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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eighty-eighth Meeting
Montreal, 15-19 November 2021¹

PROJECT PROPOSAL: NIGERIA

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

Phase-out

- HCFC phase-out management plan (stage II, second tranche) UNDP, UNIDO, and
the Government of Italy

¹ Online meetings and an intersessional approval process will be held in November and December 2021 due to coronavirus disease (COVID-19).

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Nigeria

(I) PROJECT TITLE	AGENCY	MEETING APPROVED	CONTROL MEASURE
HCFC phase-out plan (Stage II)	UNDP (lead), UNIDO, Government of Italy	81 st	51.35% by 2023

(II) LATEST ARTICLE 7 DATA (Annex C Group I)	Year: 2020	166.69 (ODP tonnes)
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(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)								Year: 2020	
Chemical	Aerosol	Foam	Fire-fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-22				28.72	103.62				132.34
HCFC-141b		10.24		24.11					34.35
HCFC-141b in imported pre-blended polyols		18.99							18.99

(IV) CONSUMPTION DATA (ODP tonnes)			
2009–2010 baseline:	344.9	Starting point for sustained aggregate reductions:	398.2
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	230.4	Remaining:	167.8

(V) BUSINESS PLAN		2021	2022	2023	Total
UNDP	ODS phase-out (ODP tonnes)	22.09	41.02	25.41	88.52
	Funding (US \$)	1,498,000	2,782,000	1,723,205	6,003,205
UNIDO	ODS phase-out (ODP tonnes)	0.0	0.0	0.0	0.0
	Funding (US \$)	0	0	0	0
Italy	ODS phase-out (ODP tonnes)	3.70	0.0	0.0	3.70
	Funding (US \$)	268,840	0	0	268,840

(VI) PROJECT DATA			2018	2019	2020	2021	2022	2023	Total
Montreal Protocol consumption limit			310.41	310.41	224.19	224.19	224.19	224.19	n/a
Maximum allowable consumption (ODP tonnes)			310.41	310.41	224.19	224.19	224.19	167.81	n/a
Agreed funding (US \$)	UNDP	Project costs	2,600,000	0	1,400,000	2,600,000	0	1,610,472	8,210,472
		Support costs	182,000	0	98,000	182,000	0	112,733	574,733
	UNIDO	Project costs	176,837	0	0	0	0	0	176,837
		Support costs	15,915	0	0	0	0	0	15,915
	Government of Italy	Project costs	269,025	0	234,400	0	0	0	503,425
		Support costs	34,937	0	30,440	0	0	0	65,377
Funds approved by ExCom (US \$)		Project costs	3,045,862	0	0	0	0	0	3,045,862
		Support costs	232,852	0	0	0	0	0	232,852
Total funds requested for approval at this meeting (US \$)		Project costs				*1,634,400			1,634,400
		Support costs				128,472			128,472

* This tranche was to be submitted in 2020

Secretariat's recommendation:	Blanket approval
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PROJECT DESCRIPTION

1. On behalf of the Government of Nigeria, UNDP as the lead implementing agency has submitted a request for funding for the second tranche of stage II of the HCFC phase-out management plan (HPMP), at a total cost of US \$1,762,872, consisting of US \$1,400,000, plus agency support costs of US \$98,000 for UNDP, and US \$234,400, plus agency support costs of US \$30,440 for the Government of Italy.² The submission includes a progress report on the implementation of the first tranche, the verification report on HCFC consumption for 2017 to 2020 and the tranche implementation plan for 2021 to 2022.

Report on HCFC consumption

2. The Government of Nigeria reported a consumption of 166.69 ODP tonnes of HCFC in 2020, which is 52 per cent below the HCFC baseline for compliance. Nigeria also used 18.99 ODP tonnes of HCFC-141b contained in imported pre-blended polyols, which is 64 per cent below the 2007-2009 average use from 2007 to 2009. The 2016-2020 HCFC consumption is shown in Table 1.

