NIGERIA ELECTRIFICATION PROJECT

TERMS OF REFERENCE (TOR) FOR CONSULTANCY SERVICES FOR PROJECT OWNER’S ENGINEER FOR PHASE 3: ENERGIZING EDUCATION PROGRAM UNDER THE RURAL ELECTRIFICATION AGENCY

MARCH 2020
DRAFT TERMS OF REFERENCE

Consultancy Services for Rural Electrification Agency (REA) as Project Owner’s Engineer (POE) for Solar Hybrid PV and Gas-Powered Generation Facilities at Federal Universities in Nigeria under Energizing Education Programme (EEP) Phase III.

1 BACKGROUND

The African Development Bank (“The Bank”) has provided financial support to the Rural Electrification Agency (REA) through Federal Ministry of Power, under the Nigeria Electrification Project (NEP). The Project will set up an aggregate of 19.5MWp Captive solar Hybrid PV and Gas-Powered plant under the “Energizing Education Project” (EEP) for the 8 Federal Universities in various capacities. The Bid for Engineering, Procurement, and Construction (EPC) Contract of this 19.5MWp Captive Power Plants Project (the Project), including initial one (1) year of operation and maintenance services is expected to be concluded by second quarter 2020.

It is anticipated that contract with the successful bidder would be signed immediately and the implementation of project would commence. REA (the Employer) now intends to hire a Consulting Firm as its Project Owner’s Engineer (POE) for supporting REA in: (i) reviewing the initial designs and specifications by the FEED consultants and the designs that will be submitted by the EPC Contractors during the construction stage; (ii) preparation for bidding documents for the installation of solar PV hybrid power and gas powered generation facilities; (iii) contract management, and (iv) construction supervision, commissioning, and acceptance tests. This will be with special emphasis on integration of the power plant to the existing distribution network in the area where the school is located.

The implementation period for this service contract is expected to be about 36 calendar months in total. The Consulting Firm also needs to provide recommendations on necessary scope of work and estimated cost for engaging the Operations & Maintenance (O&M) contractor for the operation service period of 12 months. The scope should include annual tests along with final acceptance inspection and tests to be carried out at the end of a 1 year of Operation & Maintenance service period.

2. DESCRIPTION OF THE PROJECT

Phase III of the Energizing Education Program (EEP) will be implemented in the following 8 Federal Universities.

Table 1.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Location</th>
<th>State</th>
<th>Region</th>
<th>Plant Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Modibbo Adama University of Technology, Yola</td>
<td>Adamawa</td>
<td>North East</td>
<td>Solar Hybrid</td>
</tr>
<tr>
<td>2</td>
<td>Federal University of Dutsin-Ma</td>
<td>Katsina</td>
<td>North West</td>
<td>Solar Hybrid</td>
</tr>
</tbody>
</table>
The overall EEP activities include, as associated with the power plants:

a) Review, verification and refining of energy audit, engineering and design done by Front-End-Engineering-Design (FEED) Consultants.

b) Final design, planning, engineering, procurement (manufacturing/supply), construction/erection, testing, commissioning, and one year of operation service of about 19.5MWp aggregate utility scale Solar Farms and gas plants as an EPC Contract, to be procured through an International Competitive Bidding process.

c) Consulting services for design, review, procurement and contract management, supervision of construction/installation, testing, and commissioning by an Owner’s Engineer.

d) The development of solar PV Hybrid and gas plants by the EPC contractor including: Project planning and design; Basic project planning, sequencing and scheduling, solar resource assessment, energy yield predictions for project life cycle, basic and detailed designing, project component selection, preparing engineering and construction drawings, facilitating planning permissions, and all other engineering and preparation work as required for planning, design, commissioning, and interconnecting the solar PV Hybrid and gas powered plant to the existing distribution network.

e) Site preparation (including additional topographic surveys and geotechnical investigations if necessary) and land levelling, providing construction infrastructure like site office, internal roads, stores etc., assembly and construction of the entire solar PV/Gas plant, all pre-construction tests, site management and supervision, labour provision, testing and commissioning of all the equipment in steps, and interconnection of the power plants to the universities’ utility grid control centre.
f) All the operations not expressly included, that are necessary for proper functioning of the power plants and fulfilment of the guaranteed performance, rules, regulation, and applicable codes, necessarily including all the things that are inherent to the Project and without which the Solar PV/Gas plant would be unable to start operating commercially. The performance ratio for Solar PV power plants shall be a minimum of 80% while the gas efficiency and plant availability for the gas-fired plants shall be 40% and 85% respectively. The EPC Contractor shall sign a performance guarantee contract, where they incur penalties if they do not deliver. This can then be transferred to the O&M contractor.

