



ECOWAS COMMISSION
COMMISSION DE LA CEDEAO
COMISSÃO DA CEDEAO

REGIONAL OFF-GRID ELECTRICITY ACCESS PROJECT (ROGEAP)

P160708

TERMS OF REFERENCE (TOR)

ADVISOR (Firm)

**for the development and implementation of sustainable business and financing models
for the electrification of public rural health centers and schools in Niger and Nigeria.**

Funding: World Bank/CTF/DGIS



March 2023

1. Overview of ROGEAP

The Regional Off-Grid Electricity Access Project (ROGEAP) objective is to increase access to sustainable electricity services in the fifteen ECOWAS member countries¹ and the four non-ECOWAS countries Cameroon, Chad, Mauritania, and Central African Republic. ROGEAP will improve access to sustainable energy by building a regional market for off-grid solar products and supporting the various stakeholders across the value chain, i.e., governments, private sector, financial intermediaries, and end users including households, businesses, and to public health and education facilities through a pilot program focused on two countries² that could potentially be expanded based on pilot results. These terms of reference are focused on the electrification of public health and education facilities.

While Sub-Saharan Africa experiences a lack of access to reliable electricity services, this deficit is more pronounced in the Western and Central Africa and Sahel region, particularly in countries such as the Central African Republic (CAR), Chad, Guinea-Bissau, Liberia, Niger, and Sierra Leone. In addition, household access to electricity varies considerably between urban and rural areas. Out of a population of 406 million people in the 19 project countries, it is estimated that 208 million inhabitants have no access to electricity, about 70 percent of whom live in rural areas. Based on the off-grid market assessment of 2018, the average rural electrification rate stood around 18 percent, while that of eight countries—Burkina Faso, Chad, the CAR, Guinea, Guinea-Bissau, Liberia, Mauritania, and Niger—is less than 5 percent. Improving energy access, especially for marginalized and disadvantaged groups and lagging regions is essential in achieving sustainable and inclusive development and poverty reduction.

Stand-alone solar systems have a large market potential in Western and Central Africa. Currently, less than 3 percent of the region is served by stand-alone solar systems, equivalent to roughly 5 million consumers. The market assessment carried out in 2018 identified that about 31 million households could be electrified using stand-alone solar systems in Western and Central Africa. The potential value of the household solar market is estimated to be about US\$6.6 billion. The assessment further identified about 800,000 educational and healthcare facilities that could be electrified with stand-alone solar systems with an investment estimate of US\$1.5 billion. Moreover, the share of the rural population served by decentralized renewable energy sources such as mini-grids and stand-alone systems is expected to reach 22 percent by 2020 and 25 percent by 2030.

Promoting electrification using stand-alone solar systems requires a harmonized regional approach. This entails establishing a business-friendly ecosystem to attract private sector investments to provide electricity to people without grid connection including female headed households, in a decentralized manner. The projects³ financed by the World Bank in the Africa region with stand-alone solar components have adopted a market-based approach, implemented by the private sector, to provide access to electricity to the people. This needs to be applied to electrification of public institutions too. Since 2019, the World Bank under the Lighting Africa Program with support of SHATZ ENERGY RESEARCH CENTER (SERC) and in collaboration with the ECOWAS CENTER FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY (ECREEE) have done many surveys and analytical work to assess sustainable business models for the provision of electricity services to electrify public facilities far from the Grid in Niger and Nigeria through solar PV technology under the ROGEAP. With ROGEAP the results of those studies need to be updated.

¹ ECOWAS member countries are Republic of Benin, Republic of Cape Verde, Burkina Faso, Republic of Côte D'Ivoire, Islamic Republic of The Gambia, Republic of Ghana, Republic of Guinea, Guinea-Bissau, Republic of Liberia, Republic of Mali, Republic of Niger, Nigeria, Republic of Senegal, Republic of Sierra Leone, and Republic of Togo.

² Nigeria and Niger; although the selection of countries is flexible

³ Ethiopia: Electricity Network Reinforcement and Expansion Project (P119893), Niger: Solar Electricity Access Project (P160170), Rwanda: Renewable Energy Fund Project (P160691), Zambia: Electricity Service Access Project (P162760), and Kenya: Off-Grid Solar Access Project (P160009).

2. SCOPE OF THE ASSIGNMENT

Within the above context, ECOWAS has received funding from the World Bank under ROGEAP project and would like to appoint a firm to support the selection of public facilities and foster their electrification. Selected public facilities will be in Niger and Nigeria and will be located far from the utilities' electricity grid. While the medium-term objective is to develop a sustainable financing and operating model for a variety of public facilities, this assignment represents the follow-up of the first phase of this effort and will exclusively target health facilities and schools.

