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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Ninety-first Meeting
Montreal, 5-9 December 2022
Item 9(d) of the provisional agenda¹

PROJECT PROPOSAL: MOROCCO

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

Foam

- Phase-out of HCFC-141b contained in imported pre-blended polyols in the polyurethane foam sector

UNIDO

¹ UNEP/OzL.Pro/ExCom/91/1

PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECT**Morocco****PROJECT TITLE(S)****BILATERAL/IMPLEMENTING AGENCY**

(a) Phase-out of HCFC-141b contained in imported pre-blended polyols in the polyurethane foam sector	UNIDO
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NATIONAL COORDINATING AGENCY

Moroccan Ministry of Industry and Trade

LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT**A: ARTICLE-7 DATA (ODP TONNES, 2021)**

HCFCs	17.62
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B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2021)

HCFC-22	17.62
HCFC-141b	0.00
HCFC-142b	0.00
HCFC-123	0.00
HCFC-124	0.00
HCFC-141b contained in imported pre-blended polyols	11.47

HCFC consumption remaining eligible for funding (ODP tonnes)

24.59

CURRENT YEAR BUSINESS PLAN ALLOCATIONS	Funding (US \$)	Phase-out (ODP tonnes)
	0	0.00

PROJECT:	
ODS used at enterprises (ODP tonnes):	5.38
ODS to be phased out (ODP tonnes):	7.9
ODS to be phased in (ODP tonnes):	0.00
Project duration (months):	24
Initial amount requested (US \$):	484,609
Final project costs (US \$):	
Incremental capital costs:	290,000
Contingency for equipment (10 %):	24,500
Incremental operating costs:	0
Technical assistance for SMEs:	30,000
Incremental operating cost:	Not requested
Total project costs:	344,500
Local ownership (%):	100
Export component (%):	0
Requested grant (US \$)	344,500
Cost-effectiveness (US \$/kg):	7.04
	Threshold: 9.90*
Implementing agency support costs (US \$):	24,115
Total cost of project to the Multilateral Fund (US \$):	368,615
Status of counterpart funding (Y/N):	Y
Project monitoring milestones included (Y/N):	Y

*Calculated for the umbrella project using weighted thresholds based on conversions to low-GWP technologies in all enterprises.

SECRETARIAT'S RECOMMENDATION

Individual consideration

PROJECT DESCRIPTION

1. On behalf of the Government of Morocco, UNIDO has submitted an umbrella project to phase out the use of HCFC-141b contained in imported pre-blended polyols in the manufacturing of polyurethane (PU) foam in three small and one medium-sized enterprises (SMEs)², at a cost of US \$484,609, plus agency support costs of US \$33,923, as originally submitted.

Background

2. At the 88th meeting, the Government of Morocco submitted stage II of the HCFC phase-out management plan (HPMP), which contained an umbrella project to completely phase out HCFC-141b contained in imported pre-blended polyols.³ During the review of the project, it was noted that the proposed cost for introducing cyclopentane technology had exceeded the cost threshold in decision 74/50 due to the flammability of cyclopentane and the safety-related costs involved. After extensive discussions, UNIDO requested to defer the project submission to allow additional time for consultation to consider a more cost-effective alternative technology for small enterprises. Subsequently, the Executive Committee decided to approve stage II of the HPMP for Morocco, and to allow submission of the foam umbrella project to completely phase out the HCFC-141b contained in imported pre-blended polyols in Morocco during the implementation of stage II of the HPMP, no later than the first meeting in 2024 (decision 88/52(d)).