g) Commissioning of the power plants, with provisional acceptance tests, 7 days start-up performance test, monthly and annually performance evaluations, and performance and equipment tests as required by the REA during the defect liability period.

h) Upon satisfactory commissioning of the plant facilities, provision of all the specified spare parts and documentation necessary for the correct performance, and maintenance for the life cycle time of power plants, the facilities will be officially accepted by the POE and handed to REA. Comprehensively warranting the entire power plants against all defects through a defects liability period (DLP) of one year, transfer all component warranties to the Employer post completing the DLP, and proving guarantees on annual energy output in kWh as agreed on EPC Contract for One (1) year.

i) O&M of the entire Solar PV and gas-powered plants for a period of One (1) year, from the date of official acceptance by POE and handed over to REA. The One (1) year O & M includes:(a) daily operation and maintenance services, including supply of spare parts, to ensure the plant facilities operating at guaranteed performance and availability standards; (b) training owner’s personnel for operation and maintenance, (c) conducting an Energy Output test at the end of the One (1) year of O&M to verify acceptable performance of PV plant facilities, (d) official acceptance of the one-year O&M services of EPC Contractor by REA, and handing over the O&M to REA; and (e) counter measures to be taken in case of deviations found beyond guaranteed values.

3. OBJECTIVE

3.1 Objective of Services

The objectives of the consulting services shall be to ensure that the Project is implemented with a high standard of workmanship and quality, on schedule, and within the budget, in accordance with the specifications and drawings of the EPC Contract, to acceptable environmental and social standards and in accordance with the REA’s requirements and the Bank’s Safeguard Policies.

3.2 Brief Description of Assignment

The POE shall assist REA to provide a comprehensive technical and management services during the construction and O&M stage. During the preparation stage, the
POE shall review and validate the FEED assessment of all Universities with standard of workmanship, accuracy, and in accordance with the best practices.

During the procurement stage, the POE shall assist the Employer in review of the final designs on the basis of which tender documents have been prepared. The POE shall also review Contractor’s Equipment drawings as they are received and ensure that they meet the requirements of the specifications. All procurements under the Project (nevertheless executed by the EPC Contractor or others) need to be monitored carefully and informed to the Employer and the Bank immediately the suspicious indications are perceived by the POE.

During the project implementation stage, the Consultant shall act as the Owner’s Engineer for the Construction and Equipment Contracts. The Consultant will carry out its duties and responsibilities and assume necessary powers, as stipulated in the agreement for consulting services from the Owner’s Engineer. Such agreement may include but not limited to:

- Review and confirm quality assurance program of the EPC Contractor.
- Review and confirm the delivery of material to the site.
- Review and validate construction drawings, schedules and process proposed by the EPC Contractor.
- Review and confirm quantity and quality of works completed, which would serve as a basis for payment to the contractor according to the EPC Contract terms.
- Hold regular monthly meetings with the EPC Contractor to review project progress, technical issues, and measures to achieve the targeted cost, quality and schedule control.
- Manage safety, social, and environmental related issues during the construction cooperating with the Employer.
- Review and confirm the acceptance test proposals made by the EPC Contractor and support the Employer in completing the acceptance test.
- Review and confirm the O&M Manual, including training programs for REA engineers & other stakeholders on O&M, prepared by the EPC Contractor.
- Providing additional technical support to the Employer as needed for successful implementation of the EPC Contract.

3.3 Safeguard Specialist - Roles and Responsibilities

- Monitor and control all HSE matters related with project team members and contractors in ensuring that the Project is in compliance with the project requirement i.e. specification, safety code and other policies/guidelines related to the project.
- Responsible for the health, safety, environment, security & emergency throughout the project duration to achieve safe project completion.
- Coordinate environmental activities performed by Contractors.
- Participate in HSE Risk Assessment and hold relevant meeting, workshop internally and with related 3rd parties.
• Monitor and update the HSE risks register and records (e.g. hazardous waste manifests) and ensure all mitigation plans are strictly adhered to throughout the project execution.
• Enforce and audit activities to ensure it meets design criteria and other HSE guidelines.
• Prepare and manage required documents for related internal/external audit, and process it.
• Serve as the Fire Safety Officer, including coordination of fire drills and fire extinguisher maintenance and testing.

3.4 Location of Services

In order to maintain close liaison between project management, design, and construction supervision, the Employer requires that the POE, contract management, construction supervision, and design staff members are all located on the REA selected Project sites or at minimum in the six (6) geo-political zones in Nigeria as specified in the Section 2 Description of Project.

