



Ministry of Environment, Climate Change and Technology
Republic of Maldives

**ACCELERATING RENEWABLE ENERGY INTEGRATION AND
SUSTAINING ENERGY (ARISE) PROJECT**

Terms of Reference for Electrical Engineer

1. BACKGROUND

The Republic of Maldives is a low lying, atoll based, archipelagic nation in the central Indian Ocean. It comprises 1,190 islands grouped into 26 atolls that together occupy a land area of 298 km² and form a chain over 820 km in length, spread over an area of around 90,000 square kilometers. With a total population of the Maldives is 324,9921, it is the smallest Asian country in terms of area and population. It is also amongst the most susceptible to climate change. The country is with an average elevation of 1.5 meters above ground level. The two most important sectors of the economy are tourism and fisheries, which contribute nearly 80% of the country's Gross Domestic Product (GDP). The Maldives is regularly exposed to multiple natural hazards such as storms, droughts, heavy rains and high waves caused by cyclones in the southern Indian Ocean – and the disaster risk scenario for the country can be described as moderate².

Demand for electricity has risen steadily in Maldives over the past decade, reflecting robust economic growth. Between 2007 and 2017, total electricity consumption grew by 6.2 percent annually on average, outpacing average annual GDP growth of 5.4 percent over the same period. Total electricity consumption amounted to 750 Giga Watt-hour (GWh) in 2018—much higher on a per capita basis than other countries in the region but lower than the average upper-middle-income country.³ The increase in electricity demand partly reflects the growth of the tourism sector, the mainstay of the Maldivian economy.

Electricity is generated and distributed through a patchwork of independent isolated island-based grid systems. Each island has its own powerhouse and distribution facility, effectively operating as single, isolated island power grids.⁴ There are 186 powerhouses on inhabited islands (excluding industrial islands and islands used exclusively as resorts or where service is provided by Island Councils) collectively generating 319 Mega Watt (MW) from diesel and 21.52 MW from solar. The highly dispersed nature of these power systems poses system operation and flexibility challenges. Two major state-owned utilities, State Electric Company Limited (STELCO) and FENAKA Corporation Limited (FENAKA), are responsible for delivering power supply to most of the inhabited islands. STELCO is the utility serving Greater Malé and manages 35 powerhouses in 35 islands. FENAKA was formed in 2012 as a merger of six regional utilities to serve the outer islands, except resort islands. FENAKA operates 148 powerhouses to serve 152 outer island communities and FENAKA handles sewage, water, and waste treatment for these islands.

¹ *Statistical Yearbook Maldives 2010*. Department of National Planning. Republic of Maldives.

² UNDP. 2006. *Developing a Disaster Risk Profile for Maldives*.

³ Per capita electricity consumption is about 1.8 MWh in the Maldives, compared to 0.7 MWh per person in the average South Asian country and 3.5 MWh per person in the average upper-middle-income country. Source: World Development Indicators and U.S. Energy Information Administration (EIA).

⁴ With two exceptions (a) the interconnection between the power grids of Malé, Hulhulé, and Hulhumalé, which is nearing completion under the Fifth Power Project financed by the Exim Bank of China, and (b) the central powerhouse in Addu.

The Strategic Action Plan (SAP) of the GoM have a key priority in promoting green energy use. This includes creating an enabling environment for the growth of sustainable energy use in the sector. Thus, the GoM had been taking measures under this policy to address the issues faced within the sector and promote renewable energy in power generation side as well at the consumer end. As a result, through donor support GoM had, since 2014 started to invest, through both the private sector and public sector mode, in renewable energy technology.

The Accelerating Sustainable Private Investments in Renewable Energy (ASPIRE) Project, hence had become one of the key projects, that had commenced. The project kick started private investments in solar PV technology under Independent Power Produce (IPP) model, through the development and use of an investment framework in conjunction with a comprehensive risk mitigation package to address investment risks for Private Sector in the Maldives.

The framework has been appraised taking into account government and institutional considerations and informed by feedback from potential private investors. As of date 1.5MW had been installed with an ongoing 5MW installation in Male' region under this model.

Furthermore, the more recently approved Accelerating Renewable Energy Investments and Sustainable Energy (ARISE) Project will complement the ASPIRE Project by further assisting to scale up PV installations through provision of Battery Energy Storage Systems (BESS) and complementary grid upgrades for Variable Renewable Energy integration through EPC contracts funded through the ASPIRE Project. The new project is expected to add another 36MW of solar PV into the national energy mix.

Since the proposed Project would reduce the islands' financial exposure to oil price volatility, and generate savings by replacing higher cost, imported diesel fueled generation, with cleaner PV generation. The Project also reduces the need for public investment in the power sector, and helps reduce the operating and capital expenses of the state utility companies. Not only would this get the GoM closer to its stated goal of carbon neutrality, but it would also free up resources to fund key social needs such as education and health.

