

República Democrática  de São Tomé e Príncipe

**Ministério do Planeamento, Finanças e Economia Azul
(Unidade-Disciplinada-Trabalho)
Agência Fiduciária e de Administração de Projetos
Projeto Recuperação do Setor de Energia**

EXPRESSIONS OF INTEREST

CONSULTING SERVICE

COUNTRY: REPÚBLICA DEMOCRÁTICA DE SÃO TOMÉ E PRÍNCIPE

PROJECT: POWER SECTOR RECOVERY PROJECT. - P157096

GRANTS: IDA D 1260

CONSULTING SERVICES:

Recruitment of an Expert in Monitoring and Evaluation (M&E) of Impacts of the LED BULBS AND LED TUBELIGHTS DEPLOYMENT PROGRAM IN SAO TOME AND PRINCIPE.

REFERENCE: Nº 95/C/PRSE/2022

The Government of the Democratic Republic of São Tomé and Príncipe has received grants from the World Bank to implement the Power Sector Recovery Project (P157096) and intends to apply part of this funding to consulting services for **Recruitment of an Expert in Monitoring and Evaluation (M&E) of Impacts of the LED BULBS AND LED TUBELIGHTS DEPLOYMENT PROGRAM IN SAO TOME AND PRINCIPE** for the Power Sector Recovery Project.

The services to be provided by the Consulting are in the attached Terms of Reference.

The attention of interested consultants is drawn to Section III, paragraphs, 3.14, 3.16 and 3.17 of the World Bank's "Procurement Regulations for Investment Project Finance Borrowers", November 2020 (Procurement Regulations) setting forth the World Bank's Policy on Conflict of Interest.



A Consultant will be selected according to the Individual Consultant Selection method established in the Bidding Regulations for Borrowers of World Bank-financed Investment Projects (World Bank Procurement Framework and Regulations November 2020

The Project Administration and Fiduciary Agency (AFAP) has the honor of inviting you to express your interest by sending a Letter of Intent, Copy of Identity Card and Curriculum Vitae, as well as proof of the training and qualifications requested, in a letter addressed to the General Director of AFAP, by 16:00 pm on **Mars 14, 2022** to the address below, or to the email address horacio.dias@afap.st and psrpafap@gmail.com with the Subject: **Ref.: 95/C/PRSE/2022 Consulting for Recruitment of an Expert in Monitoring and Evaluation (M&E) of Impacts of the LED BULBS AND LED TUBELIGHTS DEPLOYMENT PROGRAM IN SAO TOME AND PRINCIPE.**

Agência Fiduciária de Administração de Projectos Caixa Postal 1029,
Edifício do Afriland Fisrt Bank, 2º andar
Avenida Kwame Nkruma,
S. Tomé,
S. Tomé e Príncipe Telefone: + 239 222 52 05



**Terms of Reference for the Recruitment of an Expert in
Monitoring and Evaluation (M&E) of Impacts of the
LED BULBS AND LED TUBELIGHTS DEPLOYMENT PROGRAM
IN SAO TOME AND PRINCIPE**

World Bank: Power Sector Recovery Project: Component 3.4

1. CONTEXT

1.1. Objective of the project

The objective of the project is to reduce the impact of lighting on electricity demand through the replacement of incandescent lamps with Light Emitting Diode (LED) bulbs. By reducing the demand, particularly at peak load hours, in the supply- constrained generation system in Sao Tome and Principe (STP), the stress on the electricity supply system will be alleviated and the overall reliability enhanced.

1.2. Rationale and Benefits

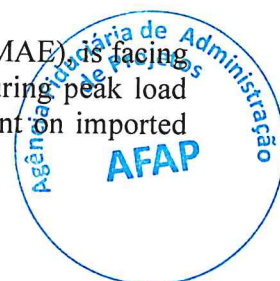
Over 70% of the electricity demand in Sao Tome and Principe (STP), including during peak load hours, comes from lighting. During peak demand hours, the country faces electricity outages and rationing. The current lighting technology in use in residential, public and commercial buildings is largely incandescent lamps (ILs). In contrast, LED bulbs not only consume 80 percent less energy (and demand) compared to ILs, but also have 15-20 times longer life and better-quality light output. Once LEDs are deployed, they will have an impact on lowered end user electricity bills thereby making it easier for phasing out subsidies on end user electricity tariffs, because the increase in tariffs will be partly offset by reduced lighting energy consumption and cost.

