCFC-141b takes place in non-Article 5 countries (US, Japan and France) and one Article 5 country (China). The Article 5 production constitutes around 95% of the global production. The HCFC-141b production in Non-Article 5 countries is for export only. In addition, China is exporting around 30-35% of its HCFC-141b production to other Article 5 countries. A certain amount of HCFC-141b is used for feedstock for the production of HCFC-142b (in China).

HCFC-141b consumption

The consumption of HCFC-141b increased sharply in the 1990s in non-Article 5 countries, then reached a maximum of about 114,000 tonnes around 2000, and decreased again to 2,000 tonnes in the year 2012. In Article 5 Parties the consumption was low until 1994-1995, then started to increase from about 5,000 tonnes in the year 1995 to about 124,000 tonnes in the years 2011-12; this was almost a continuous increase (in these figures the Republic of Korea is included).

HCFC-141b production versus consumption

Both production and consumption in Article 5 Parties are significantly larger than in non-Article 5 Parties (where both production and consumption have decreased by more than a factor 10 over the period 2000-2012). Consumption in non-Article 5 Parties has been smaller than production over the years, the difference varying between 400 and 5,000 tonnes during the period 2005-2012, which can be explained by exports to certain Article 5 Parties. Consumption in Article 5 Parties has been systematically larger than production, by about 15% during 2008-2012 (and even more before 2006). This cannot be made up for by

exports of HCFC-141b. The result is that one can observe a systematic higher global consumption of 5-9,000 tonnes of HCFC-141b over all years, with the lowest number in 2012. This cannot be explained by stockpile effects. However, a systematic over-reporting of a constant value also seems awkward, even with strongly varying production and consumption numbers in both types of Parties. The issue of HCFC-141b imported in preblended polyols may be part of the explanation here; there may be double reporting of the amount of HCFC in pre-blended polyols. This could happen via consumption reporting from the countries where the pre-blending takes place and from the Article 5 countries use pre-blended polyols that report imports (and thus consumption).

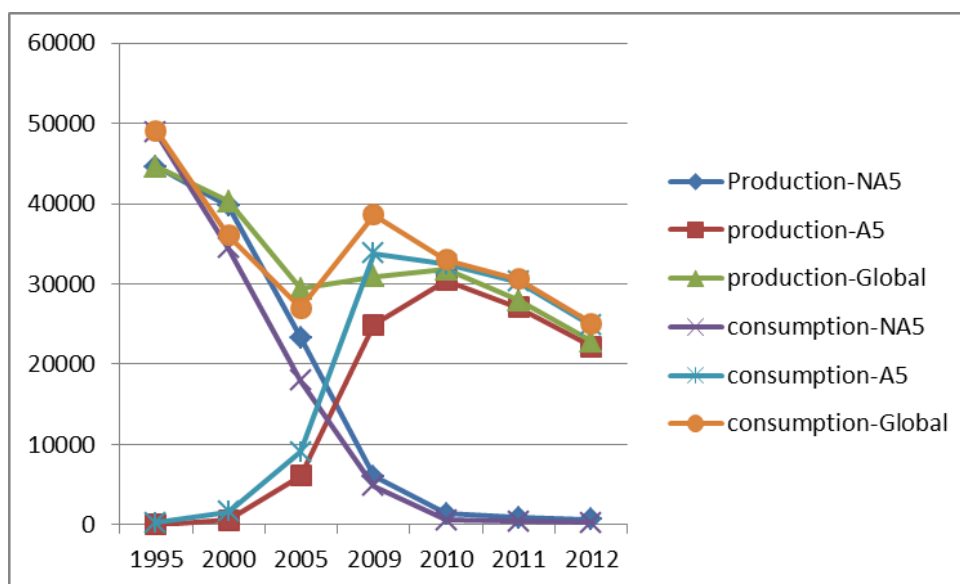
AI.1.2 HCFC-142b

HCFC-142b production and consumption decreased during 1995 to 2005 globally (about 34% and 45%), then had an increase to the peak in 2010 and 2009 respectively, and shows a decrease trends again until 2012. The Article 5 Parties started their fast growth of Production and consumption of HCFC-142b in 2003 until 2009-2010, then shows a decrease trends until 2012. Consumption in Article 5 Parties is systematically larger than production, by about 4,000-9,000 tonnes during recent years. Global consumption is more or less equal to production until 2007, which shows 10,000 tonnes higher production levels, followed by a 2-3,000 tonnes higher global consumption level in 2010-2012 (see Table A1-2).

Table A1-2 HCFC-142b Non-Article 5, Article 5 and global production and consumption numbers for 1995, 2000 and 2005-2012 (Article 7 reporting, UNEP, February 2014)

| Year (tonnes) | 1995 | 2000 | 2005 | 2009 | 2010 | 2011 | 2012 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Production-142b | | | | | | | |
| NA5 | 44642 | 39697 | 23297 | 6033 | 1337 | 865 | 680 |
| A5 | 0 | 577 | 6125 | 24890 | 30449 | 27074 | 22159 |
| Global | 44642 | 40274 | 29422 | 30923 | 31786 | 27939 | 22839 |
| Consumption-142b | | | | | | | |
| NA5 | 48838 | 34435 | 17945 | 4829 | 542 | 376 | 244 |
| A5 | 257 | 1638 | 9027 | 33783 | 32457 | 30236 | 24830 |
| Global | 49095 | 36072 | 26972 | 38612 | 32999 | 30612 | 25074 |

Figure AI-2 HCFC-142b Non-Article 5, Article 5 and global production and consumption numbers for 1995, 2000 and 2005-2012 (Article 7 reporting, UNEP, February 2014)



HCFC-142b Production

The production of HCFC-142b was increased sharply in the 1990s in non-Article 5 countries, reached a maximum of about 40,000 tonnes around 2000, and then sharply decreased through 2012.

