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Ministry of Environment and Energy

Male', Republic of Maldives.

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TERMS OF REFERENCE

Recruitment of a Technical consultant for research and analysis of low GWP alternatives and retrofit of equipment

Background

Maldives is a Party to the Montreal Protocol on Substances that Deplete the Ozone Layer and has acceded to the Vienna Convention and Montreal Protocol in May 1998. As a party to the Vienna Convention and Montreal Protocol on Substances that Deplete the Ozone Layer, Maldives has phased out several ozone depleting substances including the early phase-out of CFCs in 2008. To comply with its obligations under the Montreal Protocol, Maldives is currently implementing the phase-out of HCFCs by 2020.

At the 60th Meeting of the Executive Committee, the HCFC Phase-out Management Plan (HPMP) of Maldives was approved, for an accelerated phase-out, 10 years earlier than the dates set in the accelerated phase-out schedule agreed in the 19th Meeting of the Parties (Decision XIX/6).

HCFC is the most commonly used refrigerant in the Maldives. In early 2006, HCFC accounted for over 85% of the total refrigerant consumption in refrigeration and air-conditioning sector in the Maldives. The consumption of HCFC-22 in the year 2013 was about 60.3 MT. Of this total consumption, fisheries sector applications consume about 15-20% of the total consumption.

Fisheries sector is an important sector for Maldives economy. The fish catch of Maldives is stored and processed and exported to different countries across the globe. HCFC-22 is consumed in fisheries sector in a range of applications and predominantly in fishing vessels, processing and storage applications.

The fisheries enterprises have various types of facilities - namely, shore-based facilities, factories/processing units, cold storages, and off-shore platforms such as collecting vessels and mother vessels. Cold storages in the various facilities owned by the enterprises use HCFCs, HFCs, ammonia and other refrigerants. However, vessels used by these companies



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for fish collecting, holding, transportation and storage, mainly use HCFC-22. Most of these enterprises have shore based and offshore-based facilities, servicing needs of equipment are carried out by the company technicians based in the site or on boats. Sometimes servicing activities are outsourced to smaller servicing workshops based in Male. Servicing need is very high in the fisheries industry mainly on account of (a) operations conducted in highly salty environment which contributes to higher levels of corrosion and (b) turbulent sea accompanied by vacillating conditions which results higher levels of leakage at joints. Annual servicing needs are estimated to be as high as 50% due to high leakage rate as a consequence of corrosion.

Given the high HCFC consumption in fisheries sector and the importance of fisheries to Maldives' economy in terms of employment and income levels, support for HCFC phase-out for this industry is accorded highest priority by Government and prioritized assistance needs to be provided to assist HCFC consumers in this industry in converting to low GWP alternatives.

As such, Ministry of Environment and Energy is implementing a number of projects through Multilateral Fund for the implementation of the Montreal Protocol on Substances that deplete the Ozone Layer including the demonstration project; "HCFC free low GWP alternatives in refrigeration in fisheries sector in the Maldives" in collaboration with UNDP. The primary objective of the project is to identify low GWP substitutes to HCFC-22 in the existing refrigeration equipment using HCFC-22 and demonstrate low-GWP ODS free alternatives for use by fishing industry in Maldives. Given the limited information available on actual performance of different technical options, the project will include both detailed research and analysis of existing options available and designing project interventions for testing performance of substitutes that are drop-ins or "near" to drop-ins involving soft optimization. Replacement options for fishing vessels which are HCFC free would also be considered for demonstration projects. This demonstration project is expected to have a significant impact on (a) HCFC phase-out in the country with low-GWP ODS free alternatives and (b) scaled up adoption of ODS free alternatives in countries with large fishing industry consuming HCFCs. On this basis, the demonstration project intends to identify low-GWP alternative technologies to HCFCs for use in refrigeration equipment with a charge of 150 kg to 200 kg of refrigerant in the fisheries sector. The beneficiary enterprise for demonstration will be selected during project implementation.

The successful implementation of this demonstration project will provide information on performance of a low GWP and cost-effective alternative for fisheries industry. The results of the project would also be shared with other countries with similar operating conditions. The findings would be documented and disseminated to countries in the region.

The demonstration project will research and analysis existing technology options used in both sea-borne refrigeration equipment and in land storage and processing applications; it will undertake a technical assessment of low-GWP options in terms of their feasibility as drop-in



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refrigerants as well as replacement options; test the performance of substitutes including optimization of drop-in or replacement systems; and demonstrate the use of the selected substitutes. The project proposes to convert the HCFC-22-based refrigeration equipment in three fishing vessels to low-GWP technologies, assess its performance, and evaluate the suitability of the selected technology. Based on the evaluation, suitable technologies will be disseminated to the fishing industry during HCFC phase-out. The project will eliminate the use of 0.6 mt of HCFC-22 in fishing vessels.

In this regard, the Ministry of Environment and Energy is seeking a qualified individual (national) to undertake research and analysis on alternative technologies to HCFC-22 in the existing refrigeration equipment using HCFC-22 in fishing industry and demonstrate low-GWP HCFC free alternatives for use by fishing industry in Maldives.

Objective

The main objective of this is to demonstrate low-GWP HCFC free alternatives for use by fishing industry in Maldives.

