

**TERMS OF REFERENCE
FOR**

**DEVELOPMENT OF THE ECOWAS
ENERGY INFORMATION SYSTEM**

Funded by:

1. Introduction

The Economic Community of West African States - ECOWAS, was established in 1975, as a regional economic union comprising of fifteen (15) sovereign nations located in West Africa. These countries are united in their desire to achieve regional integration in all sectors of economic activity, namely: industry, transport, telecommunications, energy, agriculture, natural resources and trade as well as economic, social and cultural issues.

Particularly, the region's energy sector, characterized by interrelated challenges of energy access, energy security and climate change mitigation and adaptation, are intertwined with the region's economic challenges. Article 28 of the ECOWAS Treaty of 1975, relating to the energy sector, seeks to establish a common energy policy and appropriate cooperation mechanism for the resolution of energy development problems in member countries. In this regard, the ECOWAS Regional Energy Programme was embarked upon with a view to improving access to modern, clean and affordable energy services. This can be achieved by developing the region's resources and actively pursuing regional cooperation and integration, particularly in the area of cross-border infrastructure projects for electricity supply.

The commitment by the ECOWAS Authority of Heads of State towards improving the energy situation in the region, has been translated into action through the creation of the following establishments:

a. The ECOWAS Regional Electricity Regulatory Authority (ERERA)

ERERA was established on the 18th of January 2008, as a specialized institution of ECOWAS, mandated to regulate cross-border trade of electricity between Member States, while overseeing the implementation of the necessary conditions to ensure rationalization and reliability; and contributing to setting up a regulatory and economic environment suitable for the development of the regional market. ERERA has its headquarters in Accra, Ghana.

b. The West African Power Pool (WAPP)

With headquarters' based in Cotonou (Republic of Benin), WAPP was established in 1999. Their main objective is to guarantee stable and reliable electricity supply at an affordable price, by developing and coordinating the exchanges of electricity.

The mission of WAPP is to promote and develop power generation and transmission infrastructures as well as to coordinate power exchange among the ECOWAS Member States.

To facilitate the realization of its mission, the WAPP Information and Coordination Centre (ICC), an organ of WAPP, has the following responsibilities as stated in the WAPP Articles of Agreement: collection and analysis of information, and monitoring the development of the national electric power sector, facilitate adoption of standards, develop an M&E System, improve data collection and develop and maintain an electronic database of relevant technical information.

c. ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)

ECREEE is a specialized agency of ECOWAS established in 2008 with a public mandate to promote renewable energy and energy efficiency markets. The overall objective of ECREEE is to contribute to the sustainable economic, social and environmental development of West Africa, by improving access to modern, reliable and affordable energy services, energy security and reduction of energy related externalities (GHG, local pollution).

More specifically, ECREEE seeks to create favorable framework conditions for regional Renewable Energy & Energy Efficiency markets by supporting activities directed to mitigate existing technology, financial, economic, business, legal, policy, institutional, knowledge and capacity related barriers.

d. Department for Energy and Mines, ECOWAS Commission

The Department for Energy and Mines is a constituent part of the ECOWAS Commission, responsible for providing technical expertise in the areas of Energy and Mines, towards the development of policies and technical projects in the region. Its mandate is established in Articles 28 and 31 of the Revised ECOWAS Treaty which states that it shall ensure coordination and harmonization of Member State's policies and programs in the field of energy and natural resources.

2. Background

Over the last decades, the region's energy crisis has deepened, which hampers social and economic development. The reasons are manifold: political crisis, growing electricity demand due to increase in population, escalating diesel and heavy fuel prices, high power generation costs leading to higher consumer tariffs, lack of investments, slow sector reforms, high level of unreliable information, etc.

The non-availability of reliable and updated energy information is a major barrier for local and international investors, policy makers, and other project developers in the energy sector. Information about the energy resources and their potentials are not readily available in all member states, which greatly impacts decision making, policies formulation, monitoring and evaluation of targets. Given this situation, significant opportunities are lost for sustainable energy development in the region.

