



RURAL ELECTRIFICATION AGENCY

ENERGY = EMPOWERMENT = EFFICIENCY

NIGERIA ELECTRIFICATION PROJECT

TERMS OF REFERENCE

For

Consultancy Services for Project Owner's Engineer (POE) for Supervision of the Contract for Development of Solar Hybrid Power Plants & Facilities under Energizing Education Programme (EEP) Phase II

REA-NEP/C/QCBS/05/19

May, 2020

TERMS OF REFERENCE

Consultancy Services for Project Owner's Engineer (POE) for Supervision of the Contract for Development of Solar Hybrid Power Plants & Facilities under Energizing Education Programme (EEP) Phase II for Seven (7) Federal Universities & Two (2) Teaching Hospitals in Nigeria.

1. Background

Access to uninterrupted power supply in Federal Universities and University Teaching hospitals in Nigeria has been cited as a major challenge and barrier to effective learning, institutional operations and student residency. Considering the role of education in economic growth and socio-economic development in Nigeria, the Ministry of Power has resolved to embark on viable projects that will ensure the availability of reliable, sustainable and affordable power to Nigeria's tertiary institutions. This led to the conception of the 'Energizing Education Programme' (the "EEP").

The EEP seeks to provide adequate power supply (up to approximately 100MW in total) to Thirty-Seven (37) Federal Universities ("the Universities") and seven (7) University Teaching Hospitals across the Federal Republic of Nigeria. It also aims to provide streetlights to promote and facilitate safe, secure and productive learning environments, as well as develop and operate training centres to train university students in renewable energy technology innovations.

The World Bank has provided financial support to the Nigerian Rural Electrification Agency (REA) through the Federal Ministry of Power to finance Phase II of the EEP, focused on seven (7) universities and two (2) teaching hospitals ("Beneficiary Institutions"). The Bid covers Engineering, Procurement, and Construction (EPC) contracts of approx. total capacity of 38 MW Solar Hybrid Power Plants, rehabilitation of existing upstream distribution infrastructure, streetlights and a renewable energy workshop/training centre (WTC) for the Beneficiary Institutions ("the Projects"). In addition, Operations and Maintenance (O&M) of these Projects, for a duration yet to be determined, will be included into the EPC contracts, which are expected to be concluded, at the earliest, in the third quarter of 2020. It is anticipated that contracts with successful bidders would be signed immediately and the implementation of the Projects would commence thereafter. REA (the Employer) now intends to hire a Consulting Firm as its Project Owner's Engineer (POE) to support the REA through: (i) participating in the evaluation of the submissions for the EPC/O&M contracts ii) providing recommendations to the REA Project Management Unit (PMU) on necessary scope of work and estimated cost for engaging O & M contractor for the operations and maintenance period iii) reviewing designs and specifications during and after EPC/O&M contract execution; (iv) overseeing contract and project management of the Projects, and (v) conducting EPC supervision, commissioning, and acceptance tests validation (including Factory Acceptance Tests (FATs), with special emphasis on integration of the power plant to the existing distribution network.

The implementation period for this service contract is expected to be about 24 months in total (approx. 12 months for the selection and award of contracts to the EPC/O&M contractors and the construction stage thereafter, and another 12 months for the first year of the O&M period).

The scope should include evaluating annual test results along with conducting the final acceptance inspection for the duration of the contract for the Owner’s Engineer.

2. Description of Project

The Phase II sites consist of the following as shown in the table below:

Table 1. Beneficiary Institutions under EEP Phase II

S/N	Location	State	Region
1	University of Abuja	FCT	North-Central
2	Micheal Okpara University of Agriculture Umudike	Abia	South- East
3	University of Calabar & Teaching Hospital	Cross River	South- South
4	University of Maiduguri & Teaching Hospital	Borno	North-East
5	Federal University of Agriculture Abeokuta	Ogun	South-West
6	Federal University Gashua	Yobe	North-East
7	Nigeria Defence Academy Kaduna	Kaduna	North-West

