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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Seventy-seventh Meeting
Montreal, 28 November - 2 December 2016

PROJECT PROPOSALS: JORDAN

This document consists of the comments and recommendations of the Secretariat on the following project proposals:

Phase-out

- HCFC phase-out management plan (stage I) (2015-2016 progress report, 2015 verification report) UNIDO and World Bank
- HCFC phase-out management plan (stage II, first tranche) World Bank and UNIDO

PROJECT DESCRIPTION

Background

1. On behalf of the Government of Jordan, UNIDO as the lead implementing agency, has submitted to the 77th meeting the annual progress report on the implementation of the work programme associated with the second tranche of the HCFC phase-out management plan (HPMP) and a verification report in line with decision 75/60(c).

Report on HCFC consumption

HCFC consumption

2. The Government of Jordan reported a consumption of 73.99 ODP tonnes of HCFC in 2015. The 2011-2015 HCFC consumption is shown in Table 1.

Table 1. HCFC consumption in Jordan (2011-2015 Article 7 data)

HCFC	2011	2012	2013	2014	2015	Baseline
Metric tonnes (mt)						
HCFC-22	1,172	1,222.0	760.0	747.6	1,005	985.3
HCFC-141b	335	524.0	160.0	169.1	170.1	261.7
Sub-total (mt)	1,507	1,746.0	920.0	916.7	1,175.1	1,247.0
HCFC-141b in imported pre-blended polyols*	165	174.0	80.0	150.0	180	102.8**
ODP tonnes						
HCFC-22	64.46	67.21	41.80	41.12	55.28	54.19
HCFC-141b	36.85	57.64	17.60	18.60	18.71	28.79
Sub-total (ODP tonnes)	101.31	124.85	59.40	59.72	73.99	82.98
HCFC-141b in imported pre-blended polyols*	18.15	19.14	8.8	16.5	19.8	11.31**

* County programme data.

** Average consumption between 2007 and 2009.

3. In 2013 and 2014, imports of HCFC-22 and HCFC-141b (in bulk) decreased due to closure of enterprises using HCFC-22 in manufacturing refrigeration equipment and slowdown in economic activity. In 2015, an increase in HCFC consumption was experienced due mainly to the growth in demand for production of and servicing air-conditioning (AC) systems and increase in manufacturing of foam products.

4. Implementation of regulations banning use of HCFC in the manufacturing of AC equipment and import of HCFC-based AC equipment from 31 December 2016; controls on HCFC-141b consumption both bulk and contained in imported pre-blended polyol; completion of the conversion of HCFC-22 based AC manufacturing enterprises; and the activities in the refrigeration servicing sector being implemented, would result in reduction of HCFC consumption below the allowable levels of consumption in 2016 and 2017.

Verification report

5. The verification report confirmed that the Government of Jordan continued to implement its licensing and quota system for HCFC imports and exports, and that the total consumption of HCFCs for 2015 of 73.99 ODP tonnes was below the national target of 74.70 ODP tonnes in its Agreement with the Executive Committee.

Country programme (CP) implementation report

6. The Government of Jordan reported HCFC sector consumption data under the 2015 CP implementation report which was 2 mt higher than the consumption reported under Article 7 of the Montreal Protocol. This difference was due to the use of 2 mt HCFC-22 in firefighting from previous years' stocks.

Progress report on the implementation of the third tranche of the HPMP*Legal framework*

7. The licensing and quota system for HCFC imports was updated in 2013 to ensure effective control over import and export of HCFCs. The ban on manufacture and import of HCFC-based residential AC equipment will be in effect from 31 December 2016, and a mandatory compliance with minimum energy performance standard (MEPS) for AC equipment will be in place by 31 December 2016 (which would require enterprises to convert to inverter technology).

Refrigeration and AC manufacturing sector

8. The conversion at three eligible enterprises, Abu Haltam Group for Investments (Abu Haltam), National Refrigeration Company (NRC) and Petra Engineering Industries Co. (Petra), to HFC-410A technology has been completed resulting in the phase-out of 9.5 ODP tonnes of HCFC-22. In line with decision 66/52(c), Petra has also developed a split AC equipment based on HC-290 refrigerant; however, the enterprise has not been able to produce and sell this equipment as customers still resist purchase of the equipment due to flammability concerns. Petra will still try to sell equipment with HC-based refrigerant based on market readiness. Final payments are pending for operating costs and costs for prototypes, design and testing for NRC and Abu Haltam.

Refrigeration and AC servicing sector

9. The servicing sector activities included training of 20 Customs officers on enforcement and 20 officers from the Jordan Institute of Standard and Metrology on regulations and the HCFC phase-out plan in the AC sector; training of 25 trainers on good servicing practices; and development of curricula for good practice in servicing HCFC-22-based AC equipment. Training of 100 technicians and procurement and distribution of recovery and recycling equipment and refrigerant identifiers will be completed by September 2017.

Project Management Unit (PMU)

10. The PMU has provided support to the AC manufacturers through site visits and technical exchanges and meetings. A project implementation manual completed by the Ministry of Environment in 2013 is used as a guide during implementation of stage I of the HPMP.

Level of fund disbursement

11. As of September 2016, of the total funds of US \$3,366,017¹ approved, US \$2,753,205 had been disbursed. The balance of US \$ 612,812 will be disbursed in 2017 and 2018 (Table 2).

