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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL

Ninety-sixth Meeting

Montreal, 26-30 May 2025

Item 9(d) of the provisional agenda¹

PROJECT PROPOSAL: GUATEMALA

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

Energy efficiency

- 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): Introduction of energy-efficient low-global-warming-potential refrigerant-based and evaporative cooling technologies in the air-conditioning sector

UNIDO

Individual
consideration

¹ UNEP/OzL.Pro/ExCom/96/1

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**Guatemala****PROJECT TITLE****BILATERAL/IMPLEMENTING AGENCY**

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): Introduction of energy-efficient low-global-warming-potential refrigerant-based and evaporative cooling technologies in the air-conditioning sector	UNIDO
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PROJECT OBJECTIVE

The objective of the pilot project is to demonstrate and promote the adoption of low-global-warming-potential alternatives and energy-efficient technologies in the residential and commercial air-conditioning sector, while supporting national efforts toward future implementation of energy efficiency standards and regulatory improvements.

NATIONAL CO-ORDINATING AGENCY	Ministry of Environment and Natural Resources of Guatemala
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LATEST ARTICLE 7 DATA (Annex F)	Year: 2023	524.36 mt	1,038,394 CO ₂ -eq tonnes
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Particular	Non-investment activities
HFC used by the servicing sector (2023 country programme data)	524.36 mt
	1,038,394 CO ₂ -eq tonnes
Project duration (months):	36
Initial amount requested (US \$):	270,000
Final project costs (US \$):	151,000
Implementing agency support cost (US \$):	13,590
Total cost of project to Multilateral Fund (US \$):	164,590
Energy efficiency savings (US \$/KwH):	N/A
Status of counterpart funding (Y/N):	Y
Project monitoring milestones included (Y/N):	Y
Minimum energy performance standards available for the relevant sector (Y/N):	N

SECRETARIAT'S RECOMMENDATION	Individual consideration
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PROJECT DESCRIPTION

Background

1. On behalf of the Government of Guatemala, UNIDO has submitted, in line with decision 91/65, a request for a 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), in the amount of US \$270,000, plus agency support costs of US \$18,900, as originally submitted.²

Energy efficiency pilot project

2. Guatemala ratified all the amendments to the Montreal Protocol, including the Kigali Amendment on 11 January 2024. Stage I of the Kigali HFC implementation plan (KIP) was approved at the 95th meeting,³ and the country has committed to reducing HFC consumption by 15.9 per cent of the baseline by 2029. At the 93rd meeting, funding was approved for additional activities to maintain energy efficiency in the refrigeration servicing sector under decision 89/6.⁴

Policy, regulatory and institutional framework

3. The Ministry of Energy and Mines (MEM) in Guatemala is the lead government authority responsible for energy efficiency. MEM oversees the development and implementation of national energy policies and strategic plans, such as the National Energy Efficiency Plan (PNEE) 2019–2032, which aims to reduce national energy consumption and promote efficient energy use across sectors, including the refrigeration and air-conditioning (RAC) sector. The national ozone unit (NOU), operating under the MARN, is responsible for coordinating activities related to the Montreal Protocol. In the context of energy efficiency, the NOU works closely with MEM to ensure that cooling sector interventions, such as those under the HCFC phase-out management plan (HPMP) and the KIP, integrate low-global-warming-potential (GWP) alternatives and promote energy-efficient technologies.

4. Energy efficiency considerations have been gradually integrated into both the HPMP and the KIP. The HPMP introduced import restrictions on HCFC-based equipment and prioritized energy efficiency through technician certification, pilot projects to reduce refrigerant leakage, and the promotion of efficient technologies. Additionally, the activities approved under decision 89/6 further emphasized capacity-building, awareness, and updated training materials. Under stage I of the KIP, targeted interventions will enhance refrigeration efficiency and promote low-GWP alternatives.

5. Guatemala has minimum energy performance standards (MEPS) for the RAC sector, issued by the Guatemalan Standards Commission between 2010 and 2011. The MEPS are currently voluntary and outline energy efficiency ranges, labelling requirements, and testing methods for window, and split-type, air conditioners.

