Rural and Renewable Energy Agency (RREA)
Securing modern energy access for all Liberians

REQUEST FOR EXPRESSIONS OF INTEREST (CONSULTING SERVICES – FIRMS SELECTION)

Liberia Renewable Energy Access Project Grant No.: **TF-A1646**

Owner's Engineer for the Construction of Mini Grid System in Lofa County

Reference No **LR-RREA-499200-CS-QCBS**

Issue Date: **July 4, 2025**
Deadline: **July 18, 2025**

1. Back ground

The Government of Liberia *has received* financing from the World Bank toward the cost of the Liberia Renewable Energy Access Project (LIRENAP), and intends to apply part of the proceeds for consulting services.
The Liberia Renewable Energy Access Project (LIRENAP) is a partnership project between GoL and the World Bank that aims at increasing access to electricity and fostering the use of renewable energy sources in Lofa, Liberia, and runs up to Decenber 31, 2025. It supports Liberia's NES and directly aligns with global, regional, and sub-regional developmental strategies for increasing universal access to energy. Overall, the project's outcomes will significantly contribute to the overarching GoL's goal of achieving sustainable economic transformation and poverty reduction.
Mainly, the LIRENAP is currently developing a hybrid mini-grid in Lofa County (among others) as relevant for this assignment, which has the main components below. The project is expected to provide access to electricity for at least 50,000 people, including small businesses, associations, and public institutions in Lofa County. The beneficiaries of this decentralized electricity include the towns of Voinjama, Foya, Kolahun, Massambolahun, Bolahun & surrounding areas in Lofa County.
the main infrastructure components of the current project included:

- The development of a 4.0MWp solar plant with a 9.4MWh BESS
- The 1.8MW diesel power plant, serving as a backup generation source for the solar plant is scheduled for commissioning by or before December 2025).
- The 1.8MW diesel power plant, serving as a backup generation source for the solar plant is scheduled for commissioning by or before December 2025).
- The distribution network serving 10,317 service connections will also be commissioned by or before December 2025.

- After commissioning the diesel power plant and distribution network will be safeguarded until after commissioning of the Solar PV and BESS power system, scheduled in February 2026.
- Commercial operation of the Lofa mini grid comprising of the solar PV+BESS power plant, the diesel power plant and distribution network will start by or before March 2026 after commissioning of the solar PB + BESS power plant and hand over of the entire system to the Operator.

2. Objective of the Assignment

The Owner's Engineer shall assist RREA to deliver the remainder of the project on time and within budget. This shall, among others, be achieved by: (i) reviewing the distribution network as build and compare it with the contract and its subsequent amendments; (ii) supervision of the pre-commissioning and commissioning of the distribution network; (iii) formulating clear recommendations for RREA on acceptance of the distribution network; (iv) reviewing the diesel power plant as build and compare it with the contract and its subsequent amendments; (v) supervision of the pre-commissioning and commissioning of the diesel power plant; (vi) formulating clear recommendations for RREA on acceptance of the diesel power plant; (vii) reviewing the PV + BESS power plant as build and compare it with the contract and its subsequent amendments; (viii) supervision of the pre-commissioning and commissioning of the PV + BESS power plant; (ix) formulate clear recommendations for RREA on acceptance of the PV+BESS power plant; and (x) providing transaction advisory services to RREA on the Operations & Maintenance of the mini-grid (implementation); (xi) building capacity of RREA staff by explaining all aspects of the above assignments; and (xii) monitoring implementation progress (time and budget), reporting on a weekly basis, to RREA with copies to the World Bank and proposing remedial actions where needed.

3. Scope of the Assignment

The Rural and Renewable Energy Agency (RREA) seeks the services of a qualified and experienced consulting firm to act as **Owner's Engineer (OE)** for the **supervision of pre-commissioning and commissioning activities** of three interconnected infrastructure components under the Liberia Renewable Energy Access Project (LIRENAP) and the Liberia Electricity Sector Strengthening and Access Project (LESSAP). These include:

- **Distribution Network (Work Package 2)**
- **Diesel Power Plant (Work Package 3)**
- **PV+BESS Power Plant (Work Package 1)**

The Consultant will operate in accordance with internationally recognized engineering supervision practices and applicable Liberian laws, ensuring compliance with technical, environmental, and social requirements. Key responsibilities include:

a. Supervision of Pre-commissioning and Commissioning Activities

- **Review and assessment** of contractor contracts, technical documents, and plans.
- **Inspection and verification** of system construction against contract specifications.
- **Oversight of pre-commissioning tests** (e.g., calibration, continuity, insulation, integration).
- **Supervision of commissioning** and performance testing under actual and simulated conditions.

- **System validation and optimization** to ensure operational readiness and efficiency.
- **Defect identification** and supervision of corrective actions.
- **Validation of test records** and final handover documentation including O&M manuals, as-built drawings, and certifications.
- Preparation of detailed reports on findings and recommendations to RREA.

b. Technical Training and Knowledge Transfer

- Provide **on-the-job training** and capacity-building for RREA technical staff in the planning, design, supervision, and operation of solar PV, BESS, diesel generation, and T&D systems.
- Engage RREA staff directly in technical reviews and field supervision.

c. Implementation Monitoring

- Prepare and submit **weekly progress reports** to RREA and the World Bank.
- Recommend **remedial actions** in cases of delays or budget issues.
- Organize emergency meetings where critical risks to timelines or costs are identified.

d. Reporting and Deliverables

The Consultant shall submit:

- Weekly implementation progress reports.
- Reports on each pre-commissioning and commissioning phase.
- Final supervision and handover report.
- Training records and knowledge transfer documentation

. A detailed breakdown of the scope of work is outlined in the full Terms of Reference (ToR).