In Article 5 Parties the production was very low until 2003, then started to increase from about 4,000 tonnes in the year 2003 to 30,000 tonnes in the period 2009-2010; the reported production is back to about 22,000 tonnes in the year 2012 (in these figures the Republic of Korea is included; however, the Republic of Korea never produced much and stopped production of HCFC-142b as of 2005-2006).

Currently, production of HCFC-142b takes place in non-Article 5 countries (USA and EU member states) and in one Article 5 country (China). HCFC-142b is used in refrigerant blends and as a blowing agent for XPS foam. As can be observed in Table A1-3, aside from a significant increase from 2005 to 2006, there has been modest growth since then, followed by a decrease after 2010.

HCFC-142b consumption

The consumption of HCFC-142b increased sharply in the 1990s in non-Article 5 countries, reached a maximum of about 34,000 tonnes around 2000, and then sharply decreased. In Article 5 Parties the consumption was very low until 2003, then started to increase from about 6,000 tonnes in the year 2003 to 34,000 tonnes in the year 2009 (in these figures the Republic of Korea is included), however then back to 25,000 tonnes in 2012.

HCFC-142b production versus consumption

Production in Article 5 Parties is smaller than in non-Article 5 Parties in the first part of the 2000-2010 decade, but becomes much higher in 2009-2010 due to an increase in Article 5 and a decrease in non-Article 5 production. Global production therefore peaks in 2009-2010, then decreases, with a 20% decrease between 2011 and 2012.

Consumption in Non-Article 5 Parties has always been smaller than production over the years, varying between 5,000 and 15,000 tonnes during the period 2000-2009, which can be explained by exports to certain Article 5 Parties. In fact the values during recent years are hardly of any importance.

Consumption in Article 5 Parties is systematically larger than production, by about 4,000-9,000 tonnes during recent years. Global consumption is more or less equal to production until 2007, the year 2007 then shows 10,000 tonnes higher production levels, followed by a 2-3,000 tonnes higher global consumption level in 2010-2012.

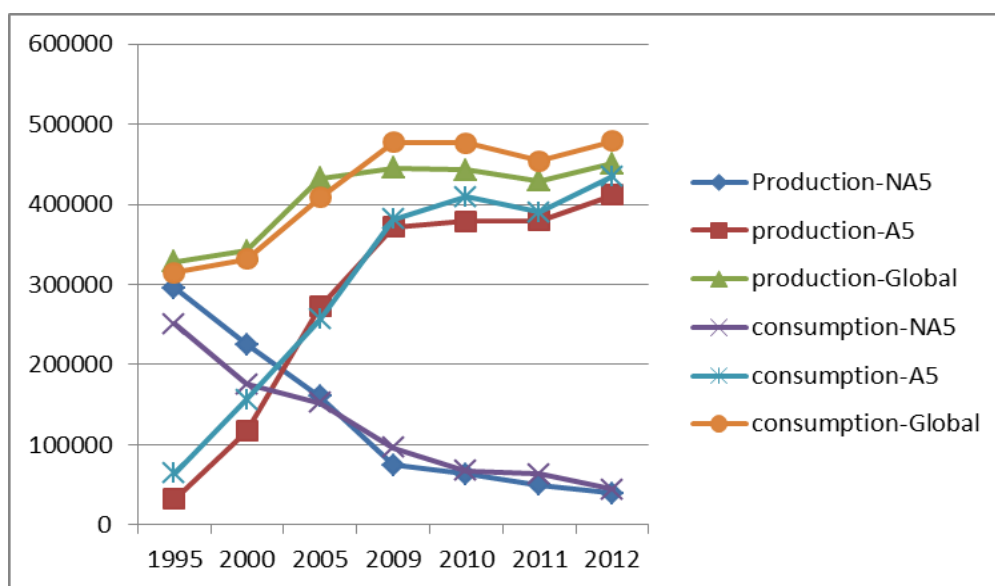
A1.1.3 HCFC-22

Different from HCFC-141b and 142b, HCFC-22 production and consumption shows an almost consistent increase trend globally during 1995-2012, with exception of production in 2010-2011 and consumption in 2011. From 1995-2009, a fast growth can be observed with increase of 35% and 52% respectively for production and consumption. Both production and consumption of HCFC-22 in Non-Article 5 Parties constitute about 10%-11% of the global ones, with a larger share compared with that for HCFC-141b and HCFC-142b (Table A1-3).

