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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Ninety-seventh Meeting
Montreal, 1-5 December 2025
Item 9(d) of the provisional agenda¹

PROJECT PROPOSAL: SIERRA LEONE

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

Energy efficiency

- | | | |
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| <ul style="list-style-type: none">• Pilot project to maintain and/or improve the energy efficiency of replacement technologies and equipment in the context of HFC phase-down (non-investment activities): Demonstration project for the use of R-290 as refrigerant in commercial refrigeration | Government of the
United Kingdom of
Great Britain and
Northern Ireland | Individual
consideration |
|--|---|-----------------------------|

¹ UNEP/OzL.Pro/ExCom/97/1

Pre-session documents of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol are without prejudice to any decision that the Executive Committee might take following issuance of the document.

PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECT**Sierra Leone****PROJECT TITLE****BILATERAL/IMPLEMENTING AGENCY**

Pilot project to maintain and/or improve the energy efficiency of replacement technologies and equipment in the context of HFC phase-down (non-investment activities): Demonstration project for the use of R-290 as refrigerant in commercial refrigeration	Government of the United Kingdom of Great Britain and Northern Ireland
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PROJECT OBJECTIVE

This pilot project aims to enhance energy efficiency in the commercial refrigeration sector by demonstrating the use of R-290-based equipment in a supermarket in Sierra Leone. The project seeks to demonstrate the potential advantages of this technology in terms of energy consumption reduction and refrigerant performance, and it aligns with the long-term Kigali HFC phase-down implementation plan strategy of facilitating the adoption of energy-efficient low-global-warming-potential alternatives in commercial refrigeration applications.

NATIONAL COORDINATING AGENCY	National Ozone Unit, Environment Protection Agency of Sierra Leone
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LATEST ARTICLE 7 DATA (Annex F)	Year: 2024	129.65 metric tonnes (mt)	271,158 CO ₂ -eq tonnes
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Particular	Non-investment activities
HFC used by the servicing sector (2024 country programme data)	132.95 mt 281,307 CO ₂ -eq tonnes
Project duration (months):	24
Initial amount requested (US \$):	265,836
Final project costs (US \$):	289,336
Requested grant (US \$):	256,139
Implementing agency support cost (US \$):	33,298
Total cost of project to Multilateral Fund (US \$):	289,437
Co-financing (US \$):	33,197
Energy-efficiency savings (kWh/year):	95,058
Status of counterpart funding (Y/N):	Y
Project monitoring milestones included (Y/N):	Y
Minimum energy performance standards (MEPS) available for the relevant sector (Y/N):	N*

* MEPS are under development for domestic refrigerators and residential air-conditioning equipment

SECRETARIAT'S RECOMMENDATION	Individual consideration
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PROJECT DESCRIPTION

Background

1. On behalf of the Government of Sierra Leone, the Government of the United Kingdom of Great Britain and Northern Ireland² has submitted, in line with decision 91/65, a request for a pilot project to enhance the energy efficiency of replacement technologies and equipment in the context of HFC phase-down (non-investment activities), in the amount of US \$265,836, plus agency support costs of US \$34,559, as originally submitted.³

Status of implementation of energy efficiency-related activities funded by the Multilateral Fund

2. Additional activities for maintaining energy efficiency in refrigeration servicing sector under the HCFC phase-out management plan (decision 89/6) approved at the 93rd meeting⁴ included developing minimum energy performance standards (MEPS) for domestic refrigerators and residential air conditioners through adapting ECOWAS⁵ regional MEPS for refrigeration and air-conditioning (RAC) appliances to national needs, building enforcement capacity of customs officers, raising awareness of stakeholders on MEPS and energy efficiency, and updating RAC technician codes and development of training manuals to reflect energy efficiency standards.

Energy-efficiency pilot project

3. Sierra Leone ratified the Kigali Amendment on 15 June 2020, with HFC import quota systems established as of April 2024. Under stage I of the Kigali HFC implementation plan (KIP) approved at the 94th meeting,⁶ the country has committed to reducing HFC consumption by 10 per cent by 2029.