4. Qualification, Experience and Competencies of the Assignment

Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services. The shortlisting criteria shall be but not limited to the following indicated below;

- ***Extensive Experience:*** At least 10 years of demonstrable expertise in detailed engineering design, construction supervision, and management of solar PV projects with BESS including in the position of Owner's Engineer;
- ***Project Assignments:*** Successfully completed at least 3 assignments directly related to the above-specified expertise, one of which must have been in Sub-Saharan Africa or developing countries;
- ***Commissioning Expertise:*** Proven experience in supervising end-to-end pre-commissioning and commissioning processes for distribution networks and diesel power plants, including solar PV plants with BESS;
- ***Mini-Grid Integration:*** Demonstrated ability to supervise the integration of mini-grid systems involving renewable energy sources, diesel power plants, and distribution networks;
- ***Operational Expertise:*** Strong understanding of best practices in O&M for mini-grids, including asset management and optimization;
- ***Institutional Capacity:*** Good reputation with strong institutional capacity, technical and managerial expertise, quality management systems, skilled technical staff, and financial soundness, etc.;

- ***Regional Experience:*** Proven track record in supervising projects in environments similar to Liberia or the region.
- ***Procurement Knowledge:*** Familiarity with the World Bank Standard Bidding Documents and Procurement Guidelines.
- ***Good reputation of project in the region****; The firm must have a good track record of project successfully implemented within the region*

The attention of interested firms is drawn to Section III, paragraphs, 3.14, 3.16, and 3.17 of the World Bank's "Procurement Regulations for IPF Borrowers" dated July 2016, revised November 2017, and August 2018, November 2020, September 2023 and revised in February 2025 setting forth the World Bank's policy on conflict of interest. Please refer to paragraph 3.17 of the Procurement Regulations on conflict of interest related to this assignment which is available on the Bank's website at http://projectsbeta.worldbank.org/en/projects-operations/products-and-services/brief/.

A Consulting Firm will be selected in accordance with Quality and Cost Based Selection (QCBS) method set out in the Procurement Regulations.

Further information and the detailed Terms of Reference (TOR) for the assignment can be obtained electronically at the following email addresses and Website, from Mondays to Fridays, from 0900 to 1600 hours GMT:

Email:
info@rrealiberia.org,augustinem@rrealiberia.org,samueln@rrealiberia.org,dehkonteew@rrealiberia.org,tenniej@rrealiberia.org, stevenp@rrealiberia.org
Website: *www.rrealiberia.org*

Expression of Interest clearly marked Consultancy for ***Owner's Engineer for the Construction of Mini Grid System in Lofa County*** must be delivered in an electronic/mail copy to the address below, on or before **4:00 p.m.** Local Time on **July 18, 2025**.

Attn: Samuel Bocay Nagbe Jr.
Executive Director
Rural and Renewable Energy Agency
LEC Sub-station, Newport Street
1000 Monrovia 10, Liberia
Email: samuelnrrealiberia.org

Electronic submission should also be copied to the following addresses:
info@rrealiberia.org;stephenp@rrealiberia.org;augustinem@rrealiberia.org,
tenniej@rrealiberia.org,dehkonteew@rrealiberia.org, theophilusk@rrealiberia.org.

Only shortlisted firm will be issued the Request for Proposals.

RURAL AND RENEWABLE ENERGY AGENCY (RREA)

Terms of Reference for Owner's Engineer for the Completion of the Mini-grid in Lofa County

Liberia Renewable Energy Access Project (LIRENAP)

5. Background

Shortage of electricity is a major constraint to economic and social development in Liberia.

Liberia's energy access is still today one of the lowest in the world. The rural energy access in Liberia is very low. Despite some progress on the electrification of Monrovia - the country capital - Liberia has still one of the lowest electrification rates in the world – 31.8% national, 14.9% rural, and 53.7% urban (World Bank Data 2022[1]). This situation leaves most people reliant upon various informal and unreliable systems and leads also to an intensive use of diesel-based generators in the less rural areas of the country. With the increasing urbanization in and around Monrovia as well as the development of the rural areas of the country, the electricity demand is increasing rapidly; as such, the expedient deployment of electricity infrastructure is essential to accelerate electricity access in Liberia.

Despite high renewable energy potential, Liberia's energy cost is one of the highest in the world. Liberia has more than 2.3 GW of hydro potential identified and widespread solar irradiation and biomass vegetation. Many locations across the country offer the potential for lower-cost renewable electricity. However, populations with electricity in Liberia face one of the highest costs of electricity in the world with tariffs of US$0.25/kWh (average).

The Government of Liberia (GoL) recognizes the country's main development challenges and has prioritized energy infrastructure development for expanding access to reliable and affordable electricity supply. With support from development partners – World Bank (WB), African Development Bank (AfDB), European Union (EU), United States Agency

[1] World Development Indicators | DataBank

for International Development (USAID), Government of Sweden, etc., the GoL has embarked on achieving universal electricity access by 2030 according to its National Electrification Strategy (NES).

The NES targets to electrify 1.1 million households through a dual approach and least cost option: (i) grid initiatives involving grid densification and expansion, expansion of the distribution network along the CLSG corridor, and expansion of the cross-border systems, and (ii) off-grid initiatives of developing large and small mini-grids and significantly scaling up the deployment of solar home systems. This integrated approach will also bridge the urban-rural electricity divide and foster sustainable development across the country.

The NES also serves as a platform to coordinate resources from multiple development partners to achieve universal electricity access in Liberia by 2030. The NES estimates that approximately US$190 million in additional public funding will be required beyond the US$276.2 million already committed in 2022 by various development partners. Furthermore, an additional US$137 million will need to be leveraged from private sector investments to support off-grid solutions, including large and single-community mini-grids and stand-alone solar systems. To facilitate effective planning, resource mobilization, coordination, and monitoring of energy access initiatives, the Rural and Renewable Energy Agency (RREA) has developed and launched the NES digital platform (NES Platform) as a critical tool in advancing Liberia's electrification goals.