Table A1-3 HCFC-22 Non-Article 5, Article 5 and global production and consumption numbers for 1995, 2000 and 2005-2012 (Article 7 reporting, UNEP, February 2014)

| Year (tonnes) | 1995 | 2000 | 2005 | 2009 | 2010 | 2011 | 2012 |
|------------------------|--------|--------|--------|--------|--------|--------|--------|
| Production -22 | | | | | | | |
| NA5 | 295690 | 225119 | 160062 | 74226 | 63656 | 49575 | 39002 |
| A5 | 32366 | 116606 | 272055 | 371418 | 379105 | 379925 | 411634 |
| Global | 328056 | 341725 | 432116 | 445644 | 442761 | 429500 | 450636 |
| Consumption -22 | | | | | | | |
| NA5 | 250595 | 175635 | 151909 | 96060 | 67159 | 63737 | 43853 |
| A5 | 64018 | 156243 | 256607 | 381517 | 408982 | 390124 | 434734 |
| Global | 314613 | 331880 | 408517 | 477577 | 476141 | 453861 | 478587 |

Figure A1-3 HCFC-22 Non-Article 5, Article 5 and global production and consumption numbers for 1995, 2000 and 2005-2012 (Article 7 reporting, UNEP, February 2014)



HCFC-22 production

Globally, the HCFC-22 production experienced an increase since 1990s, from 330,000 tonnes in 1995 to 440,000 tonnes in 2010. It decreased to 430,000 tonnes in 2011 and increased again in 2012, to about 450,000 tonnes.

The production of HCFC-22 increased sharply in the 1990s in non-Article 5 countries, reached a maximum of about 300,000 tonnes in 2000, and decreased annually to about 39,000 tonnes in the year of 2012. This is the result of the controls on HCFC-22 in the EU since the early 2000s and prohibition of the servicing with virgin materials and the ban on the use of HCFC-22 for new equipment in the EU and the USA.

In Article 5 Parties the production was low during 1990s, then a fast increase occurred from 32,000 tonnes in the year of 1995 to 410,000 tonnes in the year 2012. As a result of that increase, the production of HCFC-22 in Article 5 Parties in 2012 is almost 12 times of their production in 1995.

Production of HCFC-22 in Article 5 Parties constitutes about 90% of the global production, and was produced mainly in one major Article 5 country (China). The production in Article 5 Parties has been larger than the production in non-Article 5 Parties since the year 2003. HCFC-22 is produced for feedstock uses in both Non-Article 5 and Article 5 countries. The total global HCFC-22 production was slightly lower than the reported consumption (excluding the year of 2005).

HCFC-22 consumption

Globally, the HCFC-22 consumption increased continuously since the 1990s, from 310,000 tonnes in 1995 to about 480,000 tonnes in 2010. It decreased to 450,000 tonnes in 2011 and increased again in 2012, to about 480,000 tonnes

The consumption of HCFC-22 showed a continuing annually decrease in non-Article 5 countries since 1995, from 300,000 tonnes in 1995 to 40,000 tonnes in 2012. This mainly due to the controls on HCFC-22 in the EU since the early 2000's and prohibition of the servicing with virgin materials and ban on the use of HCFC-22 for new equipment in the EU and the U.S.

In Article 5 countries, the consumption of HCFC-22 was very low until the year of 1995 with about 32,000 tonnes, it increased to 116,000 tonnes in 2000 and was at a total consumption level of 412,000 tonnes by 2012, almost 12.7 times of the 1995 level.

HCFC-22 is reported under consumption by all Article 5 Parties, with largest consumption in one Party (China). The consumption in Article 5 Parties is larger than the consumption in non-Article 5 Parties since the year 2002.

HCFC-22 production versus consumption

Globally the reported consumption of HCFC-22 exceeds the reported production since 2006, with about 30,000 tonnes of the shortage of production gap during the year of 2009-2012, after a production surplus observed during the years 1995-2005. It is difficult to find an explanation for this situation. Stockpiling (which is expensive) is unlikely to explain this effect, with 50,000 tonnes difference during the two years 2008 and 2009. Systematic over-reporting of consumption by particularly Article 5 Parties or mis-reporting of HCFC-22 consumption due to mistakes in dispersive and feedstock uses reporting may well be possible. However, the Task Force has no data to support either assumption and is not in a position to further investigate the issue.

A1.3.1 HCFC production from 2005 to 2012 in the various groups

Table A1-4 HCFC reported consumption for 2005-12 (Article 7 reporting, UNEP, February 2014) in aggregated form for the different groups of countries (number of countries given in second column), in ODP tonnes

| Countries | Number | 2005 | 2009 | 2010 | 2011 | 2012 |
|---------------------|---------------|-------------|-------------|-------------|-------------|-------------|
| | 1 | 11652 | 18603 | 19935 | 20739 | 21095 |
| Group 2 | 57 | 7518 | 13110 | 13911 | 13093 | 14705 |
| Group 2a | 24 | 6922 | 11581 | 12281 | 11444 | 13055 |
| Group 2b (3) | 33 | 596 | 1529 | 1629 | 1648 | 1650 |
| Group 4 | 85 | 270 | 449 | 462 | 467 | 464 |

A1.3.2 HCFC production from 2008 to 2012 in the various groups

Only a small number of Article 5 Parties produce HCFCs. Production of HCFC-141b and -142b took place in one Article 5 Party only (China). HCFC-22 production is mainly produced in China, constitutes about

85-90% of the global total, and one can observe an increase trend during 2008-2012. There are four other Article 5 Parties produce HCFC-22, which are all in Group 2 (Argentina, India, Mexico and Venezuela). They produce at about 10-15% of global total, showing a decrease in output during 2009-2012. One manufacturer of HCFC-22 (Republic of Korea) has not been considered in this report since it has never requested MLF assistance (see Table A1-5).