The principal objective of this assignment is to identify the challenges in a public sector payment scheme and the private sector "appetite" to work with a service based model (payments are not made upfront against capital cost, but are instead made regularly on verified delivery of service) of public off-grid PV installations in the two ROGEAP countries Niger and Nigeria when payments are assured (guaranteed) by the ROGEAP project for the duration of 4-5 years (guarantees are a backup in case the government does not make payments for delivery of service). In line with this objective, both success and sustainability of the service and financing model to be developed will hinge on the close involvement of private sector entities as service providers guided, as well as robust remote monitoring and independent verification of services (through monitoring of key performance indicators) delivered.

In parallel, the World Bank team is working with Multilateral Investment Guarantee Agency (MIGA) on a risk mitigation solution which would allow the energy service contract tenor to extend beyond an initial period of current ROGEAP support, with an intended duration to up to 15 years (i.e., the estimated average lifetime of the respective PV assets). Once said MIGA operation is approved and effective, the service period may thus be extended accordingly.

3. Tasks

Task 1: Establish inventory and typical electricity service needs of potential public institution beneficiaries in Niger and Nigeria

Approximately 15 project sites each in Nigeria and Niger were identified for the purposes of this project in 2019. Consultants should capitalize on analytical work; electricity needs analysis, surveys, audit reports, and technical specifications already completed under the ROGEAP project. The documents from the work carried out by the World Bank under the Lighting Africa Program and ECREEE will be provided to the consultants to advance this task.

The consultant shall review said documents, evaluate the suitability of sites against E&S and climate requirements (see Annex 1), as well as correspond with the line ministries and accordingly.

- Confirm at least 15 rural health centers and schools each in Niger and Nigeria located at least 5 km from the utility grid and unlikely to be reached by any grid-electrification program over the next 5 years.
- Identify "typical" electricity needs of rural health centers and schools including the associated staff housing, based on the health and education services provided and the estimated number of beneficiaries of the public institutions surveyed.
- Based on the above needs analysis, define 2-3 suitable "standalone PV technology packages" to be used (Sizing and Designing the system) across identified health centers and schools in Niger and Nigeria.
- Said technology packages will include PV panels, charge controllers, battery banks, inverters, utility meters and remote monitoring devices, as well as internal wiring, all tailored to the identified electricity needs of health centers and schools while considering mobile network access conditions.

- In the interest of reducing safeguards complexity and potential land use issues, rooftop PV technology should be taken in priority wherever possible, unless the PV panels can be fully accommodated on the property of the public institution.

During the identification of suitable health centers and schools, consultants should work closely with World Bank teams in Niger and Nigeria to capitalize on ongoing off-grid electrification efforts in both countries (for e.g., Nigeria Electrification Project - P161885 and Niger Accelerating Electricity Access Project (HASKÉ) - P174034.). The consultants should also use the Quality Assurance Guideline to electrify public institutions and the sample technical specifications for several size of solar systems prepared by the Lighting Africa Program to benefit from activities previously carried out.

Task 2: Design Business Model for Electrification of Public Institutions

The first generation of pilot service models to be developed under this assignment shall be designed to recover capital costs within 4-5 year with ROGEAP funds to be used to ensure payments are kept within local Willingness-To-Pay (WTP) levels.

Within this context, Task 2 shall cover the following points:

- Identify and design a sustainable integrated service and financing model (**block diagram should be provided**) for the private sector to procure, install, own, operate, and maintain solar power systems for 15 pilot health centers and schools each in Niger and Nigeria. The integrated service and financing model should include robust provisions for remote monitoring and independent verification of services (by monitoring key performance indicators) provided. The consultant will assess the feasibility of private sector financing Level of upfront funding support needed from ROGEAP funds to buy down the initial cost of financing will be explored. A combination of grant and financing support from ROGEAP could be offered to private sector to encourage raising private financing under these schemes.

A. Conduct a **cost analysis** and prepare a financial model, including:

- i. Different CAPEX subsidy levels/CAPEX of equipment to be borne by the private sector;
- ii. The additional project construction and commissioning costs including project development costs, construction, import duties, transportation, security, etc.
- iii. The full OPEX for electricity services to be provided by health centers, including remote monitoring, expenses for periodic replacement of components such as batteries.
- iv. Other operational expenses including equipment disposal costs, insurance, taxes (VAT, income, etc.)

B. Conduct an **assessment of expected financial returns**, including:

- The estimated impact of non-payment risks on the investment hurdle rate and lenders' RAROC plus an analysis on how payment guarantee solutions could reduce these risk premia.
- The required minimum unlevered and levered IRRs, profit margins, and RAROC needed to attract equity and debt investors.