4. SCOPE OF WORK

4.1 GENERAL DESCRIPTION OF ASSIGNMENT

4.1.1 The objectives of the services will be achieved through the following major activities:

1. Review and validate all activities completed by Front-End-Engineering-Design (FEED) Consultants
2. Review and approve final designs of Solar PV Hybrid power plants carried out with Homer, PVsyst or other accredited design software.
3. Review and approve final designs of Gas Fired Power Plants conducted with Etap or accredited design software.
4. Review and approve final distribution network designs for the universities.
5. Provide final architectural and structural designs for Workshop and Training centre for renewable energy and recommend the equipment to be outfitted.
6. Evaluate and approve the final Technical Specifications on a site by site basis as will be resulting from the FEED design.
7. Bid Technical Evaluation & Support during contract negotiations. POE to assist during technical evaluation of proposals and provide support to REA during contract negotiations.
8. Support Contract Management in the following key areas.
   a. Support the Sustainability Consultant in drafting of Legal Agreements: Define the roles and responsibilities of each stakeholder (REA, University, EPC/O&M Contractor, Distribution Company, on-campus commercial activities, students, etc.) and support on the drafting of the adequate agreements between them (MOU, contracts, etc.).
   b. Support the Sustainability Consultant in the definition of the ownership structure: Support the definition of the best ownership structure regarding the scope of the project.
c. Support the Sustainability Consultant in developing a project and operations Financial Model. Should ensure that there has been adequate stress testing of the proposed Financial Model, which should include a base case with three likely project scenarios for the project.

d. Support the Sustainability Consultant in designing Billing Strategy which should be linked to the Financial Model.

9. Construction Management, Commissioning, Acceptance Tests and Integration to existing distribution network at the site and Hand Over of passive components of the power plant.

4.2 DETAILED DESCRIPTION OF THE ASSIGNMENT

4.2.1 Review and validate all activities completed by Front-End-Engineering-Design (FEED) Consultants.

a) Review and validate energy demand studies of all 8 universities and also assess the proposed power technology for the sub-projects, including recommendations on how best to ensure its durability;

b) Review and validate technical and financial feasibility studies for each university. Verify that the technology, plant size is appropriate and budget estimates are suitable

c) Review and validate the inspection reports for MV/LV distribution network submitted by the FEED Consultant which include:

   - Review of the proposed layouts and single-line diagrams
   - Verification of actions required to upgrade the network to accommodate the future power supply improvement.

d) Review and validate inspection reports for existing streetlight distribution infrastructure on the entire University layout network which include:

   - Review of the proposed layouts and single-line diagram.
   - Verification of proposed additional lighting needs.

e) Review and validate proposed design for the Workshop and Training Centre submitted by the FEED Consultant which include:

   - Review of architectural, structural, electrical and mechanical design/drawings
   - Validation of the list of equipment and furniture to be provided in the electrical and mechanical workshops and the training center.

f) Review and validate proposed energy efficiency measures to be adopted at each university.
g) Review and validate detailed designs for each project site, including engineering drawings, Bill of Quantities, cost estimation and technical specifications. This includes review and validation of the following documents:

- Plant Design and drawings, including detailed layouts and Single-Line Diagrams of approved technical solution.
- Plant design including all required electrical, mechanical, structural & civil works, which form the basis of the construction and equipment contract documents.
- Architectural and Structural designs for Workshop & Training Centre with recommended electrical & mechanical equipment to be outfitted.
- Equipment specification for each site
- Bill of Quantities (BOQ) that will be included in the Bidding document on a site by site basis.
- Detailed cost estimation for each project site.
- Proposed technical evaluation criteria to be used during the evaluation of Expressions of Interest or proposals.
- Technology transfer documentation to enhance the Employer’s technical knowledge on solar PV hybrid and gas power systems development and project management capacity through on-the-job training.

h) Provide a report on FEED detailing findings and proposed changes to design and engineering of power plants.

