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Terms of Reference
PN/FJ/027/19

Consultancy Title: Solar Energy Specialist

Assessment of Electricity Demand on Funaota Islet (Tuvalu), Determination of the Feasibility of Solar based Power Supply, Preparation of Overall System Design and Specification of Major Components, Preparation of Technical Requirements as part of Solicitation Documentation, and, Technical Assessment of Submitted Bids

Project Name: Solar Home Systems for Funaota (Tuvalu)

Duty Station: Tuvalu (Funafuti and Nukufetau atolls) and homebased.
1 x trip to Tuvalu

Duration of the Contract

- Total number of working days: 30 (10 days in Tuvalu including travel and 20 homebased)
- Commencement (tentative): May 2019
- Completion (tentative): 30 June 2019

Consultancy Proposal should be sent via email to etenderbox.pacific@undp.org no later than **2nd May 2019 (Fiji Time)** clearly stating the title of consultancy applied for. Any proposals received after this date/time will not be accepted. Any request for clarification must be sent in writing, or by standard electronic communication to procurement.fj@undp.org. UNDP will respond in writing or by standard electronic mail and will send written copies of the response, including an explanation of the query without identifying the source of inquiry, to all consultants. Incomplete, late and joint proposals will not be considered and only offers for which there is further interest will be contacted. **Failure to submit your application as stated as per the application submission guide (Procurement Notice) on the above link will be considered incomplete and therefore application will not be considered.**

NOTE: Proposals must be sent to the designated email (etenderbox.pacific@undp.org).
Please do not copy or directly email applications to UNDP staff.

If the selected/successful Candidate is over 65 years of age and required to travel outside his home country; He/She will be required provide a full medical report at their expense prior to issuance to contract. Contract will only be issued when Proposed candidate is deemed medically fit to undertake the assignment.

Objectives

The objectives of the assignment are to:

1. Assess household and community level electricity demand on Funaota islet and determine technical, institutional, environmental, etc. feasibility of photovoltaic (PV) solar home systems (SHSs), a PV powered telecommunication system and a PV powered community freezing system.
2. Prepare system design and specify major components for the PV SHSs, PV powered telecommunication system and PV powered community freezing system.
3. Prepare technical requirements as part of the solicitation documentation for the supply, transport, installation and preliminary commissioning of the PV SHSs, PV powered telecommunication system and PV powered community freezing system.
4. Assess technically the submitted bids and as/if required provide additional technical advice to the Tender Evaluation Team.

Background

Nearly all households in Tuvalu including in the outer islands have access to electricity. However, this is not the case for the few households living on Funaota islet that is part of Nukufetau atoll. Nukufetau atoll is situated about 120 km northwest of Funafuti, almost in the middle of the country. The only form of transportation between Nukufetau and

other atolls and islands is by ship. Nukufetau atoll has a population of 655 (as of 2012), most of which are residing in the main islet of Savave. The Solar Home Systems for Funaota project implemented by the Tuvalu Electricity Corporation (TEC) with support from UNDP and funded by the India-UN Development Fund will: 1) provide reliable, high quality and environmentally friendly 24-hours power on Funaota islet; 2) establish local capacity to operate and maintain planned photovoltaic (PV) solar home systems (SHSs), a PV powered telecommunication system (connecting Funaota and Savave islets) and a PV powered community freezing system; and, 3) establish public awareness about the project. In this context a consultant is needed to assess household and community level electricity demand on Funaota islet, determine feasibility of the PV powered systems, design the PV powered systems and specify major components, prepare technical requirements as part of the solicitation documentation, technically assess submitted bids, and, finally, as/if required, provide additional technical advice to the Tender Evaluation Team.

Scope of Work

Activities for the consultancy will include, but not necessarily be limited to the following in relation to specific deliverables:

INCEPTION NOTE

- Summarize the successful Contractor's understanding of the consultancy and associated tasks, outline the final proposed approach and methodology(ies), provide the final work plan for the consultancy, identify any issues crucial to the viability of the consultancy, and, provide comments on this TOR (subsequently, if required and approved by UNDP Pacific – Fiji Office and TEC the activities can be elaborated, modified, etc.).