Table A1-5 Production of the three main HCFCs in Group 1 and 2a Parties (Article 7 reporting, UNEP, February 2014) for the period 2008-2012 (metric tonnes)

| Group and Chemical | 2008 | 2009 | 2010 | 2011 | 2012 |
|---------------------------|-------------|-------------|-------------|-------------|-------------|
| Group 1-HCFC-141b | 81298 | 91880 | 98857 | 111922 | 117131 |
| Group 1-HCFC-142b | 22724 | 24890 | 30449 | 27074 | 22159 |
| Group 1-HCFC-22 | 263745 | 298559 | 311357 | 326692 | 364547 |
| Group 2-HCFC-22 | 59722 | 66035 | 60204 | 46098 | 41511 |

* The Republic of Korea has not been considered in this table. Over the years 2007-2009 the Republic of Korea reported zero production of the chemicals HCFC-141b and HCFC-142b

China's Production of HCFC-141b and -142b was sufficient to cover the domestic demand. This implies that both chemicals HCFC-141b and -142b have been imported from non-Article 5 Parties by virtually all (non-Group 1) Article 5 Parties with HCFC-141b and -142b consumption.

The total amount of HCFC-22 produced in 2012 of the two groups was slightly larger than 405,000 tonnes. Production of HCFC-22 in the year 2012 in the countries in the Groups 1 and 2 was again smaller than the consumption in all Article 5 Parties (see above).

ANNEX 2 - ACCOUNT OF CONSULTATIONS PURSUANT TO PARAGRAPH 4 OF DECISION XXV/8

A2.1 Summary; the reason for consultations

1. Paragraph 4 of decision XXV/8 mandated the TEAP, in preparing this replenishment report, to consult widely with all relevant persons and institutions and other relevant sources of information deemed useful.
2. That paragraph was preceded: paragraph 3 of decision XXII/3 contained a similar mandate.

Consultation can be an important stage in the preparation of a report: it allows evidence to be sought from a range of interested parties so as to inform the development of ideas. With this in mind, the consultation commenced early, before any draft of this report was prepared.

3. It is especially important to consult on decision XXV/8, which is different in some key respects from decision XXII/3. Decision XXV/8 is longer and more complex; what is more the mandate is more challenging because some paragraphs in the decision relate to continuing and unresolved policy discussions; and perhaps because of that decision XXV/8 raises difficult questions and creates ambiguities in a way that decision XXII/3 did not. The questions that the RTF asked consultees were designed to address those questions and ambiguities.

A2.2 The process

4. The RTF considered it would be helpful to engage in an informal dialogue with stakeholders prior to any more formal, written consultation to obtain initial evidence and to gain insights into the issues that needed to be considered.
5. With that in mind, members of the RTF attended the seventy-first meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in Montreal from 2 to 6 December 2013. In the margins of the meeting, members of the task force interviewed a number of members of the Executive Committee and co-opted countries, the Ozone Secretariat and the implementing agencies of the Multilateral Fund.
6. During the consultations, those interviewed were invited to give their opinion on the general issues raised by decision XXV/8, and then asked further questions that were later part of the written consultations.
7. Then on 16 December 2013 the Executive Secretary of the Montreal Protocol commenced written consultations with a letter, a copy of which is an Appendix to this Annex.
8. She explained the context of the consultations and mentioned the mandate of the TEAP to act under decision XXV/8. She also mentioned the consultations in the margins of the seventy-first meeting of ExCom.
9. The letter explained that the Secretariat was circulating to all parties and other relevant persons and institutions a request by the RTF for comments on the general issues raised by decision XXV/8 as well as on particular questions that were annexed to the letter. The request was also posted on the Ozone Secretariat website. Comments were requested before 18 January 2014. All 33 responses to the letter were seen by members of the RTF (24 from Article 5 Parties and 9 from

non-Article 5 Parties, plus responses from Implementing Agencies and from 4 stakeholders in the process).

10. All input from consultees was taken into account in the process of drafting this report; it was valuable in shaping and refining this report. Whilst the RTF has not been able to reflect in the body of this report all of the comments received, not least because many of them reflected opposing views, the RTF has tried to take account of as many suggestions as possible.
11. Naturally the RTF will welcome further reactions from Parties and other stakeholders at the thirty-fourth meeting of the Open-ended Working Group.
12. This Annex will now discuss the main issues of concern raised during consultations, and then move on to consider some responses to the specific questions that consultees were asked.

A2.2 Main issues of concern

The HFC amendment

13. Many consultees were focussed on the **North American HFC amendment proposal**: one proposed that this report should provide indicative figures for potential costs of the proposed amendment and it was also clear in some interviews that some consultees hoped the RTF would address the proposed amendment.
14. The relationship between the text of paragraph 3 of decision XXV/8 and the proposed amendment is discussed in some detail below¹⁰; in short, the decision clearly does not **require** the RTF to produce indicative figures for the costs of the amendment, nor does it imply that.

The relationship between decisions XXV/5 and 8

15. Some consultees pointed out the connection between **decisions XXV/5 and XXV/8**.
16. One said that the ambiguities in the latter decision were made more acceptable because they may be clarified by the decision XXV/5 work; and another responded to the RTF question about what should be classified as high GWP by observing that it is waiting for the results of the decision XXV/5 work.
17. In particular, the workshop convened back to back with OEWG 34¹¹ and the information provided to the Secretariat on the implementation of paragraph 9 of decision XIX/6¹² could be useful feedstock for the decision XXV/8 work. But the timing is not helpful.

Other issues

18. The specific questions that the RTF asked the consultees exposed the other issues of major concern.

¹⁰ See the discussion of question 4.

¹¹ See paragraph 2 of decision XXV/5.

¹² See paragraph 3 of the decision – which relates to alternatives that minimize environmental impacts, in particular impacts on climate.