¹ Excluding US \$89,800 returned by the World Bank as per decision 75/60 and including funding associated with Petra.

Table 2. Financial report of stage I of the HPMP for Jordan (US \$)

Agency	First tranche		Second tranche	
	Approved	Disbursed	Approved	Disbursed
UNIDO	70,000	69,774	22,184	11,494
World Bank	980,300*	378,404	0	0
Sub-total	1,050,300	448,179	22,184	11,494
Demonstration project for the phase-out of HCFC-22 and HCFC-141b from the manufacture of unitary AC equipment at Petra (60 th meeting)	2,167,033	2,167,033	0	0
Additional funds approved for the heat exchanger production and testing for Petra (66 th meeting)	126,500	126,500	0	0
Total	3,343,833	2,741,711	22,184	11,494

*Excluding US \$89,800 returned by the World Bank as per decision 75/60.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

12. The Secretariat noted the report, including independent verification demonstrating compliance with the HCFC consumption targets for 2015.

13. The consumption of HCFC-22 in servicing in 2013 and 2014 was higher than that under the CP data report; and the CP data for 2015 was 47 mt lower than the estimated service sector consumption for that year. The Secretariat also noted that the survey showed a consumption of HCFC-141b (bulk and contained in imported pre-blended polyol) of 357.72 mt for 2015 while the CP report indicated a consumption of 350.0 mt. In light of the above differences and in accordance with decision 34/18(a), the Secretariat requested the World Bank to advise the Ozone Officer to revise the data on consumption in the CP implementation report for the relevant years.

14. The Secretariat requested a clarification on the status of the conversion at Petra as the verification report indicates that the import of HCFC-22 increased from 36.72 mt in 2014 to 170.00 mt in 2015, noting that the progress report submitted to the 75th meeting² indicated that this project had been completed. UNIDO clarified that the increase in consumption was due to a high demand for ACs in the country, and confirmed that the three AC enterprises covered under stage I have stopped using HCFC-22 in manufacturing as of July 2016. The Secretariat also notes that the Government would implement a ban on import of HCFC-22 ACs and use of HCFC-22 in ACs manufacturing by 31 December 2016, ensuring the sustainability of the conversion.

15. Activities continue to be implemented as planned and the overall level of disbursement is 82 per cent of the approved funding.

RECOMMENDATION

16. The Executive Committee may wish to take note of the 2016 progress report on the implementation of second tranche of stage I of the HCFC phase-out management plan for Jordan and the verification report on the 2015 HCFC consumption, submitted by UNIDO.

² UNEP/OzL.Pro/ExCom/75/50, paragraph 9.

PROJECT DESCRIPTION

17. On behalf of the Government of Jordan, the World Bank, as the lead implementing agency, has submitted to the 77th meeting stage II of the HCFC phase-out management plan (HPMP) at a total cost of US \$6,330,174, consisting of US \$4,461,907, plus agency support costs of US \$312,334 for the World Bank, and US \$1,454,143, plus agency support costs of US \$101,790 for UNIDO, as originally submitted³. The implementation of stage II of the HPMP will phase out 46.94 ODP tonnes of HCFCs⁴ (consisting of 39.35 ODP tonnes of HCFC-141b and 7.59 ODP tonnes of HCFC-22) and assist Jordan in reducing HCFC consumption to 65 per cent of the baseline by 2020.

18. The first tranche for stage II of the HPMP requested at this meeting amounts to US \$1,851,988 consisting of US \$1,149,173, plus agency support costs of US \$80,442 for the World Bank and US \$581,657, plus agency support costs of US \$40,716 for UNIDO, as originally submitted.

Status of implementation of stage I of the HPMP

19. Stage I of the HPMP for Jordan was approved at the 65th meeting to meet 20 per cent reduction from the baseline by 2017 and phase out 17.44 ODP tonnes of HCFC-22 at the amount of US \$2,433,334, plus agency support costs. The project to phase 6.88 ODP tonnes of HCFC-22 and 1.19 ODP tonnes of HCFC-141b from the manufacturing of unitary ACs at Petra, at the amount of US \$2,167,033, plus agency support costs, was approved at the 60th meeting and subsequently included in stage I of the HPMP⁵.

20. The Agreement between the Government of Jordan and the Executive Committee was updated at the 75th meeting to reflect the revision of funding level due to the withdrawal of Middle East Complex for Engineering, Electronics and Heavy Industries PLC (MEC) (with a consumption of 6.33 ODP tonnes and an estimated cost of US \$1,360,850) from the HPMP, resulting in the return of US \$89,800⁶, plus agency support costs of US \$6,735 by the World Bank, in line with decision 75/60.

21. The details of the progress report of stage I of the HPMP is presented in paragraphs 2 to 15 of the present document.

Stage II of the HPMP

Remaining consumption eligible for funding

22. After deducting 25.51 ODP tonnes of HCFCs associated with stage I of the HPMP from starting point for aggregate reduction on HCFC consumption for Jordan, the remaining consumption eligible for funding would be 68.78 ODP tonnes.

³ As per the letter of 22 August 2016 from the Ministry of Environment of Jordan to the World Bank.