C. Conduct a **sensitivity analysis** with the expected monthly service fee as the output to inform an

optimal contract and subsidy structure, including:

- i. Contract Tenor: Balancing simple payback period with longer tenor to support affordability
 - ii. Ownership Transfer / Residual Value: To evaluate different contractual structures including a 15-year BOOT, 10-year BOOT + 5-year O&M, etc.
 - iii. Tariff Indexation: To evaluate appropriate risk allocation with respect to inflation and FX indexation
 - iv. CAPEX/OPEX Subsidies: The subsidy levels (incl. up-front CAPEX and recurring OPEX subsidies) needed to ensure affordability of services to public institutions.
- Repeat A, B, and C for the case where CAPEX cost is totally paid upfront through donor funding
 - Develop a **risk matrix** and potential mitigants for each risk including contractual risk allocation, political risk insurance, property risk insurance, community engagement/awareness, etc. Provide a qualitative description of each risk and potential mitigant and rough estimate of cost for each solution.
 - Confirm **avenues for investment, payment, subsidization, and affordability of electricity** services to public institutions:
 - Government Stakeholders: Interview government stakeholders (in ministries of energy, health, education) on envisaged challenges regarding payment to private sector (including planning, budgeting, administration, fiscal space, legal and regulatory matters, etc.)
 - Explore avenues for government ministries (including funds, escrow accounts, programs, revenue generating activities) to pay for the cost of service (including capital cost and O&M) and accordingly draft recommendations for adequate and regular release of funds.
 - Electricity Service Payment / CAPEX Grant Funders: Interview donors and DFIs to determine interest in contributing to a fund for payment of services and mitigation of offtaker and counterparty risks.
 - Private sector providers (PSPs): Interviews with PSPs on feasible and attractive contract models with respect to BOOT structures and O&M structures, including linkages to preferences for return on investment and performance incentives under O&M service contracts
 - Investors in the PSPs: Interview stakeholders to determine investment and risk appetite of different investor types including but not limited to impact investors, private equity, venture capital, equipment leasing and ESCOs.
 - Commercial financial institutions: Interview relevant commercial banks and leasing companies to assess their risk perspective to extend debt financing to support capex and opex of the pilot projects. Assess lenders' appetite to engage in such schemes to determine a suitable business model. In addition, consult with BOAD (another implementing agency of ROGEAP) to check availability of partial financing of the schemes to increase bankability.
 - Risk Mitigation Providers: Interview DFIs, financial intermediaries and other potential providers of risk mitigation instruments (such as MIGA guarantees) to determine interest in provision of suitable (sovereign and non-sovereign) guarantee instruments and insurance mechanisms to backstop payments for service and reduce offtaker and counterparty risks.

D. Based on the findings of stages A-C, conduct a **market sounding exercise** with potential private sector service providers to validate the approach and ensure there is adequate interest from potential Service Providers to ensure successful implementation and conclusion of contracts. Based on feedback

from the market-sounding stage, including from the client and other relevant stakeholders, revise and document the implementation strategy and develop appropriate tender documents in liaison with the Clients.

Task 3: Development of an Implementation Strategy

In close coordination with the clients and World Bank teams in both countries, develop a **detailed implementation strategy** for the electrification of the 15 public institutions in each country

- The Consultant shall recommend **key performance indicators (KPIs)** to be adhered to by the service providers such as system reliability and availability, ensuring sustainability related to system design, O&M services.
- The Consultant shall also suggest a remote monitoring platform and a third-party verification mechanism in case of disputes between Service Provider and Client on attainment of KPIs.
- The Consultant shall develop the Terms of Reference (ToR) and assist ECOWAS in the competitive selection and recruitment of a third-party independent verification agent (IVA) mechanism to corroborate contract provisions by Service Providers and assist in case of disputes between Service Provider and Client on attainment of KPIs;
- The Consultant shall support preparation of bidding documents (including legal contracts between the private sector provider and relevant government agencies defining the terms of operation including key performance indicators and the terms of payment) for electrification of public institutions. This would include coordinating with the technical team that has prepared technical specification and quality assurance standards.
- The consultant shall ensure that contracts between different parties: private sector and the government (entity making the payment and entity benefiting from service) as well as the independent verification agency are consistent with bidding documents and its other deliverables under this ToR.

Task 4: 1st year Implementation Support

- Contract supervision and coordination support: Following the completion of tenders and the launch of pilots in both target countries, the Consultant shall ensure that contracts between different parties incl. private sector and the governments (i.e., the entities making the payment and entity benefiting from service) as well as the independent verification agency are consistent with bidding documents and its other deliverables under this ToR.
- Documentation of pilot progress and lessons learnt: During the 1st year of implementation, the consultants shall submit quarterly reports, diligently documenting the challenges, proposed mitigation measures and revised business model to replicate the pilot measures in other sectors (including education) and across Sub-Saharan Africa.

