United States Energy Association
Power Africa: A U.S. Government-Led Partnership to Increase Sub-Saharan Africa's Access to Energy
Request for Proposal: Senegal Power System Modeling and Network Training (English and French)

REQUEST FOR PROPOSAL – Senegal Power System Modeling and Network Training

Closing date of RFP:	**March 6, 2020**
Implementing Agency:	**United States Energy Association (USEA)**
Funding Agency:	**United States Agency for International Development (USAID)**
Award Ceiling:	**$75,000 (seventy-five thousand US Dollars)**

The United States Energy Association is inviting prospective organizations or individuals through this Request for Proposal (RFP) to submit proposals for providing training on the national load flow and dynamic modeling, power system analyses and simulations for Senegal's utility, Senelec. **Training will need to be provided in French.**

This is an activity implemented by USEA under the United States Agency for International Development (USAID) Power Africa Initiative.

Proposals are due by 17:00 hours EST of the closing date. Please submit all proposals with a read receipt to Ms. Elise Voorhis, Senior Program Coordinator, at evoorhis@usea.org. Proposals must be in digital format (PDF).

As this is a USAID-funded program, the RFP follows USAID Procurement Regulations and Laws. All bidder details will be kept confidential.

I. INTRODUCTION

The United States Energy Association, headquartered in Washington, DC, is an association of public and private energy-related organizations, corporations, and government agencies. USEA represents the broad interests of the U.S. energy sector by increasing the understanding of energy issues, both domestically and internationally.

Through a cooperative agreement with the USAID Bureau for Economic Growth, Education and Environment (E3), USEA implements the Energy Utility Partnership Program (EUPP), available to all USAID-assisted countries and USAID Missions. EUPP supports the efforts in USAID-assisted developing countries to increase environmentally sustainable energy production and to improve the operational efficiency and increased financial viability of their utilities and related institutions, with the goal of increasing the access of these countries to safe, reliable, affordable and environmentally sound energy services.

USEA conducts a number of activities under the EUPP mechanism for Power Africa - a U.S. Government-led partnership to increase Sub-Saharan Africa's access to energy. Power Africa uses a wide range of U.S. government tools to support investment in Africa's energy sector. From policy and regulatory best practices, to pre-feasibility studies and capacity