Policy, regulatory and institutional framework

4. The national ozone unit (NOU), established under the Environmental Protection Agency (EPA) of the Ministry of the Environment and Climate Change, coordinates and monitors activities related to the phase-out of substances controlled by the Montreal Protocol. The NOU, and relevant agencies under the Ministry of Energy, have strong collaboration as being part of the Montreal Protocol National Steering Committee, the central decision-making body for projects and activities supported by the Multilateral Fund (MLF). Additionally, the two authorities are working closely on energy efficiency initiatives related to the RAC sector, including the development of MEPS. The Sierra Leone Standard Bureau is responsible for development of MEPS. However, the Ministry of Energy (Energy Efficiency Department), the Regulator (Sierra Leone Electricity and Water Regulatory Commission), EPA and industry representatives are part of the standard committee that is approving the MEPS.

HFC consumption and sector background

5. The HFC consumption baseline for Sierra Leone has been established at the level of 350,905 CO₂-equivalent (CO₂-eq) tonnes. Table 1 presents HFC consumption in Sierra Leone.

² The proposed project is to be supported through the bilateral assistance of the Government of the United Kingdom and implemented by the Government of Germany.

³ As per the letter of 22 August 2025 from the Environment Protection Agency of Sierra Leone to the Secretariat.

⁴ Decision 93/36

⁵ Economic Community of West African States

⁶ Decision 94/52

Table 1. Consumption of HFCs in Sierra Leone (2020–2024 Article 7 data)

HFC consumption	2020	2021	2022	2023	2024
mt	115.99	136.86	172.83	143.51	129.65
CO ₂ -eq tonnes	250,376	308,252	386,912	298,480	271,158

6. Sierra Leone only imports HFCs for use in the RAC servicing sector. As reported in the KIP, in 2022, commercial refrigeration subsector was the highest HFC consuming subsector in CO₂-eq tonnes (119,952 CO₂-eq tonnes) of HFC consumption, representing 31 per cent in CO₂-eq tonnes of the total HFC consumption.

7. Sierra Leone's supermarket sector is growing steadily, driven by rapid urbanization in major cities and supported by the rise of a middle-class consumer base seeking more organized retail experiences. Currently an estimated 39 supermarkets (medium and large) exist in the country which accounts for an increase of approximately 8.33 per cent from 2023. The sector comprises of a mix of individual stores and numerous small to medium-sized supermarkets, alongside a few larger chains. Refrigeration systems in these supermarkets typically consist of plug-in units with cooling capacities ranging from 40 kW to 60 kW and the commonly used refrigerants in the systems are HFCs, specifically R-404A and HFC-134a.

Project objective

8. The pilot project aims to demonstrate the performance and energy efficiency of a fully hydrocarbon (HC) refrigerant-based supermarket in Sierra Leone and overall improve the deployment of energy-efficient commercial refrigeration equipment using low-global-warming-potential (GWP) refrigerant. This aligns with the long-term KIP strategy of facilitating the adoption of energy-efficient low-GWP alternatives in commercial refrigeration applications. The project also proposes development of MEPS for commercial refrigeration equipment. Once the pilot project is fully developed, Sierra Leone will have the first well-established, highly energy-efficient supermarket to use 100 per cent HC technology.

Proposed activities

9. Activities with their cost breakdown (as initially submitted) are described below.

Table 2. Total project budget and breakdown of financing sources, as submitted

Item	Total (US \$)	MLF funding (US \$)	Co- funding* (US \$)
1. Replacement of HFC-based refrigeration equipment by R-290 based equipment in Freetown mall supermarket			
Procurement of R-290 based equipment ⁷ (display cabinets and freezers, plug-in multideck for bottle coolers and vegetables, ice makers, and meat hanger chiller), shipment, certification, pre-shipment inspection and clearance of the international procurement, contingency (Government of the United Kingdom) (US \$210,836); Removal of current old refrigeration system including recovery of old refrigerants, installation, piping, electric works (beneficiary) (US \$12,000);	222,836	210,836	12,000

⁷ Two display cabinets (2 m) with glass, two display cabinets (2.5 m) with glass, 17 horizontal display freezers (1.8 m) with glass doors (600 litre), 17 horizontal display ice cream freezers (1.4 m) with glass doors (400 liter), 10 plugin multideck bottle coolers (1.1 m) with glass doors (1,100 litre), two ice maker 400kg, one multideck for vegetables (2 m) (2,000 litre), one meet hanger chiller with 3 glass doors (2 m) (2,000 litre)