DEBRIEFING NOTE

- Write-up a note for one (1) mission to Tuvalu (Funafuti and Nukufetau atolls) summarizing key findings and recommendations vis-à-vis successful completion of this consultancy.

FEASIBILITY STUDY REPORT

- Consult relevant local and national level stakeholders, including the households on Funaota islet, Nukufetau Falekaupule (Island assembly), TEC, Ministry of Public Utilities and Infrastructure, and, the Ministry of Home Affairs and Rural development.
- Review the solar PV systems on Funafala islet, Funafuti atoll (installed beginning of 2017 that provides electricity to households and a cooling storage facility for a business venture), particularly technical, institutional, and financial aspects.
- Assess household and community level electricity demand on Funaota islet. Among others prepare and carry out a needs survey of the prospective recipients of the project in order to determine: 1) the electricity needed to replace energy currently obtained from other sources; 2) the desire of the recipients for additional electrical energy for new purposes, including income generation; 3) the relative importance to the recipients of lighting, radio, refrigeration and other common uses of electricity; 4) the ability of the recipients to pay the cost of whatever system is installed; 5) any constraints to installing an electricity system at the recipients' site (e.g. physical, social, cultural, economic, etc.); 6) the relative importance of community versus individual use of electrical appliances (such as, refrigerators, freezers, etc.); and, 7) any other aspects specific to the recipients' situation that would affect the size and type of electricity system required.
- Assess solar resources, including describe the technically possible solar resources that can be utilized presently and realistically in a 1-10 years period for power generation.
- Assess technology and project engineering such as: 1) present and forecast needed power supply capacities and characteristics; 2) proposed standards of power supply where different from those presently in force; 3) different power plant technology options/configurations focusing on the planned PV SHSs, including merits and disadvantages of each option/configuration; 4) recommend, with justification, the preferred option/configuration among others taking into consideration available technical and management skills; 5) power supply network technology options, including merits and disadvantages and the recommended option; 5) infrastructure required to support the power systems (e.g. land and its development, etc.); 6) overall power plant lay-out(s); 7) overall

building, machinery and equipment specifications; 8) overall procurement and construction supervision model (foreign/local suppliers); and 9) overall operation and maintenance engineering requirements (e.g. spare parts and after commissioning services). In addition, as an integral part, identify and consider opportunities for energy efficiency measures regarding electrical appliances, lights and/or machinery.

- Assess production, operation and maintenance inputs.
- Review pros and cons of relevant institutional models - including community management and utility model (i.e. TEC) - and recommend a future project/power plant organization.
- Assess the recommended future project/power plant organization vis-a-vis present human resources for power sector operation and maintenance in Nukufetau atoll (i.e., Funaota and Savave islets). If the human resources are considered inadequate for sustainable operation and maintenance of the planned PV SHSs, estimate the added human resources that would be needed to provide sustainable operation and maintenance.
- Related, assess and outline needed training and technical assistance programme including: 1) specification of staff/positions to be trained; 2) training programme (e.g. content and duration of courses, participants, on-the-job or classroom; local, regional/overseas); and 3) technical assistance programme (e.g. specification of external expertise needed, time schedule for inputs, placing and the role of expert(s) in the project/plant organisation). As part of the latter aspect, assess the option to include an external service and maintenance service contract (initially possibly with the company that win the turnkey contract for the supply, transport, installation and preliminary commissioning of equipment as well as training) that potentially could include remote real-time and historic power system performance monitoring, troubleshooting assistance, regular comprehensive on-site physical inspections, and, training/re-training of power system operators.
- Prepare costing estimate for the final system design configuration. Break down the total costs over the life of the systems into the following main components: i) installed capital costs; ii) operation and maintenance; and iii) disposal costs.
- Undertake economic analysis.
- Undertake financial analysis. The analysis might include: 1) net present value (NPV) of the investment; 2) financial internal rate of return (FIRR); 3) a cost recovery analysis; and, 4) relevant sensitivity analysis,
- State assumptions used for analyses in detail and prepare a risk analysis.