Although some interventions have been made in the past, a huge gap still exists, which serves as an obstacle that continues to hinder development of the West African region. Various bodies such as the Ministries of energy, national utilities, regulatory institutions, agencies and other institutions from the informal sector engage in some form of data generation and collection. This varied source of information means that data collation is not properly harmonized. This problem cascades down to standardization of energy data collection and sharing. Stakeholders collect data in a manner tailored to meet the requirements of their institutions and thus, there exists no standardized data collection methodology within the region.

The region is further characterized by institutional weaknesses, lack of coordination in energy data collection and information sharing amongst stakeholders and lack of skilled personnel in data management.

In an attempt to mitigate these challenges and improve energy data collection and management at national and regional level, ECREEE, WAPP and ERERA have made giant strides to support the member states. But despite these efforts, some major barriers still exist. Primarily common to the three institutions, is the unavailability of an efficient and reliable platform for data and information management, which covers the needs of all three institutions.

3. Relevance of the Energy Information System

A comprehensive Energy Information System and Database for West Africa is needed, to help collect and share reliable information relevant in the energy sector, and this requires a collective effort from the four (4) ECOWAS energy establishments, the member states and stakeholders. This initiative is pioneered by the ECOWAS energy establishments, as bodies mandated in various capacities to create an enabling environment to foster development in the region's energy sector.

As part of ongoing efforts, EREERA is currently in the process of developing a Regulatory Information Management System, where all energy regulators in the member countries can connect to share information. The ICC department at WAPP has identified the need to put in place an information system with harmonized database that will not only facilitate the collection of data but seamlessly provide data to stakeholders and development partners. A Terms of Reference has been prepared for developing the WAPP Information System (WAPPIS). The Department of Energy at the ECOWAS Commission is also gearing up towards implementing a regional database for the energy sector.

Likewise, crucial to fulfilling its mandate, ECREEE developed the ECOWAS observatory for renewable Energy and Energy Efficiency (ECOWREX) in 2012, under the GEF Strategic Program for West Africa, in cooperation with the United Nations Industrial Development Organisation (UNIDO) and support from the Austrian Development Cooperation (ADC) and the Spanish Agency for International Development Cooperation (AECID). With further support from the European Union, a Spatial Data Infrastructure (SDI) was integrated into the platform, to aid in creation and sharing of spatial datasets.

ECOWREX is an interactive data portal with energy statistics for all ECOWAS member states. The platform includes approximately 60,000 data points, dashboards with key performance indicators and energy balances. A key output of ECOWREX is the Spatial Data Infrastructure (SDI) for energy planning. Platforms such as HDX, REN21, IRENA, GEOSS and ENERGYINFO from the World Bank are currently harvesting spatial datasets from ECOWREX. Also recently, the African Energy Commission has shown interest in having energy efficiency data from ECOWREX.

Moving forward, ECREEE intends to revamp ECOWREX to include more functionalities and tools that will aid in efficient data capture and sharing. The system will be enhanced for information storage, retrieval and analysis.

Information gathering will be expanded to include studies, project documents, policy briefs, and foresight materials on emerging developments in renewable energy and energy efficiency, including equipping the member states with transferable skills on data collection and management. ECOWREX is being considered for an upgrade in the course of this assignment, to fit the needs of EEIS.

Given the needs from these institutions, there is no doubt that putting resources together to develop an integrated energy information system that will facilitate the collection and collation of information from their stakeholders, unto a common energy information platform, will bring countless benefits and provide efficiency as it will lead to the avoidance of duplication of efforts in the region.

It is in response to this laudable initiative by the Heads of these ECOWAS Energy establishments, that development partners are seeking to support the development of an ECOWAS Regional Energy Information System. Its realization is paramount to the development of the Energy Sector. It is believed that the system will enhance informed decision making and investment in the region.

4. Objectives

The main objective of this Terms of Reference (ToR) is to conduct a pre-feasibility study for the design and development of an integrated Energy Information System aimed at addressing the poor data collection and information dissemination in the energy sector.

Specifically, the study includes:

1. A preliminary indication of the project activities, resources required, timing/phasing and estimated costs, and a preliminary logical framework;
2. Specification and recommendation of a preferred solution for its implementation and;
3. The proposed modalities, processes and organizational structure required to implement and sustain such a project.