Progress report of the first tranche of stage II of the HPMP

3. The first tranche of stage II was planned for implementation between 2021 and 2023. Since the approval of the first tranche in November 2021, the implementation has been focused on the development of a certification system for servicing technicians and companies in the refrigeration and air-conditioning (RAC) servicing sector. A stakeholder consultation workshop was held in June 2022 to discuss the content of the certification system, the targeted group, modalities for implementation, the institutions involved, and lessons learned from the experience of other countries, particularly in the European Union and Tunisia. The workshop involved the Moroccan Standardization Institute, the National Agency for Professional Training, the Moroccan Association of Refrigeration Professionals, and the Moroccan Agency for Energy Efficiency. A working group was established to develop and implement the certification system, including developing the institutional and legal framework; developing the code of practice and training modules; and providing tools and equipment for training and evaluation.

Status of disbursement

4. As of September 2022, of the US \$370,000, approved for the first tranche of stage II of the HPMP a total of US \$34,879 had been disbursed, accounting for 9 per cent of the funding approved. Implementation of the first tranche will continue to the end of 2023 as planned in stage II of the HPMP.

HCFC consumption in the foam sector in Morocco

5. In stage I, Morocco implemented investment projects to phase out the consumption of pure HCFC-141b in the foam and servicing sector, followed by a ban on the import of pure HCFC-141b from 1 January 2015 to sustain the phase-out in the foam manufacturing sector. The consumption of pure HCFC-141b has been zero since then. The use of HCFC-141b contained in imported pre-blended polyols has shown an increase from the starting point due to economic development. In 2021, the Government of Morocco reported a use of 104.3 mt (11.47 ODP tonnes) of HCFC-141b contained in the imported pre-blended polyols in the PU rigid foam sector, as shown in table 1.

² As per the letter of 29 July 2022 from the Ministry of Industry and Trade of Morocco to UNEP.

³ UNEP/OzL.Pro/ExCom/88/54

Table 1. Consumption of HCFC-141b contained in imported pre-blended polyols in Morocco*

Consumption	Starting point for aggregate reduction	2017	2018	2019	2020	2021	Average 2019–2021
Metric tonnes	71.82	117.31	98.40	104.30	104.30	104.30	104.30
ODP tonnes	7.90	12.90	10.82	11.47	11.47	11.47	11.47

*Country programme (CP) data.

Enterprise information

6. Five enterprises have been identified as eligible for funding, of which four are included in the proposal: CF Loudaya, RMS (two facilities in Casablanca and Tiznit respectively), INDISOL and Metaux Profilage Isolation (MPI). The other enterprise, First Metal, did not express interest in participating in the project. There are also other enterprises in Morocco consuming HCFC-141b pre-blended polyols, which were established after the cut-off date and therefore have not been included in the proposal.

7. All four enterprises are 100 per cent Moroccan owned and established before the cut-off date. The use of HCFC-141b pre-blended polyols in four enterprises and applications are presented in table 2.

Table 2. The use of HCFC-141b pre-blended polyols in enterprises

Enterprise	Application	HCFC-141b consumption (mt)			Average (2019-2021) (mt)
		2019	2020	2021	
CF Loudaya	Commercial refrigeration	1.58	1.58	1.58	1.58
RMS (Casablanca and Tiznit)		2.09	1.75	1.11	1.65
INDISOL	Sandwich panel	1.01	1.91	1.95	1.62
MPI		39.65	39.87	52.74	44.08
Total (mt)	n/a	44.33	45.11	57.38	48.93
Total (ODP tonnes)	n/a	4.88	4.96	6.31	5.38

Technology selection

8. Cyclopentane has been selected as the alternative technology for the conversion at MPI, due to the low incremental operating cost (IOC), and because the enterprise believes that competitive importers of sandwich panels only sell cyclopentane-based products. The enterprise plans to blend the polyols and cyclopentane in its own facility to avoid issues related to the import of cyclopentane pre-blended polyols. MPI will also co-finance part of the incremental capital costs (ICCs).

9. For the remaining three enterprises with low consumption, HFO-1336mzz or HFO-1233zd have been selected due to the low ICCs and better market availability of the pre-blended polyols from various systems houses in Europe and other markets.