The main direct impact of the LED program will be partial or total elimination of unserved demand during peak load hours (5 to 10 pm). The LED deployment will also result in significant improvement on reliability of electricity supply.

The LED program will benefit both consumers and the national Power and Water Utility Company (EMAE) of Sao Tome and Principe. The consumer benefits include: reduced electricity bills, avoided capital cost of replacing ILs frequently, and better quality of light output. At an average tariff of US\$0.23/kWh, 5 hours usage per day, the consumer can save over US\$20 per year by replacing an IL with a LED bulb, with an estimated payback period of less than 3 months assuming a cost of US\$ 3 per LED bulb. However, the initial capital cost of LED bulbs is a major barrier leading to limited mainstream adoption by consumers.

1.3. The implementation of the project: Mechanism and Arrangement

The National Water and National Electricity Company of Sao Tome and Principe (EMAE) is facing electricity shortages and supply-demand deficit resulting in blackouts especially during peak load hours. This is mainly due to the limited generation capacity which is 90% dependent on imported



fuels, mainly from Angola. This proposed program is aimed at introducing and deploying energy efficient LED lighting measures to replace existing stock of lighting which is largely incandescent lamps-ILs (in households) and fluorescent tube lights (in public facilities such as offices, schools, hospitals, etc.) to reduce the peak demand (MW) and energy consumption (MWh), along with reducing energy-related environmental impacts.

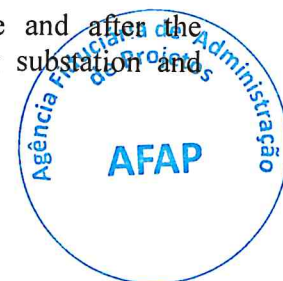
EMAE will ensure the complete execution of all the steps required for the successful implementation of the Program. Through this project, EMAE will be the first beneficiary in financial terms, which would result from the elimination of the electricity tariff subsidy (linked to the kWh), avoided capital costs of new generation capacity costs. At the national level, this would help reduce expensive diesel-fuel imports; and at the end user level, the electricity bills will be reduced.

In this context, EMAE has proposed an appropriate LED lamps distribution mechanism using its own institutional systems, logistical and human resources framework to ensure the ownership and efficient distribution and replacement of the ILs and compact fluorescent lamps (CFLs) with LED bulbs, and fluorescent tube lights (FTLs) with LED tube lights being used in residential sector. The distribution of LED lamps (LED bulbs and LED tube lights) will take place at the EMAE center office in Sao Tome (EMAE headquarters) where more than 90% of these LED lamps and tube lights will be distributed at this level (as 90% consumers come to this center for paying electricity bills). The remaining 10% will be distributed via EMAE mobile kiosks spread over 5 districts; including EMAE center office in the Island of Principe. A site has already been planned to be used as a warehouse of these LED lamps.

Furthermore, a database will be made available to manage the LED lamps stock and distribution. Household customers will be required to present their identity cards and electricity bills bearing the reference to the network connection contract (customers reference number) on the day of LED lamps distribution event. EMAE team will confirm that each customer is registered in the database, collect the five (5) ILs/CFLs/FTLs that must be in good condition, and provide the five (5) LED bulbs or tube lights along with some promotional materials explaining the location in the house these LED lamps should be used to achieve maximum benefit.

Before the lamps are delivered by the LED lamps supplier (selected competitively through the World Bank procurement regulations), the lamps will be tested by an independent pre-shipment inspection agency (selected competitively) and in the presence of designated EMAE's team.

- In addition to the main EMAE center office in Sao Tome, EMAE will set up a program for the distribution of LED lamps at the level of the five districts and the Island of Principe. This program will be agreed with district representatives during the information session(s) that will be held before the launch of the LED lamps distribution program in coordination with the consumer awareness/media agency that would have started the consumer awareness campaign at least one month before the LED lamps distribution to sensitize and encourage beneficiaries/consumers about the program. In order to encourage the household beneficiaries to use the LED bulbs, EMAE will inform them that sample consumer surveys will be conducted one month before and one month after, for helping monitor and evaluate the actual impacts at the level of households.
- EMAE will at the same time, collect and analyse information before and after the deployment of the LED lamps from their metering data at the existing substations and



network systems level. This data includes measurements of kW, kVA, kWh, and power factor.