Key Public Energy Stakeholders

Relevant government institutions of the sector are:

i. Ministry of Mines and Energy (MLME): The Ministry is responsible for overall energy sector development and policy.
ii. Rural and Renewable Energy Agency (RREA): RREA was established by an Executive Order in 2010 and by an Act of the National Legislature in 2015, as an Autonomous Agency of the GoL, with the mandate to facilitate and accelerate the economic transformation of rural Liberia, by promoting the development and supply of modern energy products and services to rural areas with an emphasis on locally available renewable energy resources. RREA's primary function is the

planning, development, and promotion of renewable energy projects together with public, private, and community developers.

iii. Liberian Electricity Corporation (LEC): LEC is a state-owned utility company that, by law, continues to be the transmission system operator and the national grid company.

iv. Liberia Electricity Regulatory Commission (LERC): LERC is the newly created regulatory Agency in charge of licensing activities, issuing regulations to implement the electricity law, approving tariff-setting methodologies, and establishing, monitoring, and enforcing technical, performance, and security regulations/standards.

6. Current Project

The Liberia Renewable Energy Access Project (LIRENAP) is a partnership project between GoL and the World Bank that aims at increasing access to electricity and fostering the use of renewable energy sources in Lofa, Liberia, and runs up to June 30, 2025. It supports Liberia's NES and directly aligns with global, regional, and sub-regional developmental strategies for increasing universal access to energy. Overall, the project's outcomes will significantly contribute to the overarching GoL's goal of achieving sustainable economic transformation and poverty reduction.

Mainly, the LIRENAP is currently developing a hybrid mini-grid in Lofa County (among others) as relevant for this assignment, which has the main components below. The project is expected to provide access to electricity for at least 50,000 people, including small businesses, associations, and public institutions in Lofa County. The beneficiaries of this decentralized electricity include the towns of Voinjama, Foya, Kolahun, Massambolahun, Bolahun & surrounding areas in Lofa County.

Originally, the main infrastructure components of the current project included:

i. 2.5MW hydropower plant on the Kahia River, the primary source of electricity generation for the mini-grid that is about 93 km from Voinjama, Lofa County, and 85 km from the Diesel Power Plant in Balawala Village.

ii. 33/0.4kV Distribution network, consisting of 136.4km of 33kV lines, 211.4km of low voltage distribution network (0.4kV), 112 pole-mounted transformers (up to 100kVA), and 10,317 service connections in the main load centers as well as other smaller townships along the 33kV line routes.

iii. 1.8MW Diesel power plant and associated infrastructure in Balawala Village, about 8km from Voinjamin, Lofa County, as the backup source of electricity generation for the mini-grid.

The development of the hydropower plant, which had progressed to approximately 20% completion, has been temporarily discontinued due to its implementation delays and considerable cost variation caused by unforeseen hydrological and ground conditions at the hydropower site, among others. Based on an optimization study recommending a least cost solar-BESS-diesel hybrid mini-grid as a more viable alternative, the following decisions have been taken regarding the shift to mini-grid development:

i. The GoL will not pursue the hydropower plant development under the project but rather in the medium term. The hydropower site will be temporarily closed per prevailing Environmental, Social, and Safety Standards.
ii. The GoL will immediately develop a 4.0MWp solar plant with a 9.4MWh BESS to replace the hydropower generation under the project. As it is infeasible to complete the solar facility by the project closing date, its implementation may continue under another World Bank funded project (LESSAP).
iii. The 1.8MW diesel power plant, serving as a backup generation source for the solar plant is scheduled for commissioning by or before December 2025.
iv. The distribution network serving 10,317 service connections will also be commissioned by December 2025.
v. After commissioining the diesel power plant and distribution network will be safeguarded until after commissioining of the Solar PV and BESS power system, scheduled in July 2026.

Commercial operation of the Lofa mini grid comprising of the solar PV+BESS power plant, the diesel power plant and distribution network will start in August 2026 after commissioining of the solar PV + BESS power plant and hand over of the entire system to the operator competitively selected by the Government of Liberia.

Given the above, the physical implementation of the project is being carried out through the below contracts (as revised):

i. **Work Package 1:** Design, supply, and installation of the 4.0 MWp solar plant with 9.4 MWh BESS and associated interconnection infrastructure **(New).** Preparatory activities for this package have been is completed, including the preliminary design of the solar facility and the preparation of bidding documents. The package is currently at the contract award stage..
ii. **Work Package 2:** Design, supply, and installation of the 33/0.4kV distribution network and customer connections – ongoing (about 91% complete), with the distribution network completed, service connections steadily progressing (5,569/10,317 complete) due to customers unreadiness to connect, and remedial activities (replacing bare conductors with insulated conductors at about 35km of the 33kV lines, and containing the pole-mounted transformers) as well as pre-commissioning and commissioning of the network pending;

iii. **Work Package 3:** Design, supply, and installation contract for the 1.8MW Diesel power plant – ongoing (> 80% complete).

It is now the intention of the RREA to get the services of an Engineering firm (Owner's Engineer) to carry out the responsibilities outline under the Objective of the Assignment below.

7. Objective of the Assignment

The Owner's Engineer shall assist RREA to deliver the remainder of the project on time and within budget. This shall, among others, be achieved by: (i) reviewing the distribution network As Built and compare it with the contract and its subsequent amendments; (ii) supervision of the pre-commissioning and commissioning of the distribution network; (iii) formulating clear recommendations for RREA on acceptance of the distribution network; (iv) reviewing the diesel power plant As Built and compare it with the contract and its subsequent amendments; (v) supervision of the pre-commissioning and commissioning of the diesel power plant; (vi) formulating clear recommendations for RREA on acceptance of the diesel power plant; (vii) supervision of the construction of the solar PV and BESS including the reviewing the solar PV + BESS power plant As Built and compare it with the contract and its subsequent amendments; (viii) supervision of the pre-commissioning and commissioning of the PV + BESS power plant; (ix) formulate clear recommendations for RREA on acceptance of the PV+BESS power plant; and (x) providing transaction advisory services to RREA on the Operations & Maintenance of the mini-grid (implementation); (xi) building capacity of RREA staff by explaining all aspects of the above assignments; and (xii) monitoring implementation progress (time and budget), reporting on a weekly basis, to RREA with copies to the World Bank and proposing remedial actions where needed.(xiii) Monitoring Correction of Defects During Defects Liability Period

Where relevant the work shall be carried out in close cooperation with the selected operator in case the operator is on board at the time of carrying out the respective tasks. All the services shall be conducted in close collaboration with the RREA.