The Project includes:

(a) Design, planning, engineering, procurement (manufacturing/supply), construction/erection, testing, commissioning, and operation and maintenance service of i) a PV solar-hybrid power plant (including rehabilitation of existing upstream distribution infrastructure), ii) installation of streetlights and iii) construction of a renewable energy workshop/training centre (WTC) for the Beneficiary Institutions (“the Projects”), as an EPC Contract, to be procured through an International Competitive Bidding (ICB) process; and

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

The development of PV solar-hybrid power plants by the EPC and O&M Contractor essentially includes, but not limited to, inter alia:

- i. 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, installing, commissioning, and interconnecting the PV solar-hybrid plant to existing distribution network, or as a standalone captive power plant as the case may be.
- ii. Site preparation (including additional topographic surveys, geophysical and geotechnical investigations if necessary) and land levelling, providing construction infrastructure like site office, internal roads, access roads, stores etc., assembly and construction of the entire PV solar-hybrid plant, all pre-construction tests, site management and supervision, labour provision, testing and commissioning of all the

equipment in steps, and interconnection of the solar-hybrid power plant to utility grid substations.

- iii. All the operations not expressly included, that are necessary for proper functioning of the solar-hybrid 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-hybrid power plants would be unable to start operating commercially.
- iv. Commissioning of the solar-hybrid power plants, with provisional acceptance tests, 7 days start-up performance test, monthly and annual performance evaluations, and performance and equipment tests as required by the REA during the defects liability period.
- v. 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 first year O&M period of the solar-hybrid power plants, the facilities will be officially accepted by the POE and handed to REA and the Beneficiary Institutions for acceptance to proceed to the O&M stage of the contract. Comprehensively warranting the entire solar-hybrid 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 providing guarantees on annual energy yield in kWh as agreed on EPC Contract for the first 10 years, post commissioning of the Projects.
- vi. O&M of the entire solar-hybrid power plants for a period to be determined, from the date of official acceptance by POE and handed over to REA and the Beneficiary Institutions. The O & M is expected to include, in accordance with the Sustainability Plan and EPC/O&M Contract terms (both documents still to be concluded),:(a) daily operation and maintenance services, including supply of spare parts, to ensure the plant facilities are operating at guaranteed performance and availability standards; (b) training of persons nominated by the Beneficiary Institution and REA on the solar hybrid power plant and the WTC; (c) conducting an Energy Output test annually for the period of the O&M to verify acceptable performance of PV plant facilities; and (d) counter measures to be taken in case of deviations found beyond guaranteed values.

3. Objective of Services

The objective of the POE consulting services shall be to ensure that the Project is implemented with a high standard of workmanship and quality in accordance with engineering best practice standards as given by IEC & IEEE, 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 World Bank's Safeguard Policies.

4. Scope of Work

The objectives of the services will be achieved through the following major activities to be carried out by the POE:

1. Designs and Documents Review (the preliminary and detailed designs will be provided by the Front-End Engineering Design (FEED) Consultant and EPC contractor).
2. Bid Technical Evaluation & Support during contract negotiations. POE shall assist during technical evaluation of proposals and provide support to REA during contract negotiations.
3. Supporting Contract Management in the following key areas.
 - a. Support the Legal Consultant and the Bid Development Consultant in the drafting of Legal Agreements, whilst ensuring that the roles and responsibilities of each stakeholder (REA, University, EPC/O&M Contractor, Distribution Company, on-campus commercial activities, students, etc.) as defined by the Sustainability Plan and agreed to in the Sustainability Agreement (which is in the process of being developed) are incorporated.
 - b. Support the Sustainability Consultant in its role to:
 - i. define the best ownership structure;
 - ii. define the Financial Model with the operations and maintenance costs of the plants in each university and identify and quantify potential sources of revenues to cover the expenses. In addition to the national budget allocations, one potential source of revenues can be the installation of meters for all on-campus commercial activities. This strategy would promote energy efficiency for those activities, and at the same time would provide a financial contribution to the O&M costs of the future plants. The financial model should be run to ensure the financial sustainability of the plants; and
 - iii. design the Billing Strategy, which will require a tariff structure, billing process, infrastructure and resources needed for the customer interface.
4. Contract, Project and Construction Management of all EEP Phase II Projects.
5. Participating in, evaluating and validating Factory Acceptance Tests, Pre and post Commissioning Test, Acceptance Tests and Integration to existing distribution network at the site (University and/or Hospital), annual tests, along with final acceptance inspection for the duration of the contract for the POE.
6. Providing training to and supervision of nominated female students of the beneficiary institutions, in the design and installation of all the components of the Project. Such training will include theoretical and on the job practical field training. It is expected that the POE's Gender Based Violence Specialist (GBVS) will be the lead, for coordinating this 'EEP STEM Female Internship Programme' on behalf of the POE. Such coordination includes, but is not limited to; liaising with relevant management of the beneficiary institutions with respect to the internship programme, working with the EPC's to develop the schedule for training activities, providing Personal Protective Equipment (PPE) for each intern for their safety at the Project sites, oversee the interns

as they participate in the training provided by the Resident Engineers and EPC contractors, in accordance with the ESMF, monitor and report on the progress of the internship programme and make payments of stipends from the allocated funds provided in the POE Contract under the NEP.

4.1 Brief Description of Services

The POE shall assist REA through providing comprehensive technical services during the selection of the EPC contractors, assisting the Employer in review of the final designs based upon which tender documents have been prepared. During the construction stage, the POE shall provide contract and project management services for the successful implementation of the Projects. Such services shall include reviewing the EPC Contractor's Equipment drawings as they are received, ensuring that they meet the requirements of the specifications, carefully monitoring all procurements under the Projects (executed by the EPC Contractor or others) and informing the Employer and the World Bank immediately on all suspicious indications perceived by the POE.

The Consultant will carry out its duties and responsibilities and assume necessary powers, for consulting services. Such duties may include but not be limited to:

1. Review and confirm quality assurance program of the EPC Contractor.
2. Review and confirm the delivery of material to the site.
3. Review and clear construction drawings, schedules and processes proposed by the EPC Contractor.
4. 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.
5. Hold regular meetings with the EPC Contractor to review project progress, technical issues, and measures to achieve the targeted cost, quality and schedule control.
6. Manage safety, social, and environmental related issues during the construction, in cooperation with the Employer.
7. Obtain, review and confirm all relevant protocols and related documents received from the EPC Contractors, prior to the conduct of all tests on the major equipment for the Solar Hybrid Power Plants and the Solar Hybrid Power Plant itself (pre and post commissioning).
8. Review and confirm the acceptance test proposals made by the EPC Contractor and support the Employer in completing the acceptance test.
9. Review and confirm the O&M Manual, including training programs for REA engineers & other stakeholders on O&M, prepared by the EPC Contractor.
10. Provide additional technical support to the Employer as needed for successful implementation of the EPC Contract.

4.2 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 be located on the EEP Phase II Project sites as specified in the Section 2 Description of Project, within its headquarters, with some members of its team also required to work from the REA PMU office in FCT

Abuja, for the purposes of effective collaboration with the REA Head PMU, EEP Component Heads (REA and World Bank) and dedicated EEP team.

5. Detailed Description of Consulting Services of the POE

5.1 Equipment and Electrical System Component

5.1.1 Design, Manufacture, and Installation of Equipment

Notwithstanding the aforementioned description of services to be conducted by the POE, the POE 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's personnel
- c) Inspect the manufacture of equipment at the Contractor's OEM Factories 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:
 - a. PV modules & Module Mounting structures (MMS)
 - b. Inverters and Power Converters/ Power Conversion Systems (PCS)
 - c. Transformers & Generators
 - d. Control Systems, and Switch gears
 - e. Street lighting infrastructure
- 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 the testing and commissioning of all equipment
- f) Supervise the interconnection and synchronization of solar power plant to the existing distribution network in a safe manner
- g) Measurement and verification of work quantities and certification of EPC Contractor's invoices for approval and recommend 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 prior to the commencement of the O&M
- p) Supervise the O&M for the duration yet to be specified

5.2 Civil Works Component

5.2.1 Design and Construction Drawings

i. 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 notices of any changes.

ii. Construction Drawings

The Consultant shall review the construction drawings for the civil works of the contracts. 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 the 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.

iii. 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.