Incremental costs

10. The ICCs for the conversions include equipment and safety measures for MPI to address the flammability of cyclopentane technology; the replacement and retrofitting of foaming machines at the three small enterprises; and technical assistance for engineering design, equipment installation, testing, trials, commission, and training at all four enterprises. The total ICCs were calculated at US \$583,367 for the umbrella project. Of this amount, US \$460,368 is requested from the Multilateral Fund, with the rest co-funded by the enterprises to cover part of the cost of the cyclopentane storage tank and the metering systems for additives at MPI; and replacement of the foaming machine and provision of the ventilation system at RMS, as shown in table 3.

Table 3. Incremental capital costs of the conversions in the PU foam umbrella project in Morocco

Items	Incremental capital costs (US \$)					
	MPI	CF Loudaya	INDISOL	RMS	Co-funded by enterprise	Requested from MLF
Equipment and safety system for conversion to cyclopentane at MPI						
Cyclopentane storage tank	100,000	0	0	0	40,000	60,000
Foam pre-mixing station	105,000	0	0	0	16,605	88,395
Retrofit of high-pressure pump	10,000	0	0	0	0	10,000
Retrofit of foam distribution control unit and provision of nucleation gas loading unit for pentane nucleation	75,000	0	0	0	0	75,000
Safety system including alarms, gas detectors, ventilation system, central control unit, grounding, lighting protection, antistatic floor, fire-fighting system for all areas	76,041	0	0	0	0	76,041
Safety audit, safety inspection and certification	15,000	0	0	0	0	15,000
Sub-total for MPI	381,041	0	0	0	56,605	324,436
HFO technology						
Replacement or retrofit of existing foaming machine	0	7,500	8,100	75,000	59,394	31,206
Retrofits of ventilation system	0	7,000	7,000	7,000	7,000	14,000
Sub-total for companies converted to HFO	0	14,500	15,100	82,000	66,394	45,206
Technical assistance for all companies						
Engineering design and ventilation drawings	9,000	4,500	4,500	4,500	0	22,500
Installation, test, trials, commissioning, and training	10,550	5,275	5,275	5,275	0	26,375
Sub-total technical assistance	19,550	9,775	9,775	9,775	0	48,875
Total ICCs	400,591	24,275	24,875	91,775	122,999	418,517
Sub-total requested ICCs	343,986	24,275	24,875	25,381	n/a	418,517
<i>Contingencies (10 per cent)</i>	34,399	2,427	2,487	2,538	n/a	41,851
Total requested ICCs	378,384*	26,702	27,363	27,919**	n/a	460,368

*The cost was US \$100,000 for storage tank including co-funds US \$40,000; US \$105,000 for pre-mixing station including co-funds US \$16,605.

** The cost for replacement of the foam machine was US \$75,000, including co-funding US \$59,394; the cost of US \$7,000 for retrofitting the ventilation system for RMS will all be provided by the enterprise.

11. The IOCs for converting to HFO technology have been calculated as US \$31,075 based on the price of US \$3.1/kg for HCFC-141b and US \$16.5/kg for HFO-1233zd. The IOCs requested were calculated based on US \$5/kg in line with decision 74/50, and result in IOCs of US \$24,241 for one year of operation.

12. The total incremental costs of the conversions in the PU foam sector amount to US \$484,609, at a cost-effectiveness of US \$9.90/kg as shown in table 4 below. The planned project duration is 24 months.

Table 4. Incremental costs of the conversion of the PU foam umbrella project in Morocco

Enterprise	HCFC-141b phase-out (mt)	ICCs (US \$)	IOCs (US \$)	Total cost (US \$)	Cost-efficiency (US \$)
CF Loudaya	1.58	26,702	7,887	34,589	21.92
RMS (Casablanca and Tiznit)	1.65	27,919	8,248	36,167	21.92
INDISOL	1.62	27,363	8,106	35,469	21.88
MPI	44.08	378,384	0*	378,384	8.58
Totals	48.93	460,368	24,241	484,609	9.90

* IOCs were not requested for introducing cyclopentane technology.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

13. The Secretariat reviewed the umbrella project in light of the policies and guidelines of the Executive Committee, including the criteria for funding stage II of the HPMP (decision 74/50), and the 2022 to 2024 business plan of the Multilateral Fund. The review is summarized as follows.