4.2.2 Equipment and Electrical System Component

4.2.2.1 Design, Manufacture, and Installation of Equipment

The Consultant shall perform the duties of the Engineer as defined in the Owner’s Engineer’s contract for the above works and specifically carry out the following duties:

a) Review designs and drawings submitted by the EPC Contractor, on the equipment and approve or amend the same in consultation with the Employer.

b) Monitor and supervise on site testing of all the major equipment to ensure that they meet the requirements and specification under the contract in consultation with the Employer in presence of the Employer personnel.

c) Inspect the manufacture of equipment at the Contractor’s workshops anywhere in the world, carry out the required tests (if any required), and certify its adequacy and quality before items are packed and shipped to the sites of works, jointly with the Employer. The list of equipment to be inspected is as follows but not limited to:

- PV modules & Module Support Structure (MMS
- Inverters
- Transformers/Generators (diesel & gas)
- Control Systems and Switch gears
- Street lighting infrastructure & equipment

d) Supervise the installation of the electrical and mechanical equipment in a satisfactory and safe manner in accordance with the specifications and contract requirements.

e) Supervise in testing and commissioning of all equipment.
f) Supervise the interconnection and synchronization of solar/gas power plants to existing distribution network in a safe manner.

g) Measurement and verification of work quantities and certification of EPC Contractor's invoices for approval and release of payments.

h) Monitor the manufacturing and delivery of equipment to ensure smooth and timely completion of the whole Project.

i) Prepare, process and issue variation orders if any.

j) Make recommendations to the Employer regarding settlement of claims by the EPC Contractor.

k) Update the cost of contract works every month.

l) Prepare items of work to be completed by the EPC Contractor during Maintenance/Defects Liability Period.

m) Assist the Employer in commissioning the Project upon completion including supervision of resolution of possible defects found during acceptance tests.

n) Review & revise the detailed "O&M Manuals" prepared by the EPC Contractor for use by REA in the operation of the Project.

o) Prepare a "Completion Report" for the works under the contract, including a summary of final costs, and supply 5 copies of the same to the Employer for future reference.

4.2.3 Civil Works Component

4.2.3.1 Design and Construction Drawing

a) Review the Design
The Consultant shall review the design of the civil works, which form the basis of the construction and equipment contract documents. The Consultant shall assume responsibility for the adequacy of such designs, and shall submit in writing to the Employer of any changes.

b) Construction Drawings
The Consultant shall review the construction drawings for the civil works of the contracts with the EPC’s. He shall also prepare construction drawings for those temporary works, which are identified in the contracts as being prepared by the Engineer or which are necessary for construction of the works, but are not responsibility of the EPC Contractor. The construction drawings shall clearly impart the final design of the works, and shall be revised and supplemented to meet field conditions as the works progress.

c) Contractor’s Drawings In cases where the EPC Contractor has to prepare construction drawings, the Consultant shall review and approve those drawings in accordance with the contractual conditions. The Consultant shall also approve layouts and details of temporary facilities to be constructed by the EPC Contractor.

4.2.4 Contract Management

4.2.4.1 Construction Supervision and Management of Contract
The Consultant shall assume full responsibility for the contract management and construction supervision of the civil works. The Consultant shall also perform all the duties and functions required of him as the Owner's Engineer under the conditions of EPC Contract for the civil works some of the important functions are:

a) Approve EPC Contractor's Programs of Work and any changes made thereto during construction.
b) Approve all items of equipment, plant, materials, etc. to be incorporated in the civil works.
c) Check, set out, and provide base line surveys with benchmarks for the EPC Contractor to establish their survey control for construction. The Consultant shall be responsible to check surveys and benchmarks established by the EPC Contractor at each site of work and ensure accuracy of surveys and benchmarks connecting various sites.
d) In consultation with the Employer, prescribe the format for milestone payment certificates of the EPC Contractor.
e) Issue stop orders of work with prior approval of the Employer.
f) Verify the amount of work done under each item of the Bills of Quantities and check the EPC Contractor's payment requests before submitting to the Employer for approval and release of payments.
g) Perform tests on materials as and, when required, to satisfy himself of the suitability of materials for use in the works at the field laboratory already established by the EPC Contractor.
h) Monitor EPC Contractor's progress of work.
i) Prepare, process and issue variation orders as required.
j) Make recommendations to and draft responses for the Employer to settle claims from the EPC Contractor.
k) Update the procurement and cost of contract works every month.
l) Supervise the Employer in taking over the Project and prepare items of work to be completed by the EPC Contractor until the commission of the PV Solar Hybrid/Gas Powered Plants.
m) Prepare a "Completion Report" for the works under the contract, including a summary of final costs, and supply 5 copies of the same to the Employer for future reference.