5. Scope of Work

i. General Description of Work

The integrated Information System shall constitute:

1. an institutional data collection and management systems for ECREEE, ERERA, and WAPP and;

2. a common Regional Energy Information System available to the public, constantly updated by the three Institutions. In relation to this, the consultant shall assess the suitability of the ECOWREX platform to meet the needs of the three institutions.

ii. Key components to be studied are outlined below

Component 1: Institutions Systems

The study will include consultations and visit to ERERA, WAPP and ECREEE to:

- Analyse and highlight the extent to which the proposed intervention benefits the sector.
- Assess the current mechanism for data collection and management in each institution.
- Assess the readiness and recommend the necessary policies, standards and procedures to facilitate data collection and management.
- Assess the capacity and any gap that needs to be overcome.
- Assess their current systems and how they would interface with the Regional Information System.
- Propose a system and design to support data collection, analysis and upload from the member states to the regional system.
- Identify key issues or risk that might hinder the realization of the system
- Identify the various stakeholders and their roles in the system.
- Assess the sustainability at the institutional and regional level.
- Propose an implementation strategy

Component 2: ECOWAS Regional Energy Information System

- Assess the suitability of ECOWREX for an upgrade to the Regional Information System. Otherwise propose and implement a new system to interface with the management systems in each institution.
- Develop a conceptual design of the proposed solution including its components and interfaces.
- Develop a detailed plan for implementation.
- The platform should include but not be limited to the following features and functionalities defined in Table1 below.

MODULE	REQUIREMENT DESCRIPTION
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<p>Web-based GIS portal</p>	<p>Implement a Spatial Data Infrastructure (SDI) to provide a centralized repository and interface to capture, visualize and analyse spatial datasets. Should conform to the Open Geospatial Consortium (OGC) standards for GIS data and Services. And also the International Organization for Standardization ISO standard for managing metadata.</p> <p>The SDI framework should include</p> <ul style="list-style-type: none"> o leading JavaScript library for mobile-friendly interactive maps o Map Server o Map Application o Spatial Database <p>The framework should incorporate a management console for administering and authoring map content in a GUI interface without much programming knowledge.</p> <p>The map interface shall contain a toolset with all of the following basic elements</p> <ul style="list-style-type: none"> o Selection tool o Zoom tool o Pan tool o scale bar o Download map layer using KML, direct download etc. o Standard metadata portal o Historical cache. o Map overlay o Legend o Distance measurement tool o Operability with other platforms to share data
<p>Content Management System (CMS)</p>	<p>Robust and well documented Content Management System with all of the following features:</p>

	<ul style="list-style-type: none"> o Powerful rich WYSIWYG editor o Content versioning and archiving o Mobile optimization / responsive design o Publishing workflow o Form generation o Content management (images, articles, etc.) o Page caching (or other features to speed delivery of content to the site) o Search Engine Optimization (SEO) support o Tools to tag content and create a taxonomy o Browser compatibility o Localization / regionalization with multi-lingual content o User roles and permissions o Application Programming Interface o Analytics tools o Import/export content o With support or module for publishing and consuming data in linked open format such as Resource Description Framework (RDF)
<p>Analysis tool for Charts and comparison</p>	<p>An integrated web data and visual analytics that can easily and efficiently handle the large amounts of data to be displayed; graphs, charts and statistical formats. This tool should have the following features:</p> <ul style="list-style-type: none"> o Rich Gallery and Dashboard o Customizable o Dynamic data- connect to data in real time o Ability to seamlessly call data from the proposed database.
<p>Database</p>	<p>The Enterprise database should;</p> <ul style="list-style-type: none"> - Be an object relational database system to organize the collection of data and its attribute - Include spatial components which adds support for storing and querying spatial datasets. - Include capability for version archiving and replication

