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# PROJECT PROPOSAL: BAHRAIN

This document consists of the comments and recommendation of the Fund Secretariat on the following project proposal:

Phase-out

- HCFC phase-out management plan (stage I, first tranche) — UNIDO and UNEP

# PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS
## Bahrain

| (I) PROJECT TITLE | AGENCY |
|---|---|
| HCFC phase out plan (Stage I) | UNEP (lead), UNIDO |

| (II) LATEST ARTICLE 7 DATA | Year: 2010 | 58.73 (ODP tonnes) |
|---|---|---|

| (III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes) | | | | | | | | | Year: 2010 |
|---|---|---|---|---|---|---|---|---|---|
| Chemical | Aerosol | Foam | Fire fighting | Refrigeration | | Solvent | Process agent | Lab Use | Total sector consumption |
| | | | | Manufacturing | Servicing | | | | |
| HCFC-141b | | | | | 0.19 | | | | 0.19 |
| HCFC-22 | | | | 42.35 | 16.19 | | | | 58.54 |
| Total reported consumption | | | | 42.35 | 16.38 | | | | 58.73 |
| HCFC-141b imported pre-blended polyols * | | 2.83 | | | | | | | 2.83 |

*this use has neither been reported under A7 nor under country programme

| (IV) CONSUMPTION DATA (ODP tonnes) | | | |
|---|---|---|---|
| 2009 - 2010 baseline: | 51.90 | Starting point for sustained aggregate reductions: | 53.13 |
| **CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)** | | | |
| Already approved: | 0.0 | Remaining: | To be determined |

| (V) BUSINESS PLAN | | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UNIDO | ODS phase-out (ODP tonnes) | 5.4 | | | | | | | | | | 5.4 |
| | Funding (US $) | 615,149 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 615,149 |
| UNEP | ODS phase-out (ODP tonnes) | 0.9 | | 0.9 | | 1.0 | | 1.0 | | 1.0 | | 4.9 |
| | Funding (US $) | 96,595 | 0 | 96,595 | 0 | 125,596 | 0 | 125,596 | 0 | 125,596 | 0 | 569,977 |

| (VI) PROJECT DATA | | | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
|---|---|---|---|---|---|---|---|---|
| Montreal Protocol consumption limits (estimate) | | | n/a | n/a | 51.90 | 51.90 | 46.71 | |
| Maximum allowable consumption (ODP tonnes) | | | n/a | n/a | *tbd** | *tbd** | 46.31 | |
| Project Costs requested in principle(US $) | UNEP | Project costs | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| | | Support costs | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| | UNIDO | Project costs | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| | | Support costs | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| Total project costs requested in principle (US $) | | | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| Total support costs requested in principle (US $) | | | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| Total funds requested in principle (US $) | | | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |

*To be determined

## PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS - continuation

| (VII) Request for funding for the first tranche (2011) | | |
|---|---|---|
| **Agency** | **Funds requested (US $)** | **Support costs (US $)** |
| UNEP | *tbd** | *tbd** |
| UNIDO | *tbd** | *tbd** |

*To be determined

| | |
|---|---|
| **Funding request:** | Approval of funding for the first tranche (2011) as indicated above |
| **Secretariat's recommendation:** | Pending |

## PROJECT DESCRIPTION

1. On behalf of the Government of Bahrain UNEP, as the lead implementing agency, has submitted to the 65th meeting of the Executive Committee stage I of the HCFC phase-out management plan (HPMP) at a total cost, as originally submitted, of US $5,870,796 plus agency support costs, of US $78,750 for UNEP and agency support costs of US $393,435 for UNIDO. The HPMP proposes strategies and activities to achieve 10 per cent reduction in HCFC consumption by 2015.

2. The first tranche being requested for stage I of the HPMP at this meeting amounts to US $235,000 plus agency support costs of US $29,610 for UNEP and US $3,472,046 plus agency support costs of US $260,403 for UNIDO, as originally submitted.

### Background

ODS regulations

3. Bahrain acceded to the Montreal Protocol in 1990. The country also acceded to the subsequent Amendments to the Montreal Protocol except for Beijing Amendment, which is at the final stage of the accession process. The Public Commission for the Protection of Marine Resources, Environment and Wildlife is the national body responsible for the implementation of the Montreal Protocol in the Kingdom of Bahrain. The National Ozone Office (NOO) was established under the Commission to co-ordinate all of the activities during implementation. Bahrain has established regulations through legislative Decree No. 21 and Ministerial Order No. 1 of 1999 and a licensing system which, *inter alia*, controls the import, export and consumption of ozone-depleting substances (ODS). HCFCs, HCFC blends and pre-blended polyols have been included into the current licensing system since 2008. The Government plans to implement a quota system for HCFCs as of 2012.

HCFC consumption and sector distribution

4. All HCFCs used in Bahrain are imported as it does not have any HCFC production capacity. The only HCFCs consumed are HCFC-22 and HCFC-141b. In 2010, HCFC-22 constituted 99.8 per cent (metric tonnes (mt) based) of the total HCFC consumption in the country. The remaining 0.2 per cent (HCFC-141b) is used for flushing/cleaning of refrigeration equipment. Bahrain also consumes pre-blended polyols which have not been reported under Article 7 of the Montreal Protocol, therefore it is not counted as consumption. The survey data is consistent with the Article 7 data. Table 1 shows the HCFC consumption levels in Bahrain.

Table 1: HCFC consumption

| Year | Article 7 data | | | | | | HCFC-141b in pre-blended polyols * | |
|---|---|---|---|---|---|---|---|---|
| | HCFC-22 | | HCFC-141b | | Total | | | |
| | mt | ODP t | mt | ODP t | mt | ODP t | mt | ODP t |
| 2005 | 482.56 | 26.54 | 3.90 | 0.43 | 486.46 | 26.97 | - | - |
| 2006 | 512.83 | 28.21 | 4.30 | 0.47 | 517.13 | 28.68 | - | - |
| 2007 | 512.83 | 28.21 | 4.30 | 0.47 | 517.13 | 28.68 | 16.00 | 1.76 |
| 2008 | 702.30 | 38.63 | 1.16 | 0.13 | 703.46 | 38.75 | 20.00 | 2.20 |
| 2009 | 807.16 | 44.39 | 6.20 | 0.68 | 813.36 | 45.08 | 20.10 | 2.21 |
| 2010 | 1,064.36 | 58.54 | 1.74 | 0.19 | 1,066.10 | 58.73 | 25.76 | 1.42 |

*not reported under Article 7

Sector distribution

5. HCFC-22 is mainly used as a refrigerant in manufacturing refrigeration air conditioning (RAC) equipment and for servicing existing units. HCFC-141b in pre-blended polyols is used for manufacturing polyurethane rigid insulation foam for doors and cabinets of freezers and refrigerated display units. In 2010, the HCFC consumption in the manufacturing sector accounted for 72.22 per cent (mt based) of the total HCFC use, excluding pre-blended polyols as shown in Table 2.

Table 2: Sector distribution of HCFCs for 2010

| Substance | Foam sector | | RAC manufacturing | | RAC Servicing | | Total | |
|---|---|---|---|---|---|---|---|---|
| | mt | ODP t | mt | ODP t | mt | ODP t | mt | ODP t |
| HCFC-22 | | | 770.00 | 42.35 | 294.36 | 16.19 | 1064.36 | 58.54 |
| HCFC-141b | | | | | 1.74 | 0.19 | 1.74 | 0.19 |
| Total HCFC consumption reported under Article 7 | | | 770.00 | 42.35 | 296.10 | 16.38 | 1066.10 | 58.73 |
| HCFC-141b as pre-blend polyols* | 25.76 | 2.83 | | | | | 25.76 | 2.83 |

*not reported under Article 7

Servicing sector

6. The total number of air-conditioning equipment using HCFC-22 installed in the country was estimated as at 1,373,886 units. The average charge for different types of equipment was estimated and used to calculate the total installed capacity. A summary of the installed capacity and HCFC consumption in the servicing sector is shown in Table 3.

Table 3: HCFC-22 consumption distribution in the servicing sector

| Type of equipment | Total no. of units | Installed capacity (tonnes) | | Service demand (tonnes) | |
|---|---|---|---|---|---|
| | | metric | ODP | metric | ODP |
| Window AC | 1,129,672 | 790.77 | 43.49 | 103.20 | 5.68 |
| Mini split AC < 10.5 kW | 181,848 | 667.38 | 36.71 | 90.74 | 4.99 |
| Mini split AC > 10.5 kW | 10,474 | 62.84 | 3.46 | 8.47 | 0.47 |
| Ducted split AC | 5,487 | 38.41 | 2.11 | 8.39 | 0.46 |
| Package - Roof Top AC | 44,101 | 220.51 | 12.13 | 15.40 | 0.85 |
| Chillers | 2,304 | 138.24 | 7.60 | 19.92 | 1.10 |
| Total | 1,373,886 | 1,918.15 | 105.50 | 246.13 | 13.54 |

Manufacturing sector

7. The manufacturing sector consists of one large enterprise, Awal Gulf Manufacture Company (AGM), one small enterprise, Awal Refrigeration and Air-Conditioning, and several very small foam enterprises. In 2010, AGM consumed 99.6 per cent (mt based) of HCFCs in the manufacturing sector, which accounts for 81.6 per cent of the estimated baseline consumption in Bahrain. Hence the HCFC phase-out in Bahrain is heavily dependent on the conversion of production capacity at AGM. A summary of the HCFC consumption in the manufacturing sector is shown in Table 4.