Table 1. HCFC consumption in Nigeria (2016-2020 Article 7 data)

HCFC	2016	2017	2018	2019	2020	Baseline
Metric tonnes (mt)						
HCFC-22	3,554.30	3,262.24	3,194.60	3,054.40	2,406.14	4,518.77
HCFC-123	0.0	0.0	45.70	0.0	0.0	0.00
HCFC-124	200.90	338.46	251.36	305.20	0.0	0.00
HCFC-141b	311.37	717.69	901.00	585.80	312.30	875.90
HCFC-142b	8.90	0.0	0.0	0.0	0.0	0.00
Subtotal (mt)	4,075.47	4,318.39	4,392.66	3,945.40	2,718.44	5,394.67
HCFC-141b in imported pre-blended polyols*	523.00	229.66	288.27	275.70	172.60	**484.43
ODP tonnes						
HCFC-22	195.49	179.42	175.70	167.99	132.34	248.50
HCFC-123	0.0	0.0	0.91	0.0	0.0	0.00
HCFC-124	4.42	7.45	5.53	6.71	0.0	0.00
HCFC-141b	34.25	78.95	99.11	64.44	34.35	96.35
HCFC-142b	0.58	0.00	0.0	0.0	0.0	0.00
(Sub-total / Total) (ODP tonnes)	234.74	265.82	281.25	239.14	166.69	344.88
HCFC-141b in imported pre-blended polyols*	57.53	25.26	31.71	30.33	18.99	**53.29

* Country programme (CP) data.

**Average use between 2007 and 2009.

3. HCFC consumption in the servicing sector has been steadily decreasing, attributed to the implementation of the phase-out activities in the HPMP and the shift to non-HCFC alternatives in the market. Nigeria consumes HCFC-141b pure and contained in imported pre-blended polyols, both in the polyurethane (PU) foam sector. After recovering from an economic crisis caused by low oil prices and currency exchange issues experienced up to 2016, the consumption of HCFC-141b pure increased and peaked in 2018 then gradually decreased in 2019 and 2020 as several enterprises converted in stage I stopped HCFC-141b consumption in 2019. The continued decrease in consumption of HCFC-141b contained in imported pre-blended polyols was due to the awareness-raising activities and the phase-out project implemented under the HPMP.

4. HCFC-142b, HCFC-123 and HCFC-124 were imported from 2016 to 2019 as components of refrigerant blends or as pure refrigerants for servicing chillers. In 2020, these substances were not imported as the Government has established the ban on the import of these substances through an administrative

² As per the letter of 3 September 2021 from the Federal Ministry of Environment of Nigeria to UNDP.

procedure.

CP implementation report

5. The Government of Nigeria reported HCFC sector consumption data under the 2020 CP implementation report consistent with the data reported under Article 7 of the Montreal Protocol.

Verification report

6. The verification report confirmed that the Government is implementing a licensing and quota system for HCFC imports and exports and that the total consumption of HCFCs reported under Article 7 of the Montreal Protocol for 2017 to 2020 was correct (as shown in Table 1 above). The verification concluded that Nigeria remains in compliance with the control targets in the Montreal Protocol and in its Agreement with the Executive Committee.

Legal framework

7. The Government of Nigeria has established a legal framework for the management of ODS, including HCFCs. The National Environmental Regulation (2009) sets out guidelines for the manufacture, import, sale and use of ODS and a protocol for a licensing and quota system. A ban on import of HCFC-123 and HCFC-124 and HCFC-142b has been established through an administrative procedure in 2020 and will be included in the updated ozone layer protection and HFC phase-down regulation, expected to be adopted by the end of 2021.

8. On 20 December 2018, the Government of Nigeria ratified the Kigali Amendment and HFCs have been added to the licensing system.

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

Phase-out of HCFC-141b in the polyurethane (PU) foam manufacturing sector

9. The conversion of the Slavit Group to replace 96 mt of HCFC-141b by cyclopentane in the manufacturing of insulation foam for cold storage rooms and panels for building construction is in progress. A Memorandum of Agreement has been signed between Slavit and the Government; equipment has been ordered; a cyclopentane tank was delivered, and the remaining equipment has been shipped; the equipment is expected to be installed by the first quarter 2022, and testing and trials will be completed by 30 June 2022.

10. The group project for the conversion of 35 downstream foam enterprises to replace 301.32 mt of HCFC-141b with methyl formate (MF) in spray foam, insulation panel and thermoware applications. The implementation of the group project depends on the operations of the systems house; although the proposal for the blending of foam systems with alternatives took longer time than originally expected, it has been prepared to encourage potential participants. It is expected that the conversion will be completed by the end of 2022.