Specifically, the Consultant shall perform the following tasks, summarized in the table below.

Task	**Scope of Services**
1. 33/0.4kV network	i. Review as built system and compare this with the contract and subsequent amendments ii. Assess compliance with ESMP iii. Supervision of all requisite remedial works to bring the installations in conformity with the design drawings, scope changes and specifications. iv. Supervision of pre-commissioning & commissioning activities (particular attention must be paid to connection readiness with the other parts of the system (diesel power plant and PV+BESS power plant) v. Review of submittals, to include As Built Drawings, Staking Charts, Spare Parts Listing and O&M Manual vi. Formulate recommendation for RREA on acceptance and handover
2. 1.8MW Diesel Plant	i. Review as built system and compare this with the contract and subsequent amendments ii. Assess compliance with ESMP iii. Supervision of all requisite remedial works to bring the installations in conformity with the design drawings, scope changes and specifications. iv. Supervision of pre-commissioning & commissioning activities (particular attention must be paid to connection readiness with the other parts of the system (T&D network and PV+BESS power plant) v. Review of submittals, to include As Built Drawings and O&M Manual

Task	Scope of Services
	vi. Formulate recommendation for RREA on acceptance and handover.
3. Solar & BESS plant	i. Review as built system and compare this with the contract and subsequent amendments ii. Assess compliance with ESMP. iii. Supervision of all materials supply and works to bring the installations in conformity with the design drawings, scope changes and specifications. iv. Supervision of pre-commissioning & commissioning activities (particular attention must be paid to connection readiness with the other parts of the system (T&D network and diesel power plant) v. Review of submittals, to include AS Built Drawings and O&M Manualiv)Formulate recommendation for RREA on acceptance and handover.
4. O&M of the mini-grid	i. Support O&M operator (selection) onboarding, and asset handover. ii. Develop KPIs, SLAs, and tools for performance monitoring and compliance. iii. Build RREA's capacity for O&M oversight and contract management.
5.Knowledge Transfer	i. Training and transfer of knowledge to RREA (& Operator) on design, and O&M of the mini-grid systems; ii. Mentor RREA staff and take then trough the process of all above tasks (this requires significant face to face meeting in the RREA or OE office and in the field) iii. Provide documents, reports and information that will help RREA staff to better understand the assessments made by the OE.
6. Monitoring Implementation Progress	i. Preparation of short concise weekly progress reports for RREA and the World Bank

Task	Scope of Services
	ii. Recommendation of remedial actions to bring the project back on track and within budget iii. Call for and organize emergency meetings with RREA and World Bank if planned time lines can no longer be kept or in case of significant budget overruns.
7.Monitoring Correction of Defects During Defects Liability Period (DLP)	i. Advise RREA of all reported defects on the installations for notification to the Contractor ii. Inspect and advise approval of all corrected defects by the contractor iii. Provide technical advice and support RREA on the resolution of any disputes that may arise from the operationalization of the installations. iv. Provide Report to RREA on all identified defects and measures undertaken to correct those defects.
** Supervision includes supervision of the Contractor's ESMP as applicable. ** The Consultant shall certify milestones for payments to Contractor(s) as applicable. ** The Contractors will perform the pre-commissioning and commissioning tasks, while the Consultant will oversee, validate, and document the process.	

The Consultant shall propose the optimal work plan, organization, and staffing schedule to efficiently implement the assignment.

The Consultant shall include in its proposal and implement throughout the assignment appropriate professional codes of conduct and behavior. This shall include a Health, Safety, and Environment (HSE) policy statement and a comprehensive Code of Conduct, which all staff members will be required to sign and adhere to.

8. Scope of Services

The Consultant shall serve as the independent technical advisor to the client and provide strategic input on project management. The consultant will oversee supervision, quality control, and compliance monitoring for the implementation of a hybrid mini-grid system

composed of: - 4 MW Solar PV - Battery Energy Storage System (BESS) - Diesel Generation Plant and MV/LV T&D network.

The Consultant shall be required to provide overall engineering and construction supervision in accordance with internationally recognized practices for consultancy services suitable to control and monitoring of the project in all aspects and in line with requirements stated in this TOR. The Consultant shall perform the requested services as an independent Engineer in conformity with acceptable international standards and applicable laws and provide appropriate advice to RREA.

The Consultant will have to interact closely with RREA for all matters related to physical implementation and financial follow-up of the project. The Consultant will also have to transfer know-how to RREA and provide adequate Technical Assistance to the further development of an efficient and effective implementation agency.

The services to be provided by the Consultant shall include but not necessarily be limited to the following:

Task 1: Supervision of the pre-commissioning and commissioning for distribution network (result Work Package 2)

At the start of the assignment the T&D system will have been constructed. The Owner's Engineer shall be responsible for overseeing pre-commissioning and commissioning of the distribution network.

Specifically, the OE shall:

i. Review the original contract with the T&D contractor and all subsequent ammendments. Review T&D Contractors design report, design assumptions and code compliance in order to appreciate a comprehensive basis for the works execution

ii. Review the T&D Contractors Quality Management, Document Control and Construction Management Protocols

iii. Review the T&D Contractors Personnel, their calibre and the tools and equipment available to them through the project and to enable them complete the assignment successfully.

iv. Inspect the T&D system and verify that the system as built conforms to the contract, including subsequent amendments and in line with good and proper workmanship. This does not only include technical aspects but also environmental and social requirements. Validate T&D Contractors Materials Quantities as installed against the contract provisions.

v. Assess readiness for connection with diesel power plant and PV+BESS power plant; Ensure that all necessary communication systems and protocols, materials, duct provisions are available to ensure seamless synchronization and control of the various systems, ie PV+BESS, Diesel Power Plant and T&D Network

vi. The OE shall prepare a report for RREA with its findings and highlight if there are any shortcomings of the contractor in meeting its contractual obligations. The report will need to highlight an assessment of the Contractors Execution Program and the critical path items to ensure that key milestones will be achieved..