5.2.2 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 within this scope include:

- 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 baseline 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 monthly 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 monthly payment requests before submitting to the Employer for approval and release of payments
- g) Perform tests on materials as and when required, to satisfy 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 based on an agreed threshold and based on certain criteria with due care not to unnecessarily increase project costs
- 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 commissioning of the PV solar-hybrid power plants
- m) Review and revise the detailed "O&M Manuals" prepared by the EPC Contractor for use by REA and other relevant stakeholders in the operation of the Project
- n) 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 prior to the commencement of the O&M.

5.3 Project Management Component

5.3.1 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 as well as the Consultant's own services, and shall effect monitoring and control of these procedures.

5.3.2 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 a number of copies to be agreed with the Employer.

- a. The monthly progress 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
- b. Quarterly project progress monitoring reports (summary reports on instrumentation monitoring or similar construction performance system) and quarterly financial monitoring reports.
- c. Technical reports on instrumentation monitoring or similar construction performance.
- d. 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.

- e. Provide any special reports as requested by the Employer.

5.3.3 Project Program

- a. Within 60 days of award of the Consulting Contract, the Consultant shall prepare, and submit to the Employer for consent, a detailed program of all 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;
 - 1. Early starts and finishes
 - 2. Late starts and finishes
 - ii. Free and total floats;
 - iii. Information on assumed shutdown periods; and
 - iv. Vacation days, and other non-working time periods.
- c. When this program has been approved by the Employer, it shall become the new baseline 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 program and shall provide update reports on a monthly basis together with 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 revised 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 the Federal Government of Nigeria and the Employer.

5.3.4 Project Relations

The Consultant shall promote good project relations and in so doing shall monitor project labour relations, living conditions, health, security 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.

5.3.5 Commissioning of Works

The Consultant shall be responsible for supervising the commissioning of all structures and plants on the Project. The Consultant shall prepare commissioning procedures, 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.

5.3.6 Review of Operation and Maintenance Manuals provided by the EPC Contractor

The Consultant shall review and finalize the detailed O&M manuals for the complete plant and all subsystems provided by the EPC Contractor under the construction and equipment contracts. The Consultant shall liaise with the Employer and the EPC Contractor to ensure that uniform, complete, high quality O&M manuals are prepared for the Project.

5.3.7 Operation and Maintenance (O&M)

The Consultant shall supervise and oversee all operations of the O&M and report to the client. The O&M oversight and supervision are, but not limited to the following

- a. Technical Asset Management
 - i. Reporting to Asset Owner
 1. Reporting on PV plant performance
 2. Reporting on O&M performance
 3. Reporting on incidents
 - ii. Ensuring regulatory compliance
 1. Legal requirements for PV plant operation
 2. Power Purchase Agreements and Interconnection Agreements
 3. Power generation license agreements
 4. Building permits and environmental permits
 - iii. Warranty administration and Warranty extensions
 - iv. Insurance claims
 - v. Contract management with end user
- b. Power Plant Operation
 - i. Plant documentation management

- ii. Plant supervision
 1. Real-time Performance monitoring and diagnostics
 2. Performance analysis and improvement
 3. Service dispatch/supervision
 4. Spare parts & obsolescence management
 5. Security monitoring interface
 6. Spare parts inventory management

- iii. Plant operation
 1. Plant controls
 2. Power Generation Forecasting
 3. Response time guarantees
 4. Availability guarantees
 5. Annual performance ratio guarantees
 6. Maintenance scheduling
 7. Metering and documentation of energy demand profiles