Table 4: HCFC consumption in manufacture sector (2010 data)

| Enterprise | HCFC-22 | | HCFC-141b in pre-blended polyols* | | Total enterprise | |
|---|---|---|---|---|---|---|
| | mt | ODP t | mt | ODP t | mt | ODP t |
| AGM | 770.00 | 42.35 | 22.50 | 2.47 | 792.50 | 44.82 |
| Awal Refrigeration and Air-Conditioning | | | 0.54 | 0.06 | 0.54 | 0.06 |
| Other small foam enterprises | | | 2.72 | 0.30 | 2.72 | 0.30 |
| Manufacture sector total | 770.00 | 42.35 | 25.76 | 2.83 | 795.76 | 45.18 |

* Not reported under Article 7

Air-conditioning manufacturing sub-sector

8. AGM is the only enterprise in the air-conditioning manufacturing sector. It was established in 1994 and is 100 per cent Bahraini-owned. It produces a wide range of air-conditioning units using HCFC-22 as refrigerants. For its air-conditioning equipment production, 85 per cent of its products are exported to other Article 5 countries with the remaining share being sold on the domestic market. The production of air-conditioning equipment and the consumption of HCFC-22 by AGM is shown in Table 5.

Table 5: Air-conditioning equipment production and HCFC-22 consumption at AGM

| Year | Type of equipment (capacity) | | | | Total |
|---|---|---|---|---|---|
| | Window AC (2.6-5.2 kW) | Split (5.3-14.7 kW) | Central AC (10.5-87.9 kW) | Water cooling unit | |
| Production (units) | | | | | |
| 2008 | 210,210 | 163,800 | 11,700 | 4,290 | 390,000 |
| 2009 | 216,678 | 168,840 | 12,060 | 4,422 | 402,000 |
| 2010 | 242,550 | 189,000 | 13,500 | 4,950 | 450,000 |
| Consumption (mt) | | | | | |
| 2008 | 231.00 | 283.10 | 78.00 | 7.80 | 599.90 |
| 2009 | 251.00 | 308.60 | 85.00 | 8.50 | 653.10 |
| 2010 | 296.00 | 363.90 | 100.10 | 10.0 | 770.00 |

9. AGM produces all of its product components in-house except for the compressors, which are imported from various sources. It has production lines of heat exchangers for all of its products. AGM has in total five air-conditioning (AC) manufacturing lines, one for window units, two for split units and two for central ACs.

Foam manufacturing sector

10. Bahrain imports HCFC-141b-based pre-blended polyols for the production of rigid polyurethane insulation foam for refrigeration equipment. AGM uses 99.2 per cent of the HCFC-141b-based pre-blended polyols in the foam sector while the remaining 0.8 per cent is used by Awal Refrigeration and Air-Conditioning and other miscellaneous users.

11. AGM has two manufacturing lines for making foam for the doors and cabinets of freezers and coolers using HCFC-141b-based imported pre-blended polyol. The cabinet line was established in 2000 and equipped with a high-pressure dispenser and a horizontal carousel with five holding fixtures on a semi automatic assembly line. The door line is also equipped with a high-pressure dispenser but a vertical carousel with six holding fixtures. The use of HCFC-141b in pre-blended polyols at AGM is shown in Table 6.

Table 6: Consumption of HCFC-141b in pre-blended polyol at AGM

| Year | Pre-blended polyol (mt) | Equivalent HCFC-141b (tonnes) | |
|---|---|---|---|
| | | Metric | ODP |
| 2008 | 153 | 20.00 | 2.20 |
| 2009 | 143 | 18.60 | 2.05 |
| 2010 | 172 | 22.50 | 2.48 |
| Average (2008-2010) | 156 | 20.37 | 2.24 |

12. Awal Refrigeration and Air-Conditioning produces a wide range of refrigeration equipment such as cool rooms, freezers and display cabinets. It was established in 1991 and is 100 per cent Bahraini. It consumes approximately 0.54 mt of HCFC-141b-based pre-blended polyols per year for the production of insulation foam for refrigeration equipment. The remaining HCFC-141b-based pre-blended polyol is consumed by some contractors who undertake roof insulation using a spray foam technique. Due to the low level of use, the phase-out in Awal Refrigeration and Air-Conditioning and miscellaneous uses is not included in the investment project and will be addressed as part of technical assistance for small users of pre-blended polyols.

Established baseline for HCFC consumption

13. The consumption baseline is established as 51.90 ODP tonnes using the average of consumption of 45.08 ODP tonnes (813.36 mt) for 2009 and 58.73 ODP tonnes (1,066.10 mt) for 2010 reported under Article 7 of the Montreal Protocol.

HCFC phase-out strategy

14. The Government of Bahrain is proposing to follow the Montreal Protocol schedule from 2015 onwards, and to adopt a staged approach to achieve complete phase out of HCFCs by 2030 with a service tail to 2040. As mentioned above, this submission only contains stage I of the HPMP to meet a 10 per cent reduction in consumption by 2015.

15. The HPMP proposed that Bahrain's over-arching strategy will have to be flexible due to its HCFC consumption distribution pattern, where AGM consumes 81.6 per cent of the country's baseline consumption and exports 85 per cent of its HCFC-containing products, creating a dependence on the technology choices in its export markets. The strategy for phasing out HCFCs is heavily dependent on AGM being able to convert part or all of its product lines to non-HCFC alternatives, which are technically and economically viable when operating in high ambient conditions. AGM has limitations in terms of selecting the technology since it is primarily an original equipment manufacturer with more than 70 per cent of its products sold under regional brands including to manufacturers in neighbouring countries, such as Kuwait, Saudi Arabia, and the United Arab Emirates, that will not convert their enterprises to non-HCFC alternatives in air-conditioning manufacturing sector during stage I of the HPMP due to different sectoral priorities.

16. After prolonged discussions with the implementing agencies prior to the submission of the HPMP, AGM has agreed, in stage I of the HPMP, to convert its two manufacturing lines for medium-sized unitary air conditioning products to HFC-410A, which will phase out 100.1 mt of HCFC-22. There are concerns about the increased manufacturing costs and the associated necessary increase in sales price resulting in decreasing market competitiveness, as UNEP advised that AGM will be the only manufacturer in the region of this particular equipment in terms of size and type that will carry out such a conversion. Based on these reasons, AGM informed the Government that it is not in a position to convert immediately to non-HCFC alternatives. The enterprise also informed that limiting its growth in HCFC-22 consumption before 2015 would have negative economic consequences. AGM has forecast its growth from the manufacturing sector baseline to be 46.5 per cent for 2012, with a limited

reduction down to 27 per cent above the baseline for 2013 and 2014. The HPMP proposes to complete the conversion at the end of 2014, resulting in the country's potential non-compliance with the Montreal Protocol in 2013 and 2014.

17. In the HPMP it was also proposed to set up a small pre-production line to conduct, on a small scale prototyping, testing, assessment of market and service requirements for the conversion of small window AC units (2.3 to 5.3 kW) using HC-290 and HFC-32 as substitutes; however, the actual conversion of the manufacturing capacity is only taking place in stage II. This conversion, once undertaken, would phase-out 140 mt of HCFC-22. The testing will not affect the company's consumption and growth since no consumption will be phased out by the pre-production line. The HPMP indicated that it is crucial to set up such a pre-production line as a first step to assess and thoroughly examine production and market readiness for such conversion before the actual conversion of a manufacturing line taking place.

18. Bahrain also proposed extensive activities in the servicing sector. In addition to these compliance related activities, Bahrain further proposes to convert the use of HCFC-141b in imported pre-blended polyols at AGM to cyclo-pentane. Detailed activities are shown in Table 8.

Forecast of future HCFC consumption

19. Bahrain forecast its HCFC consumption at an average growth of 9 per cent from 2011 to 2015 based on its current economic development and population growth under the unconstrained scenario. With the implementation of the HPMP, Bahrain's total HCFC consumption will be curbed significantly yet would still be exceeding the consumption limits by 6.95 ODP tonnes (13.4 per cent) and 5.85 ODP tonnes (11.3 per cent) in 2013 and 2014 respectively. Table 7 below provides a summary of the HCFC consumption forecast in Bahrain.