The OE shall recommend to RREA what actions (if any) will need to be taken.

vii. Review the T&D Pre-Commissioning Plan: Assess the contractor's pre-commissioning procedures, checklists, and schedules for completeness and compliance with project requirements.

viii. Inspection and Verification for Pre-commissioning:

a. Oversee inspections of installed equipment and systems to verify compliance with design drawings, technical specifications, and installation guidelines. Preparation of snag list.

b. Supervise testing of components, such as insulation resistance, cable continuity, earth resistance and mechanical integrity.
c. Verify calibration of instruments, relays, and control systems to ensure accuracy.

ix. Witness Pre-Commissioning Tests:
a. Validate the contractor's execution of pre-commissioning tests, such as earth testing, continuty checks, visual inspections and functional verifications.
b. Ensure the integration and compatibility of subsystems and components.

x. Review the T&D Commissioning Plan: Evaluate the contractor's commissioning procedures and protocols for adherence to project specifications.

xi. Supervise Commissioning Activities:
a. Witness and validate system start-up, operational performance testing, and functional testing under simulated and actual conditions.
b. Verify the operation of protection systems, control systems, and emergency safety features.
c. Ensure compliance with health, safety, and environmental standards during commissioning.

xii. System Optimization and Validation:
a. Oversee fine-tuning of system parameters for optimal performance and efficiency.
b. Validate the reliability and stability of systems under operational conditions.

xiii. Defect Identification and Monitoring:
a. Identify and document any defects or non-compliance issues during pre-commissioning and commissioning activities.
b. Supervise and verify the contractor's resolution of identified defects and discrepancies.

xiv. Test Record Validation: Review and validate all test records, reports, and certifications prepared by the contractor for accuracy and completeness.

xv. Final Handover Documentation:

a. Ensure the contractor compiles and submits as-built drawings, operating manuals, maintenance schedules, and test certificates. This should be part of the contractors completion report which shall also detail lessons learnt for future project reference.
b. Evaluate and validate T&D Contractors Training program for RREA and O&M Contractors personnel.
c. Evaluate and validate T&D Contractors plan for works execution during defects liability period.
d. Prepare a final supervision report summarizing findings, test results, and system readiness.

Task 2: Supervision of the pre-commissioning and commissioning for diesel power plant (result Work Package 3)

At the start of the assignment the diesel power plant will have been constructed. The Owner's Engineer shall be responsible for overseeing the precommissioning and commissioning of the diesel power plant.

In particular the OE shall:

i. Review the original contract with the diesel power plant contractor (both the contract funded by LIRENAP and the contract funded by LESSAP) and all subsequent ammendments. Review the DG Contractors design report, design assumptions and code compliance in order to appreciate a comprehensive basis for the works execution.
ii. Review the DG Contractors Quality Management, Document Control and Construction Management Protocols
iii. Review the DG Contractors Personnel, their calibre and the tools and equipment available to them through the project and to enable them complete the assignment successfully.
iv. Inspect the diesel power plant and verify that the system as built conforms to the contract, including subsequent amendments. This does not only include technical aspects but also environmental and social requirements. Validate DG Contractors Materials Quantities as installed against the contract provisions.

v. Assess readiness for connection with T&D network and PV+BESS power plant; Ensure that all necessary communication systems and protocols, materials, duct provisions are available to ensure seamless synchronization and control of the various systems, ie PV+BESS, Diesel Power Plant and T&D Network

vi. The OE shall prepare a report for RREA with its findings and highlight if there are any shortcomings of the contractor in meeting its contractual obligations. The report will need to highlight an assessment of the Contractors Execution Program and the critical path items to ensure that key milestones will be achieved.. The OE shall recommend to RREA what actions (if any) will need to be taken.

vii. Review Pre-Commissioning Plans: Assess the contractor's pre-commissioning procedures, checklists, and schedules for completeness and compliance with project requirements.

viii. Inspection and Verification for Pre-commissioning:

a. Oversee inspections of installed equipment and systems to verify compliance with design drawings, technical specifications, and installation guidelines.

b. Supervise testing of components.

c. Verify calibration of instruments, relays, and control systems to ensure accuracy.

iv. Witness Pre-Commissioning Tests:

a. Validate the contractor's execution of pre-commissioning tests.

b. Ensure the integration and compatibility of subsystems and components.

v. Review Commissioning Plans: Evaluate the contractor's commissioning procedures and protocols for adherence to project specifications.

vi. Supervise Commissioning Activities:

a. Witness and validate system start-up, operational performance testing, and functional testing under simulated and actual conditions.

b. Verify the operation of protection systems, control systems, and emergency safety features.

c. Ensure compliance with health, safety, and environmental standards during commissioning.

vii. System Optimization and Validation:

a. Oversee fine-tuning of system parameters for optimal performance and efficiency.

b. Validate the reliability and stability of systems under operational conditions.

viii. Defect Identification and Monitoring:

a. Identify and document any defects or non-compliance issues during pre-commissioning and commissioning activities.

b. Supervise and verify the contractor's resolution of identified defects and discrepancies.

ix. Test Record Validation: Review and validate all test records, reports, and certifications prepared by the contractor for accuracy and completeness.

x. Final Handover Documentation:

a. Ensure the contractor compiles and submits as-built drawings, operating manuals, maintenance schedules, and test certificates. This should be part of the contractors completion report which shall also detail lessons learnt for future project reference.

b. Evaluate and validate DG Contractors Training program for RREA and O&M Contractors personnel.

c. Evaluate and validate DG Contractors plan for works execution during defects liability period.

d. Prepare a final supervision report summarizing findings, test results, and system readiness.