⁴ The total consumption of HCFC-141b according to the CP report is 170.1 mt (18.71 ODP tonnes) in bulk and 180 mt (19.8 ODP tonnes) in imported pre-blended polyols. The total HCFC-141b consumption (in pure or imported pre-blended polyols) according to the survey is 357.72 mt (39.35 ODP tonnes), 7.62 mt higher than in the CP report.

⁵ Additional funding of US \$126,500, plus agency support costs, was approved for the heat exchanger production and testing for Petra at the 66th meeting (decision 66/52).

⁶ A total of US \$2,341,150 was approved in principle for the World Bank. Deducting an estimated cost of conversion at MEC (US \$1,360,850) results in the balance of US \$980,300, which is US \$89,800 lower than the amount approved in the first tranche (US \$1,070,100). This balance was returned to the Multilateral Fund.

HCFC sector distribution

23. Table 3 presents the consumption of HCFCs by sector as reported in the CP data for 2015.

Table 3. Distribution of HCFCs use by sector and substance in 2015

HCFC	Sector	HCFC use			
		mt	mt (%)	ODP tonnes	ODP tonnes (%)
Manufacturing					
HCFC-22	RAC**	410.0	30.2	22.55	24.0
HCFC-141b		50.0	3.7	5.50	5.9
HCFC-141b	Foam	120.1	8.8	13.21	14.1
HCFC-141b (polyols)*		180.0	13.3	19.80	21.1
Sub-total		760.1	56.0	61.06	65.0
Servicing					
HCFC-22	RAC	595.0	43.8	32.73	34.9
	Firefighting	2.0	0.1	0.11	0.1
Sub-total		597.0	44.0	32.84	35.0
Total		1,357.1	100	93.90	100

* HCFC-141b contained in imported pre-blended polyols

** Refrigeration and air-conditioning

24. HCFC-22 is consumed for the production of ACs, commercial refrigeration systems and small uses (i.e., 2.00 mt) by the Jordan Telecom Company for servicing in firefighting; HCFC-141b is used as a foam blowing agent, including insulation foam for domestic and commercial refrigerators. Field survey indicated that the consumption of HCFC-22 for servicing was higher than the amount reported under the 2015 CP data report due to closure of enterprises that were manufacturing HCFC-22-based equipment.

Polyurethane (PU) foam manufacturing sector

25. All foam users buy pre-blended polyols containing HCFC-141b from local systems houses or through importers. Break-up of consumption of HCFC-141b in imported pre-blended polyols or locally blended in systems house at a sub-sector level could not be provided as it is difficult to estimate the distribution.

26. The PU foam sector is dominated by sandwich panel and spray applications produced by 52 enterprises; in addition one enterprise, Abu Haltam, manufactures refrigerators with HCFC-141b used as foam blowing agent for insulation. The distribution of HCFC-141b use in bulk and imported pre-blended polyols among PU foam enterprises according to the survey undertaken in stage II preparation is presented in Table 4.

Table 4. Distribution of HCFC-141b among PU foam enterprises (2015)

Sub-sector	Number of enterprises			HCFC-141b (2015)*	
	>20 mt	<20 mt	Total	mt	ODP tonnes
Discontinuous panels	2	13	15	147.38	16.21
Continuous panels	1	0	1	23.80	2.62
Spray	1**	5	6	82.01	9.02
Solar heaters	0	23	23	18.89	2.08
Refrigerated transport	0	2	2	18.33	2.02
Shutters	0	5	5	13.23	1.46
Domestic refrigeration	0	1	1	17.00	1.87
Total	4	49	53	320.64	35.27

*The breakdown between HCFC-141b pure vs in imported pre-blended polyol was not provided.

**Only average 2013-2015 consumption was provided for each spray foam enterprise. Using this average, there is one enterprise with consumption over 20 mt.

27. Jordan has one blending house, Fathei Abu Arja and Partners Industrial Co. (FAA), that has shifted to import HCFC-141b-pre-blended polyols, mainly from Saudi Arabia (Huntsman-APC), the United Arab Emirates (Bayer System Pearls) and Kuwait (KPI). This enterprise continues to be the leading foam provider for insulation in the country.

Refrigeration and AC manufacturing sector

28. Currently, there are three enterprises manufacturing AC equipment. One enterprise, MEC (that was included in stage I of the HPMP and subsequently withdrew) is re-establishing the production lines for manufacturing their products and appliances and has confirmed the conversion of the AC manufacturing line to R-410A technology (with its own resources). The conversion plans of the remaining two enterprises are not known.

29. About 30 per cent of commercial refrigeration equipment is manufactured by one larger enterprise, Abdin Industrial Establishment Co., (Abdin), with a consumption of 0.50 ODP tonnes of HCFC-22 and 0.97 ODP tonnes of HCFC-141b, in 2015. There are also 22 small-sized enterprises using 1.58 ODP tonnes of HCFC-22 and 3.11 ODP tonnes of HCFC-141b contained in imported pre-blended polyols for production of sandwich panels. The total consumption in the sector is 2.09 ODP tonnes of HCFC-22⁷ and 4.08 ODP tonnes of HCFC-141b.

30. HCFC-22 is also used in industrial refrigeration for cold storage and ice-making. Condensing units using HFC-134a, R-404A and R-507A are used in cold storage for meat, fruits and vegetables. It is estimated that 2,500 chillers and central AC systems, using HCFC-22, HFC-134a and R-410A, are installed in Jordan. During a survey done in 2010, the estimated number of HCFC-22 based chillers was 1,800.