Item	Total (US \$)	MLF funding (US \$)	Co- funding* (US \$)
2. Technical assistance			
Local and international technical consultants for project implementation and coordination (Government of the United Kingdom) (US \$25,000); Staff support for project implementation, monitoring and reporting, analysis and dissemination of results; and demonstrating technology to various stakeholders, administration and management (beneficiary) (US \$11,500)	36,500	25,000	11,500
3. Development of MEPS and labels for commercial refrigerators			
National survey on energy efficiency of commercial refrigerators, development of MEPS and labels for commercial refrigerators (including gazetting) and awareness workshops as required (was proposed as an optional component, and was included during the review) (Government of the United Kingdom) (US \$30,000)	30,000	30,000	0
Total	289,336	265,836	23,500

* The original proposal included US \$51,400 as co-financing from the beneficiary towards repair and maintenance for 15 years, along with the contingency. This was not considered as part of the project discussion as regular maintenance of an asset over its life span is an expected practice from any end user.

10. The project is estimated to result in about 40 per cent reduction in energy consumption. It is expected to achieve an annual reduction of 95,058 kWh in energy consumption, resulting in an estimated savings of US \$31,643 in total annual electricity costs. The results, based on monitoring energy efficiency performance, would be shared with relevant stakeholders through awareness and outreach activities to facilitate the widespread adoption of this technology. Given the expected high growth in medium- and large-size supermarkets in Sierra Leone and its plan to implement HFC phase-down, this project is expected to result in a reduction in HFC consumption growth in supermarkets and the adoption of energy-efficient low-GWP technologies in the country.

Total cost of the pilot project

11. The project is expected to be completed in 24 months (January 2026 to December 2027) for a total cost of US \$265,836, plus agency support costs, as initially submitted. The beneficiary enterprise would provide co-funding of US \$23,500.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

12. The Secretariat has reviewed the project proposal in light of the activities described under decisions 89/6 and 91/65 as well as those being implemented under stage I of the KIP.

Eligibility under decision 91/65

13. In line with decision 91/65, confirmation from the Government of Sierra Leone has been obtained that the NOU will coordinate with relevant energy efficiency authorities and national standards bodies to facilitate the consideration of refrigerant transition when developing energy efficiency standards in the relevant sectors/applications; that, if Sierra Leone has mobilized or were to mobilize funding from sources other than the MLF for energy efficiency components when phasing down HFCs, the project will not result in the duplication of activities among those funded by the MLF and those funded from other sources; that information on project progress, results and key learning will be made available, as appropriate; and that the date of completion of the project will be set as no more than 24 months after the date of approval by the Executive Committee and that a detailed project report will be submitted to the Executive Committee within six months of the date of completion of the project.

Relationship to HFC phase-down and the Kigali HFC implementation plan

14. The pilot project complements stage I of the KIP. The KIP activities include updating the training curriculum, training technicians, and conducting awareness workshops for importers on low-GWP refrigerants. The Government is also developing the ban on imports of HFC-based equipment in the domestic refrigeration and commercial stand-alone refrigeration sectors. These activities will support the adoption of the technology to be demonstrated in this pilot project.

15. Most supermarkets in Sierra Leone use HFC-134a- and R-404A-based equipment. The demonstration of R-290 technology will help build stakeholder capacity and raise awareness in the commercial refrigeration sector about low-GWP technologies and their performance. This will contribute to achieving the KIP's objective of phasing down high-GWP HFC consumption and support the country's efforts to meet the 10 per cent reduction target from the baseline by 2029, with a focus on the RAC servicing sector. Additionally, the results and dissemination of this pilot project will promote the adoption and acceptance of energy-efficient R-290 commercial refrigeration equipment by end users, thereby supporting future stages of the KIP.

Policy, regulatory and institutional framework

16. Regarding the ban on import of domestic refrigerators and commercial stand-alone refrigeration units based on HFC-134a, initially planned for 1 January 2025 under stage I of the KIP, the Government of the United Kingdom explained that there was a delay in the implementation; however, the regulation has been passed into law effective June 2025.