4.2.4.2 O&M Contract Management and Supervision

a) Review and confirm the acceptance test proposals made by the EPC Contractor and support the Employer in completing the acceptance test.
b) Review and confirm the O&M Manual, including training programs for REA engineers & other stakeholders on O&M, prepared by the EPC Contractor.
c) Provide additional technical support to the Employer as needed for successful implementation of the EPC’s O&M Contract.
d) Review and revise the detailed "O&M Manuals prepared by the EPC Contractor for use by REA in the operation, from the date of official acceptance by POE and hand over to REA of the Project.
e) Manage and supervise all O&M Services provided by the EPC Contractor for all power plants for the first 12 months operation. This 12-month O&M includes:
Daily operation and maintenance services, including supply of spare parts, to ensure the plant facilities operating at guaranteed performance and availability standards
- Training owner's personnel for operation and maintenance
- Conducting an Energy Output test annually till One (1) year of O&M to verify acceptable performance of PV plant facilities
- Official acceptance of the one-year O&M services of EPC Contractor by REA, and handing over the O&M to REA; and
- Counter measures to be taken in case of deviations found beyond guaranteed values.

4.2.4.3 Minimum Trainings

The minimum trainings to be carried out by the EPC Contractors are designed to add value as part of Nigeria’s capacity building drive in the power sector. The trainings target three categories of participants:
- Government Agencies: REA, NERC, MoPW staff (5 persons per Agency)
- 80 university staff in the utilities and works departments (10 per university)
- 800 students in the engineering departments (100 per university), of which 20% will be female.

The government agencies (REA, NERC, MoPW staff) and university staff will have the following curriculum:
- Plant operations and maintenance;
- Energy efficiency & technology certification; and
- Advanced technical & commercial aspects of renewable energy technologies.

The students’ curriculum includes the following:
- Renewable energy principles (design, installation, commissioning, operations, maintenance, economic viability, safety);
- Generation, transmission, distribution (installation, transformer technology, protection, network design); and
- Metering (energy meters, installation, troubleshooting).

4.2.5 Project Management Component

4.2.5.1 Contract Procedures

The Consultant shall formulate and establish procedures for the proper management, administration and quality assurance of all contracts for the construction of the Project(s) as well as the Consultant’s own services, and shall effect monitoring and control of these procedures.

4.2.5.2 Reports
The Consultant shall check and approve the following reports, which shall be in a format agreed with the Employer and which shall be submitted in number of copies to be agreed with the Employer.

a. The monthly report shall be coordinated with the requirements set forth in "Project Program" to include submittal of the following:
   I. Cumulative expenditure record and estimated cost at completion of each item;
   II. Claims received, under consideration and settled;
   III. Quarterly project progress monitoring reports (summary reports on instrumentation monitoring or similar construction performance system) and quarterly financial monitoring reports;
   IV. Technical reports on instrumentation monitoring or similar construction performance;
   V. Completion Reports for all major structures or elements of the contract works, incorporating as-built records and drawings, within 60 days of issue of any Taking-Over Certificate. Completion Reports shall also include details of construction methodology, concrete quality, geological condition etc; and
   VI. Provide any special reports as requested by the Employer.

4.2.5.3 Project Program Report (Inception Report)

a) Within 14 days of award of the Consulting Contract, the Consultant shall prepare, and submit to the Employer for consent, a detailed program of all of the activities related to the execution of the Project. The Consultant's program shall be based on the reviewed and accepted programs of the Civil and Electrical Works and shall include all activities that interface or otherwise relate to the work being done by the different sub-Contractors or other involved parties.

b) Submission of program data shall include as a minimum:
   i) Tabular listings giving:
      a) Early starts and finishes
      b) Late starts and finishes
   ii) Free and total floats;
   iii) Computer generated bar charts;
   iv) Information on assumed shutdown periods; and
   v) Vacation days, and other non-working time periods.

c) When this program has been approved by the Employer, it shall become the new base-line program for monitoring the execution of the Project (the progress monitoring with milestones) and shall not be modified or revised by the Consultant without the prior consent of the Employer.

d) If updating of the Project program is required, a revised program shall be prepared by the EPC Contractor and reviewed by the Consultant, and resubmitted to the Employer for its consent. When approved, this program will become the new baseline program for all future work. During the performance of the work, the Consultant shall monitor the program and shall provide update reports on a monthly basis together with the monthly report on progress of the works. The monthly updates of the Consultant's program shall be monitored against the approved program and all variations shall be noted. The future impact of major variations shall be determined and analysed. Necessary
corrective measures or re-planning of the Consultant’s work shall be established by the Consultant. The Employer shall be notified of corrective measures. When approved, this program will become the new baseline program for the project.

e) Without assuming responsibility, the Consultant shall assist the Employer in the preparation of financing plans for every contract and every component of the Project. These financing plans shall be based on the various financial agreements entered into by Federal Government of Nigeria and the Employer.