Table 7: Forecast consumption of HCFCs

| **Scenario** | | | **2009*** | **2010*** | **2011** | **2012** | **2013** | **2014** | **2015** |
|---|---|---|---|---|---|---|---|---|---|
| Montreal Protocol control targets | | | | | | | 51.90 | 51.90 | 46.71 |
| Constrained | HCFC-22 manufacturing sector | mt | 595.00 | 770.00 | 840.00 | 1000.00 | 870.00 | 870.00 | 692.00 |
| | HCFC-141b servicing sector | mt | 6.20 | 1.74 | 1.50 | 1.59 | 0.00 | 0.00 | 0.00 |
| | HCFC-22 servicing sector | mt | 212.16 | 294.36 | 233.40 | 233.40 | 200.00 | 180.00 | 150.00 |
| | **Total HCFC consumption** | mt | 813.36 | 1066.10 | 1074.90 | 1234.99 | 1070.00 | 1050.00 | 842.00 |
| | | **ODP t** | **45.08** | **58.73** | **59.20** | **68.01** | **58.85** | **57.75** | **46.31** |
| | Consumption above compliance level | ODP t | 0.00 | 0.00 | 0.00 | 0.00 | 6.95 | 5.85 | 0.00 |
| Unconstrained | HCFC-22 manufacturing sector | mt | 595.00 | 770.00 | 840.00 | 1000.00 | 1097.00 | 1162.82 | 1232.59 |
| | HCFC-141b servicing sector | mt | 6.20 | 1.74 | 1.50 | 1.59 | 1.69 | 1.79 | 1.89 |
| | HCFC-22 servicing sector | mt | 212.16 | 294.36 | 233.40 | 247.40 | 262.25 | 277.98 | 294.66 |
| | **Total HCFC consumption** | mt | 813.36 | 1066.10 | 1074.90 | 1248.99 | 1360.93 | 1442.59 | 1529.15 |
| | | **ODP t** | **45.08** | **58.73** | **59.20** | **68.78** | **74.94** | **79.44** | **84.21** |
| | Consumption above compliance level | ODP t | 0.00 | 0.00 | 0.00 | 0.00 | 23.04 | 27.54 | 37.50 |

*actual reported Article 7 data

Total cost of the HPMP

20. The total cost of the HPMP for Bahrain has been estimated at US $5,870,796 to achieve a 10 per cent reduction in HCFC consumption by 2015. Although the phase-out through the activities planned in the HPMP amounts to 22.05 ODP tonnes, due to the growth in the manufacturing sector the reduction in national consumption under the HPMP will cover only 5.59 ODP of HCFCs. The detailed activities and cost breakdown are presented in Table 8.

Table 8: Specific activities, cost and proposed period of implementation

| Description of activities | UNEP | UNIDO | Total Funding | Phase-out tonnage | Implementation period |
|---|---|---|---|---|---|
| | (US $) | (US $) | (US $) | (ODP t) | |
| **Activities related to compliance** | | | | | |
| Conversion of central AC line to HFC-410A | | 2,171,774 | 2,171,774 | 5.51 | 2013-2014 |
| Setting up a pre-production line for the conversion of small window AC units to HC-290 | | 420,000 | 420,000 | | 2013-2014 |
| Conversion of small AC line to HC-290 | | 1,673,750 | 1,673,750 | 7.70 | Stage II |
| Updating policy and regulatory | 170,000 | - | 170,000 | 6.84 | 2011-2014 |
| Technical assistance to the servicing sector, including updating vocational curriculum, developing standard, training of technicians | 170,000 | - | 170,000 | | |
| National HCFC reclamation programme | | 220,000 | 220,000 | | |
| **Activities not related to compliance** | | | | | |
| Conversion of HCFC-141b in pre-blended polyols to cyclo-pentane at AGM | | 550,272 | 550,272 | 2.00 | 2011-2012 |
| Technical assistance to the small consumers in foam sector | | 60,000 | 60,000 | | 2011-2012 |
| **Co-ordinating activities** | | | | | |
| Project implementation, monitoring and verification | 285,000 | 150,000 | 435,000 | | 2011-2015 |
| Total | 625,000 | 5,245,796 | 5,870,796 | 22.05 | 2011-2015 |

## SECRETARIAT COMMENTS AND RECOMMENDATION

### COMMENTS

21. The Secretariat reviewed the HPMP for Bahrain in the context of the guidelines for the preparation of HPMPs (decision 54/39), the criteria for funding HCFC phase-out in the consumption sector agreed at the 60th meeting (decision 60/44), subsequent decisions on HPMPs and the 2011-2014 business plan of the Multilateral Fund. The Secretariat discussed technical and cost issues as well as issues relating to the strategic approach with UNEP and UNIDO as summarized below. The Secretariat and UNEP have not been able to reach an agreement on all of the issues yet. The following comments are therefore sorted into matters that have been resolved and those pending resolution.

**Resolved issues**

HCFC consumption and starting point

22. The Secretariat queried the rapid growth in HCFC consumption and the number of installed equipment, resulting in an average of 6.5 units of window AC per household. UNEP explained that high growth in national development post 2005 led to a sharp increase in population due to the increase in expatriates (non-Bahrainis). Therefore, the HCFC-based equipment increased greatly as demand for comfortable room air-conditioning soared. The average number of units per household may be counter intuitive, but the Secretariat was informed that this is the trend not only in Bahrain but in all of the Gulf countries with similar climate conditions. According to UNEP, every single room is air-conditioned, and most households have at least 10 to 12 window or split units, while non-Bahraini families, on average, have 3-4 window/split units. This would explain an average of 6.5 units per household. In addition, the Government subsidizes the cost of electricity for domestic uses which encourages the public to widely utilize AC units.

23. The Secretariat further noted that the servicing sector consumption increased by 107 per cent in 2009 and 39 per cent in 2010. The Secretariat argued that servicing demand showed an unexpected growth pattern as it would normally increase in relation to the size of the equipment based with some years delay. Given the demand for servicing existing equipment estimated by Bahrain in the HPMP is only 246.13 mt in 2010, UNEP was asked whether the servicing sector consumption of 294.38 mt reported under Article 7 includes some stockpile.

24. UNEP informed that the Article 7 data from 2005 to 2008 might not be accurate due to the lack of a strong monitoring system. During the survey, only 2009 and 2010 consumption were verified while consumption records for other years could not be retrieved. It is possible that the actual consumption in 2008 was higher than the reported data under Article 7, resulting in a lower percentage of increase in consumption from 2008 to 2009. Furthermore, during the 2007 to 2009 period, several large development projects occurred, new areas were developed and public buildings were constructed. Most of these projects started to be commissioned and operated in 2009 and 2010, thus the initial charge by those units delivered without charge might have contributed to the sudden increase in refrigerant demand.

25. Despite the above explanations, UNEP agreed with the assumption that some stockpiling took place in 2010 as some importers expected continuous increases in HCFC-22 prices and intended to profit by stockpiling while no quota for HCFCs is enforced. The Secretariat further advised that stockpile is not eligible for funding as no actions are required to phase out stockpiles, and requested UNEP to estimate the level of stockpiles in 2010. UNEP advised that the actual 2010 consumption in the servicing sector is estimated at the level of 250 to 255 mt. Based on UNEP's estimation and the servicing demand stated in the HPMP, the starting point for the servicing sector was agreed at 242 mt (13.53 ODP tonnes). The starting point for Bahrain was calculated as 53.13 ODP tonnes as shown in Table 9.

Table 9: Starting point for HCFC phase-out

| | Foam | | Manufacturing | | Service | | Substance total | |
|---|---|---|---|---|---|---|---|---|
| Substance | mt | ODP t | mt | ODP t | mt | ODP t | mt | ODP t |
| R-22 | 0.00 | 0.00 | 682.50 | 37.54 | 238.03 | 13.09 | 920.53 | 50.63 |
| 141b | 0.00 | 0.00 | 0.00 | 0.00 | 3.97 | 0.44 | 3.97 | 0.44 |
| 141b polyols | 18.70 | 2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 18.70 | 2.06 |
| Grand total | 18.70 | 2.06 | 682.50 | 37.54 | 242.00 | 13.53 | 943.20 | 53.13 |

HCFC-141b in pre-blended polyols

26. The eligible consumption for HCFC-141b in imported pre-blended polyols was calculated as the average of 2007 to 2009, resulting in an eligible consumption of 18.7 mt (2.06 ODP tonnes) of HCFC-141b.

27. The Secretariat requested UNEP to differentiate between the consumption of the two foam production lines at AGM as the dispenser for the door line was installed after the cut-off date. UNIDO, the cooperating agency responsible for this component, responded that the reported consumption for the door line is fully eligible as this is for the purpose of improving quality rather than capacity expansion. The Secretariat reviewed the explanation and concurred with UNIDO's viewpoint.