17. On the development and enforcement of MEPS for the commercial refrigeration equipment, it was explained that this project will conduct an energy efficiency market assessment in the commercial refrigeration sector, as well as develop and publish MEPS and labels for commercial refrigeration equipment within the project period. The enforcement of MEPS is a complex and lengthy process which requires approval of several ministries and final approval of the Parliament. Hence it is difficult to commit to the timeline for the enforcement of MEPS. It was agreed that the Government of Sierra Leone will develop MEPS and labels for commercial refrigeration equipment by 31 December 2027.

Technical and cost-related issues

Technology selection

18. On inquiring about the process and reasons for the selection of R-290 technology for the supermarket, the Government of the United Kingdom informed that during the planning phase, various low-GWP refrigerant technologies were evaluated based on energy efficiency, safety, technical complexity, cost, environmental impact, market availability, and long-term viability, considering the local context. HC systems were identified as a suitable option for the size of equipment included in the demonstration due to their low-GWP, favourable thermophysical properties, high energy efficiency, and possibility to be safely deployed with the proper standards, training, and servicing procedures in place. In Sierra Leone, various RAC safety standards have been recently revised to enable its broader application, whilst maintaining a very low level of risk. The project will ensure that newly installed cooling systems comply with high levels of safety and applicable safety standards.

19. The Secretariat requested a brief overview of the adoption of HC refrigerant-based refrigerators in Sierra Leone and the status of technician training on their safe use. The Government of the United Kingdom informed that visible progress has been made in the uptake of HC-based refrigeration systems, attributed to the efforts of the NOU, implementing agencies, and other partners. Technicians have acquired knowledge on the safe handling of HCs, and ongoing training programmes include modules on HCs as part of both general technician training and the national certification programme.

Beneficiary selection

20. Regarding the process of beneficiary selection, it was informed that the Freetown mall supermarket was selected based on certain criteria including location within the western urban area, certified RAC technicians providing routine maintenance, size in the range between medium to large supermarket, a refrigeration system running on HFCs, willingness to co-finance the implementation of the project, and staff available to provide vital information to the project team. Freetown mall has a range of centralized cooling systems, bottle coolers, display cabinets, cold room, chest freezers which use mainly R-404A and HFC-134a. The quantity and type of equipment will be selected based on the ability of maintaining the existing cooling capacity. All the existing HFC equipment will be replaced with the new HC equipment. The total refrigerant charge contained in this equipment is approximately 21.85 kg with an estimated cooling capacity of around 53.22 kW.

Implementation plan

21. The project will involve extensive design and planning to determine the cooling load, select suitable equipment, and develop detailed engineering designs including system layout, piping, electrical connections and control systems, in compliance with safety and environmental regulations. Installation will follow the design plan, incorporating all necessary components, with electrical systems and controls monitored and adjusted. The system will be tested, commissioned, and followed by training for supermarket staff on operation, basic maintenance, and emergency procedures. A schedule will be established for periodic maintenance and monitoring to ensure efficient operation, issues prevention and safety. The old equipment will be removed, the refrigerant will be recovered, and the equipment will be dismantled.

Energy consumption monitoring and results dissemination

22. The project will be monitored for a period of 12 months (6 months before and 6 months after) using smart meters and by comparing the supermarket's energy consumption to a business-as-usual scenario. Results will be analysed, including financial cost-benefit assessments, and shared through awareness activities using accessible media. A high-level handover event will be covered by the media, with invitations extended to other supermarket owners and servicing companies to observe the system and review the energy savings data, which will also be shared with stakeholders like the Ministry of Energy. MEPS and refrigerant labels will be developed to highlight technology benefits, supported by training to encourage sector-wide adoption.

23. About the regional impact, it was mentioned that the project is likely to have an impact within the sub-region of ECOWAS, because this will be one of the first fully HC-based energy-efficient supermarkets in West Africa. The results will be presented at various Montreal Protocol-related meetings (for example the UNEP network meetings), as a best practice example, encouraging other countries to learn and replicate the results in their countries.