- iv. Management of change (after consultation with client)

- c. Power Plant Maintenance
 - i. Preventive Maintenance
 1. Preventative maintenance and a visual inspection of the PV array
 2. Periodic PV array cleaning schedules
 3. Preventative maintenance of BoS components such as combiner boxes, disconnects, and Data Acquisition Systems (DAS)
 4. Thermal scans on all electrical DC wiring, AC wiring, inverters, plinth-mounted transformers, and other electrical equipment to identify anomalies (thermography)
 5. Repair and parts replacements of all BoS components
 6. Agreed periodic servicing of DG system
 7. Torque checks on mechanical joints
 8. MMS Tilt change schedules (for seasonal tilt designs)
 9. Regularly scheduled sub-system testing and verification

- d. Proactive maintenance; Real-time 24/7 monitoring & diagnostics

- e. Corrective Maintenance
 - i. PV array cleaning schedules after sandstorms
 - ii. Repairs of all faults and failures according to agreed MTTR

- f. Additional maintenance services
 - i. system-wide vegetation and erosion control
 - ii. Pest (rodent) management and reptile control
 - iii. Waste management
 - iv. Sand removal
 - v. Road management
 - vi. Perimeter fence repair

- vii. Maintenance of buildings
- g. Extraordinary Maintenance

Extraordinary Maintenance interventions shall be required for:

- i. Damages consequent of Force Majeure events.
- ii. Damages consequent of theft or natural disaster.
- iii. Serial defects/ recurring or endemic failures on equipment.
- iv. Modifications required by regulatory changes

5.3.8 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.

6. Qualification and Experience of the Firm

General Requirement for Project Owner's Engineer

To provide the consulting services for the duration of the Project (until the commissioning of the solar-hybrid captive power plants), the Consultant team of engineers and other specialists, shall be experienced in the design and supervision of construction of solar projects including power stations, civil structures, transmission lines, grid substations, 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 are as follows:

- a. Must have valid registration (i.e. certificate of incorporation) and must have been established for no less than 5 years prior to the date of the EOI.
- b. Must have at least 3 years' experience in utility scale solar PV.
- c. The Consulting firm sought for this assignment must be an Engineering firm with a minimum of two (2) years of continuous experience serving as an Owner's Engineer on a combination of Solar Hybrid Power Plants at Megawatt scale in Nigeria or other similar developing country(ies)
- d. Must have worked as independent consulting firm in at least 2 PV solar projects larger than 3 MWp and total track record more than 10 MWp.
- e. Track record in grid interconnection at 11 KV or more for at least 2 projects.
- f. Track record in civil works for at least 2 PV solar projects.

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 as follows.

Table 2. Expected key personnel

S/N	PERSONNEL	REQUIRED QUALIFICATION & EXPERIENCE	MAN /MONTH
1	Project Manager	Bachelor's Degree in Engineering preferably electrical with 10 years of general experience and over 3 years of experience in solar power construction projects. He shall have an experience as a team player in at least one solar project of installed capacity of 2 MW or above.	1/26 (full time)
2	Team Lead, Head Review Team	Bachelor's Degree in Electrical Engineering with 8 years of general experience and over 2 years of experience in solar power construction projects. He shall have	1/26

		an experience as a team leader in at least one solar project of installed capacity of 2 MW or above.	
3	Lead (Solar), Review Team	Bachelor's Degree in Electrical Engineering with 7 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 project of installed capacity of 2 MW or above.	1/26
4	Lead (Electrical/Mechanical), Review Team	Bachelor's Degree in Electrical/mechanical Engineering with 7 years of general experience and over 2 years of experience in solar power construction projects. He/she shall have experience as a team leader in at least one solar project of installed capacity of 2 MW or above	1/26
5	Lead (Civil), Review Team	Bachelor's Degree in Civil Engineering with 7 years post qualification experience in Foundations, Structures and at least 2 years of experience for Solar photovoltaic projects	1/26
6	Financial Expert	Bachelor's Degree in Accounting with 5 years post qualification experience in Project Management Accounting, and at least 2 years of experience for Solar photovoltaic projects.	1/24
7	Contracts Manager	Bachelor's Degree in social sciences or sciences with 5 years post qualification experience in power sector project management	1/14
8	Line Manager 1	Bachelor's Degree in Electrical/mechanical Engineering with 6 years of general experience and over 2 years of experience in solar power construction projects. He/she shall have experience in at least one solar project of installed capacity of 2 MW or above	1/18
9	Line Manager 2	Bachelor's Degree in Electrical/mechanical Engineering with 6 years of general experience and over 2 years of experience in solar power construction projects. He/she shall have experience in at least one	1/18