28. The cost for the foam conversion was estimated at US $550,272 for converting the HCFC-141b-based pre-blended polyols to cyclo-pentane, with a significant amount of funding for safety. The Secretariat advised UNEP and UNIDO that the funding from the Multilateral Fund would be subject to a threshold of US $9.79/kg for converting to hydrocarbon, which implicates that more than 60 per cent of the cost would need to be contributed by the enterprise. The Secretariat also noted that the phase-out of this consumption will not contribute to the compliance target. The Secretariat noted further that the total funding for Bahrain foreseen in the business plan is US $1,185,000 until 2020, a level that is greatly exceeded alone by the activities related to the country's compliance. Based on the above, the country agreed to defer this component to stage II when more cost effective technologies would be available.

Impact on the climate

29. A calculation of the impact on the climate of HCFC consumption through the conversion of the central AC manufacturing line to HFC-410A in stage I of the HPMP in Bahrain based on the global warming potential (GWP) values of the HCFCs and alternative substances introduced and their level of consumption before and after conversion shows an increased emission of 557,891 $CO_2$-equivalent tonnes as presented in Table 10.

30. The substitute technology of HFC-410A for the conversion of the central AC manufacturing line will generate significantly higher climate impact than HCFC-22. The selection of this technology was based on the technologies that are currently available, are sufficiently mature and that could be used in high ambient temperatures while maintaining high-energy efficiency and performance. Hydrocarbon technology, such as HC-290, has a low GWP but can only be used in appliances with smaller charges due to its flammability. Bahrain intended to introduce HC-290 in AGM's small AC manufacturing line. Should there be such conversions in stage I of the HPMP, this would reduce the $CO_2$ emissions by 245,375 $CO_2$-equivalent tonnes per year, which will reduce the overall climate impact of the investment projects to a level of increased emission of 312,516 $CO_2$-equivalent tonnes.

Table 10: Climate impact indicator for investment project

| | | | | | |
|---|---|---|---|---|---|
| **Input** | **Generic** | | | | |
| | Country | [-] | **Bahrain** | | |
| | Company data (name, location) | [-] | **Awal Gulf Manufacture Company** | | |
| | Select system type | [list] | Commercial cooling on site assembly | AC factory assembly | Total |
| | **General refrigeration information** | | | | |
| | HCFC to be replaced | [-] | HCFC-22 | HCFC-22 | |
| | Amount of refrigerant per unit | [kg] | 7.41 | 1.01 | |
| | No. of units | [-] | 13,500 | 138,254 | 151,754 |
| | Refrigeration capacity | [W] | 49,224 | 3,956 | |
| | | | | | |
| | **Selection of alternative with minimum environmental impact** | | | | |
| | Share of exports (all countries) | [%] | - | - | |
| | **Calculation of the climate impact** | | | | |
| | Alternative refrigerant (more than one possible) | [list] | HFC-410A | HC-290 | |
| All data displayed is specific to the case investigated and is not generic information about the performance of one alternative; performance can differ significantly depending on the case. | | | | | |
| | | | | | |
| **Output** | *Note: The output is calculated as the climate impact of the refrigerant systems in their life time as compared to HCFC-22, on the basis of the amount produced within one year. Additional/different outputs are possible* | | | | |
| | Country | **Bahrain** | | | |
| | **Identification of the alternative technology with minimum climate impact** | | | | |
| | **List** of alternatives for identification of the one with minimum climate impact | [Sorted list, best = top (% deviation from HCFC)] | HC-600a (-14%) | HC-600a (-18%) | |
| | | | HC-290 (-9%) | HC-290 (-14%) | |
| | | | HFC-134a (-4%) | HFC-134a (-4%) | |
| | | | HCFC-22 | HCFC-22 | |
| | | | HFC-407C (3%) | HFC-407C (0%) | |
| | | | HFC-410A (6%) | HFC-410A (7%) | |
| | **Calculation of the climate impact** | | | | |
| | Per unit, over lifetime (for information only): | | | | |
| | Currently used refrigerant | | HCFC-22 | HCFC-22 | |
| | Energy consumption | [kWh] | 13,241,946,344 | 2,545,176,133 | |
| | Direct climate impact (substance) | [kg CO2 equiv] | 755,525 | 258,563 | |
| | Indirect climate impact (energy): In country | [kg CO2 equiv] | 8,069,734 | 1,551,048 | |
| | Indirect climate impact (energy): Global average | [kg CO2 equiv] | - | - | |
| | **Calculation of the climate impact of the conversion** | | | | |
| | **Selected refrigerant** | | HFC-410A | HC-290 | |
| | *Total direct impact (post conversion – baseline)** | *[t CO2 equiv]* | *20,431.0* | *(257,382.0)* | |
| | *Indirect impact (country)*** | *[t CO2 equiv]* | *537,460.0* | *12,007.0* | |
| | *Indirect impact (outside country)*** | *[t CO2 equiv]* | - | - | |
| | *Total indirect impact* | *[t CO2 equiv]* | *537,460.0* | *12,007.0* | |
| | **Total impact of the selected refrigerant** | **[t CO2 equiv]** | **557,891** | **(245,375)** | |
| | **Alternative refrigerant** | | HFC-134a (-4%) | HC-290 | |
| | *Total direct impact (post conversion – baseline)** | *[t CO2 equiv]* | *(150,859)* | *(257,245)* | |
| | *Total indirect impact (country)*** | *[t CO2 equiv]* | *(190,655)* | *(63,610)* | |
| | *Total indirect impact (outside country)*** | *[t CO2 equiv]* | - | - | |
| | *Total indirect impact*** | *[t CO2 equiv]* | *(190,655)* | *(63,610)* | |
| | **Total impact of alternative refrigerant** | **[t CO2 equiv]** | **(341,514)** | **(320,855)** | |

*Direct impact: Different impact between alternative technology and HCFC technology for the substance-related emissions.

**Indirect impact: Difference in impact between alternative technology and HCFC technology for the energy-consumption-related emissions of CO2 when generating electricity.

31. In the servicing sector, the proposed technical assistance activities in the HPMP, which include the introduction of better servicing practices and enforcement of HCFC import controls, will reduce the amount of HCFC-22 used for refrigeration servicing. Although the impact on the climate of the activities in the servicing sector was not specifically assessed in the HPMP, the activities planned by Bahrain, in particular technical assistance to servicing technicians on refrigerant recovery and reuse indicate that it is likely that the country will achieve the level of 46,303 $CO_2$-equivalent tonnes that would not be emitted into the atmosphere assuming that 10 per cent of the servicing sector baseline would be phased out.

32. In conclusion, due to the high GWP value of HFC-410A to be introduced in the central AC manufacturing line, the overall climate impact of the implementation of stage I of the HPMP would be an increase in emission by 511,588 $CO_2$-equivalent tonnes, as shown in Table 11.

Table 11: Summary of climate impact of the HPMP

| **Project component** | **Increased (+)/decreased (-) $CO_2$ emission, ($CO_2$-eq tonnes)** | |
|---|---|---|
| | Stage I | Stage II |
| Conversion of central AC production lines to HFC-410A | +557,891 | |
| Conversion of small window AC production line to HC-290 | | -245,375 |
| Activities for phasing out 10 % of servicing sector baseline | - 46,303 | |
| Total climate impact | +511,588 | -245,375 |

Co-financing

33. In response to decision 54/39(h) on potential financial incentives and opportunities for additional resources to maximize the environmental benefits from HPMPs pursuant to paragraph 11(b) of decision XIX/6 of the Nineteenth Meeting of the Parties, UNEP informed that Bahrain is considering setting up a co-financing scheme to support the relevant enterprise to conduct the conversion project as the actual cost of completing the conversion would be much higher than the amount that would be eligible under the Multilateral Fund. This co-financing scheme would involve technical assistance and facilitating access to a range of public finance instruments.

**Issues pending resolution**

Phase-out strategy and potential non-compliance

34. The Secretariat discussed with UNEP and UNIDO the intention of Bahrain to use as a maximum allowable consumption for the HPMP-related Agreement HCFC levels in excess of those prescribed by the Montreal Protocol for 2013 and 2014. UNEP advised that the Government believes that the conversion of the manufacturing capacity at AGM, if carried out before 2014, or any further limitation to the enterprise's growth beyond the level of consumption that is foreseen under the constraint scenario might have a negative impact on the enterprise's profits given that neighbouring countries, mentioned in paragraph 15, have not yet all undertaken or committed to similar conversions of air conditioning manufacturing in the same time frame, and that the market and economy in the region is closely interconnected. According to the Government's own planning, in spite of its efforts to limit the growth, the forecast growth would still be significant at AGM. This, in combination with the high share of the country's HCFC consumption, will lead to non-compliance with the HCFC phase-out schedule of the Montreal Protocol. The Government has submitted, through UNEP, a phase-out schedule for the HPMP which proposes an allowable consumption above the compliance targets for 2013 and 2014, shown as "constraint scenario" in Table 7. According to this schedule, Bahrain will be in non-compliance with the Montreal Protocol by 6.95 ODP tonnes in 2013 and 5.85 ODP tonnes in 2014.