HFC consumption and sector background

6. The HFC consumption baseline for Guatemala has been established at the level of 1,217,998 CO₂-equivalent (CO₂-eq) tonnes. Table 1 presents HFC consumption in Guatemala.

² As per the letter of 13 February 2025 from the Ministry of Environment and Natural Resources (MARN) of Guatemala to UNIDO.

³ Decision 95/65

⁴ Decision 93/36

Table 1. Consumption of HCFCs and HFCs in Guatemala (2019–2023)

HFC consumption	2019	2020	2021	2022	2023
mt	541.18	438.71	507.00	689.18	524.36
CO ₂ -eq tonnes	1,169,662	959,866	885,589	1,332,660	1,038,394

Project objective

7. The objective of the pilot project is to demonstrate and promote the adoption of low-GWP alternatives and energy-efficient technologies in the residential and commercial air-conditioning (AC) sector, while supporting national efforts toward future implementation of energy efficiency standards and regulatory improvements.

Proposed activities

8. The activities as initially proposed are as follows:

- (a) Demonstration of low-GWP alternatives and energy-efficient technologies in the AC sector (US \$180,000):
 - (i) *Replacement of 10 R-410A units with refrigerant-free evaporative cooling units*, including all associated installation in three locations (US \$130,000); market feasibility study and site selection for optimal climate compatibility with the alternative technology (US \$10,000); and comparative energy efficiency performance analysis, by measuring and comparing energy consumption, efficiency and environmental impact (US \$10,000);
 - (ii) *Replacement of five R-410A units with R-290 units*, including all associated installation (US \$15,000); market feasibility study and site selection for optimal impact for the alternative technology (US \$5,000); and comparative energy efficiency performance analysis, by measuring and comparing energy consumption, efficiency and environmental impact (US \$10,000);
- (b) RAC technicians training, capacity-building and support to RAC training centre (US \$50,000):
 - (i) *Procurement and installation of one evaporative cooling and one R-290 AC simulators in training centres*, providing hands-on experience in energy-efficient and low-GWP cooling technologies, enhancing technical skills, promoting safe practices, and fostering innovation through collaboration between students and industry professionals (US \$40,000);
 - (ii) *Conduct three training sessions for 20 RAC technicians each*, focused on safe handling of R-290 systems, energy-efficient maintenance, and bioclimatic integration, using newly installed simulators to build practical skills and support the adoption of low-GWP cooling technologies (US \$5,000);
 - (iii) *Awareness workshop for policymakers and industry*: organize a stakeholder workshop in coordination with the Ministry of Energy to engage 20 policymakers and industry leaders on regulatory incentives, technical standards, and best practices that promote the adoption of energy-efficient R-290 and bioclimatic AC systems, aligning efforts with HPMP and KIP energy efficiency initiatives (US \$5,000);

- (c) Technical assistance and awareness campaigns (US \$40,000):
 - (i) *Awareness and educational campaign:* development of brochures, guides, videos, and public outreach to promote the adoption of energy-efficient, low-GWP cooling technologies and disseminate key findings, targeting policymakers, industry stakeholders, and the public to support broader engagement and long-term policy impact (US \$10,000);
 - (ii) *Stakeholder engagement and project coordination:* establishment of a management and coordination framework, including a project coordinator, a multi-stakeholder Steering Committee, and the preparation of the final project report, to ensure effective implementation, oversight, and documentation of outcomes that inform future policy and support broader adoption of sustainable cooling solutions (US \$30,000).

Total cost of the pilot project

9. The project is expected to be completed in 36 months after approval, between June 2025 and May 2028, for a total cost of US \$270,000, plus agency support cost, as initially submitted.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

10. The Secretariat has reviewed the project proposal in light of the activities and criteria under decisions 89/6 and 91/65 as well as those to be implemented under stage I of the KIP.

