



Ministry of Environment
Republic of Maldives

**ACCELERATING RENEWABLE ENERGY INTEGRATION AND SUSTAINABLE
ENERGY (ARISE) PROJECT**
SCF Grant No.: TF-B4305

Terms of Reference for the Services of a Civil Engineering

A. BACKGROUND

The Republic of Maldives is a South Asian island country, located southwest of Sri Lanka and India. It is comprised of 1,192 coral islands grouped into 26 geographical atolls, spreading over an area of 115,300 km² and occupying a total land area of 224 km². Maldives is recognized as an upper middle-income economy by the World Bank, with a GDP growth rate of 6.99 % in 2019¹.

Out of the total 1,192 islands, 187 are inhabited, 123 are self-contained tourist resorts and 128 are used for other industrial and commercial activities. The total population of Maldives is 530,953. The dispersed nature of the islands requires each island to have a separate power generation and distribution system. The powerhouses are operated mainly by three utility companies namely, State Electric Company Limited (STELCO), FENAKA Corporation Ltd. (FENAKA) and Male' Water and Sewerage Company Pvt. Ltd. (MWSC).

Maldives has achieved universal electricity access with provision of 24 hours electricity service for all inhabited islands including resorts throughout the country in 2008. By the end of 2018, the total installed generation capacity in Maldives stood as below³:

- Diesel based installed capacity: Diesel based installed capacity in inhabited islands stood at 319 MW, and around 210 MW across resort islands, therefore, making a total of ~530 MW
- Renewable based installed capacity: Total installed capacity of Renewable Energy (RE) Systems stood at 16.5 MW

To ensure energy security, the Government of the Republic of Maldives (GoM) has embarked on a plan to transform the electricity sector and the enabling policies and programs of the GoM makes the country an attractive destination for private sector investments in RE. The National Strategic Action Plan (2019-2023) (SAP) sets targets to increase the share of RE by 20% compared to 2018 levels and also the GoM has recently announced its vision to achieve the ambitious goal of carbon neutrality by 2030.

There are several solar PV projects that have already been installed/awarded in the country through various modes under different programs. By the end of 2019, the total installed capacity of RE systems in the Maldives reached 20.5 MW.

¹ Source : <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=MV>

² Census 2014. <http://statisticsmaldives.gov.mv/nbs/wp-content/uploads/2015/12/census-leaflet-final-Page-1-2.jpg>

³ Source: <https://www.environment.gov.mv/v2/en/download/10752>

B. PROJECT DESCRIPTION

The Ministry of Environment, Climate Change and Technology (MECCT) is seeking private sector investment pathways to address the financial challenges for renewable energy development in the country. The Accelerating Sustainable Private Investments in Renewable Energy (ASPIRE) project supported by guarantees from the International Development Association (IDA) and grant from the Scaling-up Renewable Energy Program (SREP) of the Climate Investment Funds (CIF) mobilized through the World Bank has made significant contributions in addressing the early stage challenges for developing RE projects in the Maldives, through private investments.

Two successful subprojects which include installation of 1.5 MW rooftop PV and 5MW land-based PV, have been rolled out through the ASPIRE project based on a standardized public-private partnership project framework backed by risk mitigation instruments. Bid submission for the third subproject for installation of 11 MW land based solar PV is expected for mid-October.

As the current RE targets of the Maldives require a high penetration of variable renewable energy (VRE) to the island grids, modernizing and upgrading of the existing grid infrastructures and building complementing technology options for energy storage become necessary. In addressing this need, during December 2020, the World Bank has approved the Accelerating Renewable Energy Integration and Sustainable Energy (ARISE) project for further assisting the Maldives in its energy transition process.

The development objective of the ARISE project is to increase the generation capacity from renewable energy sources and facilitate the integration of VRE in the mini grids of Maldives islands. The ARISE project has a target of 36 MW new solar PV installations with an estimated cumulative 50MWh of Battery Energy Storage Systems (BESS), and grid infrastructure upgrades.

In preparation for the first phase of solar PV installations under the ARISE project, 14 island grids comprising of the below islands have been selected and a total capacity range of 11-14 MW is expected based on currently identified sites. Hybridisation of these grids will result in Solar PV and BESS taking a significant share of the energy mix of the grid specially during day time, and lowering the overall reliance on diesel for power generation.

1. L. Fonadhoo: 2 MW
2. L. Gan: 2.5 MW
3. L. Dhanbidhoo: 0.2 MW
4. L. Isdhoo: 0.4 MW
5. L. Kalaidhoo: 0.4 MW
6. L. Maabaidhoo: 0.5 MW
7. L. Maamendhoo: 0.5 MW
8. L. Kunahandhoo: 0.2 MW
9. L. Hithadhoo: 0.3 MW
10. L. Maavah: 0.5 MW
11. Lh. Naifaru: 1.5 MW
12. Dh. Kudahuvadho: 1.5 MW
13. GA. Villingili: 1.5 MW
14. Sh. Funadhoo: 1MW

In addition to the island grids listed above, further subprojects for solar PV installation will be identified as to achieve the set target and beyond of 36 MW PV installations

C. OBJECTIVE OF THIS ASSIGNMENT

Consultant will provide advisory and support services to MECCT, on a time-input basis, during the sub-project planning, rollout and implementation stages for all the relevant subprojects formulated both under ASPIRE and ARISE project. All the necessary works will be carried out in close coordination with various key stakeholders including individuals assigned to monitor this assignment, to whom the consultant will also be reporting to.