19. There is a clear link between some of the issues exposed by the paragraphs that were singled out as the subject matter for the RTF questions: for example, a number of consultees commented on the challenges that go with the introduction of new alternatives pursuant to stage II HPMPs (see paragraph 2(f) of the decision and question 3); similar and related issues were highlighted when considering the special needs of LVCs and SMEs (see paragraph 2(a) and both parts of question 1).

A2.3 SPECIFIC QUESTIONS

QUESTION 1: Paragraph 2 of decision XXV/8 lists components that the Panel should take into account. It includes the following subparagraph (a): *All control measures and relevant decisions agreed upon by the parties to the Montreal Protocol and the Executive Committee, in particular those related to the special needs of low-volume- and very-low-volume-consuming countries, in addition to small and medium-size enterprises, and the decisions of the Twenty-Fifth Meeting of the Parties and the Executive Committee at its seventieth and seventy-first meetings insofar as those decisions will necessitate expenditure by the Multilateral Fund during the period 2015–2017*

What are the special needs of low-volume- and very-low-volume-consuming countries and, in your view, how might they be addressed?

What are the special needs of small and medium-sized enterprises and, in your view, how might they be addressed?

Interpreting paragraph 2(a)

20. Paragraph 2(a) of decision XXV/8 is based largely on the precedent of paragraph 2(a) of decision XII/3. Both decisions require the RTF to take into account extant control measures and relevant decisions agreed by Parties and the Executive committee. In comparing the two decisions it becomes clear that the reference to LV and VLV countries can be found in both decisions – *it is only the reference to SMEs that is new.*
21. Also it seems significant that paragraph 2(a) of decision XXV/8 does *not* require the RTF directly to take into account the special needs of LV and VLV countries and SMEs: rather does it require the RTF to take into account *all control measures and relevant decisions agreed upon by the parties to the Montreal Protocol and the Executive Committee, in particular those related to the special needs of low-volume- and very-low-volume-consuming countries*
22. In other words the special needs of LV and VLV countries and SMEs need to be viewed through the lens of the control measures and relevant decisions; any specific needs identified in the consultation should only be taken into account if they are reflected, expressly or implicitly, in control measures and relevant decisions.

Control measures and relevant decisions

23. Whilst some Parties responded to the RTF questions with comprehensive lists of special needs, others have expressly drawn attention to the necessity to focus on control measures and decisions.
24. Consultees did not draw attention to many control measures and relevant decisions that may be in point. For example one consultee's concise list for LVCs included the cost guidelines for stage I

HPMP (decision 60/44) and projects approved under the guidelines; that consultee added that stage II preparation guidelines (decision 71/42) could also be referred to when considering LVCs which have remaining ODS to be phased out; and also asserted that there is no specific decision by the MOP or ExCom on the special needs of SMEs that could serve as a reference except paragraph 11(c) of decision XXI/6.

Special needs of LVCs

25. As we have seen, paragraph 2(a) of decision XXII/3, in so far as it relates to LVCs is very similar (almost identical) to the corresponding provisions in paragraph 2(a) of decision XXV/8. This may suggest that the way the last RTF dealt with the special needs of LVCs may be a useful starting point for the current RTF, and should be modified only to the extent that there are new relevant decisions that relate to LVCs and/or there are new developments that require provisions in existing control measures and decisions to be viewed in a different light. More than one consultee remarked that the last RTF report took into account the needs of LVCs.
26. Some Parties support the proposition that the current RTF should consider LV and VLV needs in a very similar way to the previous RTF did when implementing the decision XXII/3 mandate: for example one consultee argued that the specific support required by LVCs is provided for in decision 60/54 and that no revision of the decision is necessary. Another consultee, whilst acknowledging the LVCs have special needs, asserts those needs are already subject to special consideration through the exemption on cost effectiveness thresholds and more funding being provided on a per kilo basis.
27. There was a range of views expressed on the extent that current funding met the special needs of LVCs. On the one hand some consultees complained in interviews about excessive focus on LVCs, whilst on the other hand one consultee asserted that the level of funding available to LVCs was purely symbolic. Another one acknowledged that the special needs of LVCs were recognized in funding guidelines but added this should be evaluated to see if cost differential is adequate.
28. Consultees provided an extensive list of special needs. The detail will not be repeated here; suffice it to say that the headlines might include lack of information and training, the lower cost effectiveness of projects, a lack of economies of scale, health and safety issues and a lack of human and other resources.
29. Turning to funding these special needs, one consultee observes that whilst the majority of LVCs chose the 2020 35% phase out target (or higher) for their stage I HPMPs, a minority chose only to implement the 2015 target, and in calculating the need of those latter countries, RTF should use the difference between the amount of reduction in stage I and the 2020 35% target.

Special needs of SMEs

30. One consultee argues that SMEs have difficulties vis-à-vis technologies and funding, and need more technological support to achieve the required conversion; it adds that stage 1 guidelines developed for large-scale enterprises may work for those enterprises but not for SMEs.

31. This analysis is given some support by a number of consultees; for example it is argued that in stage I the MLF targeted cost effective interventions involving big enterprises with high ODS consumption; the challenge now is to address the consumption of ODS in a wide number of SMEs which have smaller economies of scale, which is particularly the case with flammable alternatives that need additional costs in terms of safe equipment and training.
32. Another consultee argues, however, that in SMEs ODS may be phased out with minimal economic disruption if a well-designed sector plan ensures that conversion to non-HCFC technology coincides as closely as possible with important capital renovation.
33. Another asserts that the RTF needs to consider how SMEs will use the lessons learned from Stage I to allow for more cost-effective phase out' and also urges the RTF to use real cost-effectiveness based on actual approvals of HPMPs rather than thresholds in guidelines; its experience is that in many countries the costs of conversion are less than the thresholds.