35. In an effort to avoid potential non-compliance, the Secretariat discussed with UNEP and UNIDO several options on how to allow Bahrain to commit itself to stay in compliance. Different scenarios for HCFC-reductions are summarized in Table 12.

(a) Scenario I: Import of 232.5 mt (12.79 ODP tonnes) of HCFC-22 for stockpiling at the manufacturer's expense during 2012 without change to the use forecast for that manufacturer, as shown in the constraint scenario in Table 7, with servicing sector consumption reduction as proposed in the original submission. The Secretariat estimates the additional costs for capital outlay and storage, to be born by the manufacturer, to be in the order of US $1/kg; or

(b) Scenario II: Restrict growth at AGM to 6 per cent in 2012 and 2013 and zero growth after 2013, in the meantime complete the conversion of two production lines (100.1 mt) to HFC-410A by 1 January 2013, and complete the conversion of one production line (140 mt) to HC-290 by 1 June 2013, and fund basic servicing sector activities; or

(c) Scenario III: Freeze the consumption at AGM to the sector baseline from 2013 onwards without further reduction of consumption, and correspondingly increase efforts to achieve compliance with the 2013 to 2015 reduction targets through funding the servicing sector activities. The Secretariat noted that the phase-out foreseen in the servicing sector in this scenario is still lower than the servicing sector phase-out proposed in the original submission.

Table 12: HCFC phase-out scenarios – discussed alternative scenarios

| Scenario | | Unit | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|
| Montreal Protocol control targets | | ODP t | | | | | 51.9 | 51.9 | 46.7 |
| Scenario I | AGM HCFC-22 level of consumption originally proposed in HPMP with support from MLF | mt | 595.0 | 770.0 | 840.0 | 1,000.0 | 870.0 | 870.0 | 692.0 |
| | AGM HCFC-22 level of consumption proposed by Secretariat with pre-2013 stockpiling on manufacture's cost based on original proposal | mt | 595.0 | 770.0 | 840.0 | 1,232.5 | 743.6 | 763.6 | 692.0 |
| | HCFC-141b in servicing sector | mt | 6.2 | 1.7 | 1.5 | 1.6 | 0.0 | 0.0 | 0.0 |
| | HCFC-22 in servicing sector | mt | 212.2 | 294.4 | 233.4 | 233.4 | 200.0 | 180.0 | 150.0 |
| | Total HCFC consumption | mt | 813.4 | 1,066.1 | 1,074.9 | 1,467.6 | 943.6 | 943.6 | 842.0 |
| | | ODP t | **45.1** | **58.7** | **59.2** | **80.8** | **51.9** | **51.9** | **46.3** |
| Scenario II | AGM HCFC-22 consumption forecast in unconstrained growth without funding | mt | 595.0 | 770.0 | 840.0 | 1,000.0 | 1,097.0 | 1,162.8 | 1,232.6 |
| | AGM HCFC-22 level of consumption with restricted growth 6% for 2012 and 2013, no growth after 2013 | mt | 595.0 | 770.0 | 840.0 | 890.4 | 943.8 | 943.8 | 943.8 |
| | HCFC-22 reduction in AGM by phasing in 100.1 mt HFC-410A in Dec. 2012, taking into account growth from baseline during 2010-2012 | mt | 0.0 | 0.0 | 0.0 | 0.0 | 138.4 | 138.4 | 138.4 |
| | HCFC-22 reduction in AGM by phasing in 140 mt HC-290 in June 2013, taking into account growth from baseline during 2010-2013 | mt | 0.0 | 0.0 | 0.0 | 0.0 | 112.9 | 193.6 | 193.6 |
| | Remaining HCFC-22 consumption in AGM (mt) | mt | 595.0 | 770.0 | 840.0 | 890.4 | 692.5 | 611.8 | 611.8 |
| | HCFC-141b in servicing sector | mt | 6.2 | 1.7 | 1.5 | 1.6 | 0.0 | 0.0 | 0.0 |
| | HCFC-22 in servicing sector | mt | 212.2 | 294.4 | 233.4 | 247.4 | 242.0 | 242.0 | 237.0 |
| | Total HCFC consumption | mt | 813.4 | 1,066.1 | 1074.9 | 1,139.4 | 934.5 | 853.8 | 848.8 |
| | | ODP t | **45.1** | **58.7** | **59.2** | **62.8** | **51.4** | **47.0** | **46.7** |
| Scenario III | AGM HCFC-22 level of consumption with no growth from baseline after 2013 | mt | 595.0 | 770.0 | 840.0 | 1,000 | 682.5 | 682.5 | 682.5 |
| | HCFC-141b in servicing sector | mt | 6.2 | 1.7 | 1.5 | 1.6 | 0.0 | 0.0 | 0.0 |
| | HCFC-22 in servicing sector | mt | 212.2 | 294.4 | 233.4 | 233.4 | 261.1 | 261.1 | 166.8 |
| | Total HCFC consumption | mt | 813.4 | 1,066.1 | 1,074.9 | 1,235.0 | 939.7 | 939.7 | 849.3 |
| | | ODP t | **45.1** | **58.7** | **59.2** | **68.0** | **51.9** | **51.9** | **46.7** |

36. All these options can be principally implemented in time for compliance if approved at the 65th meeting. After consideration, the Government advised that each of these scenarios would place an undue burden on the manufacturer, and was therefore unacceptable.

37. The Secretariat advised the agencies that it is the country's responsibility to comply with the Montreal Protocol and the Multilateral Fund can only provide assistance to the country if the country is willing to meet its targets under the treaty. The Multilateral Fund Secretariat feels unable to recommend HPMPs that might place a country in non-compliance. Through UNEP, the country explained to the Secretariat that independently they wished to see the case presented to the Executive Committee, seeking the Committee's guidance.

38. The Secretariat noted that in principle, review of the project should cease at this point, until the Executive Committee had a possibility to discuss the implications of the Government of Bahrain's proposed phase-out schedule, including the potential non-compliance. However, the Secretariat also considered the limited time remaining until the Montreal Protocol control measures for HCFCs come into effect, and the time needed to implement the HPMP. Such scheduling issues would suggest that an agreed solution at the 65th meeting, if possible, would result in a substantially higher chance for the country to comply with the HCFC controls in 2013 and 2015, as compared to a resolution at future meetings. Consequently, the Secretariat attempted to continue the discussions with UNEP, in order to provide the Executive Committee with a number of options to discuss during the 65th meeting. However, the Secretariat had to advise that the lack of a common ground in terms of timing of implementation and consumption limits created a significant number of possible permutations. Below a number of possible elements are provided for discussion during the 65th meeting.

Cost for the conversion of production capacity in AGM

39. The separate pre-production line (US $420,000) for the conversion to HC-290 and HFC-32 represents, in the view of the Secretariat, a new production capacity which will not phase out any HCFC consumption. The Secretariat advised that funding of new manufacturing capacity is principally ineligible and requested UNEP to provide justifications for a separate pre-production line. The Secretariat also queried whether it is possible to convert the existent production line during stage I; if the pre-production line is indeed required; and what the fate of the equipment for the pre-production line would be after the conversion of the main production line in stage II. The Secretariat further advised that the market assessment (US $30,000) was funded as part of the preparation for the HPMP, and that prototype design and testing (US $140,000) would need to be integrated into the conversion of the main production line. Answers to these queries were not received as of writing of this document; however, UNEP removed the cost item for market assessment and maintained other cost items for the testing line in a funding request submitted subsequent to the discussion.

40. During the review of the cost for the investment components, the Secretariat noted that the HPMP lacked certain information necessary to evaluate eligibility and incremental cost, such as a list of baseline equipment and the dates of installation. The Secretariat requested UNEP and UNIDO to provide the missing information, but this had not been provided as of writing of this document. The Secretariat will advise the Executive Committee of any progress made.

Funding in the servicing sector

41. The funding referred to as servicing sector funding consists, in case of a low-volume consuming (LVC) country, of funding for activities in the refrigeration servicing sector, regulatory and enforcement activities, and costs associated with a project management unit (PMU). The following paragraphs provide information related to several possibilities discussed with UNEP regarding the funding level in the servicing sector.