4.2.6 Project Relations

The Consultant shall promote good project relations and in so doing shall monitor project labour relations, living conditions, health and safety programs, and community relations to identify potential problems and resolve them promptly. Problems that cannot be resolved promptly by the Consultant through the construction and equipment contracts shall be reported forthwith to the Employer for action at the earliest possible.

4.2.7 Commissioning of Works

The Consultant shall be responsible for supervising the commissioning of all structures and plant on the Project. The Consultant shall review the commissioning procedures prepared by the EPC Contractor, involving the Employer’s operating staff, coordinate testing and commissioning programs. During construction, the Consultant shall make himself fully aware of the state of all structures and plant of the civil works, and ensure that the EPC Contractor or unauthorized personnel do not use or operate the structures and plant prior to or after commissioning except as authorized by the Consultant.

4.2.8 Additional Assistance to REA

As directed by the Employer, the Consultant shall assist the Employer in carrying out specific tasks directly or indirectly related to the Project, such as, but not necessarily limited to, the following:

a. In the event that the Consultant is required to deal with any dispute pursuant to the EPC contract, the services required and the remuneration for such services shall be deemed to be additional to the scope of the Consulting Services Agreement, provided that such dispute does not arise from any failure of the Consultant to properly perform his duties under the Agreement and provided further that the Consultant shall assign senior staff other than the field staff responsible for the supervision work to deal with such dispute.

b. Supervising in initiating work on future phases of the Project, if required.

c. Technology transfer to enhance the Employer’s technical knowledge on solar power development and project management capacity through on-the-job training.

5.0 FIRM’S QUALIFICATION AND EXPERIENCE

The Consulting firm for this assignment must be an Engineering firm with minimum of five (5) years continuous experience serving as an Owner’s Engineer in Solar Hybrid Power Plant at Megawatt scale in Nigeria or other similar developing country.
To provide the consulting services for the duration of the Project (until the Solar PV Hybrid Power and Gas-fired Plants commissioning) and for one year thereafter during the operation of the plant. The Consultant team of engineers and other specialists, shall be experienced in the design and supervision of construction of solar/gas projects including power stations, civil structures, distribution lines and 33kV substations and below, and other appurtenant works. Emphasis is placed on the need for relevant design and construction supervision engineers to have knowledge and previous experience of similar works to those at the Project site. It is particularly important that the engineers shall have substantial previous experience in dealing with contractual matters and contract claims.

The benchmarks for owners engineering company which could be a Joint Venture partnership are as follows:

- Must have valid registration, and must have been established for not less than 10 years from the date of the EOI.
- Must have at least 5 years’ experience in utility scale solar PV.
- Must have at least 5 years’ experience working on gas-fired power plants construction.
- Must have experience as owners engineer in at least 3 Solar PV Hybrid and 2 gas-fired power projects in developing countries.
- Must have worked as independent consulting firm in at least 3 solar projects larger than 1 MWP and total track record more than 3 MWp.
- Must have worked as independent consulting firm in at least 2 gas-fired power plant projects larger than 1 MWe and total track record more than 2 MWe.
- Track record in grid interconnection at 11 KV or more for at least 2 projects.
- Track record in civil works for at least 2 solar PV Hybrid/gas projects.

6.0 KEY EXPERTS’ QUALIFICATION AND EXPERIENCE

6.1 Key Expert Requirement: The Consultant will assign adequately qualified key personnel to carry out the Consulting Services. In particular, the key personnel should possess the qualification and experience as indicated in the following.

Table 2.