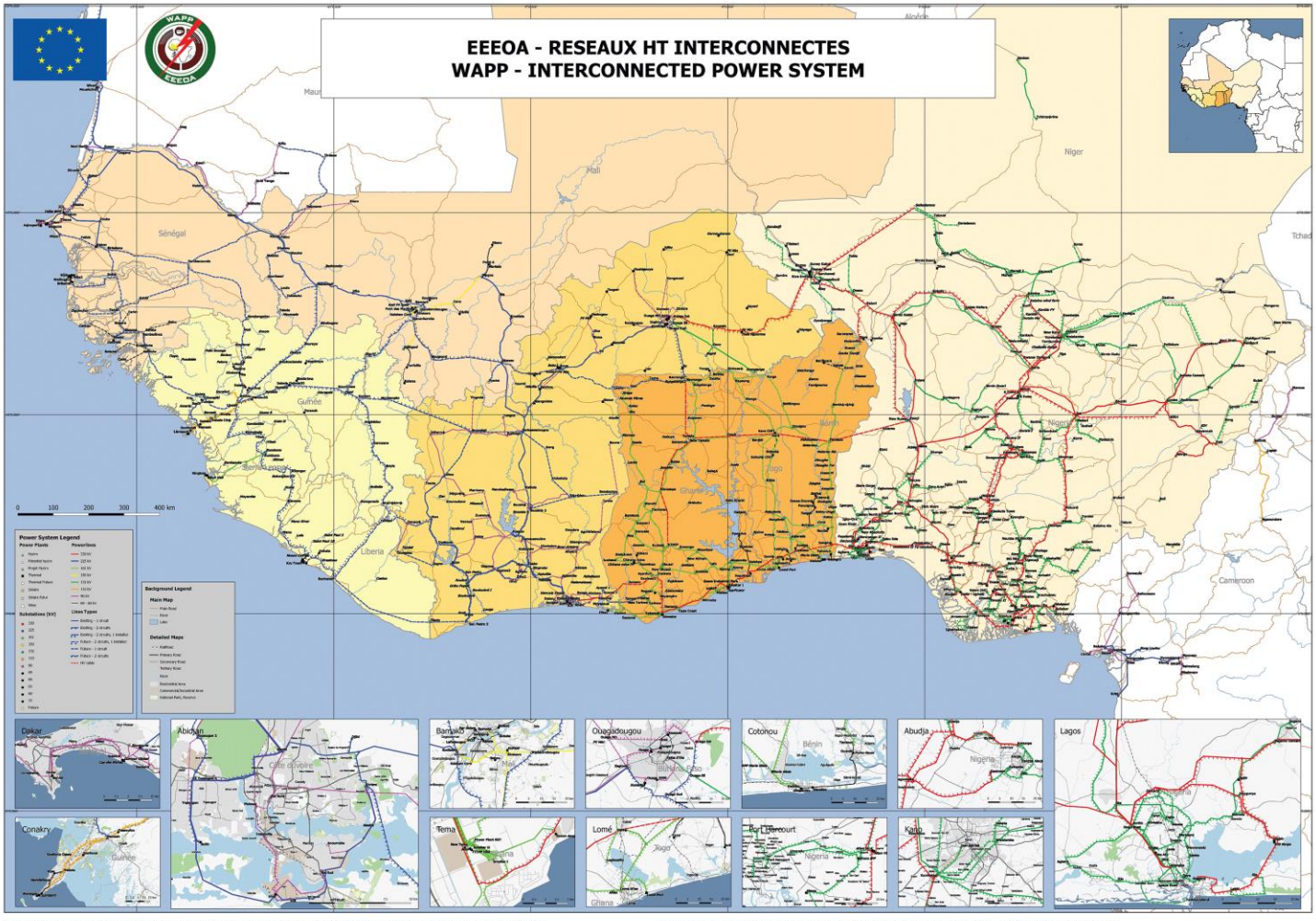
building, to long-term financing, insurance, guarantees, credit enhancements and technical assistance, Power Africa provides coordinated support to help African partners expand their generation capacity and access.

II. BACKGROUND

Senegal is a rapidly developing country in West Africa with substantial renewable energy resources and a growing economy. The Government of Senegal has made power sector development a key priority in its Plan Sénégal Emergent (PSE) – a five-year plan that aims to achieve universal electricity access by 2025.

The Société Nationale d'Électricité du Sénégal (Senelec) is the incumbent operator and concessionaire of electricity in Senegal. This public limited company was established by Law 83-72 on July 5, 1983 with the mission of producing, transporting, and distributing electricity across the country. Currently, Senelec has a monopoly on the distribution and transmission sectors in Senegal. Senelec has been involved, for a few years, in a dynamic of modernization of its electrical network with a vast investment program.

Due to the large number of renewable energy projects that are being integrated into the national grid system, Senelec will need to have the ability to run dynamic models and simulations of the system to protect against intermittency. Moreover, Senegal is a member of the West African Power Pool (WAPP) under the auspices of the Economic Community of West African States (ECOWAS) which was established in 1999 to act as a regional market for electricity.



Senelec utilizes the PSS/E power system planning and analysis tool for transmission planning, network stability and grid operation studies. For this purpose, the company has maintained an accurate load flow network PSS/E model and trained a few engineers in PSS/E software applications and transmission planning. The model, in its current form, has been successfully used in planning studies that do not require high-level detailed analysis. However, there is a need for increased capacity building in advanced application of the PSS/E software tool. This capacity building will be targeted at 10 to 12 engineers at various levels of proficiency in application of the software, who will receive hands-on training in advanced power flow, contingency, voltage stability and dynamic analysis. The engineers will also be trained in transmission planning, power system operation, integration of renewable energy, tasks automation with Python scripts and user defined modeling.