Cost

24. While the overall cost of the project was consistent with the amount of equipment being procured and installed, the Secretariat enquired whether the beneficiary supermarket would be able to provide a higher level of co-financing, noting expected energy savings and that the existing equipment would eventually be replaced by the beneficiary's funds in the absence of the project. The Government of the United Kingdom indicated that in Sierra Leone, it is difficult to find such a facility meeting the required criteria, notably certified RAC technicians providing routine maintenance and a willingness to allow other users to access the technology, all of which are important for the implementation and promotion of HC technology in the commercial refrigeration sector. This supermarket has agreed to provide co-financing along with the willingness to support the implementation and promotion of activities. Upon further

discussions on the budget, the level of co-financing was increased by US \$9,697, and the same amount was reduced from the cost of equipment covered by the MLF funding.

25. Additionally, it was informed that the country will receive in-kind contribution from the Government of Germany through supporting the preparation of training materials and manuals on safe handling of HCs (for commercial refrigeration), training on recovery and end of life, and providing equipment to training centres. Support will also be provided in drafting the basic structure of commercial refrigeration MEPS and labels.

Agreed cost of the pilot project

26. The agreed costs to implement the pilot project to demonstrate the performance and energy efficiency of a fully HC-based supermarket in Sierra Leone amount to US \$289,336, including MLF funding of US \$256,139 and co-funding by beneficiary of US \$33,197, as shown in table 3.

Table 3. Total project budget and breakdown of financing sources, as agreed

Item	Total (US \$)	MLF funding (US \$)	Co- funding (US \$)
1. Replacement of HFC-based refrigeration equipment by R-290 based equipment	222,836	201,139	21,697
2. Technical assistance	36,500	25,000	11,500
3. Development of MEPS and labels for commercial refrigerators	30,000	30,000	-
TOTAL*	289,336	256,139	33,197

* In-kind contribution through training materials, training to technicians, equipment to training centres, and support to drafting of commercial refrigeration MEPS and labels.

Improvements in energy efficiency and preliminary estimates of electricity savings

27. The Government of the United Kingdom estimated energy savings of about 40 per cent (95,058 kWh/year) to be obtained from replacing HFC-based equipment with high-efficiency systems using low-GWP refrigerants and the annual energy savings in electricity costs are estimated to amount to US \$31,643.

Sustainability, replicability and assessment of risks

28. The current pilot project would demonstrate the performance of energy-efficient, HC-based commercial refrigeration equipment in supermarkets to relevant national stakeholders. The project will also support the development of MEPS for commercial refrigeration equipment. Awareness and outreach efforts will promote broader adoption of the technology. Sierra Leone has an estimated 39 medium- and large-sized supermarkets, reflecting an 8.33 per cent increase since 2023, with growing demand driven by population growth. Most existing and newly installed supermarkets use HFC refrigerants such as R-404A and HFC-134a, presenting strong replication potential. The beneficiary supermarket will make the newly installed systems available to local technicians and practitioners for proof of concept and the energy savings of the project will be shared widely with relevant stakeholders. Thus, this project would contribute to the faster adoption of energy efficient HC-based commercial refrigeration equipment and support Sierra Leone's adoption of MEPS for commercial refrigeration equipment. The main risk identified is the uptake of the technology. This risk will be mitigated by implementing training and awareness activities, including the technician training on HC equipment handling, planned under stage I of the KIP.

RECOMMENDATION

29. The Executive Committee may wish to consider approving the pilot project to maintain and/or enhance the energy efficiency of replacement technologies and equipment in the context of HFC phase-down (non-investment activities): Demonstration project for the use of R-290 as refrigerant in commercial refrigeration in Sierra Leone, in the amount of US \$256,139, plus agency support costs of US \$33,298 for the Government of the United Kingdom of Great Britain and Northern Ireland, noting:

- (a) That the Government of Sierra Leone has committed to the conditions referred to in decision 91/65(b)(iv)b. to b(iv)d.;
 - (b) That the Government of Sierra Leone will develop minimum energy performance standards and labels for commercial refrigeration equipment by 31 December 2027; and
 - (c) That the project would be operationally completed no later than 31 December 2027 and a detailed project report would be submitted to the Executive Committee within six months of the date of completion of the project, including a detailed description of the activities undertaken to disseminate the results of the technology demonstrations and to promote the adoption of the selected energy-efficient alternative technologies.
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