Refrigeration servicing sector

31. Jordan has over 400 licensed workshops that service RAC equipment, of which 250 workshops are certified to provide maintenance and servicing.

Proposed activities in stage II of the HPMP

32. The activities to be implemented during stage II include regulatory actions; complete conversion of the PU foam and refrigeration manufacturing sectors; technical assistance (TA) to foam and refrigeration manufacturing sectors; assistance to the servicing sector; and implementation and monitoring.

Regulatory actions

33. The regulatory component aims to support the conversion of the PU foam and refrigeration manufacturing sectors through introduction of a ban on the use of HCFCs in all manufacturing sectors by the end of 2021.

⁷ Round-off adjustment of 0.01 ODP tonnes.

Activities in the manufacturing sector

PU foam manufacturing sector

34. The PU foam sector plan consists of two components:

- (a) A phase-out of HCFC-141b (both in bulk and contained in imported pre-blended polyols) in three large and 43 small and medium-sized enterprises (SMEs)⁸, to be implemented with the assistance of the World Bank; and
- (b) A spray foam sector plan covering six enterprises, to be implemented with the assistance of UNIDO.

35. Of the three foam enterprises producing sandwich panels with consumption over 20 mt, Al Safa for Sheet Metal Industry and Panel Co (Al Safa) and Jordan Manufacturing and Services Solutions (JMSS), selected HFO-based formulations, while Jordan Pioneer for Metal Industry (Pioneer) selected hydrocarbon (HC) blowing technology. The incremental capital costs (ICC) for conversion of Pioneer to HC has been estimated at US \$399,300, taking into account the baseline equipment. The ICC for conversion of Al Safa and JMSS to HFO has been estimated based on their baseline equipment, including retrofit of four and two heating systems, respectively, as shown in Table 5.

Table 5. ICC for conversion of large enterprises to HFO formulations

Item	Unit cost (US \$)	Al Safa (US \$)	JMSS (US \$)
Cooling system for HFO formulated polyol	10,000	10,000	10,000
Retrofit of heating systems to avoid foam friability	10,000	40,000	20,000
K factor tester	35,000	35,000	35,000
Training and TA	10,000	10,000	10,000
Trials	10,000	10,000	10,000
Testing	10,000	10,000	10,000
Contingency	8,500	11,500	9,500
Total cost	93,500	126,500	104,500

Note: Contingency at 10 per cent of the project costs was added to the above. Al Safa and JMSS requested funding for retrofits, respectively.

36. The 43 SMEs will convert to HFO formulations. ICC includes US \$5,000 for a cooling system for HFO-based formulated polyol for enterprises consuming more than 500 kg. Costs for technology transfer, trials, testing and training vary based on the level of HCFC consumption by the SME as shown in Table 6.

Table 6. ICC for conversion of 43 SMEs to HFO formulations

Item	Unit cost (US \$)
Production	
Cooling system for HFO-based formulated polyol	5,000
TA, trials and testing	
Technology transfer support	1,300 to 10,000
Trials and testing	
Training	
Contingency	630 to 1,500

⁸ During the project review, it was noted that one enterprise, Enjaz Jordan for Steel Structure, included in the original proposal was established after the cut-off date and is non-eligible for funding.

37. The six spray foam enterprises will be converted to HFO formulations with a total cost of US \$117,700 as shown in Table 7.

Table 7. ICC for conversion of spray foam enterprises to HFO formulations

Item	Unit cost (US \$)	
	1 large enterprise	5 SMEs
Production		
Retrofit of foaming machine for HFO formulations	10,000	20,000
Storage cooling system with AC	15,000	20,000
TA, trials and testing		
Technology transfer support	6,500	6,500
Trials and testing	7,500	7,500
Training	7,000	7,000
Contingency	4,600	6,100
Total cost	50,600	67,100

38. Incremental operating costs (IOC) for all enterprises were calculated taken into account the price difference between HCFC-141b and alternative technologies; increase in the cost of polyol formulation, reflecting the need for special catalyst package for HFO-1233zd(E); and the difference in the amount of blowing agent required for producing the same amount of foam. The IOC for two large enterprises was adjusted to US \$5.00/kg based on decision 74/50. For spray foam enterprises, IOC was calculated at US \$6.47/kg and, where applicable, US \$5.00/kg based on decision 74/50.

39. Table 8 summarizes the incremental costs for the conversion of the PU foam manufacturing sector in Jordan.

Table 8. Total cost for the conversion of the PU foam sector

Enterprise	HCFC-141b (mt)	Cost (US\$)				
		ICC	IOC	Total	Requested*	Co-funding
PU foam						
Pioneer	23.80	399,300	975	400,275	233,001	167,274
Al Safa**	35.00	126,500	175,000	301,500	301,500	0
JMSS**	30.00	104,500	150,000	254,500	254,500	0
SMEs (43)***	132.80	520,620	1,274,304	1,794,924	1,456,078	338,846
Sub-total	221.60	1,150,920	1,600,279	2,751,199	2,245,079	506,110
Spray foam						
Six enterprises	78.98***	386,100	511,392	897,492	840,680	n/a
Total	300.58	1,537,020	2,111,671	3,648,691	3,085,759	n/a

*Adjusted for enterprises with conversion costs higher than the cost-effectiveness (CE) threshold, as per decision 74/50

**Difference in costs of Al Safa and JMSS is due to the number of units retrofitted (i.e., four in Al Safa, two in JMSS) and 10 per cent contingency.