Scope of services

- 1. Prepare a work schedule for the duration of the consultancy, providing details of the works to be undertaken including the training schedule and the monitoring visits and finalize the work schedule with Ozone Unit.
- 2. Detail research and analysis of existing options available designing project interventions for testing performance of substitutes that are drop-ins or "near" to drop-ins involving soft optimization as well as replacement options
- 3. Research and analysis should include technology options used in both sea-borne refrigeration equipment and in land storage and processing applications;
- 4. Prepare bid documents for the procurement of selected technology items including the technical specifications;
- 5. Design (retrofit) of equipment for feasible HCFC free alternatives after agreement of such alternatives in consultation with MEE and UNDP as well as with identified national stakeholders
- 6. Test the performance of substitutes including optimization of drop-in or "near" to drop-ins or replacement systems; assess its performance, and evaluate the suitability of the selected technology;
- 7. Carryout information sessions to the stakeholders to demonstrate the findings;





- 8. Advise Ozone unit on selecting the beneficiaries based on the detail research and analysis of the existing equipment in the fisheries sector and on project implementation.
- 9. Identification of regulatory barriers that could affect implementation of new technologies, particularly relating to occupational safety, health, regulations governing shipping, regulations relating to fish quality and standards for processing storage etc.
- 10. Visit equipment location of the beneficiary enterprises (islands) and follow-up monitoring of the operation and maintenance of the equipment as requested by the Ozone Unit;
 - a. A minimum of at least 2 visits per year after the completion of the demonstration project for 2 years.
 - b. Prepare and submit reports upon completion of monitoring visits to Ozone Officer
- 11. Demonstrate the use of the selected substitutes in the selected three equipment;
- 12. Study on Energy Efficiency comparison of the equipment prior and after
- 13. Develop manuals for the selected three equipment for demonstration; this should include a checklist for replacement or drop-in activities; operation and maintenance on servicing.
- 14. Undertake trainings to the technical staff of the selected three beneficiary enterprises on replacement, drop-in, and the selected technology options, and on maintenance and servicing including good practices for minimizing refrigerant leakage
- 15. Take pictures of all the important steps needs due consideration for future retrofitting.
- 16. Develop 3 separate reports on;
 - a. the technology research and analysis conducted
 - b. the technology choice and retrofit options using low GWP technologies identified
 - c. the compilation of findings of demonstration project and information dissemination to be disseminated to countries in the region and for the countries like Maldives





- 17. Carryout a stakeholder workshop to disseminate the findings of the detail research and analysis
- 18. Carryout a stakeholder workshop to disseminate the findings of the demonstration project after the completion of one project;
- 19. Involve in all the activities related to the demonstration project.

Requirements for Experience and Qualifications

The following members will be required for the assignment

Post	Nos
Team Leader	1
RAC technician	1

Interested proponent should provide CVs of team members meeting the following requirements:

a) Team Leader

- Hold an undergraduate degree in a relevant field.
- Must have at least 5 years' experience in vocational or in RAC field.
- Must have excellent presentation and report writing skills.
- Excellent verbal and written skills in English
- Sound understanding of Montreal Protocol targets and the schedule of phase out activities carried in Maldives.
- Demonstrated experience in HCFC phase-out project activities.
- Ability to work in close cooperation with all key stakeholders including the fisheries enterprises, government authorities and other stakeholders.

b) RAC Specialist

- Minimum undergraduate degree in Mechanical Engineering or related RAC field
- Must have at least 5 years' experience in RAC field.
- Sound understanding of Montreal Protocol phase-out activities
- Must have excellent communication skills in Dhivehi and English
- Ability to work well in a team





Financial Proposal

The consultant is expected to include in his/her proposal a lump sum fee in MVR for carrying out the tasks.

Schedule for the assignment

The consultant is expected to complete the tasks within 10 months

Institutional Arrangement

The Consultant will report directly to Ozone Unit at MEE.

Once a week a meeting will be scheduled at MEE with Ozone Unit and UNDP and other required institutions to provide updates, targets for the week, share and gather information and discuss way forward.

Local travel will be arranged by MEE. A field visit report will have to be submitted to the Ozone Unit, MEE no later than 3 days after every field visit.

Selection Criteria

Selection will be based on academic qualification and experience. The consultant will be selected based on the following criteria:

	Points
(A) Company Profile:	[20]
No. of similar projects/assignments	[20]
Total A =	[]

(B) Project Team	[40]
Team Leader	[20]
RAC Specialist	[20]
Total B	[]

(C) Financial Proposal	[40]
Financial proposal	[40]
Total C	[]



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Application and Submission

Interested proponents may submit their proposals in a sealed envelope indicating the following:

- Summary of similar assignments performed in the past
- Curriculum Vitae of the consultant
- Attested copies of the academic certificates
- Financial proposal (fees for the assignment)

Proposals must be delivered in sealed envelopes to the address below on 05^{th} July 2017 at 1130 hours local time. Electronic bidding will not be permitted. Late bids will be rejected. Bids will be opened in the presence of the bidders' representatives at the address below on 05^{th} July 2017 at 1130 hours.

Procurement Section

Ministry of Environment and Energy Contact number: 3018341 procurement@environment.gov.mv Green Building, Handhuvaree Hingun, Maafannu Male', 20392, Republic of Maldives



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