Security	<p>Security consideration must include but not limited to:</p> <ul style="list-style-type: none"> - System logging - Access management - Risk assessment: check the risk of using all applications on the website and - Authentication: Authentication policies, processes, and logging must be designed, developed and documented to assure that the application keeps unauthorized users from accessing the site - Authorization and Access Control: Access control determines where a user can connect from; what time they can connect, and the type of encryption required. The goal is to develop a security strategy to protect back-end and front-end data and systems. This can be accomplished through the use of roles, credentials, and sensitivity labels - Good session management - Implement data and input Validation: appropriate client and server-side validation should be developed. - Cross Site Scripting (XSS) - Command Injection Flaws - Buffer Overflows - Error Handling: develop a policy for error handling policy. - Logging: Should be as detailed as possible. At minimum it should include Date and Time · Initiating Process · Process Owner · Description. It should also log all activities including <ul style="list-style-type: none"> o Authentication and Authorization Events- success and failure attempts. o Administrator activity. o Deletion of any data. o Modification to data characteristics such as permissions, location, field type. o Log files are critical and should be well protected. o Secured remote administration
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<p>Interfaces Design</p>	<p>Considerations for the following must be taken into account when designing the interface</p> <ul style="list-style-type: none"> o Consistency o Usability Issues o Responsive o Streamlining the Experience: improving the navigation of a site, making navigation more consistent and enjoyable. o Must follow a simple user Interface design process, in order to achieve best design for the intended product and users. The process must include at least - Study & research; Design mock-ups; create and validate user case; implement. o The interface colour should reflect a theme of the ECOWAS logo
<p>Sections</p>	<ul style="list-style-type: none"> - Documents Library: This section contains a collection of electronic documents including: publications, country data, policies, statistics, reports, project documents, archive and others. - Energy News Section: Gives energy information and reports on member states and the international energy community. It could be implemented using feed or alternatively, this section could also be implemented with the link Open data - Country profile: contains some defined indicators about each country presented in formats including graphical, charts, table etc. This would be implemented using the linked open data format (RDF and SPARQL query language) - Map interface: a portal interface for displaying and working with spatial datasets. - RDF Section: an internal section to aid in publishing the platform data and consuming data form other site.

TABLE 1: SPECIFICATIONS FOR REGIONAL INFORMATION SYSTEM

iii. General Considerations

1. Assess which solutions exist in other regions for West Africa to choose a model
2. Propose a software development methodology to be used.
3. Strategy to sensitize member states and users about the platform
4. Create an M&E plan to monitor progress before and after operation.
5. Define in detail the resources required to implement and maintain the platform, including; human, software and hardware
6. Use of appropriate programming language conforming to the World Wide Web Consortium (W3C) standards.
7. The Regional Information System should be easily maintained and customizable by the institutions.
8. OGC and ISO Standard for the Map framework. Any others international standard can also be considered
9. Optimized for low-bandwidth users.
10. Trilingual site structure and administration (English, French, Portuguese)
11. Open source software should to taken into consideration before commercial solutions
12. Systems proposed for each institution and the Regional Information System should be easily integrated, compatible and interoperable.

6. Deliverables

A Pre-Feasibility Study Report, including key sections such as;

1. an indication of the project and resources, and estimated costs, and a preliminary logical framework;
2. Specification of the recommendation solution;
3. Proposed modalities, processes and organizational structure.
4. Roadmap or Implementation plan for implementation

7. Profile of the firm/ Team

1. At least 8 years of experience in designing/managing large multi-country Regional Information Systems projects is required.
2. At least 7 years of experience of the proposed project team in web system design and development is required.
3. Track record of project team in implementing similar systems is required.
4. Extensive experience of team member(s) in developing web based Geographic Information Systems (GIS) is highly desirable.
5. Experience in the energy sector is highly desirable;

6. Proficiency in programming languages/standards such as PHP Java, HTML, W3C standards, OGC standards and ISO is desirable.
7. Knowledge of Linked Open data is desirable.

8. Language of Work

The system would be a trilingual site - its interface and content would be in English, French and Portuguese. All communication and documentation with the consultant will be in English.

9. Other required skills and competencies include:

- i. Strong planning, organization and time management skills and ability to manage multiple tasks;
- ii. Ability lead multi-disciplinary team, provide guidance, and recommend actions;
- iii. Proficiency in preparing and presenting professional reports and analytical papers;
- iv. Fluency in read, spoken and written English. Ability to communicate in French and Portuguese is an advantage.
- v. Very good interpersonal and communication skills, ability to manage relations with development partners, to work under pressure and handle politically- and culturally-sensitive issues.

Firms and/or Citizens of an ECOWAS member state are particularly encouraged to apply for this consultancy.

10. Documents required:

The application should contain the following documents:

- Technical proposal (including CVs of lead expert and other support staff).
- Financial Proposal