Task 3: Supervision of the materials supply and construction, pre-commissioning and commissioning of the PV+BESS power plant (result Work Package 1)

The Owner's Engineer shall be responsible for overseeing commissioning of the diesel power plant. In particular the OE shall:

i. Review the original contract with the PV+BESS power plant contractor (both the contract funded by LIRENAP and the contract funded by LESSAP) and all subsequent ammendments. Review the PV/BESS Contractors design report, design assumptions and code compliance in order to appreciate a comprehensive basis for the works execution.

ii. Review the PV/BESS Contractors Quality Management, Document Control and Construction Management Protocols

iii. Supervise the materials supply and construction of the PV/BESS Power Plant/ Inspect the PV+BESS power plant and verify that the system as built conforms to the contract, including subsequent amendments. This does not only include technical aspects but also environmental and social requirements. Validate PV/BESS Contractors Materials Quantities as installed against the contract provisions.

iv. Assess readiness for connection with T&D network and diesel power plant; Ensure that all necessary communication systems and protocols, materials, duct provisions are available to ensure seamless synchronization and control of the various systems, ie PV+BESS, Diesel Power Plant and T&D Network.

v. The OE shall prepare a report for RREA with its findings and highlight if there are any shortcomings of the contractor in meeting its contractual obligations. The report will need to highlight an assessment of the Contractors Execution Program and the critical path items to ensure that key milestones will be achieved..The OE shall recommend RREA what actions (if any) to be taken.

vi. Review Pre-Commissioning Plans: Assess the contractor's pre-commissioning procedures, checklists, and schedules for completeness and compliance with project requirements.

vii. Inspection and Verification for Pre-commissioning:

a. Oversee inspections of installed equipment and systems to verify compliance with design drawings, technical specifications, and installation guidelines.

b. Supervise testing of components.

c. Verify calibration of instruments, relays, and control systems to ensure accuracy.

viii. Witness Pre-Commissioning Tests:

a. Validate the contractor's execution of pre-commissioning tests.

b. Ensure the integration and compatibility of subsystems and components.

ix. Review Commissioning Plans: Evaluate the contractor's commissioning procedures and protocols for adherence to project specifications.

x. Supervise Commissioning Activities:

a. Witness and validate system start-up, operational performance testing, and functional testing under simulated and actual conditions.

b. Verify the operation of protection systems, control systems, and emergency safety features.
c. Ensure compliance with health, safety, and environmental standards during commissioning.

xi. System Optimization and Validation:
a. Oversee fine-tuning of system parameters for optimal performance and efficiency.
b. Validate the reliability and stability of systems under operational conditions.

xii. Defect Identification and Monitoring:
a. Identify and document any defects or non-compliance issues during pre-commissioning and commissioning activities.
b. Supervise and verify the contractor's resolution of identified defects and discrepancies.

xiii. Test Record Validation: Review and validate all test records, reports, and certifications prepared by the contractor for accuracy and completeness.

xiv. Final Handover Documentation:
a. Ensure the contractor compiles and submits as-built drawings, operating manuals, maintenance schedules, and test certificates. This should be part of the contractors completion report which shall also detail lessons learnt for future project reference.
b. Evaluate and validate PV/BESS Contractors Training program for RREA and O&M Contractors personnel.
c. Evaluate and validate PV/BESS Contractors plan for works execution during defects liability period.
d. Prepare a final supervision report summarizing findings, test results, and system readiness.

Task 4: Support for Onboarding and Operationalization of O&M Services for the Hybrid Minigrid

At the commencement of the works by the Owner's Engineer, the selection of the O&M Operator may have progressed, and the O&M Operator might already be onboard. If the process is still underway, the OE will (i) Advise RREA on technical criteria for selecting a qualified O&M operator, and (ii) Participate in evaluating proposals and reviewing O&M contract provisions

including the scope of works outlined below. If the selection process is complete and the O&M Operator's contract has been signed, the OE shall undertake the following:

i. Facilitate technical onboarding, including training, orientation, and knowledge transfer from Contractors to the O&M operator.

ii. Oversee Handover and Asset Readiness
   a. Ensure complete transfer of technical documentation, as-built drawings, O&M manuals, warranties, spare parts, and system tools.
   b. Verify asset readiness and operational functionality prior to handover.
   c. Support development of operational procedures and preventive maintenance schedules.

iii. Develop and Advise on Performance Monitoring Framework
   a. Define Key Performance Indicators (KPIs) and Service Level Agreements (SLAs) for O&M.
   b. Recommend reporting templates and digital tools for ongoing monitoring.
   c. Support RREA in establishing systems for performance tracking and contract enforcement.

iv. Ensure Regulatory Compliance and Risk Mitigation
   a. Confirm that O&M arrangements comply with national mini grid codes, licensing conditions, and safety regulations.
   b. Identify potential operational risks and mitigation measures for post-handover phase.

v. Build RREA's Capacity for O&M Oversight
   a. Provide training and technical backstopping to RREA's staff on supervision, performance monitoring, and contract management.
   b. Recommend institutional tools for documentation, reporting, and issue escalation during the O&M phase.

Task 5: Training and Knowledge Transfer

The Consultant shall provide training to selected technical staff of RREA in the design, supervision, project management, and operation of the mini-grid systems (with emphasis on the infrastructure of this project). These trainings shall cover various areas including but not limited to: planning and design of power generation (solar PV with BESS and diesel plants), transmission and distribution systems including plant civil works designs; and protection and control of generation plants, electrical transmission and distribution systems.

The program shall be primarily on-the-job training. On-the-job training shall be provided by having the Client's staff work with the Consultant either at the Consultant office or at RREA by carrying out the consultants tasks as a team. After any review by the consultant, the consultant shall explain in detail to selected RREA staff the comments and recommendations made.