11. In line with decision 91/65, confirmation has been obtained from the Government of Guatemala that the NOU will coordinate with relevant energy-efficiency authorities (MARN and MEM) and national standards bodies to facilitate the consideration of refrigerant transition when developing energy-efficiency standards in the relevant sectors/applications; that, if Guatemala has mobilized or were to mobilize funding from sources other than the Multilateral Fund (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 36 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.

Policy, regulatory and institutional framework

12. In response to the Secretariat's inquiry about whether the proposed project would lead to the update and enforcement of mandatory MEPS developed in 2011, UNIDO indicated that the planned workshop will initiate dialogue among key stakeholders to assess the feasibility of introducing MEPS for refrigeration, air-conditioning and heat-pump equipment, focusing on the AC sector. A key expected outcome is the development of a sector-specific roadmap to promote energy efficiency and low-GWP technologies, aligned with the Kigali Amendment and national energy goals. While Guatemala's voluntary AC standards have not been updated since 2011 and no legally binding MEPS currently exist, the project will generate data and insights to inform potential regulatory updates, using regional standards as reference points.

13. UNIDO confirmed that the relevant energy efficiency authorities had been consulted during the different steps for developing the current project proposal and that their views had been appropriately incorporated into the project components. UNIDO further explained that the NOU and national energy efficiency authorities have established strong collaboration through joint activities, including a workshop

and technical mission, held in November 2024, where key stakeholders aligned the project's design and scope with Guatemala's energy efficiency strategies and Kigali Amendment commitment.

Technical and cost-related issues

14. The proposed demonstration project is expected to significantly reduce energy consumption and greenhouse gas emissions through the deployment of two alternative technologies. The installation of 10 refrigerant-free evaporative cooling units, each with a capacity of 5 tonnes of refrigeration, is projected to consume 18,000 kWh annually, representing a 76 per cent reduction compared to conventional R-410A-based systems with similar capacity. Furthermore, the five R-290 mini-split units are estimated to consume only 1,467 kWh annually, achieving a 22 per cent reduction compared to conventional R-410A-based systems with similar capacity. Over a 15-year period, an estimated overall emissions reduction of approximately 76 per cent for refrigerant-free evaporative cooling and 63 per cent for R-290 systems is expected,⁵ highlighting the substantial climate and energy efficiency benefits of the proposed technologies.

15. The Secretariat acknowledged the considerable energy efficiency benefits and significant energy-saving potential of the two alternative technologies proposed, specifically the refrigerant-free evaporative cooling systems. However, concerns were raised regarding potential duplication with existing HPMP and KIP training activities, particularly those focused on the safe handling of low-GWP refrigerants and maintaining energy efficiency in the RAC sector. In response, UNIDO clarified that the current pilot project is distinct in scope, as it centers on the demonstration of innovative, alternative technologies for stationary AC that go beyond conventional servicing practices. The project aims to generate practical evidence on the feasibility and impact of these technologies, which, if adopted at scale, could substantially contribute to national energy savings and accelerate the transition to sustainable cooling solutions.

16. The Secretariat discussed with UNIDO the costs proposed for the demonstration components involving refrigerant-free evaporative cooling and R-290 mini-split units, in comparison with regional market prices for similar technologies. The possibility of increasing the number of R-290 mini-splits from five to 10 was also discussed, which would enhance the impact of the demonstration project within the domestic AC sector.

17. Following the discussion, the present project was adjusted to include the procurement and installation of 10 evaporative cooling systems at a cost of US \$70,000, and 10 R-290 mini-split units, increasing the originally proposed number of five units, at a cost of US \$15,000. Additionally, the costs associated with feasibility studies, site selection, and comparative energy efficiency performance analysis under the first component will be moved to the technical assistance component and adjusted to US \$10,000. Under the second component, training activities were redirected to focus solely on promoting the introduction of refrigerant-free evaporative cooling units. This includes the procurement and installation of one evaporative cooling simulator in a training centre, one training session for 20 RAC technicians, and the upgrade of training materials to reflect best practices in energy efficiency in the AC sector, at a cost of US \$16,000.

18. UNIDO confirmed that there are currently no projects addressing energy efficiency in the context of HFC phase-down funded by non-MLF sources.