42. The Secretariat reviewed the funding request and cost schedule and noted that the level of requested for the servicing sector (US $560,000), plus project coordination and monitoring (US $435,000) as specified in Table 13, amounts to US $995,000. It advised the country that, based on decision 60/44 (f)(xv) of the Executive Committee, non-LVC countries should first address consumption in the manufacturing sector to meet the reduction steps in 2013 and 2015. Consequently, the funding for the servicing sector should be zero. Should the country require assistance in the servicing sector to sustain the capacity established during its terminal phase-out management plan and comply with control targets, funding would be calculated at US $4.50 per metric kg.

43. The funding of US $560,000 for the servicing sector as requested in the original submission would suggest a reduction of the country's funding eligibility by 124.44 mt, accounting for 49.15 per cent of the servicing sector baseline as shown in Table 12. The Secretariat believes that potential reductions in HCFC consumption through activities in the servicing sector in any country are limited, since the basis for the HCFC-22 consumption in the servicing sector is the need for servicing existing HCFC-22 equipment. While better practice can possibly save a significant share of the refrigerant consumption, this cannot lead to reduction levels close to zero as long as new systems are being manufactured, imported and installed with HCFC-22 as a refrigerant, and as long as those, inevitably, experience leaks leading to a need to replace the refrigerant. The Secretariat was also not convinced that the proposed activities represent the optimum mixture between institutional approaches and direct support for service technicians to achieve maximum reductions. Another issue the Secretariat raised was that LVC countries with a similar amount of consumption in the servicing sector as Bahrain would receive funding of US $176,000 until 2015 based on decision 60/44(f)(xii). In the case of a 10 per cent phase-out of the manufacturer's baseline consumption until 2015, the intensity of the servicing sector activities in Bahrain would be equivalent to that for a LVC country with the same consumption. Therefore, it appears, to the Secretariat that, taking reference to the funding table in decision 60/44(f)(xii) would be a meaningful approach.

44. Based on the above consideration, the Secretariat suggested the funding of US $236,000 for non-investment activities as the justifiable level of funding for Bahrain, based on the funding level for a LVC country with a similar level of consumption plus US $60,000 for independent verifications from 2013 to 2015. UNEP responded that the work needed for the servicing sector is not auxiliary but is as important as that in the manufacturing sector. The servicing sector activities are needed, according to UNEP, to ensure the control on demand by 2015, including arranging the necessary technical and institutional setup for applying any future bans and introduction of new alternatives ahead of neighbouring countries. However, based on the Secretariat's comment, UNEP reduced its funding request in the servicing sector to US $425,000.

45. The Secretariat noted that funding was requested for setting up and implementing an e-licensing system. According to UNEP, a regional approach is being proposed to address the illegal trade in ODS. The proposed e-licensing system will enhance the monitoring of ODS trade by accelerating data reporting and compilation, facilitate the identification of gaps between licensed and imported shipments soon after they might occur, support the local and regional efforts to monitor and curb illegal trade, and facilitate the process of ODS licensing through proper share of information amongst NOUs, importers, exporters and boarders' authorities. The e-licensing system is intended to be part of the HPMPs for Iraq, Kuwait, Oman, Qatar, Saudi Arabia, the Syria Arab Republic and Yemen. Part of the funds for the e-licensing system are pooled between all participating countries to enable programming a generic system catered to the needs in the region, and the remaining funds are used for each country to customize the generic version to its

particular needs and establish the conditions for its use. The funds for the e-licensing system are part of the overall HPMP funding for the servicing sector in each country and subject to the cost effectiveness value established in decision 60/44(f)(xv).

46. Subsequent discussions related to the activities in the servicing sector did not yield a final result, since UNEP informed the Secretariat that the Government of Bahrain could not accept a reduction in funding beyond the level of US $425,000. At this level, the funding and proposed activities consisted of US $30,000 for customs training and enforcement, US $75,000 for various institutional supports, US $125,000 for direct interaction with service technicians and US $195,000 for purchasing equipment. The related phase-out would be 94.44 mt, representing 40.01 per cent of the starting point for the servicing sector as shown in Table 13. This amount is substantially higher than the funding level the Secretariat views as possibly justifiable. There is some prospect for discussions to continue between writing of this document and the Meeting of the Executive Committee. Table 13 provides a summary of the different cost scenarios for the servicing sector.

Table 13: Different funding scenarios for the servicing sector

| **Servicing sector scenario** | **Servicing sector scenario 1** | **Servicing sector scenario 2** | **Servicing sector scenario 3** | **Servicing sector scenario 4** |
|---|---|---|---|---|
| Type of funding for non-investment | Original submission | Minimum acceptable to Gov. of Bahrain | Application of decision 60/44 for LVC mutatis mutandis | Funding for reduction in servicing sector only with no growth starting from 2010 in manufacturing |
| Costs for non-investment activities other than PMU and verification (US $) | 560,000 | 425,000 | 140,800 | 338,535 |
| Cost for PMU and verification (US $) | 435,000* | 150,000 | 95,200 | 67,707 |
| Total (US $) | 995,000 | 575,000 | 236,000 | 406,242 |
| Phase-out (mt) | 124.44 | 94.44 | 31.29 | 75.23 |
| Phase-out (ODP t) | 7.06 | 5.41 | 1.94 | 4.36 |
| Percentage of the country's baseline | 13.61% | 10.43% | 3.74% | 8.39% |
| Percentage of servicing sector baseline | 49.15% | 37.67% | 13.50% | 30.31% |
| Per cent of servicing sector starting point | 52.20% | 40.01% | 14.33% | 32.20% |
| Comments | Compliance only in 2015 | Compliance only in 2015 | Assuming compliance, phase-out of 10% in manufacturing | Assuming compliance, no change in consumption in manufacturing, reduction in servicing sector only |

*The proposal foresaw costs for two consultants which the Secretariat considers to be equivalent of a PMU activity and subsumed the costs accordingly

Monitoring, co-ordination and verification

47. Project monitoring and co-ordination of activities are planned to take place throughout the implementation period. The National Ozone Committee (NOC) of Bahrain will be established to address policy issues and will provide strategic direction during HCFC phase-out. An independent agency will be selected to conduct independent monitoring and verification of achievement during the implementation of the HPMP. The NOO, under the Commission mentioned in paragraph 3, will provide support and coordination to ensure that the selected monitoring body would have access to all information and resources. Reporting on the progress made during the implementation will be carried out by the NOO with support from UNEP and UNIDO. The cost foreseen for the PMU has been requested at a level of US $435,000 including costs associated with verification of the consumption in 2013, 2014 and 2015.

However the cost of monitoring and verification has not been agreed as of writing of this document. The Secretariat will advise the Executive Committee of any progress made.

2011-2014 business plan of the Multilateral Fund

48. UNEP and UNIDO are requesting, as originally submitted, US $5,870,796 plus support costs for implementation of stage I of the HPMP. The total value requested for the period 2011-2014 of US $5,456,587 including support costs is well above that of US $933,935 projected in the business plan for the period. The difference in the figures is related to the estimated baseline in the business plan of 46.52 ODP tonnes. The funding requested would lead to a phase-out of 20.2 ODP tonnes, equal to 43 per cent of the baseline estimated in the business plan. Taking into account the baseline estimated in the HPMP of 51.9 ODP tonnes, the funding requested would still lead to a phase-out of 39 per cent of the baseline estimated in the HPMP, which is well above the required 10 per cent for complying with 2015 10 per cent reduction. However, at this time, discussions related to funding have not been completed, thus the implication of the funding on the business plan currently cannot be assessed. The Secretariat will advise the Executive Committee of any progress made.

Draft Agreement

49. The Government of Bahrain provided, through UNEP, a draft Agreement with the Executive Committee for HCFC phase-out in Bahrain. However, it is inconsistent with the rules and guidelines of the Multilateral Fund since the draft Agreement anticipates that the country would not be in compliance with the Montreal Protocol. In addition, the funding levels have not been agreed and could therefore not be included. The Secretariat decided nevertheless to make that draft Agreement available to the Executive Committee, with grey shading for all those areas where agreement has not been achieved, to provide a basis for discussions during the 65th meeting of the Executive Committee.

**RECOMMENDATION**

50. Pending.

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**Annex I**

**DRAFT AGREEMENT BETWEEN THE GOVERNMENT OF THE KINGDOM OF BAHRAIN AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROCHLOROFLUOROCARBONS**

1. This Agreement represents the understanding of the Government of the Kingdom of Bahrain (the "Country") and the Executive Committee with respect to the reduction of controlled use of the ozone-depleting substances (ODS) set out in Appendix 1-A ("The Substances") to a sustained level of [46.3] ODP tonnes by 1 January 2015 in compliance with Montreal Protocol schedules, with the understanding that this figure is to be revised one single time, once the baseline consumption for compliance has been established based on Article 7 data.