<table>
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<tr>
<th>S/N</th>
<th>PERSONNEL</th>
<th>REQUIRED QUALIFICATION &amp; EXPERIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Team Lead, Head Review Team</td>
<td>Bachelor’s Degree in Electrical Engineering with 10 years of general experience and over 5 years of experience in solar power construction projects. He/She shall have an experience as a team leader in at least one solar PV Hybrid/gas powered project of installed capacity of 3 MW or above.</td>
</tr>
<tr>
<td></td>
<td>Role</td>
<td>Qualifications</td>
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<tr>
<td>2</td>
<td>Lead, Review Team (Solar)</td>
<td>Bachelor’s Degree in Electrical Engineering with 6 years of general experience and over 2 years of experience in solar power construction projects. He shall have an experience as a team leader in at least one solar powered project of installed capacity of 2 MW or above.</td>
</tr>
<tr>
<td>3</td>
<td>Lead, Review Team (Gas)</td>
<td>Bachelor’s Degree in Electrical/mechanical Engineering with 6 years of general experience and over 2 years of experience in gas power construction projects. He/she shall have experience as a team leader in at least one gas project of installed capacity of 2 MW or above.</td>
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<tr>
<td>4</td>
<td>Lead, Review Team (Electrical)</td>
<td>Bachelor’s Degree in Electrical Engineering with 6 years of general experience and over 2 years of experience in solar/gas power construction projects. He/she shall have experience as a team leader in at least one solar/gas project of installed capacity of 2 MW or above.</td>
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<tr>
<td>5</td>
<td>Lead, Review Team (Civil)</td>
<td>Bachelor’s Degree in Civil Engineering with 10 years post qualification experience in Foundations, Structures and at least 3 years of experience for Solar PV Hybrid/gas projects</td>
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<tr>
<td>6</td>
<td>Civil Engineer</td>
<td>Bachelor’s Degree in Civil Engineering with 5 years post qualification experience in Foundations, Structures and at least 2 years of experience for Solar photovoltaic projects</td>
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<tr>
<td>S/N</td>
<td>KEY EXPERT</td>
<td>NO</td>
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<td>-----</td>
<td>------------------------------------------------</td>
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</tr>
<tr>
<td>1.</td>
<td>Team Lead/Project Manager, Head Review Team</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Lead, Review Team (Solar)</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Lead, Review Team (Gas)</td>
<td>1</td>
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<tr>
<td>4.</td>
<td>Lead, Review Team (Electrical)</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Lead, Review Team (Civil)</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Civil Engineer</td>
<td>8</td>
</tr>
<tr>
<td>7.</td>
<td>Electrical Engineer /Resident Engineers</td>
<td>8</td>
</tr>
<tr>
<td>8.</td>
<td>Safeguard Specialist (Health, Safety &amp; Environment)</td>
<td>8</td>
</tr>
<tr>
<td>9.</td>
<td>Gender Based Violence (GBV) officer</td>
<td>1</td>
</tr>
</tbody>
</table>

### 7.0 DELIVERABLES & PAYMENT SCHEDULE

The consultants are expected to work in collaboration with the members of Rural Electrification Agency / Nigeria Electrification Project toward successful execution of the assignment to achieve the key deliverables. The Consultant will be required to prepare and submit the following scheduled reports and deliverables on the service.

### 7.1 REPORTING

The Consultant will report to Head Project Management Unit. In the course of the service, the consultant is required to provide reports as listed below in respect of the various contracts and activities at the project area. The various reports shall be submitted
to REA-NEP in the number of copies indicated in paragraph 11.

7.1.1 **Inception and Monthly Progress Report**
The Consultant shall submit an Inception Report at the end of week four. Subsequently, monthly progress reports encompassing all the activities under the deliverables section of the assignment for the duration of the Services shall be submitted every four weeks. This report should be detailed including progress pictures and illustrations where necessary. The consultant shall provide all data required by REA-NEP to enable proper and timely monitoring of the contract to ensure that the contract is completed on schedule. As part of the progress report, and based on contractor’s programme of work, the Consultant shall determine and project possible and reasonable payment amounts and intervals for the duration of the Contract. This is to give the Client information on Cash Flow during the contract duration for disbursement / payment preparation.

7.1.2 **Completion/Final Report**
On issuance of completion certificate to the contractor, the Consultant shall prepare and submit the Completion Report on the service detailing the project objective, work scope, achievements, problems, issues on the contract physical works implementation and the consultancy service.

7.1.3 **Periodic Milestones:**
The following milestones are expected to be achieved within the indicated timelines:

<table>
<thead>
<tr>
<th>S/N</th>
<th>Deliverables</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project Program Report (Inception Report)</td>
<td>T+ 4 weeks</td>
</tr>
<tr>
<td>2</td>
<td>GBV Prevention Plan</td>
<td>T+6 weeks</td>
</tr>
<tr>
<td>3</td>
<td>Review and Validation of Final Energy Demand Analysis Reports from the FEED</td>
<td>T + 9 weeks</td>
</tr>
<tr>
<td>4</td>
<td>Review and validate technical and financial feasibility studies for each university.</td>
<td>T+16 weeks</td>
</tr>
<tr>
<td>5</td>
<td>Review and validate the inspection reports for existing MV/LV distribution network and street lighting infrastructure</td>
<td>T+18 weeks</td>
</tr>
<tr>
<td>6</td>
<td>Review and validate proposed design for the Workshop and Training Centre</td>
<td>T+10 weeks</td>
</tr>
<tr>
<td>7</td>
<td>Review and validate proposed energy efficiency measures to be adopted at each university</td>
<td>T+20 weeks</td>
</tr>
<tr>
<td>8</td>
<td>Review and validate detailed designs for each project site, including engineering drawings, Bill of Quantities and cost estimation (based on final agreed FEED.</td>
<td>T+20 weeks</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th>Provision of technical input for the Bidding documents</th>
<th>T+24 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Handover of site to EPC Contractor</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Review of topological, geophysical, and geotechnical survey</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Review of Site Preparation Report</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Review of designs/construction drawings from EPC contractors</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Review of Status Report on Equipment Order/procurement</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Report on Manufacture (Factory Acceptance Test)</td>
<td>T+30 week</td>
</tr>
<tr>
<td>16</td>
<td>Report on Construction and Installation of Equipment</td>
<td>T+37 weeks</td>
</tr>
<tr>
<td>17</td>
<td>Commissioning Report</td>
<td>T+40 weeks</td>
</tr>
<tr>
<td>18</td>
<td>Integration Report</td>
<td>T+43 weeks</td>
</tr>
<tr>
<td>19</td>
<td>Final Acceptance Test (Completion Report &amp; Report on O&amp;M activities after 1 year of operation)</td>
<td>T+95 weeks</td>
</tr>
</tbody>
</table>