***IOC and ICC were calculated based on the average 2013-2015 consumption; 2015 consumption was 82.01 mt.

40. Stage II also proposes to replace 17.0 mt of HCFC-141b with HFO formulations and 9.9 mt of HFC-134a with isobutane used at Abu Haltam in the manufacturing of domestic refrigerators and chest freezers. Incremental cost was estimated at US \$699,916 of which US \$462,714 are requested (based on a CE threshold of US \$17.20/kg⁹).

⁹ UNEP/OzL.Pro/ExCom/16/20 (paragraphs 32 c) and d)) with a 25 per cent increase for adopting low-GWP alternative based on decision 74/50(c)(iii).

Commercial refrigeration manufacturing sector

41. Stage II proposes to replace 2.09 ODP tonnes of HCFC-22 with R-448A and 4.08 ODP tonnes of HCFC-141b to HFO formulation used in the commercial refrigeration sector through the conversion of one large enterprise, Abdin, and 22 SMEs including Baitak Refrigeration Nabil Wakfi (Baitak) which was established after the cut-off date. The cost of conversion at Abdin has been estimated at US \$524,780 and includes new vacuum pumps, refrigerant charging machines and leak detectors for R-448A refrigerant; changes to the testing facility; retrofitting of heating systems; provision of K factor tester and cooling systems. Baseline equipment used for manufacturing refrigeration appliances in Abdin (e.g., charging equipment, vacuum pumps) were purchased after 2007.

42. Incremental cost for the 21 SMEs has been estimated at US \$1,704,577, based on standard unit costs presented in Table 9.

Table 9. Standard unit costs cost for conversion of SMEs in commercial refrigeration sector

Item	Unit cost (US \$)
All enterprises	
Refrigerant charging equipment	5,000 to 7,500
Leak detectors	2,000
Testing, trials and training	9,000 to 25,000
Enterprises with consumption above 1.5 mt	
Cooling system for HFO-based polyols above 500 kg	5,000
Two stage vacuum pumps	2,500

43. The funding request for Abdin and the 21 SMEs¹⁰ was adjusted to US \$1,349,754¹¹, based on the CE threshold of US \$19.01/kg¹².

Activities in the refrigeration servicing sector

44. Stage II of the HPMP proposes to phase out 100 mt (5.5 ODP tonnes) of HCFC-22 used in the refrigeration servicing sector at a total cost of US \$480,000 (at US \$4.8/kg) through the following activities:

- (a) Refrigeration technicians training on adopting good servicing practices to ensure energy efficient operation and maintenance of RAC equipment and for certification, by conducting eight workshops and distributing training kits to improve handling of refrigerant gases and reduce consumption of HCFCs (US \$147,000);
- (b) TA for introduction of low GWP and energy efficient alternatives in cold rooms and air-conditioning through six workshops (US \$59,000);

¹⁰ During the project review process, it was noted that the tonnage used for calculating the funds requested based on US \$19.01/kg included consumption at Baitak. Figures are presented as originally submitted.

¹¹ The tonnage used for calculating the funds requested based on US \$19.01/kg was reduced by 4 mt using import data instead of survey data.

¹² UNEP/OzL.Pro/ExCom/16/20 (paragraphs 32c and 32d) with a 25 per cent increase for adopting low-global warming potential (GWP) alternative based on decision74/50(c)(iii).

- (c) Recovery, recycling and reclamation programme consisting of three reclamation centres for maximising recovery and reclamation of HCFC-22 which will reduce consumption (US \$185,000); and
- (d) Awareness programme on transition from HCFCs to substitutes for different target audiences through nine outreach workshops (US \$89,000);

TA activities

45. Stage II of the HPMP also includes the following TA activities at a total cost of US \$215,129:
- (a) Training of 100 to 120 customs and government officers annually on controlling and monitoring of HCFCs and HCFC-141b contained in pre-blended polyol (US \$60,000);
 - (b) Training workshops for the foam and refrigeration enterprises in central and southern Jordan to broadly inform foam and commercial refrigeration enterprises on HPMP stage II objectives, technology options, regulations and project implementation processes (US \$40,000);
 - (c) Other TA activities including electronic management information system (MIS) on HCFC use by enterprises for project monitoring and implementation (US \$11,829);
 - (d) Study tours on low GWP alternatives for enterprises in the foam and RAC sectors to learn from practical experience of experts and industries implementing such technologies (US \$70,000); and
 - (e) Technical support and guidance to the national ozone unit (NOU)/PMU and enterprises on technology options, equipment technical specification and other technical issues associated with project implementation (US \$33,300).

Implementation and monitoring activities

46. The PMU, located within the NOU at the Ministry of Environment, will manage the implementation of stage II of the HPMP through: coordination with stakeholders; consultants' terms of reference preparation, hire and work supervision; preparation of work programmes and reports; financial management; development and maintenance of management information system; project evaluation and supervision; training organization and information dissemination to beneficiaries.