The overall consulting services will be composed of the following major activities:

- a) Assist in the development of pipeline sub-projects by supporting the PMU to conduct site surveys and detailed civil/structural assessments.
- b) Develop standardized PV installation concepts that can generally be adopted for various types of PV installations (categorized based on usability, location etc) and also site-specific designs where needed.
- c) Provide input in the preparation of the employer's requirement in regard to the civil engineering compliance aspects and requirements for the solar PV bidding documents.
- d) Engineering review of the PV installation structure designs and related project documents submitted by the PV developers to ensure compliance with bidding requirements, local and international regulations and codes of practice.
- e) Provide support for the necessary inspections to be made prior, during and post commissioning of the project.

D. SCOPE OF WORKS

The consultant will provide civil engineering advisory services to the MECCT during the site acquisition, pre-bidding, bidding, post bidding, installation and commission stage of sub-projects formulated under the ASPIRE and ARISE project on a time-input basis. The expected services cover the following major activities.

1. Development of PV installation concepts and structural designs

Consultant shall develop general PV installation concepts for various space classifications covering building rooftops, terraces and land spaces (such as airports, harbours, ring roads, highways etc) and categorized based on the usability such as vehicle parking, open market spaces, recreational space etc. In order to expedite the deliverables for this activity consultant will be provided with concepts developed from previous similar assignments undertaken by MECCT. More generalized concepts shall be developed that can be adopted for the sites identified for this assignment. The following factors to be addressed in general for the designs:

- Least cost design in terms of material requirements and construction methods.
- Zero/minimal environmental impact.
- Durability for the useful life and beyond of the solar PV system.
- Modularity in design and provision of site access for other required activities around the facility site such as provision for sea wall maintenance works in coastal areas or free movement for traffic and other operations near harbour areas, or any other site-specific requirements.
- Design for the functionality of the site.
- Design for site specific weather and environmental conditions.
- Sufficient load bearing capacity to cater for site specific loads from wind, rain etc in addition to all other typical live and dead loads the structure will be exposed during its construction and operational phase.

- Consideration for ground shifting, erosion etc in sensitive ground conditions.
- Aesthetically fitting to the site depending on its usability (tourism zones, public areas, harbour areas etc).

The draft concepts shall be submitted for MECCT's approval before proceeding to the structural design. The drawings submitted shall include layout and sectional details.

2. Cost estimates and material specifications for the design and installation of PV mount structures

The consultant shall prepare engineer's estimate for the design and installation of the structures to provide the Client with a broad estimate of the project cost. This shall include design, material and installation related cost values along with any site-specific preparatory works. If the structure must conform to a particular standard or material specification due to an aggravated environmental condition of the site, the consultant shall provide the details of such to a level sufficient to be incorporated in the bidding documents for the solar PV project. A balance of cost effectiveness and durability shall be achieved with the choice of material/standard proposed.

3. Structural assessment for building/rooftop PV installation sites

For any rooftop or other building sites identified by the PMU, the consultant is required to undertake the structural evaluation of the site based on the engineering drawings provided by the client. If drawings with sufficient details are not available, consultant is expected to visit to the site and perform inspection to assess the site condition and collect necessary data to further carryout detailed structural assessment evaluations.

The structural assessment undertaken will determine the capability of the building/structure to support the additional load originating from the Solar PV systems (inclusive of mounting structures and accessories), for the project period (25 years).

Aspects such as structural distresses, dampness, cracks, corrosion, integrity of the sealing system around penetrations for leakage preventions, impact if any on the site due to topographic features like wind and rain etc. include some key factors which need to be looked into in assessing this integrity.

For sites indicating a limited load bearing capacity from the assessment, suggestions/ recommendations shall be provided on possible reinforcement options that can upgrade the sites for solar PV installation.

4. Civil engineering requirements to supplement the PV bids

This includes detailing site features, work methodologies, design requirements including specialized construction methods, choice of material or any other specifications related to the design and installation of PV that are required to be incorporated in the PV bidding document. For any identified site that requires specialized preparatory works such as vegetation clearing, levelling, improving the ground condition etc need to be reflected in the work methodologies. Any associated costs to bring the sites to a condition usable for the purpose of solar PV installation shall also be considered.

5. Support for technical reviews and inspections

This includes engineering review of the PV installation structure designs and related project documents submitted by the PV developers to ensure compliance with bidding requirements, local and international regulations and codes of practice. Furthermore, support is required in prior, during and post commissioning inspections for the project.