2. The Country agrees to meet the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A ("The Targets, and Funding") in this Agreement as well as in the Montreal Protocol reduction schedule for all Substances mentioned in Appendix 1-A. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to any consumption of the Substances that exceeds the level defined in row 1.2 of Appendix 2-A as the final reduction step under this Agreement for all of the Substances specified in Appendix 1-A, and in respect to any consumption of each of the Substances that exceeds the level defined in rows 4.1.3, 4.2.3 and 4.3.3 (remaining eligible consumption).

3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees, in principle, to provide the funding set out in row 3.1 of Appendix 2-A to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A ("Funding Approval Schedule").

4. The Country agrees to implement this Agreement in accordance with the HCFC phase-out sector plans submitted. In accordance with sub-paragraph 5(b) of this Agreement, the Country will accept independent verification of the achievement of the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A of this Agreement. The aforementioned verification will be commissioned by the relevant bilateral or implementing agency.

5. The Executive Committee will not provide the Funding in accordance with the Funding Approval Schedule unless the Country satisfies the following conditions at least eight weeks in advance of the applicable Executive Committee meeting set out in the Funding Approval Schedule:

(a) That the Country had met the Targets set out in row 1.2 of Appendix 2-A for all relevant years. Relevant years are all years since the year in which this Agreement was approved. Years for which no obligation for reporting of country programme data exists at the date of the Executive Committee meeting at which the funding request is being presented are exempted;

(b) That the meeting of these Targets has been independently verified, unless the Executive Committee decided that such verification would not be required;

(c) That the Country had submitted annual implementation reports in the form of Appendix 4-A ("Format of Implementation Reports and Plans") covering each previous calendar year; that it had achieved a significant level of implementation of activities initiated with previously approved tranches; and that the rate of disbursement of funding available from the previously approved tranche was more than 20 per cent;

(d) That the Country has submitted an annual implementation plan in the form of Appendix 4-A covering each calendar year until and including the year for which the funding schedule foresees the submission of the next tranche or, in case of the final tranche, until completion of all activities foreseen; and

(e) That, for all submissions from the 68th meeting onwards, confirmation has been received from the Government that an enforceable national system of licensing and quotas for HCFC imports and, where applicable, production and exports is in place and that the system is capable of ensuring the Country's compliance with the Montreal Protocol HCFC phase-out schedule for the duration of this Agreement.

6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement. The institutions set out in Appendix 5-A ("Monitoring Institutions and Roles") will monitor and report on implementation of the activities in the previous annual implementation plans in accordance with their roles and responsibilities set out in Appendix 5-A. This monitoring will also be subject to independent verification as described in paragraph 4 above.

7. The Executive Committee agrees that the Country may have the flexibility to reallocate the approved funds, or part of the funds, according to the evolving circumstances to achieve the smoothest reduction of consumption and phase-out of the Substances specified in Appendix 1-A:

(a) Reallocations categorized as major changes must be documented in advance either in an annual implementation plan submitted as foreseen in sub-paragraph 5(d) above, or as a revision to an existing annual implementation plan to be submitted eight weeks prior to any meeting of the Executive Committee, for its approval. Major changes would relate to:

(i) Issues potentially concerning the rules and policies of the Multilateral Fund;

(ii) Changes which would modify any clause of this Agreement;

(iii) Changes in the annual levels of funding allocated to individual bilateral or implementing agencies for the different tranches; and

(iv) Provision of funding for programmes or activities not included in the current endorsed annual implementation plan, or removal of an activity in the annual implementation plan, with a cost greater than 30 per cent of the total cost of the last approved tranche;

(b) Reallocations not categorized as major changes may be incorporated in the approved annual implementation plan, under implementation at the time, and reported to the Executive Committee in the subsequent annual implementation report;

(c) Should the Country decide during implementation of the agreement to introduce an alternative technology other than that proposed in the approved HPMP, this would require approval by the Executive Committee as part of an Annual Implementation Plan or the revision of the approved plan. Any submission of such a request for change in technology would identify the associated incremental costs, the potential impact to the climate, and any differences in ODP tonnes to be phased out if applicable. The Country agrees that potential savings in incremental costs related to the change of technology would decrease the overall funding level under this Agreement accordingly;

(d) Any enterprise to be converted to non-HCFC technology included in the approved HPMP and that would be found to be ineligible under the guidelines of the Multilateral Fund (i.e., due to foreign ownership or establishment post the 21 September 2007 cut-off date), will not receive assistance. This information would be reported to the Executive Committee as part of the Annual Implementation Plan;

(e) The Country commits to examining the possibility of using pre-blended hydrocarbon systems instead of blending them in-house, for those foam enterprises covered under the umbrella project, should this be technically viable, economically feasible and acceptable to the enterprises; and

(f) Any remaining funds will be returned to the Multilateral Fund upon completion of the last tranche foreseen under this Agreement.

8. Specific attention will be paid to the execution of the activities in the refrigeration servicing sub-sector, in particular:

(a) The Country would use the flexibility available under this Agreement to address specific needs that might arise during project implementation; and

(b) The Country and the bilateral and implementing agencies involved will take full account of the requirements of decisions 41/100 and 49/6 during the implementation of the plan.

9. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfil the obligations under this Agreement. UNEP has agreed to be the lead implementing agency (the "Lead IA") and UNIDO has agreed to be the cooperating implementing agency (the "Cooperating IA") under the lead of the Lead IA in respect of the Country's activities under this Agreement. The Country agrees to evaluations, which might be carried out under the monitoring and evaluation work programmes of the Multilateral Fund or under the evaluation programme of any of the agencies taking part in this Agreement.

10. The Lead IA will be responsible for ensuring co-ordinated planning, implementation and reporting of all activities under this Agreement, including but not limited to independent verification as per sub-paragraph 5(b). This responsibility includes the necessity to co-ordinate with the Cooperating IA to ensure appropriate timing and sequence of activities in the implementation. The Cooperating IA will support the Lead IA by implementing the activities listed in Appendix 6-B under the overall co-ordination of the Lead IA. The Lead IA and Cooperating IA have reached consensus on the arrangements regarding inter-agency planning, reporting and responsibilities under this Agreement to facilitate a co-ordinated implementation of the Plan, including regular co-ordination meetings. The Executive Committee agrees, in principle, to provide the Lead IA and the Cooperating IA with the fees set out in rows 2.2 and 2.4 of Appendix 2-A.

11. Should the Country, for any reason, not meet the Targets for the elimination of the Substances set out in row 1.2 of Appendix 2-A or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Approval Schedule. At the discretion of the Executive Committee, funding will be reinstated according to a revised Funding Approval Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next tranche of funding under the Funding Approval Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amount set out in Appendix 7-A ("Reductions in Funding for Failure to Comply") in respect of each ODP kg of reductions in consumption not achieved in any one year. The Executive Committee will discuss each specific case in which the Country did not comply with this

Agreement, and take related decisions. Once these decisions are taken, this specific case will not be an impediment for future tranches as per paragraph 5 above.

12. The Funding of this Agreement will not be modified on the basis of any future Executive Committee decision that may affect the funding of any other consumption sector projects or any other related activities in the Country.

13. The Country will comply with any reasonable request of the Executive Committee, the Lead IA and the Cooperating IA to facilitate implementation of this Agreement. In particular, it will provide the Lead IA and the Cooperating IA with access to the information necessary to verify compliance with this Agreement.

14. The completion of stage I of the HPMP and the associated Agreement will take place at the end of the year following the last year for which a maximum allowable total consumption level has been specified in Appendix 2-A. Should there at that time still be activities that are outstanding, and which were foreseen in the Plan and its subsequent revisions as per sub-paragraph 5(d) and paragraph 7, the completion will be delayed until the end of the year following the implementation of the remaining activities. The reporting requirements as per sub-paragraphs 1(a), 1(b), 1(d), and 1(e) of Appendix 4-A will continue until the time of the completion unless otherwise specified by the Executive Committee.

15. All of the conditions set out in this Agreement are undertaken solely within the context of the Montreal Protocol and as specified in this Agreement. All terms used in this Agreement have the meaning ascribed to them in the Montreal Protocol unless otherwise defined herein.