Total cost of stage II of the HPMP

47. The total cost of stage II of the HPMP for Jordan has been estimated at US \$5,916,050, as originally submitted (excluding support costs). Detailed activities and cost, as originally submitted, are shown in Table 10.

Table 10. Total cost of stage II of the HPMP for Jordan

Sector	Substance	Total phase-out*		Phase-out for which funding is requested		Overall CE (US \$)	Funded CE (US \$)	Funds requested (US \$)
		mt	ODP t	mt	ODP t			
PU foam	HCFC-141b	303.64*	33.40	300.61	33.07	10.16	10.26	3,085,759
Domestic refrigeration (insulation foam)	HCFC-141b	17.00	1.87	17.00	1.87	17.20	17.20	462,714
Domestic refrigeration (refrigerant)	HFC-134a	9.90	n/a	9.90	n/a			
Commercial refrigeration	HCFC-22	37.91	2.09	37.91**	2.09	18.00	19.01	1,349,754
	HCFC-141b	37.08	4.08	33.08**	3.64			
Refrigeration servicing	HCFC-22	100.00	5.50	100.00	5.50	4.80	4.80	480,000
TA, regulatory measures	n/a							215,129
PMU	n/a							322,694
Total stage II		505.53	46.94	498.50	46.17	11.94***	12.11***	5,916,050

*According to the CP report, the total consumption of HCFC-141b is 170.1 mt in bulk and 180 mt in imported pre-blended polyols. The total HCFC-141b consumption (in bulk or imported pre-blended polyols) according to the survey is 357.72 (7.62 mt higher than in the CP report). Survey data is used for calculation of the total phase-out per sub-sector. Tonnage used for calculated funds requested was reduced by 4 mt for commercial refrigeration to adjust to the CP data/import data.

**Includes consumption of Baitak initially included in the calculation, and excludes 4 mt of HCFC-141b (adjustment to import data).

***CE calculated using HCFC consumption data and excludes HFC-134a.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

48. The Secretariat reviewed stage II of the HPMP for Jordan in light of stage I of the HPMP, the policies and guidelines of the Multilateral Fund, including the criteria for funding HCFC phase-out in the consumption sector for stage II of HPMPs (decision 74/50), and the 2016-2018 business plan of the Multilateral Fund.

Overarching strategy

49. The Government of Jordan committed to achieve a HCFC consumption target of 66.40 ODP tonnes by 2017, representing 20 per cent of the HCFC baseline, as indicated in row 1.2 of Appendix 2-A of its Agreement with the Executive Committee. To achieve the 35 per cent reduction of HCFC consumption baseline by 2020, Jordan would need to phase out only 12.45 ODP tonnes, i.e., 34.49 ODP tonnes lower than the 46.94 ODP tonnes proposed to be phased out in stage II. Upon request for clarification, the World Bank informed that Jordan's strategy for stage II aims to achieve complete phase-out of HCFCs in the manufacturing sector (i.e., 41.44 ODP tonnes) and to provide for ongoing support to the servicing sector (i.e., 5.50 ODP tonnes). As a result, the total phase-out quantity proposed in HPMP stage II is higher than the quantity required to meet the 2020 control target.

Remaining consumption eligible for funding

50. Stage I of the HPMP established the starting point for aggregate reduction on HCFC consumption at 28.79 ODP tonnes for HCFC-141b (in bulk) and 11.31 ODP tonnes of HCFC-141b contained in imported pre-blended polyols (i.e., 2007-2009 average consumption, in line with decision 61/47). In stage I, 1.19 ODP tonnes of HCFC-141b was phased-out resulting in a remaining consumption eligible for funding of 27.60 ODP tonnes. Based on the 2015 CP data report submitted by the Government of Jordan, the consumption of HCFC-141b amounts to 18.71 ODP tonnes and the consumption of HCFC-141b contained in imported pre-blended polyols amounts to 19.80 ODP tonnes, as shown in Table 11.

Table 11. Remaining consumption eligible for funding (in ODP tonnes)

Substance	ODP tonnes			
	Starting point	Stage I approved	Remaining	Current (2015)
HCFC-141b bulk	28.79	1.19	27.60	18.71
HCFC-141b polyol	11.31	0.00	11.31	19.80*

* HCFC-141b contained in imported pre-blended polyol increased from 8.8 ODP tonnes in 2013 to 19.8 ODP tonnes in 2015.

51. Stage II of the HPMP proposes the phase-out of 39.35 ODP tonnes of HCFC-141b, consisting of the current consumption of HCFC-141b in bulk, which is lower than the remaining consumption eligible for funding, and the consumption of HCFC-141b contained in imported pre-blended polyols, which is higher than the remaining consumption eligible for funding. Noting that HCFC-141b contained in imported pre-blended polyols is not a controlled substance under the Montreal Protocol (as agreed by the Parties) and in line with decision 61/47, the consumption eligible for funding for stage II would be 18.71 ODP tonnes of HCFC-141b in bulk (i.e., current consumption) and 11.31 ODP tonnes of HCFC-141b contained in imported pre-blended polyols. The World Bank indicated that the Government of Jordan considers that the remaining consumption of HCFC-141b eligible for funding should be determined by the sum of the consumption of HCFC-141b in bulk and contained in imported pre-blended polyol, and, therefore, does not agree. The Government of Jordan further indicated that it had managed the compliance challenge resulting from high growth in HCFC consumption experienced in the last two to three years by controlling HCFC-141b import in bulk.