QUESTION 2: Paragraph 2 (d) of decision XXV/8 requires the Panel to take into account the following: *Dividing the funding related to the 2020 target applicable to hydrochlorofluorocarbon consumption and production in an appropriate manner, including, but not limited to, one scenario that divides the funding related to the 2020 target applicable to HCFC consumption equally between the 2015–2017 and 2018–2020 replenishments*

In your opinion, what would be an “appropriate manner” for dividing the funding related to the 2020 target between the two replenishment periods?

Paragraph 2 (d) specifies a scenario in which the funding related to the 2020 target for HCFC consumption would be divided equally between two replenishment periods. This scenario does not address production sector funding. Do you have views on how production sector funding should be considered in this scenario?

Do you have any viewpoints on the need to consider other specific scenarios?

Interpreting paragraph 2(d)

34. It is clear from the terms of the decision there must be more than one scenario – one as described and at least one other. There could be several scenarios – indeed some consultees request that.
35. The specified scenario is one that divides the funding related to the 2020 target applicable to HCFC *consumption* equally between two replenishments. The exclusion of *production* in this context was discussed by consultees, particularly during interviews; some consultees considered the omission of an express reference to production was simply an oversight. Others considered that it was deliberate.
36. The paragraph does not require that in the specified scenario *all* funding should be equally divided between the next two replenishments; although it is clear this would be the preferred approach of

at least one consultee.

Reasons for the distinction between consumption and production

37. A number of countries observe that production funding is provided post hoc and after verification. It would follow that production funding might be back loaded.
38. On the other hand, some countries argue there is a necessity to consider the link between production and consumption, and that HCFC phase out in consumption depends on phase out of production.

“Sufficient and stable”

39. Some consultees considered there may be a tension between what is sufficient and what is stable. The words do not mean the same thing and the tests of sufficiency and stability might lead in different directions.
40. A number of consultees asked for this report to include a range of scenarios because sufficient funding is not inevitably evenly spread across a replenishment period.
41. One consultee argued that “appropriate manner” refers to actual needs; so that an “appropriate” division of funding between replenishments would reflect the needs of Article 5 countries. The implication is that if equal division of funding for the 2020 target across the two replenishment periods does not meet the needs of Article 5 countries, that division would not be in “the appropriate manner” required by the RTF mandate.

Comments on possible scenarios

42. Other comments on possible scenarios include the following:
 - a. one consultee suggests that the funding for the production sector should be treated separately from the consumption sector, and should take into account the HPMP agreements for stage I and their disbursement schedule;
 - b. another argues that under no circumstances should the RTF consider overlapping tranches between first and second stages;
 - c. several consultees state that funding for production should extend beyond 2020, and it is pointed out that the final tranche for stage I is in 2016, after verification; and
 - d. there is a suggestion that production sector funding is only needed in the 2018-20 replenishment period.

QUESTION 3) Paragraph 2 (f) of decision XXV/8 states that the following should be taken into account: *The need to allocate sufficient resources to the activities in the servicing sector in stage II of hydrochlorofluorocarbon phase-out management plans (HPMPs) through technical assistance such as recovery, training and other necessary activities*

Are there any new issues in stage II HPMPs which have an impact on servicing practices using ODS

alternatives and the activities required to support them?

In your opinion, what does “other necessary activities” refer to here?

New issues

43. Many consultees gave detailed lists of “other necessary activities”. A theme that emerges is new substances will generate new problems – many of which are connected with flammability, energy efficiency, recovery and re-use.
44. A key concern appears to be safety – the point is made again that stage II will engage a larger number of SMEs and an appreciable number of low GWP refrigerants are flammable. Developments of standards, controlling leakage and training will be major concerns. One consultee says adoption of new technologies is a big challenge for servicing sector.
45. Another observed that stage II HPMP guidelines state that project proposals should contain a description of, inter alia, how HPMP strategy had considered a range of non-ODS, including climate-friendly alternatives to HCFCs and a qualitative description of how the strategy for the servicing sector had taken into account climate aspects. This leads to a need to re-orientate the servicing sector.

Other necessary activities

46. As a general proposition it seems sound to work on the basis that “other necessary activities” includes activities other than servicing and training. A list of such activities identified by consultees might include –
 - replacement and/or redesign of existing systems to deal with leakage, energy and refrigerant consumption;
 - regeneration;
 - incentive programmes for end use conversion;
 - energy optimization;
 - development and implementation of policies and regulations;
 - introduction of standards and certification schemes;
 - promotion of good refrigeration practices;
 - training of customs officers;
 - incentive programmes for retrofitting;
 - the encouragement of natural refrigerants as substitutes, demonstration and piloting activities; and
 - outreach with stakeholders.

QUESTION 4: Paragraph 3 of decision XXV/8 states: *That, as a separate element to the funding requirement estimated in paragraph 2 of the present decision, the Panel should provide indicative figures for additional resources that would be needed to enable parties operating under paragraph 1 of Article 5 to gradually avoid high-global-warming-potential alternatives to ozone-depleting substances, taking into account the availability of safe, environmentally friendly, technically proven and economically viable technologies*

Which alternatives, in your opinion, could be classified as “high-GWP”?

Under business as usual, some high-GWP alternatives are already being avoided to some extent. How does this paragraph envisage a departure from business as usual? Please provide examples if possible.