## APPENDICES

### APPENDIX 1-A: THE SUBSTANCES

| Substance | Annex | Group | Starting point for aggregate reductions in consumption (ODP tonnes) |
|---|---|---|---|
| HCFC-22 | C | I | 50.63 |
| HCFC-141b | C | I | 0.44 |
| Sub-total | | | 51.07 |
| HCFC-141b pre-blended polyols not reported under Article 7 | C | I | 2.06 |
| Grand total | | | 53.13 |

## APPENDIX 2-A: THE TARGETS, AND FUNDING

| Row | Particulars | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
|---|---|---|---|---|---|---|---|
| 1.1 | Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes) | | | 51.90 | 51.90 | 46.71 | n/a |
| 1.2 | Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes) | | | 58.85 | 57.75 | 46.31 | n/a |
| 2.1 | Lead IA (UNEP) agreed funding (US $) | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| 2.2 | Support costs for Lead IA (US $) | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| 2.3 | Cooperating IA (UNIDO) agreed funding (US $) | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| 2.4 | Support costs for Cooperating IA (US $) | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| 3.1 | Total agreed funding (US $) | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| 3.2 | Total support costs (US $) | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| 3.3 | Total agreed costs (US $) | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** | *tbd** |
| 4.1.1 | Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes) | | | | | | *tbd** |
| 4.1.2 | Phase-out of HCFC-22 to be achieved in previously approved projects (ODP tonnes) | | | | | | n/a |
| 4.1.3 | Remaining eligible consumption for HCFC-22 (ODP tonnes) | | | | | | *tbd** |
| 4.2.1 | Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes) | | | | | | 0.44 |
| 4.2.2 | Phase-out of HCFC141b to be achieved in previously approved projects (ODP tonnes) | | | | | | n/a |
| 4.2.3 | Remaining eligible consumption for HCFC-141b (ODP tonnes) | | | | | | 0 |
| 4.3.1 | Total phase-out of HCFC-141b pre-blended polyols not reported under Article 7 agreed to be achieved under this Agreement (ODP tonnes) | | | | | | 0 |
| 4.3.2 | Phase-out of HCFC 141b pre-blended polyols not reported under Article 7 to be achieved in previously approved projects (ODP tonnes) | | | | | | n/a |
| 4.3.3 | Remaining eligible consumption for HCFC-141b pre-blended polyols not reported under Article 7 (ODP tonnes) | | | | | | 2.06 |

*To be determined.

## APPENDIX 3-A: FUNDING APPROVAL SCHEDULE

1. Funding for the future tranches will be considered for approval at the last meeting of the year specified in Appendix 2-A.

## APPENDIX 4-A: FORMAT OF IMPLEMENTATION REPORTS AND PLANS

1. The submission of the Implementation Report and Plan for each tranche request will consist of five parts:

(a) A narrative report, with data provided by calendar year, regarding the progress since the year prior to the previous report, reflecting the situation of the Country in regard to phase out of the Substances, how the different activities contribute to it, and how they relate to each other. The report should include ODS phase-out as a direct result from the implementation of activities, by substance, and the alternative technology used and the related phase-in of alternatives, to allow the Secretariat to provide to the Executive Committee information about the resulting change in climate relevant emissions. The report should further highlight successes, experiences, and challenges related to the different activities included in the Plan, reflecting any changes in the circumstances in the Country, and providing other relevant information. The report should also include information on and justification for any changes vis-à-vis the previously submitted Annual Implementation Plan(s), such as delays, uses of the flexibility for reallocation of funds during implementation of a tranche, as provided for in paragraph 7 of this

Agreement, or other changes. The narrative report will cover all relevant years specified in sub-paragraph 5(a) of the Agreement and can in addition also include information on activities in the current year;

(b) A verification report of the HPMP results and the consumption of the Substances mentioned in Appendix 1-A, as per sub-paragraph 5(b) of the Agreement. If not decided otherwise by the Executive Committee, such a verification has to be provided together with each tranche request and will have to provide verification of the consumption for all relevant years as specified in sub-paragraph 5(a) of the Agreement for which a verification report has not yet been acknowledged by the Committee;

(c) A written description of the activities to be undertaken until and including the year of the planned submission of the next tranche request, highlighting the interdependence of the activities, and taking into account experiences made and progress achieved in the implementation of earlier tranches; the data in the plan will be provided by calendar year. The description should also include a reference to the overall plan and progress achieved, as well as any possible changes to the overall plan that are foreseen. The description should cover the years specified in sub-paragraph 5(d) of the Agreement. The description should also specify and explain in detail such changes to the overall plan. This description of future activities can be submitted as a part of the same document as the narrative report under sub-paragraph (b) above;

(d) A set of quantitative information for all annual implementation reports and annual implementation plans, submitted through an online database. This quantitative information, to be submitted by calendar year with each tranche request, will be amending the narratives and description for the report (see sub-paragraph 1(a) above) and the plan (see sub-paragraph 1(c) above), the annual implementation plan and any changes to the overall plan, and will cover the same time periods and activities; and

(e) An Executive Summary of about five paragraphs, summarizing the information of the above sub-paragraphs 1(a) to 1(d).

**APPENDIX 5-A: MONITORING INSTITUTIONS AND ROLES**

1. In order to ensure that all activities are taking place as planned in the HPMP and to ensure close collaboration between the implementing agencies (UNEP and UNIDO), a project implementation and monitoring component is included in the project. This will cover the implementation of activities, the day-to-day follow-up, and the selection of consultants who will advise the National Ozone Office, UNEP and UNIDO if necessary corrective measures are required. As in the case of the terminal phase-out management plan (TPMP), it is proposed to appoint the Bahrain Society of Engineers as the consultants.

2. The goal of the component is to monitor effectiveness of implementation of the HPMP, including reductions of HCFC consumption levels, and to measure the impact of the project activities on the overall phase out strategy and programme. The Government of Bahrain in consultation with UNEP and UNIDO will select and contract an independent local organization/firm to undertake this task and report annually on the outcomes and deliverables of the HPMP.

3. The National Ozone Unit (NOU) will be responsible for:

   (a) Providing the selected organization with all relevant information in possession;

   (b) Providing the selected organization with full information on NOU activities and partners;

   (c) Providing the selected organization with the necessary support/documentation to ensure its access to relevant official institutions and other organizations; and

   (d) Providing the reasonable support in independent data collection.

4. The responsibility of the selected organization will be:

   (a) To develop and present to UNEP, UNIDO and the NOU the approach to independent monitoring of the TPMP implementation;

   (b) To undertake independent monitoring of all the activities implemented in the HPMP;

   (c) To present reports on HPMP implementation status and HCFC consumption in the country every six months;

   (d) To prepare periodic (annual) assessment of the consumption of ODS and evaluate the impact of the projects being undertaken; and

   (e) To take into consideration comments and recommendations of UNEP, UNIDO and the NOU on activities and react accordingly.

**APPENDIX 6-A: ROLE OF THE LEAD IMPLEMENTING AGENCY**

1. The Lead IA will be responsible for a range of activities, including at least the following:

   (a) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's HPMP;

   (b) Assisting the Country in preparation of the Implementation Plans and subsequent reports as per Appendix 4-A;

   (c) Providing independent verification to the Executive Committee that the Targets have been met and associated annual activities have been completed as indicated in the Implementation Plan consistent with Appendix 4-A;

   (d) Ensuring that the experiences and progress is reflected in updates of the overall plan and in future annual implementation plans consistent with sub-paragraphs 1(c) and 1(d) of Appendix 4-A;

   (e) Fulfilling the reporting requirements for the annual implementation reports, annual implementation plans and the overall plan as specified in Appendix 4-A for submission to the Executive Committee. The reporting requirements include the reporting about activities undertaken by the Cooperating IA;

   (f) Ensuring that appropriate independent technical experts carry out the technical reviews;

(g) Carrying out required supervision missions;

(h) Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Implementation Plan and accurate data reporting;

(i) Co-ordinating the activities of the Cooperating IA, and ensuring appropriate sequence of activities;

(j) In case of reductions in funding for failure to comply in accordance with paragraph 11 of the Agreement, to determine, in consultation with the Country and the Cooperating IA, the allocation of the reductions to the different budget items and to the funding of each implementing or bilateral agency involved;

(k) Ensuring that disbursements made to the Country are based on the use of the indicators; and

(l) Providing assistance with policy, management and technical support when required.

2. After consultation with the Country and taking into account any views expressed, the Lead IA will select and mandate an independent entity to carry out the verification of the HPMP results and the consumption of the Substances mentioned in Appendix 1-A, as per sub-paragraph 5(b) of the Agreement and sub-paragraph 1(b) of Appendix 4-A.

## APPENDIX 6-B: ROLE OF THE COOPERATING IMPLEMENTING AGENCY

1. The Cooperating IA will be responsible for a range of activities. These activities are specified in the overall plan, including at least the following:

(a) Providing assistance for policy development when required;

(b) Assisting the Country in the implementation and assessment of the activities funded by the Cooperating IA, and refer to the Lead IA to ensure a co-ordinated sequence in the activities; and

(c) Providing reports to the Lead IA on these activities, for inclusion in the consolidated reports as per Appendix 4-A.

## APPENDIX 7-A: REDUCTIONS IN FUNDING FOR FAILURE TO COMPLY

1. In accordance with paragraph 11 of the Agreement, the amount of funding provided may be reduced by US $ [to be determined] per ODP kg of consumption beyond the level defined in row 1.2 of Appendix 2-A for each year in which the target specified in row 1.2 of Appendix 2-A has not been met.

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