Supply of alternatives selected

52. In line with decision 74/20, the Secretariat requested if information had been received from suppliers on the local availability and adequate supply of the HFO (for the foam sector) and R-448A (for the refrigeration sector) technologies proposed in stage II. At the time of writing of this document, such information had not yet been received.

Foam sector

53. With regard to the conversion of Pioneer, the Secretariat and the World Bank discussed the cost of the equipment related to foam dispensing machine and safety infrastructure, and technical support including a safety audit needed for the conversion to cyclopentane, and IOCs. Based on this review, the Secretariat proposed revised costs for foam dispenser and safety infrastructure, IOCs, and total incremental cost at a level of US \$232,259 (at a CE of US \$9.76/kg).

54. During project review, the World Bank clarified that for the conversion of Al Safa and JMSS to HFO formulation, retrofitting of the moulds/presses with heating systems was requested to reduce friability; and installation of cooling systems was requested given the boiling point of HFO and the need to improve the stability of HFO-formulated systems. The Secretariat noted, however, that those items were not incremental and had not been approved in similar projects. A further advice received by the Secretariat from an independent foam technical expert confirmed that the issues related with the friability and stability can be addressed through improved formulations (i.e., varying the constituent polyols, catalysts and surfactants), as well as by optimizing operating practices, if needed. Based on that advice, the Secretariat considered that those items were not eligible, and calculated the total incremental cost for eligible enterprises¹³ at US \$20,000 each, consisting of costs for trials, testing and training activities to facilitate adoption of the HFO formulations, and IOC amounting to US \$175,000 and US \$150,000 for Al Safa and JMSS, respectively, as IOC estimated at US \$5.00/kg (in line with decision 74/50). However, the World Bank did not agree with the costs proposed by the Secretariat.

¹³ Enjaz Jordan for Steel Structure was established after 2007 and hence is not eligible.

55. For the remaining 42 eligible SMEs in the foam sector, the Secretariat proposed incremental costs of US \$940,248, consisting of US \$120,200 for trials, testing and training activities to facilitate adoption of HFO formulations based on the consumption level of the enterprises¹⁴ and US \$820,048 as IOC at US \$6.20/kg for phasing-out HCFC-141b consumption; total eligible costs were adjusted to US \$936,583 based on the applicable CE threshold of US \$10.96/kg in accordance with decision 74/50. However, the World Bank did not agree with the costs proposed by the Secretariat.

56. With regard to conversion of the six spray foam enterprises, technical and cost issues were discussed between the Secretariat and UNIDO. It was agreed that retrofitting the existing foam equipment for use with HFO formulations and the request for cooling systems were not incremental. The final costs for the six spray foam enterprises was agreed at US \$527,823, consisting of US \$94,000 for trials, testing and training activities, and US \$433,823 as IOC as proposed at US \$5.68/kg or US \$5.00/kg when consumption was greater than 20 mt (in line with decision 74/50).

57. With regard to the conversion at Abu Haltam, the Secretariat pointed out to the World Bank that the request for phasing-out of HFC-134a as a refrigerant was not eligible as HFC-134a is not a controlled substance under Annex C of the Montreal Protocol. It was agreed to remove this project component with the understanding that such HFC projects could be submitted at a later date and in accordance with relevant policies and guidelines that would be established for consideration of those projects. The Secretariat also pointed out that the maximum eligible incremental cost for the conversion of the foam component of the manufacturing line would be US \$186,320, based on a consumption of 17.00 mt of HCFC-141b and at the CE threshold of US \$10.96/kg in accordance with decision 74/50. Taking into consideration that the enterprise purchases pre-blended polyol containing HCFC-141b, the Secretariat proposed ICC amounting to US \$6,000 for trials, testing and training activities to facilitate adoption of the HFO formulations, and US \$105,429 as IOCs calculated at US \$6.20/kg based on the reported costs of chemicals in Jordan, resulting in a total incremental cost of US \$111,429. However, the World Bank did not agree with the costs proposed by the Secretariat nor that a CE threshold of US \$10.96/kg should apply.

Commercial refrigeration manufacturing

58. The Secretariat noted that the total consumption of HCFC-22 used in the manufacturing of commercial refrigeration equipment in 2015 represented only 2.5 per cent of the HCFC baseline; given the relatively high GWP of 1,300 of R-448A (the refrigerant proposed), the limited availability of the technology in the local market, and the very poor CE of the conversion at over US \$19.01/kg, the Secretariat requested clarification on the need to address this component in stage II of the HPMP. The World Bank considered that adoption of R-448A would result in avoiding the introduction of a refrigerant with a higher GWP (e.g., R-404A, which is frequently adopted for low temperature commercial refrigeration applications) by the enterprises; this approach would also assist the Government in phasing out all HCFCs used in the manufacturing sector. While giving due consideration to the clarifications provided, the Secretariat still does not consider the conversion of the commercial refrigeration as a cost-effective and sustainable approach, nor as an effective approach for promoting climate-friendly technologies, and not required to ensure compliance with the 2020 (or even 2025) control target. While recognizing the difficulties the Government of Jordan may face in phasing out some but not all HCFC-based manufacturing, the Secretariat noted that it was common for Article 5 Parties to phase out only part of their HCFC-based manufacturing. The Secretariat therefore proposed that the phase-out of HCFC-22 in commercial refrigeration be considered at a later stage and that in the interim, TA for the identification and testing of potential low GWP refrigerants that could become commercially available in

¹⁴ Costs for trials, testing and training was calculated at US \$1,300 (0-500 kg HCFC-141b consumption), US \$3,000 (500-10,000 kg HCFC-141b consumption), US \$6,000 (10,000-20,000 kg HCFC-141b consumption and US \$10,000 (greater than 20 mt HCFC-141b consumption).

the local market in the foreseeable future could continue to be provided. The World Bank did not agree with this approach and considers that this conversion should be maintained in the stage II HPMP.