E. CONSULTANT'S REPORTING OBLIGATIONS

The Consultant is expected to report to PMU and work closely with the MECCT, ASPIRE/ARISE PMU, project stakeholders in all project related matters and will report directly to the PMU designate during the course of the assignment. The consultant will also be required to submit quarterly reports which describe the work done during the period and the corresponding invoices.

The total estimated input days of the assignment is 60 Days over 13 calendar months from the date of commencement of the Services. The following lists required deliverables expected to be provided as per the specified schedules or throughout the assignment period as relevant.

Concepts for PV installation structures, detailed structural assessments and requirements to be supplemented in the PV bid:

The consultant is expected to submit deliverables pertaining to the point 1 to point 4 detailed above within 45 calendar days from contract award. The exact schedule will be finalized based on negotiations with the consultant at the time of contract award.

This includes but not limited to the following:

- Detailed design drawings (Sectional and layout drawings) both in dwg. and pdf format.
- Load calculations.
- Site preparation requirements and methodologies where applicable.
- Site features, work methodologies, design requirements including specialized construction methods, choice of material or any other specifications related to the design and installation of PV systems as per the developed concepts that are required to be incorporated in the PV bidding document.

Quarterly progress report: The consultant will be required to submit quarterly progress reports (each quarter of Calendar Year) listing the activities carried out, planned activities for the next quarter, and issues to be addressed.

Final Completion Report: The consultant will prepare a Final Completion Report on completion of the assignment/contract that summarizes the overall work carried out throughout the assignment.

F. SERVICES TO BE PROVIDE BY CLIENT

The PMU/MECCT will coordinate closely with the Consultant during the process. PMU will assign a project specific counterpart to liaise with the consultant. This counterpart may also join some field visits and review progress from time to time. The PMU will ensure access to data and reports to the consultant in a timely manner. PMU will facilitate meetings with various ministries and government agencies, including councils to enable productive field visits, workshops and consultations where needed. In addition the following specific details and facilitations will be provided.

- Maps and other relevant site specific information for the PV installation sites
- Specifications and requirements for the concepts
- Arrangement of permits to access sites where applicable
- Facilitation of meetings and site visit, when and as required.
- Cost of site visits

G. KEY QUALIFICATIONS AND EXPERIENCE

- Minimum Bachelor's degree in Civil Engineering. Having studied environment or energy elective subjects will be an added advantage;
- Must have professional work experience of minimum three (03) years. Having experience in structural engineering will be an added advantage;
- Must be a registered Civil Engineer at Ministry of National Planning, Housing and Infrastructure. And also, Accredited professional engineer - structural design compliance (possessing Structural Checker Stamp).
- Should possess sound knowledge of computer aided design software/applications commonly used in the industry.
- Should have excellent command over English with proven communication and, presentation and interpersonal skills.

In addition to the above the consultant's reputation of integrity and impartiality routed in independent from third parties shall be considered.

H. EVALUATION

Evaluation of the applications will be done by a committee selected by the PMU. Evaluation will be based on the following point scheme. Contract will be awarded to the substantially responsive applicant with highest score above the 70% pass marks and after successful negotiation of contract price.

No.	Criteria	Points
1	Key Qualification	25
a)	- Meets qualification requirement	20
b)	- Qualification(s) meet core or preferred discipline	2.5
c)	- Qualification(s) exceeds minimum requirement	2.5
2	Key Experience	45
a)	- Meets work experience requirement	35
b)	- Meets specific work experience requirement as per scope of work	5
c)	- Work experience exceeds minimum requirement	5
3	Meets added advantage requirement(s)	5
4	Responsiveness to other considerations	5
5	Interview / Assessment (exam and/or practical)	20
Total Points		100

Submission Requirements:

Applicants should submit the following documentation to demonstrate their eligibility for the consultancy.

1. Cover Letter for Expression of Interest in English Language;
2. CV including information that demonstrates that the applicant is qualified to undertake the scope of work;
3. Copies of academic certificates;
4. Copy of Experience / Reference letters from current and/or previous Client / Employers; and
5. Copy of government issued identification document.

Annex A: Work plan

The tentative work plan is provided below.

	Input Months												Total Input days		
	Year	1	2	3	4	5	6	7	8	9	10	11	12	Home	Field
<i>11-14 MW Concept development</i>	2021											30		30	
<i>11-14 MW Field visits for structural assessments</i>	2021											4			4
<i>11-14 MW Input for document preparation</i>	2021											4		4	
<i>11-14 MW- Review of Bidders designs and and other construction document</i>	2022								5					5	
<i>5 MW- Review of Bidders designs and and other construction documents</i>	2021										2			2	
<i>5 MW - Site visits during construction phase</i>	2021												3		3
	2022	1	1	1	1										4
<i>11 MW- Review of Bidders designs and and other construction document</i>	2022							4	4					8	
													49	11	
													<u>60</u>		