11. The conversion of four enterprises in commercial refrigeration foam to replace 30.5 mt of HCFC-141b with MF or hydrofluoroolefins (HFO) is nearly complete: two training workshops were conducted for 137 participants (including 13 women) by technology providers to demonstrate equipment use and alternative technologies; equipment specifications were developed and adjusted to each beneficiary's requirements; four high-pressure foaming machines were procured from and delivered to beneficiaries in early 2021. Subsequently, equipment was installed and training was provided to enterprises. Three beneficiaries started a trial run with HFO; it is expected that all enterprises will be converted by April 2022.

12. All foam enterprises that were converted in stage I have stopped using HCFC-141b and have started production with alternatives. The Vitapur's (systems house) downstream users have signed a commitment to stop using HCFC-141b.

Activities in refrigeration servicing sector

13. The following activities were implemented in the servicing sector under the first tranche:

- (a) A draft national code of practices for using ammonia (NH₃), carbon dioxide (CO₂) and hydrocarbons (HC) in refrigeration and air-conditioning (AC) systems was developed, with 500 copies of the code disseminated to stakeholders, including technicians and associations; and an electronic ODS and HFC registry and data reporting tool was developed to strengthen the enforcement of the licensing and quota system;
- (b) A training manual on HCFC import control and ODS phase-out was developed with 500 copies produced and distributed to stakeholders; and 30 importers and enforcement officers were trained in HCFC control using the training manual;
- (c) A training programme was developed by an international consultant; 10 private training centres were selected to be upgraded to technician training centres through the provision of equipment; and a standard list of training equipment was drafted;
- (d) A list of equipment for a medium-sized refrigerant reclaim centre and a model of operation of the refrigerant reclaim centres were developed as part of the national strategy for HCFC phase-out; and
- (e) A feasibility study on demonstration of R-290 in air-conditioners and CO₂ and NH₃ technologies in larger installations was undertaken by a consultant and initial information/data collection and technical analysis were completed; it is planned to install R-290 air-conditioning units in Government offices and training institutes (second tranche) and convert one small-to-medium sized supermarket to CO₂ and two HCFC-22- based installations (150 – 600 KW) to NH₃ technology (third tranche).

Project management and coordination

14. Project coordination and monitoring is conducted by the project and management unit (PMU) that is established within the National Ozone Unit (NOU). The total expenditure amounted to US \$115,619 for UNDP and US \$17,376 for UNIDO, with the following breakdown: staff and consultants US \$62,024 (UNDP) and US \$7,091 (UNIDO); travel US \$23,891 (UNDP) and US \$5,000 (UNIDO); meeting and workshops US \$25,714 (UNDP) and US \$5,000 (UNIDO); other miscellaneous US \$3,990 (UNDP) and US \$285 (UNIDO).

Level of fund disbursement

15. As of September 2021, of the US \$3,045,862 approved so far (US \$2,600,000 for UNDP, US \$176,837 for UNIDO and US \$269,025 for the Government of Italy), US \$867,942 (28 per cent) had been disbursed (US \$693,728 for UNDP and US \$174,214 for UNIDO). The balance of US \$2,177,920 will be disbursed in 2021-2022.