		solar project of installed capacity of 2 MW or above	
10	Civil Engineer	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	7/12 (on site)
11	Electrical Engineer /Resident Engineers	Bachelor's Degree in Electrical Engineering with 5 years post qualification experience in solar power construction projects.	7/24 (on site)
12	Safeguard Specialist (Health, Safety & Environment)	Bachelor's Degree in Social Sciences or equivalent with 5 years post qualification experience in HSE with least 3 years of experience in Solar photovoltaic projects environment.	7/12 (on site)
13	Gender Based Violence (GBV) officer	Bachelor's Degree in Social Work or other Social Sciences with knowledge of gender issues in development particularly GBV, with 5 years post qualification experience in GBV and at least 1year of experience in Solar photovoltaic projects environment.	7/12 (on site)
14	Document Control Officer	Bachelor's degree in any discipline, with pro efficiency in Microsoft Office Applications and have experience in document management control as well as document drafting (minutes etc.) with at least 3 years post qualification experience	2/24

6.1 KEY STAFF INPUTS

The proposed estimated staff inputs are as follows:

Table 3. Estimated consultant staff time inputs

S/N	KEY EXPERT	NO	TIME INPUTS (MAN-MONTH)	TOTAL MAN-MONTHS
1.	Project Manager	1	26	26
2.	Team Lead, Head Review Team	1	26	26
3.	Lead, Review Team (Solar)	1	26	26
4.	Lead, Review Team (Electrical/Mechanical)	1	26	26
5.	Lead, Review Team (Civil)	1	26	26
6.	Financial Expert	1	24	24
7.	Contracts Manager	1	14	14
8.	Civil Engineer	7	12	84
9.	Electrical Engineer /Resident Engineers	7	24	168
10.	Safeguard Specialist (Health, Safety & Environment)	7	12	84
11.	Gender Based Violence (GBV) officer	7	18	126
12.	Document Control Officer	2	24	48
13.	Line Manager	2	18	36
	Total (Man-Months)			714

7. DELIVERABLES

The POE/Consultant is expected to work in collaboration with the members of the Rural Electrification Agency's Project Management Unit / Nigeria Electrification Project toward successful execution of the assignment to achieve the deliverables. The Consultant will also be required to prepare and submit the following scheduled reports, with minutes of meetings where applicable and deliverables on the service:

7.1.1. Progress Report

The Consultant shall prepare and submit monthly progress reports encompassing all the activities under the deliverables section of the assignment for the duration of the Services. This report should be detailed, including progress pictures, illustrations and minutes of meetings 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.

7.1.2.1 List of Reports

The list of reports expected to be submitted are listed below:

Table 4. Expected deliverables

S/N	DESCRIPTION	DELIVERY TIMELINES	REMARKS
1.	Inception Report	Four (4) weeks from commencement date	Upon submission and approval of the report
2.	Monthly Progress Report 1	8 weeks from commencement	Upon submission and approval of the report
3.	Monthly Progress Report 2	12 weeks from commencement	Upon submission and approval of the report
4.	Monthly Progress Report 3	16 weeks from commencement	Upon submission and approval of the report
5.	Monthly Progress Report 4	20 weeks from commencement	Upon submission and approval of the report
6.	Monthly Progress Report 5	24 weeks from commencement	Upon submission and approval of the report
7.	Monthly Progress Report 6	28 weeks from commencement	Upon submission and approval of the report
8.	Monthly Progress Report 7	32 weeks from commencement	Upon submission and approval of the report
9.	Monthly Progress Report 8	36 weeks from commencement	Upon submission and approval of the report
10.	Monthly Progress Report 9	40 weeks from commencement	Upon submission and approval of the report
11.	Monthly Progress Report 10	44 weeks from commencement	Upon submission and approval of the report
12.	Draft Final Report for the construction stage	48 weeks from commencement	Upon submission and approval of the report
13.	Final Report for the construction stage	52 weeks from commencement	Upon submission and approval of the report
14.	Quarterly progress report 1 on O&M stage	12 weeks from commencement of O&M stage	Upon submission and approval of the report

15	Quarterly progress report 2 on O&M stage	24 weeks from commencement of O&M stage	Upon submission and approval of the report
16	Quarterly progress report 3 on O&M stage	36 weeks from commencement of O&M stage	Upon submission and approval of the report
17	Quarterly progress report 4 on O&M stage	48 weeks from commencement of O&M stage	Upon submission and approval of the report

7.1.2.2 Key Milestones

The following milestones are expected to be achieved within the indicated timelines:

Table 5. Key expected milestones

S/N	Deliverables	Timeline
1	Inception Report	4 WEEKS FROM COMMENCEMENT OF THE CONTRACT
2	GBV Prevention Plan	8 WEEKS
3	Report on Manufacture (Factory Acceptance Test)	11 WEEKS
4	Report on Construction & Installation of Equipment	31 WEEKS
5	Commissioning	35 WEEKS
6	Integration	39 WEEKS
7	Final Acceptance Test (Completion Report)	21 WEEKS 52 WEEKS

8. Reporting

The Consultant will report to Head Project Management Unit

9. Duration of the Assignment

The duration of this assignment shall be Two (2) years i.e. Twenty-Four (24) months (12 months for the construction stage and 12 months for the O&M stage). The Man-Month is 714

10. Consultant's Facilities

10.1 Housing and Office for Consultant

The Consultant shall arrange its own accommodation and office.

10.2 Consultant's Transportation

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

10.3 Equipment and Miscellaneous

The Consultant shall arrange the office equipment, including computers with necessary software, at their own cost.

10.4 International and Local Trips and Hotel Accommodation in Nigeria

The cost of all travel and accommodation shall be included and arranged by the Consultant.

11. 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 to meet deliverables.

12. Remuneration and Payment

13.1 Terms of Payment for Consulting Services

Payments to the Consultant shall be made monthly 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 Table 4 and acceptable to the Client.

Reports of each deliverables will be submitted as follows: One Electronic copy and 3Nos hard copies. After the delivery of each deliverable, REA-NEP will review the submissions (Deliverables) and confirm that the reports are satisfactory within one week. The consultant will incorporate comments into the final copies of the reports, which will be submitted in 3Nos hard copies and 2No. soft copies.

13. Equipment Inspection

Equipment Inspection shall be done in co-ordination with REA engineers and PMU team members assigned to EEP Phase II. For each inspection there will be one (1) POE staff accompanying REA engineers and PMU team members to facilitate the inspection process. The entire cost of inspection will be borne by the EPC Contractor.

14. Consultant Selection Method

The Consultant will be selected in accordance with the Quality and Cost Based Selection (QCBS) Method set out in the Procurement Regulations for IPF Borrowers dated *July 2016 Revised November 2017 and August 2018* available on www.worldbank.org/procure.

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.

16. Organization and Staffing

16.1 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 EEP Phase II Projects.

This POE 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 POE shall be assigned for the full duration of their involvement and shall be stationed at the various EEP Phase II Project site offices. During this time, they shall report to the Project Manager directly, or to assigned supervisors within the POE team.

The construction management and construction supervision, including design changes, project monitoring, certification of monthly bills etc., shall be carried out from the EEP Phase II Project site offices.