Interpreting paragraph 3

47. There is some considerable ambiguity in the mandate: in particular the words “gradually avoid” and “high-global-warming-potential alternatives” are uncertain. The consultations do not enable us to take a conclusive view on the meaning of either phrase.
48. What is clear, however, is the text does not ask the RTF to produce figures that relate to a *phase down* of any *particular* high global warming potential alternative, and yet some consultees have asked the RTF to produce figures that are based on the proposal for amendment to the Protocol that would specifically require such a phase down.
49. It has also become clear that some Parties attach particular importance to the words *gradually avoid* and argue that an increase in use of a particular high global warming alternative could be consistent with its being gradually avoided, provided that over a period of time that alternative was avoided as other alternatives became available.

Does paragraph 3 relate to a binding regime?

50. More than one consultee asserts that paragraph 3 refers to implementation of a binding system gradually to avoid high-GWP substitutes, and that this would be different from the decision XIX/6 regime, which simply encouraged Parties to promote selection of alternatives minimizing environmental, and in particular climate, impacts.
51. Paragraph 3 does not expressly refer to a binding regime. On its face, paragraph 3 could refer either to a binding regime, or a non-binding regime, or both.
52. It should be added, however, one consultee argues that avoidance of high-GWP substitutes without policy intervention is “almost negligible”. It would follow from this that there would be a need for policy intervention – mandatory or non-mandatory - to secure gradual avoidance.

High GWP

53. The RTF explicitly asked Parties what substances may be classified as high-GWP. There are a number of quite different responses. Some consultees say the definition of high GWP would have to be considered on a sector-by-sector basis. More than one EU country refers to the 150 CO₂ eq. limit enshrined in the prospective EU F- gas legislation. One consultee reminds us that the decision XXIV/7 task force assumed alternatives with GWPs above 750 were high GWP. Other figures are suggested too. Another observes that alternatives with a GWP of less than 50 exist for many sectors, and that others are in the process of being proven and commercialized.
54. The range of answers given show there is no consensus on the matter and indeed one consultee suggests that TEAP should be given a specific mandate to discuss what could be classified as high-GWP.

Difference from BAU

55. In any event, paragraph 3 does not address the 25% increment above the cost effectiveness threshold for low GWP alternatives (as provided for in ExCom decision 60/44 paragraph (f)(iv). As a matter of logic this will be covered by the requirement for the RTF to take into account *all relevant decisions agreed upon by....the Executive Committee* as such decisions will include that ExCom decision.

56. One consultee argues that under the present regime, avoidance of low GWP takes place if an appropriate selection is made and funding is made available. But paragraph 3 envisages a situation where a low-GWP alternative would be selected so long as it is safe etc. irrespective of the costs of conversion and local preferences, in order to meet mandatory targets.

57. Paragraph 3 recognizes that in some cases there have not been adequate resources to avoid HFC transitions, and that in the planning stage some countries have not chosen to apply low-GWP alternatives. The challenge is to explore alternatives that bypass HFC during the HCFC phase-out.

Appendix

Our reference: Oz. Sec/Dec.XXV/8

Date: 16 December 2013

Sir/Madam,

Re: Consultations on the 2015-2017 funding requirement for the replenishment of the Multilateral Fund

The Secretariat wishes to convey to you decision XXV/8, adopted at the Twenty-Fifth Meeting of the Parties to the Montreal Protocol in October 2013, in which the parties requested the Technology and Economic Assessment Panel (TEAP) to prepare a report to enable the Twenty-Sixth Meeting of the Parties to take a decision on the appropriate level of funding for the replenishment of the Multilateral Fund for the triennium 2015-2017. A copy of decision XXV/8 is attached (see annex 1). The Panel has established a replenishment task force to prepare the report.

In paragraph 4 of decision XXV/8, TEAP is mandated to consult widely with all relevant persons and institutions and other relevant sources of information deemed useful. To this end, members of the task force attended the seventy-first meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in Montreal early this month. In the margins of the meeting, members of the task force interviewed a number of members of the Executive Committee and co-opted countries, the Ozone Secretariat and the implementing agencies of the Multilateral Fund.

The task force has advised the Secretariat that it would like to consult further in order to facilitate consideration of the views of a wide range of stakeholders in the preparation of the TEAP replenishment report. Accordingly, the Secretariat is hereby circulating to all parties and other relevant persons and institutions a request by the task force for comments on the general issues raised by decision XXV/8 as well as on the particular matters identified by the task force in annex 2 to this letter. The request is also posted on the Ozone Secretariat website.

In the interests of transparency, the task force has indicated that it may wish to publish some or all of the comments received as an annex to the TEAP report on the replenishment of the Multilateral Fund. You are invited to bear this in mind in your response. The task force will assume that you are content for your comments and observations to be included in a public document unless all or part of your response is marked “confidential”.

I would be grateful if your comments and observations could be sent by e-mail to the TEAP replenishment task force through the Ozone Secretariat, for the attention of Ms. Sophia Mylona (e-mail: Sophia.Mylona@unep.org), before 18 January 2014. The task force has advised the Secretariat that it is working on a tight schedule and that it may be difficult for responses received after that date to be given the fullest consideration.