4. Duration and Deliverables

4.1 Assignment Duration

The assignment will be conducted in two parts:

- Part 1 – Task1 to task 3: 24 weeks
- Part 2 - Task 4: 52 weeks

Kick off meeting	Final report task 3	Process of contracting private entrepreneurs	Technical assistance during the implementation phase	Total of assignment
Week 1	Week 24	N/A	One year (52 Weeks)	76 weeks

The period relating to the selection of private contractors is not part of the count. The duration of this period will depend on the selection method that will be proposed by the firm. However, for international open selection, it will take between 6 and 8 months to finalize the recruitment process.

4.2 Deliverables

Deliverables	Due date (from start)
Kick off meeting (MoM)	Week 1
Inception Report Summarize approach, methodology and flag key issues to be addressed that may present challenges during the study	Week 3
Task 1 - Draft Report on inventory and typical electricity service needs of potential public beneficiaries in Niger and Nigeria	Week 6
Task 1- Final Report on inventory and typical electricity service needs of potential public beneficiaries in Niger and Nigeria To organize a national workshop in each Country to present the results of the study to relevant stakeholders	Week 10
Task 2 – Draft Report including Sustainable Business Model Framework (block diagram), cost analysis, assessment of expected financial returns, sensitivity analysis, risk matrix, and confirmed avenues for investment, payment, subsidization, and affordability of electricity	Week 15
Task 2 – Final Report including Sustainable Business Model Framework (block diagram), cost analysis, assessment of expected financial returns, sensitivity analysis, risk matrix, and confirmed avenues for investment, payment, subsidization, and affordability of electricity	Week 21
Task 3 - Draft Implementation Strategy including key performance indicators and bidding documents	Week 18
Task 3 - Final Implementation Strategy including key performance indicators and bidding documents	Week 24
Task 4 – Interim/progress report on the support of the implementation	Every semester

5. Firm Qualifications

Interested consultancy firms should provide information demonstrating that they have the required qualifications and relevant experience to perform the services outlined.

- Experience of at least one similar assignment involving the preparation and implementation of innovative business models for energy access projects;
- Solid qualifications and technical expertise in the following areas:
 - Finance
 - Legal
 - Public Health Sector
 - Social and Environment Safeguards
- Experience on at least one assignment working in Sub-Saharan Africa;
- Experience with World Bank projects and in rural electrification and renewable energy domains will be considered an advantage;
- Experience in the development, implementation, and supervision of long-term service contracts with public institutions will be an asset

- Fluent French language proficiency will be required for team members working on Niger.
- Fluent English language proficiency will be required for team members working on Nigeria.

Key experts for the assessment

Key Experts	Qualification Required	Minimum Experience	Language
Team leader	Master's degree (Engineering, economics, management, ...)	10 years with 3 years in similar assessment	Fluent English and French
Technical Expert 1	Master's degree (Electrical or Renewable Energy)	5 years with 2 similar assessments	Fluent English
Technical Expert 2			Fluent French
2 Technicians Group1	Bachelor's degrees (Electricity)	2 years with 1 similar assessment	Fluent English
2 Technicians Group 2			Fluent French
Financial Senior Expert 1	Master's degree (Finance or Economic)	8 years with 2 similar assessments	Fluent English
Financial Senior Expert 2			Fluent French
Financial junior expert 1	Bachelor's degrees (Finance)	2 years with 1 similar assessment	Fluent English
Financial junior expert 2			Fluent French
Legal Expert 1	Master's degree (Law)	8 years with 3 similar assessments	Fluent English
Legal Expert 2			Fluent French
E&S Expert 1	Master's degree (Environment or Social)	5 years with 2 similar assessments	Fluent English
E&S Expert 2			Fluent French

Team 1: Fluent in English will intervene in Nigeria

Team 2: Fluent in French will intervene in Niger

Additionally, participation of a qualified local counterpart firm/professional personnel in Nigeria and Niger is strongly encouraged. Professionals assigned by the qualified local counterpart should add value through demonstrable expertise and efficiency in data-gathering and site visits.

The proposal should include information on individuals who would participate in the team for this assignment, including their profile and relevant experience, and their expected levels of effort (LOEs) for the assignment as an input to the budget.

6. Facilities and Counterpart Staffing provided by the Client.

The client will provide the firm with the following facilities:

- Official letters for introduction to relevant authorities and stakeholders in Niger and Nigeria.
- Documents related to the assignment.
- Availability of the PIU staff to provide necessary information needed.
- To accompany the firm for site visits if necessary or needed.