Starting point, reduction and remaining eligible consumption

14. The starting point for aggregate reduction of HCFC consumption for Morocco included the use of 71.82 mt (7.9 ODP tonnes) of HCFC-141b pre-blended polyols, which had neither been addressed in stage I nor stage II. Morocco reported 104.30 mt of HCFC-141b contained in imported pre-blended polyols in 2021, of which 57.38 mt (6.31 ODP tonnes) was identified as eligible consumption. Given that the umbrella project will phase out all uses of HCFC-141b contained in imported pre-blended polyols in the country, the total eligibility of 71.72 mt (7.9 ODP tonnes) of HCFC-141b pre-blended polyols will be deducted from the starting point after implementation of the umbrella project. The remaining eligible consumption for Morocco will be 303.45 mt (16.69 ODP tonnes) of HCFC-22 in the servicing sector to be addressed in future stages, as shown in table 5.

Table 5: Starting point, reductions and remaining eligible consumption in Morocco

Substance	Starting point		Reduction in stage I		Reduction in stage II		Remaining eligible consumption	
	mt	ODP tonnes	mt	ODP tonnes	mt	ODP tonnes	mt	ODP tonnes
HCFC-22	834.18	45.88	373.64	20.55	157.09	8.64	303.45	16.69
HCFC-141b pure	127.36	14.01	127.36	14.01	0	0	0	0
HCFC-141b in pre-blended polyols	71.82	7.9	0	0	71.82	7.9	0	0
Total	1033.36	67.79	501	34.56	228.91	16.54	303.45	16.69

Phase-out strategy

15. The Secretariat recalled that stage I had converted the enterprise Manar to cyclopentane and enquired about whether Manar could supply cyclopentane pre-blended polyols to other enterprises in Morocco. UNIDO reported that Manar had expressed to the NOU that supplying cyclopentane pre-blended polyols to other enterprises in Morocco does not match its business model. Given the above, the Secretariat reviewed the proposal for MPI based on conversion of the full foam manufacturing process.

16. UNIDO confirmed that the umbrella project submission includes all the remaining eligible enterprises that are willing to participate in the project in the foam sector, and there will be no further

requests for funding from the Multilateral Fund for any enterprise in the foam sector, in line with decision 19/32.

Regulatory measures to support sustainable HCFC phase-out

17. In addition to the 48.93 mt of HCFC-141b contained in imported pre-blended polyols used by the four eligible enterprises covered by the umbrella project, there are also other enterprises consuming this substance which are either not eligible for funding or not interested in participating in the project. The Secretariat noted that the umbrella project aims to completely phase out HCFC-141b contained in imported pre-blended polyols in the PU foam sector and discussed the regulatory measures to ensure the sustainability of the conversion in line with decisions 63/15(d) and 79/25.⁴ To address the remaining use of HCFC-141b pre-blended polyols not phased out through the conversion projects, the Government committed to implementing a ban on the import and use of HCFC-141b in pre-blended polyols after project completion, no later than 1 January 2025, consistent with decisions 63/15(d) and 79/25. The Secretariat appreciates the efforts and commitment by the Government to address the use of HCFC-141b contained in pre-blended polyols in remaining enterprises not covered by the umbrella project. The transition to HCFC alternative technologies in these enterprises would be self-funded. The Government will undertake awareness raising activities, provide technical assistance, and develop and enforce regulatory measures to ensure the sustainable phase-out of HCFC-141b pre-blended polyols in the whole sector.