Yours sincerely,
Tina Birmpili
Executive Secretary
Ozone Secretariat

Annex 1

Decision XXV/8: Terms of reference for the study on the 2015–2017 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol

Recalling the parties' decisions on previous terms of reference for studies on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol,

Recalling also the parties' decisions on previous replenishments of the Multilateral Fund,

To request the Technology and Economic Assessment Panel to prepare a report for submission to the Twenty-Sixth Meeting of the Parties, and to submit it through the Open-ended Working Group at its thirty-fourth meeting, to enable the Twenty-Sixth Meeting of the Parties to take a decision on the appropriate level of the 2015–2017 replenishment of the Multilateral Fund;

That, in preparing the report referred to in paragraph 1 of the present decision, the Panel should take into account, among other things:

All control measures and relevant decisions agreed upon by the parties to the Montreal Protocol and the Executive Committee, in particular those pertaining to the special needs of low-volume- and very-low-volume-consuming countries, in addition to small and medium-sized enterprises, and the decisions of the Twenty-Fifth Meeting of the Parties and the Executive Committee at its seventieth and seventy-first meetings insofar as those decisions will necessitate expenditure by the Multilateral Fund during the period 2015–2017;

The need to allocate resources to enable all parties operating under paragraph 1 of Article 5 to maintain compliance with Articles 2A–2E, 2G and 2I of the Protocol;

The need to allocate resources to enable all parties operating under paragraph 1 of Article 5 to maintain or meet 2013, 2015 and 2020 compliance obligations in respect of Articles 2F and 2H of the Protocol, taking into account the extended commitment provided by parties operating under paragraph 1 of Article 5 under approved hydrochlorofluorocarbon phase-out management plans;

Dividing the funding relating to the 2020 target applicable to hydrochlorofluorocarbon consumption and production in an appropriate manner, including, but not limited to, one scenario that divides the funding relating to the 2020 target applicable to hydrochlorofluorocarbon consumption equally between the 2015–2017 and 2018–2020 replenishments;

Rules and guidelines agreed upon by the Executive Committee at all its meetings, up to and including its seventy-first meeting, for determining eligibility for the funding of investment projects and non-investment projects, including, but not limited to, institutional strengthening;

The need to allocate sufficient resources to the activities in the servicing sector in stage II of hydrochlorofluorocarbon phase-out management plans through technical assistance such as recovery, training and other necessary activities;

That, as a separate element to the funding requirement estimated in paragraph 2 of the present decision, the Panel should provide indicative figures for additional resources that would be needed to enable parties operating under paragraph 1 of Article 5 to gradually avoid high-global-warming-potential alternatives to ozone-depleting substances, taking into account the availability of safe, environmentally friendly, technically proven and economically viable technologies;

That, in preparing the said report, the Panel should consult widely all relevant persons and institutions and other relevant sources of information deemed useful;

That the Panel should strive to complete the report referred to above in good time to enable it to be distributed to all parties two months before the thirty-fourth meeting of the Open-ended Working Group;

That the Panel should provide indicative figures for the periods 2018–2020 and 2021–2023 to support a stable and sufficient level of funding, on the understanding that those figures will be updated in subsequent replenishment studies.

Annex 2

Specific issues identified by the replenishment task force pursuant to decision XXV/8

Paragraph 2 of decision XXV/8 lists components that the Panel should take into account. It includes the following subparagraph (a): *All control measures and relevant decisions agreed upon by the parties to the Montreal Protocol and the Executive Committee, in particular those related to the special needs of low-volume- and very-low-volume-consuming countries, in addition to small and medium-size enterprises, and the decisions of the Twenty-Fifth Meeting of the Parties and the Executive Committee at its seventieth and seventy-first meetings insofar as those decisions will necessitate expenditure by the Multilateral Fund during the period 2015–2017*

What are the special needs of low-volume- and very-low-volume-consuming countries and, in your view, how might they be addressed?

What are the special needs of small and medium-sized enterprises and, in your view, how might they be addressed?

Paragraph 2 (d) of decision XXV/8 requires the Panel to take into account the following: *Dividing the funding related to the 2020 target applicable to hydrochlorofluorocarbon consumption and production in an appropriate manner, including, but not limited to, one scenario that divides the funding related to the 2020 target applicable to HCFC consumption equally between the 2015–2017 and 2018–2020 replenishments*

In your opinion, what would be an “appropriate manner” for dividing the funding related to the 2020 target between the two replenishment periods?

Paragraph 2 (d) specifies a scenario in which the funding related to the 2020 target for HCFC consumption would be divided equally between two replenishment periods. This scenario does not address production sector funding. Do you have views on how production sector funding should be considered in this scenario?

Do you have any viewpoints on the need to consider other specific scenarios?

Paragraph 2 (f) of decision XXV/8 states that the following should be taken into account: *The need to allocate sufficient resources to the activities in the servicing sector in stage II of hydrochlorofluorocarbon phase-out management plans (HPMPs) through technical assistance such as recovery, training and other necessary activities*

Are there any new issues in stage II HPMPs which have an impact on servicing practices using ODS alternatives and the activities required to support them?

In your opinion, what does “other necessary activities” refer to here?

Paragraph 3 of decision XXV/8 states: *That, as a separate element to the funding requirement estimated in*

paragraph 2 of the present decision, the Panel should provide indicative figures for additional resources that would be needed to enable parties operating under paragraph 1 of Article 5 to gradually avoid high-global-warming-potential alternatives to ozone-depleting substances, taking into account the availability of safe, environmentally friendly, technically proven and economically viable technologies

Which alternatives, in your opinion, could be classified as “high-GWP”?

Under business as usual, some high-GWP alternatives are already being avoided to some extent. How does this paragraph envisage a departure from business as usual? Please provide examples if possible.