III. IMPLEMENTATON AND APPROACH

The purpose of this RFP is to solicit proposals from various candidate organizations or individuals, conduct a fair evaluation, and select the organization deemed most suitable to undertake the project.

Award Ceiling

USEA is constrained by a $75,000 budget for this project. This budget does **not** include travel and logistical expenses that USEA will be responsible for (see Section on USEA Responsibilities).

USEA Responsibilities

USEA will be responsible for all logistical arrangements for the participants and consultants. USEA Staff will be attending each trip to facilitate the logistics and trainings. This includes arrangement and costs for the following (for each of the three trainings and one technical meeting):

- Economy-class roundtrip international flights to Dakar, Senegal for up to 2 consultants per trip;
- Per diem (meals and lodging) for up to 2 consultants per trip to include all travel and training days and maximum of 1 full day of rest prior to start of activity (Note: Lodging to be provided according to U.S. government regulations);
- Reimbursement of visa fees;
- Reimbursement of vaccinations (if needed) and travel medication costs;
- International health insurance for the duration of the travel to Senegal;
- Ground transportation to/from the airport and any required transportation to site visits/meeting venue;
- Meeting space and AV;
- Printing/photocopying of handout materials.

Subcontract Agreement Management and Oversight

A subcontract agreement between USEA and the winning bidder shall be subject to all USAID Special Terms and Conditions, including all mandatory FAR Flow-Down clauses, where applicable, and the provisions included in 2CFR200 and 2CFR700. All bidders should review these provisions prior to submitting a proposal.

- Standard Provisions for U.S. Nongovernmental Organizations: https://www.usaid.gov/sites/default/files/documents/1868/303maa.pdf
- 2CFR200: https://www.gpo.gov/fdsys/pkg/CFR-2014-title2-vol1/pdf/CFR-2014-title2-vol1-part200.pdf
- 2CFR700: https://www.gpo.gov/fdsys/pkg/CFR-2015-title2-vol1/pdf/CFR-2015-title2-vol1-part700.pdf

Subcontract agreement management, oversight of contractual obligations, and payment will be carried out by USEA. USEA will be responsible for any communication regarding the subcontract with USAID.

IV. SCOPE OF WORK

Purpose: The purpose of this program is two-fold: 1) to enhance the capacity of Senegal and its utility, Senelec, for safe, reliable and efficient operation of the national network, as well as near-term planning; and 2) to increase Senelec's capacity for advanced network modeling and long-term planning in the West African Power Pool (WAPP).

Objectives: The objectives of this program shall include the following:

- To enhance Senelec's capacity for carrying out safe, reliable and efficient operation of their grid;
- To enhance Senelec's capacity, including human resources and technical tools, for understanding and operating their network with reliability, security and efficiency;
- To enhance Senelec's capacity for understanding and analyzing the impact of various disturbances that may occur in the internal network of Senegal, as well as in other power systems outside of their territory, due to interconnections and operations of the cross-boundary power plants and increased renewable energy integration;
- To assist Senelec with developing a comprehensive plan for dealing with any system disturbances in accordance with regional grid codes;
- To increase Senelec's planning staff with the capacity for advanced modeling and long-term planning.

Tasks: The tasks to be performed within this Scope of Work shall include:

Task 1: Conducting a 3-day technical meeting to review data from Senelec and evaluate Senelec's network model and Senelec's practices:

- Senelec will provide a presentation of network model, planning methods and review of studies conducted using PSS/E (1 day);
- Presentation of data validation procedures – comparing real time conditions to the model under similar conditions;
- Data requirements for various models and stability studies;
- Review Senelec's load forecasts, transmission, and generation expansion plans through the year 2025.