⁵ Factoring emissions from servicing and refrigerant leakage and the energy consumption, total emissions for the evaporative cooling units are estimated at 108,000 kg CO₂-eq, compared to 1,130,464 kg CO₂-eq for baseline R-410A systems. Similarly, R-290 mini-splits are projected to emit 8,852 kg CO₂-eq, versus 23,844 kg CO₂-eq for R-410A refrigerant-based mini-splits.

Agreed cost of the pilot project

19. A total cost of US \$151,000 was agreed to implement the pilot project to promote the adoption of low-GWP alternatives and energy-efficient technologies in Guatemala. The adjusted activities and their agreed costs are as follows:

- (a) Demonstration of low-GWP alternatives and energy-efficient technologies in the AC sector (US \$85,000):
 - (i) *Replacement of 10 R-410A units with refrigerant-free evaporative cooling units, including all associated installation in three locations (US \$70,000);*
 - (ii) *Replacement of 10 R-410A units with R-290 units, including all associated installation (US \$15,000);*
- (b) RAC technicians training, capacity-building and support to RAC training centre (US \$21,000):
 - (i) *Procurement and installation of one evaporative cooling simulator in a training centre, providing hands-on experience in energy-efficient and low-GWP cooling technologies, enhancing technical skills, promoting safe practices, and fostering innovation through collaboration between students and industry professionals (US \$12,000);*
 - (ii) *Conduct one training session for 20 RAC technicians, focused on bioclimatic integration, and energy-efficient maintenance, using the newly installed simulator to build practical skills and support the adoption of low-GWP cooling technologies; and the upgrade of training materials to reflect best practices in energy efficiency in the AC sector (US \$4,000);*
 - (iii) *Awareness workshop for policymakers and industry: organize a stakeholder workshop in coordination with the Ministry of Energy to engage 20 policymakers and industry leaders on regulatory incentives, technical standards, and best practices that promote the adoption of energy-efficient R-290 and bioclimatic AC systems, aligning efforts with HPMP and KIP energy efficiency initiatives (US \$5,000);*
- (c) Technical assistance and awareness campaigns (US \$45,000):
 - (i) *Awareness and educational campaign: development of brochures, guides, videos, and public outreach to promote the adoption of energy-efficient, low-GWP cooling technologies and disseminate key findings, targeting policymakers, industry stakeholders, and the public to support broader engagement and long-term policy impact (US \$10,000);*
 - (ii) *Market feasibility study and site selection for optimal climate compatibility with the alternative technology and comparative energy efficiency performance analysis, by measuring and comparing energy consumption, efficiency and environmental impact (US \$10,000);*
 - (iii) *Stakeholder engagement and project coordination: establishment of a management and coordination framework, including a project coordinator, a multi-stakeholder Steering Committee, and preparation of the final project report,*

to ensure effective implementation, oversight, and documentation of outcomes that inform future policy and support broader adoption of sustainable cooling solutions (US \$25,000).

Sustainability of the pilot project and assessment of risks

20. By implementing this pilot project while also implementing the KIP, the country's main stakeholders will gain experience in identifying challenges and opportunities related to assessing market responses to energy-efficient alternative technologies and evaluating the performance of energy-efficient RAC equipment. Furthermore, the capacity-building of the NOU and institutions involved in energy efficiency and standards will highlight challenges in the enforcement of MEPS and identify solutions that could address those challenges and facilitate the inclusion of refrigerants' GWP in designing and implementing those standards. This would help support adopting low-GWP energy-efficient technologies in the AC sector.

RECOMMENDATION

21. 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) for Guatemala, in the amount of US \$151,000, plus agency support costs of US \$13,590 for UNIDO, noting:

- (a) That the Government of Guatemala has committed to the conditions referred to in decision 91/65(b)(iv)b. to (b)(iv)d.; and
 - (b) That the project would be operationally completed no later than 30 May 2028, and a detailed project report would be submitted to the Executive Committee within six months of the date of completion of the project.
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