Implementation plan for the second tranche of the HPMP

16. The following activities will be implemented between November 2021 and December 2022:

- (a) Completing the conversion of the foam project at Slaviv Group including: delivery of the remaining equipment by the end of 2021, equipment installation, test and trial by 30 June 2022; and completing the conversion of the group project of 35 companies, including procurement of equipment, developing formulation, trials, optimization and field applications of formulations, awareness workshops for small enterprises by 31 December 2022; and introducing a ban on the import and use of HCFC-141b by 1 January 2023 (UNDP: US \$347,593) (Italy: US \$199,887);
- (b) Training of 160 customs and enforcement officers, and 150 importers in data recording, harmonized system (HS) codes, data reporting, refrigerant identification; procurement of 25 refrigerant identifiers (UNDP) (US \$75,000);
- (c) Developing the registry of refrigeration equipment installations and the registry of certified technicians to promote ODS integrated life-cycle management by controlling ODS import, sale, distribution, transport, storage, and recycling; disseminating 1,000 copies of the new codes of practice for servicing equipment with alternative refrigerants; visit to an Article 5 country to learn about the licensing and certification system for technicians; (UNDP) (US \$87,120);
- (d) Strengthening the RAC training and certification programme through updating the national training curricula for RAC technicians and distributing 5,000 copies to training institutions; establishing two master training centres and upgrading the capacity of five training centres³ through provision of training equipment (e.g., refrigerant charging machines, refrigerant identifiers, leak detector, vacuum pumps, recovery units and servicing tools); continuing development of the certification system for technicians including filling the registry with data, developing website, testing modules, and training materials and undertaking a pilot certification of 30 technicians; training of 50 dealers, consultants, designers and installers on the areas covered by the certification programme; training of 40 trainers and 10 certification evaluators on the certification system; and continued support to industrial associations (UNDP: US \$270,487) (Italy: US \$34,513);
- (e) Refrigerant recovery and reclamation programme: completing the feasibility study included under the first tranche; developing guidelines for reclamation facilities; procurement of laboratory equipment for testing refrigerant quality (e.g., gas chromatograph, scales, glassware) and tools for recovery of refrigerants for 70 technicians; and awareness-raising campaign on the negative impacts of using counterfeit refrigerants (UNDP) (US \$445,200);
- (f) Demonstration of low-global-warming-potential (GWP) technologies: procurement of 70 R-290-based air-conditioners, of which 40 units will be installed at Government buildings for the demonstration of R-290 technology, and the remaining 30 will be used in technician training centres (UNDP) (US \$99,600); and
- (g) PMU (UNDP) (US \$75,000): funds will be used for the operation of the unit with the following cost breakdown: US \$67,000 for staff and consultant; US \$7,000 for travel; and US \$1,000 for other costs.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

³ The difference between the master training centres and regular training centre is the geographic areas to be covered. More equipment is provided to master centres than to regular centres.

Progress report on the implementation of the first tranche of the HPMP

Legal framework

17. The Government of Nigeria has already issued HCFC import quotas for 2021 at 214.50 ODP tonnes, which is lower than the Montreal Protocol control targets.

Technical issues

18. The Secretariat noted that the second tranche was originally planned for the 86th meeting. While some progress was made in the conversion of foam enterprises, most activities in the servicing sector were not completed. UNDP explained that the delay was due to additional time taken to develop and sign the project documents and hold consultations with stakeholders; since the signature of the documents in November 2020, implementation of activities is accelerating and it is expected that stage II will be completed as planned.

19. When stage II was approved, the alternative technology for insulation foam selected by four enterprises manufacturing commercial refrigeration equipment was MF as the most cost-effective technology for cost calculation. Three companies conducted trials using HFO as a foam blowing agent, notwithstanding the much higher price of HFO (approximately US \$23/kg as compared to US \$5.80/kg for MF). Both alternatives are low-GWP technologies and have similar climate impact. All four enterprises have committed to stopping the use of HCFC-141b after completion of the project to ensure sustainability of the phase-out.

20. Stage II of the HPMP approved at the 81st meeting included demonstrations of low-GWP technologies (R-290, CO₂ and NH₃). In the first tranche, a feasibility study was conducted, and in the second tranche a purchase of 100 R-290-based air conditioners is planned. In accordance with decision 84/84(b), certain circumstances must prevail before demonstration and pilot projects to end-users could be implemented, including the effectively enforced import controls on HCFC and HCFC-based equipment. Currently Nigeria does not have such established controls on the manufacturing and import of HCFC-based equipment. In addition, the demonstration of R-290 technology through the installation of 100 air conditioners in a public building with no co-funding does not appear to be a cost-effective way to adopt the technology and promote market transformation.