Task 2: Conducting a 5-day training program (Training 1), including all necessary theoretical and practical elements, to help Senelec improve its capacities regarding dynamic model development and tasks automation. The training will be organized in Dakar, Senegal, and include the following topics:

- Introduction to basic principles of transmission system dynamic modeling;
- Development of scripts on Python for the automation of tasks in PSS/E;
- Introduction to dynamic model development and development of user-defined dynamic models using PSS/E (Fortran or C++);

Task 3: Conducting a second 5-day training program (Training 2) to further enhance Senelec's planning personnel on dynamic modeling and analytical capacity. The training will be organized in Dakar, Senegal and include the following topics:

- Introduction to dynamic simulation principles;
- Performing dynamic analyses;
- Small signal stability principles and simulations;
- Reliability analysis principles and simulations;
- Methodology for the development of a measurement – based dynamic load model (2 days).

Task 4: Conducting a third 5-day training program (Training 3) to further advance Senelec's modeling and analytical capacity of intermittent renewable energy systems (wind and solar) in PSS/E software and power system planning. Senelec has several medium to large-scale grid solar and wind energy projects that will significantly impact grid stability. The consultant is to conduct capacity building in power system analysis for integration of intermittent renewable energy including:

- Performing advanced contingency analyses taking into account multi-level contingency analyses, tripping simulations and corrective actions;
- Implementing renewable generation and simulating their effects on the grid;
- Theoretical aspects of modelling and simulation of solar and wind farms in PSS/E for load flow, short circuit, flicker and dynamic studies;
- Estimation of optimal level of penetration of integrated renewables in the power system;
- Impact of embedded generation on power system operation;
- Performing Inertia/Governor load flow calculations;
- Reactive power planning.

Deliverables: Based on the Scope of Work, the following deliverables and products shall be submitted:

Deliverable 1: Conduct a 3-day technical meeting presenting Senelec's network model and improvements that could be made. Two digital copies (Word Document and PDF) – in English and in French – of a brief report on data collected, difficulties encountered in the process, a workplan for topics to cover during each training, and recommendations for mitigating these challenges.

Deliverable 2: Conduct a 5-day training program (Training 1), including all necessary theoretical and practical elements, to help Senelec improve its dynamic models for the existing network topology and develop specific user models to replicate the behavior of power plants and network equipment. Two digital copies – in English and in French – of the full workshop curriculum, including manuals, presentations and all other training materials developed for Senelec and distributed to the participants. The curriculum and other training materials shall be digitally sent to USEA at least 1 week prior to the training.

Deliverable 3: Two digital copies – in English and in French – of the 1st Training Report on approach, accomplishments and recommendations of the first 5-day training program. See "Reporting" section below for the requirements of the technical report.

Deliverable 4: Conduct a second 5-day training program (Training 2) to further enhance Senelec's modeling and analytical capacity. Two digital copies – in English and in French – of the full workshop curriculum, including manuals, presentations and all other training materials developed for Senelec and distributed to the participants. The curriculum and other training materials shall be digitally sent to USEA at least 1 week prior to the training.

Deliverable 5: Two digital copies – in English and in French – of the 2nd Training Report on approach, accomplishments and recommendations. See "Reporting" section below for the requirements of the technical report.

Deliverable 6: Conduct a third 5-day training program (Training 3), including all necessary theoretical and practical elements, to further advance Senelec's capacity. Two digital copies – in English and in French – of the full workshop curriculum, including manuals, presentations and all other training materials developed for Senelec and distributed to the participants. The curriculum and other training materials shall be digitally sent to USEA at least 1 week prior to the training.

Deliverable 7: Two digital copies – in English and in French – of the 3rd Training Report. The Report will include an Executive Summary, findings, recommendations, and annexes. See "Reporting" section below for the requirements of the technical report.