DOCUMENT WITH OVERALL SYSTEM DESIGN AND SPECIFICATION OF MAJOR COMPONENTS

- Based on the findings from the feasibility study report, prepare overall system design and specifications for major components for the future planned PV based power systems.
- Undertake the following general design steps: 1) establish design criteria including general criteria and specific requirements; 2) assess end-use services, energy demand for each, and energy sources to task matching; 3) undertake site assessment and selection; 4) determine system configuration; 5) survey available and appropriate equipment and costs; 6) determine and specify major components; 7) determine control system and control strategies; 8) finalise system design; and, 9) size balance-of-system (BOS) component. Regarding the PV SHSs specifically, follow the latest version of the Off-Grid PV Power System Design Guidelines prepared by the Pacific Power Association (PPA) and the Sustainable Energy Industry Association of the Pacific Islands (SEIAPI).
- Specify: 1) internal electrical wiring components. The electrical specifications may include but not necessarily be limited to the following; a) DC wiring type; b) DC wiring size; c) acceptable voltage losses; d) AC wiring type; e) AC wiring size; f) wiring terminations and connection type; g) over-current and over-temperature protection; h) disconnect locations and hardware; i) grounding of conductors and grounding of metal components not part of an electrical circuit; j) surge and lightning protection; k) instrumentation; and l) junction box locations and ratings; and 2) mechanical components. The mechanical specifications might include but not necessarily be limited to the following; a) array mounting design; b) mechanical strength and compatibility with relevant local requirements, particularly wind loading; c) environmentally compatible materials; d) mounting hardware compatibility; e) weather sealing materials and approach; f) accessibility for maintenance of all components; g) safety; and, h) aesthetics. Prepare specifications with a tender process in mind. As such the specifications for major components if possible should not cut out competition unnecessarily during the tender process for hardware, i.e. it should be as generic in nature as possible.
- The overall the system design and specifications for major components must reflect: 1) the difficult access to Funaota islet; 2) the very small number of persons with basic skills in power system operation, maintenance and repair; 3) the difficult environmental conditions, i.e. mixture of high

temperature, humidity and salt level in the air; and, 4) high cost in both time and money for repairs and for the replacement of components in the context of Tuvalu in general and Funaota islet particularly.

DOCUMENT WITH TECHNICAL REQUIREMENTS AS PART OF THE SOLICITATION DOCUMENTATION

- Based on the document with overall system design and specification of major components prepare the technical requirements for solicitation documentation as per UNDP policies and procedures.
- Specifically using UNDP corporate standard templates prepare specifications, terms of reference (TOR) and/or Statement of Work (SOW) describing the detailed technical requirements. For goods, include all technical specifications, norms and standards, functional guarantees, inspection requirements, etc. For any possible civil works describe the SOW, quality standards of different materials to be used, handling of defects, etc. For any services prepare the TOR, qualification and experience of consultants required, expected outputs, etc.
- Propose technical evaluation criteria (must be directly derived from the specifications, TOR and/or SOW) such as: a) previous experience in undertaking similar projects; b) track record and working knowledge of a particular region or the country; c) manufacturing capacity (goods) and competences and capabilities (for services and works); d) ability to provide after-sales services and/or technical support; e) delivery time within strict timelines or defined parameters; f) certification of compliance to national and internationally known and accepted quality standards (e.g., ISO, ECC, etc.); g) low life-cycle cost or total cost of ownership; h) highly qualified individuals and experts to perform the services required; and, i) responsiveness of bids/offers to specifications, TOR and/or SOW.
- Assist UNDP prepare responses to any technical queries raised by potential bidders during the period from when the tender is issued until the deadline for submissions.
- Participate remotely (via telephone/Skype) in possible Offeror's Conference(s).

REPORT ASSESSING TECHNICAL ASPECTS OF SUBMITTED BIDS

- Assess bids against the technical criteria stipulated in the solicitation documentation covering the following three (3) general areas: 1) the criteria related to a company's capacities and capabilities; 2) the criteria related to the degree of compliance of the goods, services and/or works to be delivered against the requirements; and, where services are required, 3) the criteria related to the expertise and capabilities of the specific individuals who will be performing any or all of the services to UNDP (either as the main scope or a mere sub-component of the UNDP requirements).
- As/if required, provide additional technical advice remotely (via email/telephone/Skype) to the Tender Evaluation Team.

Input Provided

TEC

- Desk space, access to phone (local calls) and internet.
- Relevant background information, including documents.
- Organizing meetings.
- Comments on all draft deliverables.