59. Noting that the Government of Jordan decided to maintain the conversion of the commercial refrigeration manufacturing sector as part of stage II of the HPMP (despite the concerns raised by the Secretariat), the Secretariat pointed out to the World Bank that the maximum eligible incremental cost of the conversion would be US \$10.96/kg in accordance with decision 74/50, and not US \$19.01/kg (based on US \$15.21¹⁵ per kg plus 25 per cent increment for adoption of low GWP technology). For the reasons noted, the Secretariat did not propose costs to convert the HCFC-22 consumption in the sector, and instead proposed incremental costs of US \$220,282, consisting of US \$51,100 for trials, testing and training activities to facilitate adoption of HFO formulations based on the consumption level of the enterprises¹⁶ and US \$169,182 as IOC at US \$6.20/kg for phasing-out HCFC-141b consumption; total eligible costs were adjusted to US \$217,454 based on the applicable CE threshold of US \$10.96/kg in accordance with decision 74/50. The World Bank did not agree with the CE threshold proposed by the Secretariat nor with its calculation of the incremental costs; instead the World Bank proposed a CE of US \$19.01/kg for the foam (based on US \$15.21 plus 25 per cent for low-GWP HFOs) and US \$15.21 for the refrigerant component.

Refrigeration servicing sector

60. As a result of discussions with UNIDO on the activities on the refrigeration servicing sector, it was agreed to reduce the awareness component by US \$6,000 (i.e., removing the costs for an international consultant), bringing the total agreed cost to US \$474,000 and the total phase-out at 5.43 ODP tonnes of HCFC-22.

TA

61. The World Bank clarified that the proposed TA activities relating to training workshops, consultancy services for project implementation support, and study tours for technology promotion would cover both the foam and the refrigeration manufacturing sectors. Those activities would help adoption of non-HCFC alternatives in different applications, facilitate implementation of projects and effective design and enforcement of regulations.

62. The Secretariat noted that the request for TA activities relating to customs training, data monitoring and other TA (at a cost of US \$71,829) are policy enforcement activities and would need to have an associated HCFC phase-out of 0.82 ODP tonnes (calculated at US \$4.80/kg). However, the World Bank disagreed, noting that those activities would facilitate ODS phase-out across all sectors and no deductions from the remaining eligible consumption would be applicable.

Other components of the project proposal for stage II

63. Due to the lack of agreement between the Secretariat and the World Bank on a number of issues, the following items of the project document could not be finalized: cost of the PMU, since those costs depend on the scope of activities undertaken and project components; impact on the climate associated with the conversion of the manufacturing enterprises to be included in stage II, the level of co-financing as the project cost discussions have not concluded; and the draft Agreement between the Government of Jordan and the Executive Committee.

¹⁵ UNEP/OzL.Pro/ExCom/16/20 (paragraphs 32c) and 32d)).

¹⁶ Costs for trials, testing and training was calculated at US \$1,300 (0-500 kg HCFC-141b consumption), US \$3,000 (500-10,000 kg HCFC-141b consumption), US \$6,000 (10,000-20,000 kg HCFC-141b consumption and US \$10,000 (greater than 20 tonnes HCFC-141b consumption).

Remark

64. The Secretariat undertook extensive and constructive discussions with the implementing agencies that will assist the Government of Jordan in implementing stage II of the HPMP. While agreement was reached on technical and costs issues related to the project components associated with UNIDO and a few components associated with the World Bank, there are still major issues for which agreement was not reached, including on the distribution of HCFC-141b in bulk and HCFC-141b contained in imported pre-blended polyols; on the inclusion of the phase-out of HCFC-22 used in commercial refrigeration; on the incremental costs of the PU foam sector phase-out, excluding six spray foam enterprises; on the associated amount of HCFCs phase-out for TA; and on the costs of the PMU. In accordance with decision 20/15, this document presents the underlying basis of the disagreement for the consideration of the Executive Committee.

RECOMMENDATION

65. The Secretariat is presenting the request submitted by the World Bank on behalf of the Government of Jordan for stage II of the HCFC phase-out management plan for individual consideration, seeking the guidance of the Executive Committee in particular with respect to the distribution of HCFC-141b in bulk and HCFC-141b contained in imported pre-blended polyols; on the inclusion of the phase-out of HCFC-22 used in commercial refrigeration, noting that the consumption of HCFC-22 in this application represents only 2.5 per cent of the HCFC baseline and the cost-effectiveness of US \$19.01; and on amount of HCFCs phase-out associated with the technical assistance activities.