Task 6: Monitoring Implementation Progress

From the start of the assignment until the end of this contract until the commissioning of the Solar with BESS project, the OE shall report weekly on implementation progress. In particular the OE shall:

i. Hold Regular, joint meetings (weekly) with the respective contractors to resolve technical issues, review project progress and measures to achieve cost, quality and schedule objectives. Record minutes of meetings for submission as part of progress report. Preparation of short concise weekly progress reports for RREA and the World Bank. Include pictorial evidence of works progress in reports.
ii. Recommendation of remedial actions to bring the project back on track and within budget
iii. Call for and organize emergency meetings with RREA and World Bank if planned time lines can no longer be kept or in case of significant budget overruns.

Task 7: Monitoring Correction of Defects During Defects Liability Period (DLP)

During the defect liability period where the respective contractors are responsible for the correction of defects on their installation the OE shall ensure that the respective contractors fulfil their obligations to rectify defects. Particularly, the OE shall,

i. Advise RREA of all defects on the installations for notification to the Contractor the contractor of all reported defects on the installations

ii. Inspect and approve all corrected defects by the contractor

iii. Provide technical advice and resolve any disputes that may arise from the operationalization of the installations.

iv. Provide Report to RREA on all identified defects and measures undertaken to correct those defects

9. Reporting and Deliverables

The Consultant shall report directly to the Project Coordinator (and the World Bank were required) and shall be required to prepare and submit to RREA the following reports and documents:

Task	Report	Time Line
1	a. Inception with updated timeline of activities	a.Two weeks after signing contract
2	a. Review T&D system as built b. T&D Pre-Commissioning Report c. T&D Commissioning Report	a.Before T&D pre-commissioning b.1 week after T&D pre-commissioning c.2 week after T&D commissioning
3	a. Review diesel power plant as built b. Diesel power plant Pre-Commissioning Report	a.Before diesel power plant pre-commissioning b.1 week after diesel power plant pre-commissioning

	c. Diesel power plant Commissioning Report	c.2 week after diesel power plant commissioning
4	a. Review PV+BESS power plant as build b. PV+BESS power plant Pre-Commissioning Report c. PV+BESS power plant Commissioning Report	a.Before PV+BESS power plant pre-commissioning b.1 week after PV+BESS power plant pre-commissioning c.2 week after PV+BESS power plant commissioning
5	a. O&M Operator Onboarding and Operational Readiness Report b. Other reports as required	aBefore O&M operator full system commissioning and handover
6	a. Training plan b. Background documents and information as needed	a.1 month after signing contract b.During whole contract period
7	a. Concise weekly progress reoports	a.Every Monday
8	a. Defect Liability Monitoring Report b. Site inspection Report	a.Every Quarter during the Defect Liability Period of a year b.As agreed depending on extent of defects

10. Contractual Arrangement

This assignment will be funded from resources of two World Bank funded project (LIRENAP and LESSAP II**)**

11. Qualification of Consultant

The Consultant shall be a registered engineering firm with the qualifications below.

- **Extensive Experience:** At least 10 years of demonstrable expertise in detailed engineering design, construction supervision, and management of solar PV projects with BESS including in the position of Owner's Engineer;
- **Project Assignments:** Successfully completed at least 3 assignments directly related to the above-specified expertise, one of which must have been in Sub-Saharan Africa or developing countries;
- **Commissioning Expertise:** Proven experience in supervising end-to-end pre-commissioning and commissioning processes for distribution networks and diesel power plants, including solar PV plants with BESS;
- **Mini-Grid Integration:** Demonstrated ability to supervise the integration of mini-grid systems involving renewable energy sources, diesel power plants, and distribution networks;
- **Operational Expertise:** Strong understanding of best practices in O&M for mini-grids, including asset management and optimization;
- **Institutional Capacity:** Good reputation with strong institutional capacity, technical and managerial expertise, quality management systems, skilled technical staff, and financial soundness, etc.;
- **Regional Experience:** Proven track record in supervising projects in environments similar to Liberia or the region.
- **Procurement Knowledge:** Familiarity with the World Bank Standard Bidding Documents and Procurement Guidelines.
- **Good reputation of project in the region**; The firm must have a good track record of project successfully implemented within the region

12. Qualifications for the key professional staff

The key professional staff to be provided by the Consultant shall be sufficient to cover all the scope of the assignment. The Consultant is thus free to organize their resources as they wish around the key experts outlined below. Some positions can be combined and carried out by one expert. Key experts are expected to be on site to sometime in the field when

necessary while non-key experts can provide support from home base and are not required to travel to Liberia or the site.

i. **Team Leader/Project Manager:** An Engineering professional with at least a Bachelors degree or equivalent degree and at least 15 years of experience designing, supervising, and managing of Power Supply System Projects. Must have managed at least 2 similar mini-grid systems that involved a hybrid of solar PV plant with BESS and diesel generators. Working Experience in West Africa is desirable. Professional certification in project management, such as PMP (Project Management Professional), PRINCE2 (Practitioner), or equivalent is desirable. Significant experience in proposal evaluation and working as Owner's Engineer, preferably in projects in Africa.

ii. **Electrical Engineer:** An Electrical Engineering professional (with at least Bachelor Degree in electrical engineering (Masters degree is preferred) with at least 15 years' experience in electrical engineering, power systems, specifically in the design, supervision, and commissioning of solar PV plants, BESS, and medium-to-low voltage (33/0.4kV) distribution networks.. Must have participated in at least 5 similar projects, with responsibilities including electrical system design, installation supervision, and pre-commissioning/commissioning. Familiarity with diesel generator plant design, integration, and commissioning. Working Experience in West Africa is desirable.

iii. **Resident Electrical Engineer:** A Electrical Engineering professional (with at least a Bachelors degree in Electrical Engineering) with at least 10 years experience in field supervision of energy projects (hybrid mini-grid systems is preferred) in West Africa and with proven experience in procurement and commissioning grid systems and excellent reporting and coordination skills.