Issues related to technology selection

18. Regarding the technology selection in the three small enterprises, UNIDO explained that methyl formate was not selected because large systems houses do not use this chemical due to the issues related to flammability, corrosiveness, foam density and greater deterioration rates. The Secretariat noted that the IOCs for the conversions of the three enterprises were high (US \$8.82/kg for HFO-1336mzz and US \$6.42 for HFO-1233zd) and enquired about the competitiveness of these small enterprises using HFO technology, as well as the risk of not achieving sustainability of the conversions. Subsequently, it was agreed that the alternative technology for the conversion of the three small enterprises would not be decided at this moment, and that the project would provide technical assistance to the three enterprises to assist them in converting to low-GWP technologies when phasing out HCFC-141b pre-blended polyols.

Issues related to incremental costs

19. The incremental costs of the project for MPI were adjusted in line with the guidelines of the Executive Committee. The costs of retrofitting the high-pressure metering pump unit (US \$10,000), and the cost of retrofitting the foam distribution control unit and providing the nucleation gas loading unit (US \$75,000) were removed from the project, because that equipment had been purchased after the cut-off date and retrofitting the foam distribution control system was considered a cost that would lead to a technical upgrade. The co-funding for the pre-mixing station was removed; the costs for tests, trials and commissioning were adjusted to US \$9,000; and the contingency amount was applied only to equipment costs. After adjustment, the total cost of the conversion at MPI was calculated at US \$314,500 with a cost-effectiveness of US \$7.13/kg.

20. The costs for conversion of the three small enterprises to HFO technology (US \$45,206) were removed; and the costs of technical assistance (US \$48,875) for the three enterprises were reduced to US \$30,000 to provide consultancy on alternative technologies to assist the three enterprises in transitioning to non-ODS, low-GWP technologies when phasing out HCFC-141b pre-blended polyols.

⁴ The Executive Committee decided to request bilateral and implementing agencies together with Article 5 countries, when preparing requests for funding for complete HCFC phase-out in the manufacturing sector, to include the necessary regulatory measures to ensure the sustainability of complete HCFC phase-out in that specific sector, such as policies banning the import and/or the use of HCFCs.

21. On the basis of the above, the funds requested by the enterprises were adjusted accordingly, as shown in table 6 below. The total agreed cost of the project amounts to US \$344,500 to phase out 48.93 mt (5.38 ODP tonnes) of HCFC-141b pre-blended polyols, with a cost-effectiveness of US \$7.04/kg.

Table 6. Agreed incremental costs for the conversion of PU foam enterprises in Morocco

Enterprise	HCFC-141b phase-out (mt)	ICC (US \$)	IOC (US \$)	Technical assistance (US \$)	Total cost (US \$)	Cost-efficiency (US \$)
MPI	44.08	314,500	0	0	314,500	7.13
CF Loudaya	1.58	0	0	30,000	30,000	6.19
RMS Casablanca and Tiznit	1.65	0	0			
INDISOL	1.62	0	0			
Totals	48.93	314,500	0		344,500	7.04

Revision of the Agreement

22. The Agreement between the Government of Morocco and the Executive Committee for stage II of its HPMP has been revised to reflect the changes in Appendix 2-A (the funds approved and the remaining eligible consumption), paragraph 1 of Appendix 7-A (adjusting the reductions in funding for failure to comply), and a paragraph 17 has been added to indicate that the revised Agreement for stage II supersedes the one reached at the 88th meeting, as contained in Annex I to the present document. The full revised Agreement will be appended to the final report of the 91st meeting.

Gender policy implementation⁵

23. The umbrella conversion project will be implemented as part of stage II of the HPMP, which has taken into consideration the Multilateral Fund's gender mainstreaming policy and relevant indicators have been incorporated into the stage II HPMP activities.

Impact on the climate

24. The climate impact of the conversion from HCFC-141b to cyclopentane at MPI would avoid greenhouse gas emissions into the atmosphere of 31,919 CO₂-eq tonnes per year. The climate impact of the phase-out by the three small enterprises is unknown, as it will depend on the technologies to be selected during implementation; it is expected that the technical assistance provided will guide the enterprises to transition to low-GWP alternatives, resulting in a climate benefit.