Reporting

The consultants will report to USEA. All communication and deliverables will be submitted to USEA for review.
The subcontractor shall submit a technical report to USEA at the end of each training (USEA will provide a template):

Technical Report to include:

- Executive Summary and overview of training;
- Statement of consultants' background and key qualifications;
- Summary of knowledge/skills acquired by the participants;
- Summary of findings and models;
- Recommendations for improving operations;
- Recommendations for further technical assistance and training

Schedule

The project is expected to begin in March 2020 and take approximately 6 months to complete.

Task(s)	Activities	Deliverables	Target Completion Date
1. Technical Meeting & Data Collection	Conduct 3-day technical Meeting, create a Dynamic Modelling and Reliability Study based on data collected	(Deliverable 1) Workshop materials; Data for dynamic model; Brief data collection report and workplan for the trainings.	March/April 2020
2. Training 1	Conduct 5-day training to prepare Senelec to develop and/or improve its dynamic models for the existing network topology	(Deliverables 2 and 3) Training materials; Training report	April/May 2020
3. Training 2	Conduct 5-day training on advanced contingency analyses, Inertia/Governor load flow calculations, reactive power, and small signal simulations	(Deliverables 4 and 5) Training materials; Training report	July/August 2020
5. Training 3	Conduct 5-day training on renewable energy integration modelling	(Deliverables 6 and 7) Training materials; Training report	September/October 2020

These target completion dates are provided solely for information purposes and the benefit of bidders. Modification of these assignment dates will not constitute a change in scope.

V. PROPOSAL CONTENT

The proposal must contain the following:

a) A cover letter to the proposal, including:
   - A bidder's Data Universal Numbering System (D-U-N-S) number and proof of a current registration in the System of Award Management (SAM) **[Bidders will be disqualified without a valid DUNS number and SAM registration]**

b) A technical proposal, including:
   - Demonstration of an understanding of the issues to be addressed under the proposed scope of work specified above by providing a summarized technical approach for each of the tasks listed (not to exceed 3 pages);
   - Proposed project schedule to perform the tasks under this project highlighting any deviations from the scope of work specified above;
   - Bio sketches of personnel, including at least 1 – 2 subject matter experts including a team leader that will be dedicated to the project;
   - Summary of relevant experience of each proposed team member for (not beyond) the past 10 years. Relevant experience should be listed chronologically (starting with the most recent). Not to exceed 2 pages for each proposed team member;
   - Summary of the work to be performed by each employee proposed for this project.

c) A financial proposal, including:
   - Detailed justification (i.e. line item budget);
   - Labor, indirect costs, and level of effort for each employee proposed for this project.
   - Please note, as referred in Section 3 "USEA Responsibilities", USEA will arrange and pay for all travel costs. These costs do not need to be included in the financial proposal.

d) Completed USAID Contractor Employee Biographical Data Sheet forms for each employee proposed for this project (https://www.usaid.gov/forms/aid-1420-17).

VI. EVALUATION CRITERIA

All bidders are required to provide a DUNS number and maintain a current SAM registration. Proposals without a DUNS number or proof of SAM registration will not be considered.

Selection of an offer for a subcontract award will be based on an evaluation of proposals against qualifications, subject matter expertise and budget justification. Proposals shall first be evaluated from a technical standpoint (qualifications and subject matter expertise) without regard to proposed budget justification. For those proposals determined to be technically acceptable, budget justification will be evaluated.

Evaluation Criteria:	15%:	Experience with similar projects (for each consultant and the organization in general)
	30%:	Subject matter expertise (education and other relevant experience)
	30%	Technical approach
	25%:	Cost

VII. QUESTIONS AND CLARIFICATIONS

All questions and clarification requests related to this RFP should be submitted via email to Ms. Elise Voorhis, Senior Program Coordinator, at evoorhis@usea.org no later than **February 28, 2020**. All questions and answers will be provided to all prospective bidders on the USEA website: www.usea.org.

END OF RFP