UNDP

- Providing background information, including documents.
- Reviewing draft deliverables.

Supervision/Reporting

The consultant will be contracted by UNDP and report to the Team Leader, Resilience and Sustainable Development (RSD), UNDP Pacific – Fiji Office (or his/her designate).

Requirement for Qualifications & Experience

- Degree in power/energy engineering.
- 10 years of relevant and practical working experience with determining the feasibility of power systems based on solar.
- 10 years of relevant and practical working experience with system design and specifications of components for small, preferably island based, solar photovoltaic systems.
- 10 years of relevant and practical working experience preparing tender documentation.
- Substantial, relevant and practical working experience in Tuvalu or other Pacific Island Countries.
- Excellent working knowledge of English.

Payment Schedule

Deliverable	Percentage of Total Price (Weight for payment)	Due Date
Final version of the Inception Note	10	To be determined (TBD) based on proposed work plan.
Final version of the Feasibility Study Report	30	TBD
Final version of the Document with Overall System Design and Specification of Major Components	20	TBD
Final version of Document with Technical Requirements as Part of the Solicitation Documentation	20	TBD
Report Assessing Technical Aspects of Submitted Bids	20	TBD
Total	100%	

Evaluation

The proposals will be evaluated using the cumulative analysis method with a split 70% technical and 30% financial scoring. The proposal with the highest cumulative scoring will be awarded the contract. Applications will be evaluated technically, and points are attributed based on how well the proposal meets the requirements of the Terms of Reference using the guidelines detailed in the table below.

When using this weighted scoring method, the award of the contract may be made to the individual consultant whose offer has been evaluated and determined as:

- Responsive/compliant/acceptable, and,
- Having received the highest score out of the pre-determined set of weighted technical and financial criteria specific to the solicitation.

Only candidates obtaining a minimum of 49 points in the Technical Evaluation would be considered for the Financial Evaluation. Interviews may be conducted as part of technical assessment for shortlisted proposals.

	Points	Percentage
Qualifications		10%
Minimum degree in power/energy engineering	10	
Experience		40%
10 years of experience with determining the feasibility of power systems based on solar	10	
10 years of experience with system design and specifications of components for small, preferably island based, solar photovoltaic systems	10	
10 years of experience preparing tender documentation	10	
Extent of experience in Tuvalu or other Pacific Island Countries	10	
Quality of Proposal		20%
Quality and soundness of the proposed approach/methodology	10	
Realistic work plan, including time schedule	10	

Technical Criteria		70%
**If necessary interviews shall also be conducted as part of the technical evaluation to ascertain best value for money.		
Financial Criteria – Lowest Price		30%
Total		100%

Proposal Requirements

Technical Proposal

- A statement of how the applicant meets the qualifications and experience requirements.
- A Detailed CV with contact details of minimum 3 referees
- Proposed methodology/approach including preliminary work plan (covering deliverables, key activities and due dates).

Financial Proposal

- A completed Offeror's Letter to UNDP Confirming Interest and Availability for the Individual Contractor (IC) Assignment including Annex A: Breakdown of Cost by Components.

Consultant must send a financial proposal based on a **Lump Sum Amount**. The total amount quoted shall be all-inclusive and include all costs components required to perform the deliverables identified in the TOR, including professional fee, travel costs, living allowance (if any work is to be done outside the Individual Consultants (IC's) duty station) and any other applicable cost to be incurred by the IC in completing the assignment. The contract price will be fixed output-based price regardless of extension of the herein specified duration. Payments will be done upon completion of the deliverables/outputs. In general, UNDP shall not accept travel costs exceeding those of an economy class ticket. Should the IC wish to travel on a higher class he/she should do so using their own resources. In the event of unforeseeable travel not anticipated in this TOR, payment of travel costs including tickets, lodging and terminal expenses should be agreed upon, between the respective business unit and the IC, prior to travel and will be reimbursed

Template for confirmation of interest and Submission of Financial Proposal is available under the procurement section of UNDP Pacific Office in Fiji website (www.pacific.undp.org)

Women candidates are encouraged to apply

Interested Candidates must accept UNDP General Terms and Conditions for Individual Consultants