RECOMMENDATION

25. The Executive Committee may wish to consider:

- (a) Approving the project proposal for the phase-out of HCFC-141b contained in imported pre-blended polyols in the foam sector in Morocco, in the amount of US \$344,500, plus agency support costs of US \$24,115 for UNIDO;
- (b) Deducting 7.9 ODP tonnes of HCFCs from the remaining HCFC consumption eligible for funding;

⁵ In line with decision 84/92(d), decision 90/48(c) encouraged bilateral and implementing agencies to continue ensuring that the operational gender mainstreaming policy was applied to all projects, taking into consideration the specific activities presented in table 2 of document UNEP/OzL.Pro/ExCom/90/37.

- (c) Noting:
- (i) The commitment of the Government of Morocco to ban the import and use of HCFC-141b contained in pre-blended polyols after the completion of the umbrella project, no later than 1 January 2025; and
 - (ii) That the Fund Secretariat has revised the Agreement between the Government of Morocco and the Executive Committee for stage II of its HCFC phase-out management plan (HPMP), as contained in Annex I to the present document, specifically: Appendix 2-A to reflect the approval of the foam project referred to in subparagraph (a) above; paragraph 1 of Appendix 7-A to adjust the reductions in funding for failure to comply; and paragraph 17, added to indicate that the revised Agreement for stage II supersedes that reached at the 88th meeting.

Annex I

TEXT TO BE INCLUDED IN THE REVISED AGREEMENT BETWEEN THE GOVERNMENT OF MOROCCO AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROCHLOROFLUOROCARBONS IN ACCORDANCE WITH STAGE II OF THE HCFC PHASE-OUT MANAGEMENT PLAN

(Relevant changes are in bold font for ease of reference)

17. This revised Agreement supersedes the Agreement reached between the Government of Morocco and the Executive Committee at the 88th meeting of the Executive Committee.

APPENDIX 2-A: THE TARGETS, AND FUNDING

Row	Particulars	2021	2022	2023	2024	2025	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	33.38	33.38	33.38	33.38	16.69	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	33.38	25.33	25.33	25.33	16.69	n/a
2.1	Lead IA (UNIDO) agreed funding (US \$)	370,000	344,500	305,000		79,032	1,098,532
2.2	Support costs for Lead IA (US \$)	25,900	24,115	21,350		5,532	76,897
3.1	Total agreed funding (US \$)	370,000	344,500	305,000	0	79,032	1,098,532
3.2	Total support costs (US \$)	25,900	24,115	21,350	0	5,532	76,897
3.3	Total agreed costs (US \$)	395,900	368,615	326,350	0	84,564	1,175,429
4.1.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)						8.64
4.1.2	Phase-out of HCFC-22 to be achieved in the previous stage (ODP tonnes)						20.55**
4.1.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)						16.69
4.2.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)						0.00
4.2.2	Phase-out of HCFC-141b to be achieved in the previous stage (ODP tonnes)						14.01
4.2.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)						0.00
4.3.1	Total phase-out of HCFC-141b contained in imported pre-blended polyols agreed to be achieved under this Agreement (ODP tonnes)						7.90
4.3.2	Phase-out of HCFC-141b contained in imported pre-blended polyols to be achieved in the previous stage (ODP tonnes)						0.00
4.3.3	Remaining eligible consumption of HCFC-141b contained in imported pre-blended polyols (ODP tonnes)						0.00

*Date of completion of stage I as per stage I Agreement: 31 December 2021.

**Stage I was originally planned for 2017. At the 83rd meeting, stage I was extended from 2017 to 2020. Additional 17.98 ODP tonnes of phase-out was achieved after stage I was extended.

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 \$133 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, on the understanding that the maximum funding reduction would not exceed the funding level of the tranche being requested. Additional measures might be considered in cases where non-compliance extends for two consecutive years.