2. PROJECT DESCRIPTION

The main objective of ASPIRE and ARISE Project is to increase renewable energy generation capacity and enhance the financial and environmental sustainability of the power sector in the Maldives. The initial subprojects under ARISE will target larger outer islands and will consider potential sub-projects for Male' region. The consumer base would later expand to other islands in Maldives, and would receive improved electricity services, with lower local environmental externalities.

The ARISE project would support solar PV generation through IPP sub-projects; support BESS deployment and grid modernization to enable VRE integration; and provide technical assistance (TA) for institutional capacity building, pipeline development, and support for early stage feasibility work associated with the development of other sustainable energy sources (including electric mobility, wind and wave energy, and green hydrogen). The project has been specifically designed to address various risks associated with project development and deployment.

The key areas of project include solar PV risk mitigation (Component 1) which aims to support the Government in mobilizing private sector investment to deploy solar PV generation capacity by providing a risk mitigation package for private sector IPPs. Where feasible, particularly in large to medium size islands, IPPs may be requested to invest in solar PV and BESS.

The Battery Energy Storage System component (Component 2) will support deployment of BESS in Addu City and other large islands to enable a high penetration of solar PV in the power system while ensuring reliable supply in a cost-efficient manner. The component will support approximately 50

MWh of BESS in the selected grid systems, for VRE integration, that may include applications such as ancillary services, load shifting, and other benefits. Project is expected to finance the procurement of the BESS and its short-term operation and maintenance (O&M) contract to build O&M capacity of the utilities.

The grid modernization for VRE component (Component 3) will support grid upgrades and reinforcement to accommodate an increasing volume of renewable energy and BESS, in selected grid systems. This will be implemented in close coordination with STELCO and FENAKA. The primary scope of Component 3 will include strengthening network capacity; deploying supervisory control and data acquisition (SCADA) systems; and optimizing performance of interlinked renewable energy generations, BESS, and existing conventional power plants. In particular, this will include upgrades in Low Voltage and Medium Voltage distribution lines, transformers, and distribution boxes, to facilitate optimization between solar PV, distributed generation, and BESS. In addition, ME will also lead the co-ordination on site acquisition while defining parameters for design configurations, engineering and functional requirements including retrofitting rooftops and survey of land and lagoons/ocean for renewable energy generation sites. As the penetration of solar PV and renewable energy increases, interconnection among islands will also be considered to improve system balancing and flexibility.

3. OBJECTIVE

The objective of this assignment is to provide assistance to in all areas of project implementation of the ASPIRE and ARISE projects' engineering and implementation, which range from design, review and contract execution support for Solar PV, BESS and Grid contracts. In general, this would cover all activities related to power system planning and execution works under the projects, facilitating the timely delivery of the outputs and milestones of the overall projects.

4. SCOPE OF WORK

The consultant is expected to provide support in all areas of the projects where applicable in general, inclusive of PV systems, electrical grid upgrades, Battery Energy Storage System (BESS) design and integration, and all activities related to power system expansion planning and execution works under the project.

The consultant will be supporting the project under the following broad key activities.

- Provide support to the Project Management Unit (PMU) in power system planning aspects and various other electrical aspects to support development of sub-projects, and provide technical and operational advice to PMU during the implementation stages;
- Determine & and carry out all technical assessments requirements particularly for the electrical systems and electrical engineering needs to integrate hybrid renewables into the grid, and any other activities related to the project, particularly taking into account the relationship between key project components (Solar PV, BESS and associated grid upgrades);
- Review and approve electrical system designs ensuring alignment with the relevant regulations, standards and guidelines, safety and reliability of overall electrical system designs and its parts;
- Standardization of electrical systems designs taking into regulations, local and international standards, in collaboration with international experts, utilities, PMU and other relevant government agencies;

- Developing monitoring manuals and troubleshooting procedures in coordination with utilities, contractors and other consultants;
- Provide support in all technical aspects related to tendering, including but not limited to, developing technical specifications, setting qualification criteria, overall bid document review, handling bidder queries, bid evaluations, contract reviews and drafting, etc. in coordination with local & international experts and in consultation with the PMU;
- Supervise implementation, testing and commissioning of PV-BESS hybrid in consultation with key experts and with the Utility Companies;
- Oversee & managing of EPC and PPA contracts ensuring milestones/deliverables are completed within the agreed timeframes with the specified quality, along with clearance of invoices and completion certificates where assigned or applicable;
- Monitor contractor progress of activities on site and do necessary site inspections and verifications where applicable, and report issues and resolve any matters on site and issue supervision reports, completion certificates and other approvals as needed;
- Identify and address technical issues faced during sub-project implementations, particularly in relation to electrical aspects propose solutions to technical issues thus identified during sub-project design stages and contract execution stages. Furthermore, assistance to PMU and utilities to troubleshoot technical issues related to overall running of hybrid system installed under the project, and identify any impacts on safety and reliability of electricity services in project areas;
- Facilitate the delivery of component activities assigned and support tracking of the overall implementation plan, liaise with project stakeholders and advisors to ensure timely and coordinated implementation of the project's activities;
- Provide input to the PMU in generation of (i) Terms of References (ToR) for consultancy and non-consultancy service providers and (ii) specifications for goods and equipment to be procured under the Project;
- Coordinate with other team members and external consultants to review project reports, system designs, and other aspects related to the overall project design, and address any technical issues relating to the project and provide support in resolving them;
- Participate in document review, evaluations and Project Technical Committees, and various other activities that will be carried out routinely under the project;
- Align all work carried out with the objectives, delivery mechanisms and time-frames that must be followed stringently in World Bank-supported projects;
- Travel frequently to islands within the scope of the project to monitor implementation aspects on site;