iv. **Civil/Structural Engineer:** An Civil Engineering professional (With at least a Bachelors degree in civil engineering or equivalent) with at least 10 years experience in supervision of civil engineering projects, including solar PV projects.

v. **O&M Advisor**: should be a senior professional with at least 10 years of experience in operating and maintaining hybrid renewable energy mini-grids, including solar PV, battery storage, and diesel generators. They must have expertise in O&M contracting, defining KPIs and SLAs, onboarding third-party operators, and setting up performance

monitoring systems. A solid understanding of regulatory compliance, asset management, and risk mitigation in rural or off-grid electrification is essential. Experience in Sub-Saharan Africa, particularly in low-capacity settings like Liberia, is highly desirable. Strong communication and capacity-building skills are required to support the RREA and ensure a smooth operational transition.

vi. **Safeguards Specialist (Health, Safety and Environment):** An Environmental professional (with at least a first degree in Environmental Science or a closely related field) preferably a local consultant or one with extensive experience in Liberia. Must have at least five (5) years of experience in managing environmental and safety compliance processes for infrastructure and energy projects) preparing and/or supervising the implementation of ESMP(preferrably donor funded projects). Experience in Gender issues associated with Electricity Power Systems and Networks would be an added advantage.

Non-key experts: The consultant shall list all required Non-Key experts to enable the consultant to successfully complete the assignment. CVs for non-key experts should not be submitted in the proposal but the Consultant will have to demonstrate in their offer that they have access to experts with the required profiles. The Consultant shall select and hire other experts as required according to the profiles identified in the Organization & Methodology and/or these Terms of Reference. It must clearly indicate the experts' profile so that the applicable daily fee rate in the budget breakdown is clear. All experts must be independent and free from conflicts of interest in the responsibilities they take on.

Support staff & backstopping: The Consultant will provide support facilities to their team of experts (back-stopping) during the implementation of the contract. Backstopping and support staff costs must be included in the fee rates.

All experts must be fluent in both oral and written English.

13. Duration of Assignment

The assignment is time-based and expected to commence by September 2025.

The estimated total man-months effort over a 6-month period required by the 5 key staff to complete the assignment is presented in the table below. An estimated 1.5 man-months is needed to cover the defect liability period. All 5 key staff are expected to travel one or more times to Lofa county. These are for reference only. Consultants must make their own estimates and specify non-key staff requirements.

The pre-commissioning and commissioning of the diesel power plant and T&D network (Tasks 1 and 2) are expected in November and December 2025 and of the PV+BESS power plant (Task 3) in January and February 2026. Task 4 is expected to be implemented throughout the assignment. Task 6 is expected to be implemented following the commissioning of the respective installations and throughout the duration of the Owner's Engineer's (OE) contract. During this period, the OE shall ensure that all reported defects on the installations are properly addressed by the respective contractors. This includes advising RREA of all identified defects for official notification, inspecting and approving rectification works, providing technical guidance and resolving any disputes that may arise, and submitting regular reports on defects and corrective actions undertaken.

Key Staff	**Key Responsibilities**	**Total Staff Months**[1]
Team Leader/Project Manager	Management of the project	4
Electrical Engineer	Inception, Supervision of Electrical & Mechanical Remedial Works of DG and T&D Works. Supervision of PV/BESS Installations. Supervision of pre-commissioning & commissioning of the mini-grid systems	4

Resident Electrical Engineer	Full time on Site for a period of 6 Months – September 2025 to February 2026	6
Civil/ Structural Engineer	Civil and Structural part of the PV + BESS power plant including PV modules, buildings, compound and access facilities	1
Safeguards Specialist (Health, Safety and Environment)	Safeguard issues including Environment, Social, Gender, Health and Safety	2
Non-key experts support		
Genset Commissioning Engineer	Pre-Commissioning and Commissioning of the diesel power plant	1
Commissioning Engineer	Pre-Commissioning and Commissioning of T&D, DG and PV+BESS	3
BESS&SCADA Specialist&Portection and Controls Engineer	Pre-Commissioning and Commissioning PV/BESS	1.5
O&M/Asset Management Advisor	O&M Planning and Oversight, Operator Onboarding Support, Performance Monitoring Setup and Capacity Building Assistance	2.5

14. Client's Input

i. All relevant technical reports for the project;
ii. About 3 Engineers would be attached to the Consultant for the on-the-job training;
iii. Assistance in obtaining permission, working permits, residence visas, and re-entry and exit visas for the Consultant's staff;

iv. Assistance in facilitating and expediting customs procedures in connection with the importation of equipment and materials necessary for the Consultant's services.
v. One four wheel drive off Road vehicle will be provided
vi. Maintenance of the vehicle provided.
vii. A driver will be provided.
viii. Office space near the project site in Lofa County will be provided to accommodate both RREA's field team and the Consultant's staff, to facilitate joint oversight and effective communication during the construction period.

15. Facilities to be provided by the Consultant

All residential accommodation including the payment of all utility bills for the Consultant's staff shall be the responsibility of the Consultant. The Consultant shall equip itself with all necessary equipment for the proper execution of the tasks. Such equipment includes, but is not limited to, communication equipment with international and local access to the telecoms systems and for communications between the staff of the Consultant and with RREA, computers and printers, and scanners, all with the necessary software.

Reporting Relationship

The Client is represented by the Executive Director with the following contact details:

Mr. Samuel B. Nagbe, Jr.
Executive Director
Rural and Renewable Energy Agency (RREA)
Old LEC Substation, Newport Street
Monrovia, Liberia

The Client's Project Coordinator of the assignment is:

Mr. Theophily A.T. Kambo Jr
Project Lead, Electrical Engineer Consultant
Rural and Renewable Energy Agency (RREA)
Old LEC Substation, Newport Street
Monrovia, Liberia

All reports and other deliverables shall be presented to the Project Lead. The Project Lead shall be responsible for providing day-to-day supervision and support to the Consultant as may be required. This support includes introduction to the management staff of RREA and assistance to secure all relevant documentation that may be required.