21. While noting that the project was approved before the adoption of decision 84/84(b), the Secretariat enquired whether the plan could be adjusted to take it into consideration. UNDP explained that this was an important component for the Government of Nigeria because it intended to start the introduction of equipment based on low-GWP alternatives in Government buildings; also the Government had been supporting the local production of R-290 as a refrigerant. However, after further consultations with the Government it was agreed that 80 R-290-based air-conditioners would be provided to training centres to support the ongoing training of technicians, and only 20 units would be installed in the building of the Federal Ministry of the Environment. The Ministry will co-fund the costs of delivery, storage and installation of these AC units, measure performance, and grant access to the site to personnel from the training centres and their students to inspect the equipment for training purposes. The Government further plans to upscale the HC refrigerant production plant for commercial production to increase its affordability and accessibility. Moreover, importers will be encouraged to increase the importation of HC refrigerant to make it more accessible to technicians. In order to ensure import control of HCFC-based equipment that would help the adoption of equipment based on low-GWP alternatives, the Government was considering establishing the ban on HCFC-based equipment by 1 January 2026.

22. With regard to the conversion of a supermarket refrigeration system to CO₂ and the conversion of two HCFC installations to NH₃ technology, the Government confirmed that the demonstration of these

technologies would be combined with the ongoing training programme for engineers and RAC technicians to improve training in conversion, installation, servicing and maintenance of large refrigeration installations, as one of the criteria for selecting the beneficiaries was their willingness to share with the NOU their data on energy use, performance, and issues related to equipment servicing, and to allow access to the installation sites for subsequent training on the demonstrated technology. In line with decision 84/84(d), upon completion of this activity, data collected during the implementation of this demonstration will be submitted to the Secretariat, which will be used for developing the factsheets.

Gender policy implementation⁴

23. To encourage gender equality, the NOU and UNDP conducted a gender analysis in November 2020 and prepared an action plan under the HPMP. A desk study of relevant documents was conducted to collect information on the current status in order to address gender equality issues and identify main challenges and opportunities for further improvement. Based on discussions with beneficiaries and stakeholders, an action plan was developed to facilitate the implementation of activities enhancing gender equality and women's empowerment under the HPMP projects in Nigeria.

24. The NOU has established a gender desk for coordinating all issues related to gender mainstreaming in Montreal Protocol projects and is collaborating with female consultants to increase the participation of women in activities implemented under the HPMP.

Sustainability of the HCFC phase-out

25. The HPMP in Nigeria has prioritized sustainable reduction of HCFC-141b in the manufacturing sector. The Government has planned a ban on the import and use of HCFC-141b pure and contained in imported pre-blended polyols by 1 January 2023. Updating the training curriculum and providing tools and equipment to support training institutions will sustain technician training and result in continuous capacity improvement in the servicing sector. The infrastructure being established for the recovery and reclamation of HCFC-22 will also contribute to reduce, in a sustained manner, consumption of new HCFC-22 for servicing purposes.

Conclusion

26. The Government of Nigeria is implementing a licensing and quota system, and HCFC consumption in 2020 was lower than the targets set in the Montreal Protocol and in the Agreement with the Executive Committee. A training manual on customs training has been developed and customs officers have been trained. Nigeria ratified the Kigali Amendment on 20 December 2020 and has included HFCs in the licensing system. The foam conversion projects are progressing and are expected to be completed by the end of 2022 resulting in the phase-out of 506.6 mt of HCFC-141b pure and in imported polyols, with the support of a ban on the import and use of HCFC-141b to come into effect by 1 January 2023. The groundwork for activities in the servicing sector have been completed and implementation of the activities will accelerate. The disbursement of the first tranche has reached 28 per cent.

RECOMMENDATION

27. The Fund Secretariat recommends that the Executive Committee takes note of the progress report on the implementation of the first tranche of stage II of the HCFC phase out management plan (HPMP) for Nigeria.

⁴ Decision 84/92(d) requested bilateral and implementing agencies to apply the operational policy on gender mainstreaming throughout the project cycle.

28. The Fund Secretariat further recommends blanket approval of the second tranche of stage II of the HPMP for Nigeria, and the corresponding 2021-2023 tranche implementation plan, at the funding levels shown in the table below, on the understanding that information on the implementation of the end-user demonstration/incentive programme would be included in the progress reports submitted when requesting future tranches of stage II of the HPMP:

	Project title	Project funding (US \$)	Support cost (US \$)	Implementing agency
(a)	HCFC phase-out management plan (stage II, second tranche)	1,400,000	98,000	UNDP
(b)	HCFC phase-out management plan (stage II tranche)	234,400	30,440	Italy