- Oversight of assigned key tasks and coordinate implementation of studies and/or consulting works under the project, and provision of support to coordinate implementation of studies and/or consulting works under the project; and
- Provide support to the Project Management Unit (PMU) in power system planning aspects and various other electrical aspects to support development of sub-projects, and provide technical and operational advice to PMU during the implementation stages.

The Consultant will be working under the guidance of Senior Energy Specialist, and is expected to work closely with all PMU team members, other local and international consultants, utilities, and shall undertake administrative and coordination aspects related to the scope of work. Furthermore, the Consultant shall work with minimal supervision. Furthermore, input would need to be provided on a need basis that are relevant to sector activities, particularly on technical and regulatory aspects relevant to Ministry and Utility Regulatory Authority.

5. REPORTING

The Consultant will work closely with the Ministry, ASPIRE/ARISE PMU, Utility Companies, and other stakeholders in all project related matters and will report directly to the Senior Energy Specialist or any designate during the course of the assignment.

The consultant will also be required to submit monthly timesheets, which describes the work done during the month and the corresponding invoices. The consultant is also required to provide periodic reports in a format prescribed by the PMU, should this be determined during the period of the assignment. Furthermore, the Consultant's contract will be subject to performance evaluation as determined by the PMU.

6. KEY QUALIFICATIONS AND EXPERIENCE

- **Either**, Minimum Master's degree in Electrical Engineering or related field applicable to the scope of work and minimum seven (7) years' work experience with three (3) years of related work experience to the scope of work; **OR** Minimum Bachelor's degree in Electrical Engineering or related field applicable to the scope of work and minimum ten (10) years' work experience with five (5) years of related work experience to the scope of work;
- Hold an Electrical Engineer license issued by Utility Regulatory Authority.
- Work experience in donor-funded activities/projects, experience in similar assignments will be an added advantage.
- Experience in renewable energy installations designs will be an added advantage.
- Qualification for Medium Voltage (MV) system designs & installations (preferably with the MV category license) will be an added advantage.
- Experience with FIDIC contracts will be an added advantage.

In addition, the following shall be considered:

- Strong communication skills and ability to present, coordinate and resolve difficult issues;
- Demonstrate professional working proficiency for English and Dhivehi language;

- Computer literate in general office software, and specific software/applications status quo within the market;
- Ability to work efficiently and effectively in a multidisciplinary team and willingness to work in a team environment;
- Demonstration of specialized knowledge in the area and capacity to carry out all tasks specified in the scope of work, inclusive of field work;
- Reputation of integrity and impartiality routed independent from third parties;
- Be flexible to emerging or changing conditions and undertake initiative in the candidate's broad field of action;
- Willingness to work for extended periods without direct supervision; and
- Willing to travel frequently to islands within the scope of the project for contract monitoring, approvals and attending various issues in at all project sites.

7. ESTIMATED LEVEL OF EFFORT & FEES

Successful candidate will be paid a negotiable fee depending on qualification and experience.

The duration of the assignment is **12 months** from the commencement of the assignment with potential of 18 additional months extension based on performance and need.

The consultant is expected to provide an indicative average 4 hours of input per weekday at office and/or field. Remote work can be allowed provided sufficient evidence of time input is demonstrated. Furthermore, depending on the need for meeting milestones and assigned tasks, Consultant may need to spend time beyond official hours.

8. FACILITIES TO BE PROVIDED BY THE CLIENT

The PMU will coordinate closely with the Consultant during the term of the consultancy. The PMU will facilitate meetings with various ministries and government agencies, including councils to enable a productive consultation service. Costs of travel, food and accommodation will be provided. The Consultant will have access to all necessary/relevant information provided by the Client and Utilities to carry out the duties under this assignment.

The Consultant shall perform the Services on Work from Home (WFH) basis and shall provide inputs via online services (Meetings, Calls, Instant Messaging, E-Mails, etc.) at the Consultant's own expense.

The Consultant will also be provided a workstation free of cost at the PMU set up in the Ministry if on-site work is required. The Consultant, may mutually agree on the frequency and duration of physical meetings with the PMU. However, the consultant is expected to take part in meetings (physical or virtual) where relevant.

9. EVALUATION

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	40
2	Key Experience	50
3	Meets added advantage requirement(s)	10
Total Points		100

10. SUBMISSION REQUIREMENTS

Applicants should submit the following documentation to demonstrate their eligibility for the assignment,

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. Attested Copies of academic certificates;
4. Reference letters from current and/or previous employers; and
5. A copy of National Identity Card.