Note: T= Contract Signature date

Additionally, the Consultant will also submit regular project monitoring and supervision reports as detailed in Section 4 of this Terms of Reference that will be required throughout the duration of the Assignment.

8. DURATION OF THE ASSIGNMENT
The duration of this assignment shall be Three (3) years i.e. Thirty-Six (36) months.

9. Consultant's Facilities

9.1 Housing and Office for Consultant
The Consultant shall arrange its own accommodation and office.

9.2 Consultant's Transportation
The Consultants shall arrange the rental vehicles including all necessary costs, such as drivers, fuels, maintenance fees, and insurances.

9.3 Equipment and Miscellaneous
The Consultant shall arrange the office equipment including computers with necessary software at their own cost.
9.4 International Trips and Hotel Accommodation in Nigeria (as identified). The cost of all travel and accommodation shall be included and arranged by the Consultant.

10. FACILITIES/DATA TO BE PROVIDED BY THE CLIENT

The REA will provide the Consultant with the relevant documents and information that will enable the consultant meet deliverables.

11. REMUNERATION AND PAYMENT

11.1 Terms of Payment for Consulting Services

Payments to the Consultant shall be made based on the time inputs of the staff and the actual expenditures incurred (evidenced with appropriate receipts) under the reimbursable component of the contract, as well as submission of the reports listed in paragraph 7 and acceptable to the Client.

Reports of each deliverables will be submitted as follows: One Electronic copy and three hard copies. After the delivery of each deliverable, REA-NEP will review the submissions (Deliverables) and confirm that the reports are satisfactory or not within one week. The consultant will incorporate comments into the final copies of the reports which will be submitted in three hard copies and two soft copies.

12. FACTORY ACCEPTANCE TESTS AND INSPECTION OF MAJOR EQUIPMENT

Factory Acceptance Tests (FAT)/inspection shall be conducted on all major power plant Equipment at the manufacturer’s premises prior to their delivery to site. The FAT/inspection shall be done in co-ordination with REA-NEP staffs assigned to the project. For each FAT/inspection there will be one POE staff accompanying at least three (3) REA-NEP engineers to facilitate the inspection process. The entire cost of inspection will be borne by the EPC Contractor.

13. ORGANISATION AND STAFFING

10.1 Site Supervision and Supporting Team

For effective implementation, the work shall be carried out by a fully integrated team of staff consisting of the Project Manager, expatriate staff/experts, locally hired manpower, and exclusively assigned staff from REA to the Project.

This team shall operate as an independent and self-sufficient entity with the Project Manager entrusted with full responsibility and authority to act on behalf of the Consultant.

Members of the project team shall be assigned for the full duration of their involvement and shall be stationed at the site office. During this time, they shall report to the Project Manager directly, or to assigned supervisors within the project team.

The services shall be fully based at the site with a site office. The construction management and construction supervision shall be carried out from this site office.
The design changes, project monitoring, certification of monthly bills etc. shall all be carried out form this site office.

14. CONSULTANT SELECTION METHOD

Consultant will be selected in accordance with the Quality-and-Cost-Based Selection (QCBS) set out in the AFDB procurement framework for group funded operations, October 2015. [www.afdb.org](http://www.afdb.org)

15. COPYRIGHT AND OWNERSHIP

All raw and finished materials would be owned and copyrighted, permission to use materials by the consultant for other projects shall require a written permission of the employer and the Consultant shall maintain in strict confidence all information received from the employer concerning imports, financial records and nature of the business.