1.4. Main project benefits and impacts

a) At the level of end user Benefits: Reduced electricity bills, avoided capital cost of replacing incandescent lamps frequently, better quality of light output.

b) At the level of EMAE Benefits: Peak load shaving, higher reliability of supply, and availability of generation capacity and energy supply, fast response to the challenge of shortages, more environmentally sustainable power sector, more financially-viable power sector, reduction in the total amount of subsidies (through subsidized tariffs to low-income consumers), easier to rationalize tariff increases for high-income, commercial, and institutional consumers.

c) At the level of Public buildings benefits: Reduced electricity bills, better indoor quality and comfort, avoid electricity cuts.

d) At the level of Gender impact: This project is considered a specific pilot operation where gender is directly involved in all stages of its implementation. However, gender is also the direct beneficiary of the positive impacts of this project.

(i) At the implementation level, gender provides the appropriate information in terms of the frequency of use of LED lamps, the required quantity and quality of light. This information is important for sizing the technical specifications of the equipment to be acquired. The services provided by these lamps will be in comfort desired by women.

(ii) At the level of promotion, awareness and execution of household surveys before and after the distribution of lamps to assess the Impacts of LED lamps.

2. MONITORING AND EVALUATION OF IMPACTS OF THE PROJECT

2.1. Objective of the assignment

The objective of the assignment is to assist Power and Water Utility company (EMAE) and Fiduciary Agency and Project Administration (AFAP) to develop and deliver a robust Monitoring and Evaluation (M&E) program and associated capacity building of EMAE and all relevant stakeholders, in order to effectively contribute to the successful implementation of the LED Program and evaluate its impacts.

2.2. Specific Objectives and Tasks

The Monitoring and Evaluation (M&E) Consultant will design and develop and help implement along with EMAE and AFAP team the following three (3) main technical tasks to evaluate the impact of the LED Lamps deployment program amongst its various stakeholders – including EMAE itself and its various categories of electricity consumers who are the LED lamps program beneficiaries (households, offices, etc). The results of analysis under the two tasks will be consolidated in a single M&E Report.



Task (i): Measurement and Verification (M&V) of Energy (kWh) and Demand (kW) Savings: Before and after deployment, the relevant hourly electrical measurement data (including kW, kWh, kVAR, pf) shall be logged by appropriate meters and data-loggers for a 24/7 two-week period (including holidays) that will be collected for a selected sample sub-stations of EMAE, both before and after the deployment (distribution) of LED lamps.

Task (ii): Consumer Survey to Validate the M&V Results: In addition, an ex-ante and ex-post random sample survey of about 400 consumers of EMAE will be carried out using standardized questionnaires in these selected sub-stations. The survey data will be analysed to cross-check the “deemed savings” from the LED lamps replacements to estimate the overall impact in terms of reduction of electricity demand and energy consumption due to LED deployment. The estimated numbers will be correlated to the results of Task (i)

Task (iii) Based on the analysis of results from Tasks (i) and (ii), this task will focus on extrapolation to impacts on: (a) Energy (kWh); (b) Load/Demand (kW); (c) Load Curve/shape (hourly load data), across the country (national level); (d) Reduction in Energy and Load Demand at household (average) and office levels; [e] Improvement in quality and comfort level of light in households and offices; [f] Average estimated reduction in electricity bills of consumers; [g] Estimated Cost of Energy saved (\$/kWh), Cost of Demand Saved (\$/kW) and Cost of GHG emissions saved (\$/ton of CO₂).

2.3. Expected Impacts and Outcomes

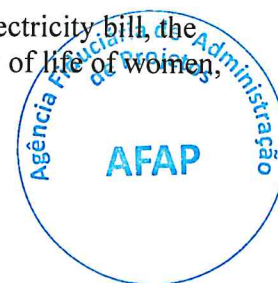
In addition to the estimates highlighted above in terms of impacts, the expected broader outcomes of this project include:

(i) Before the distribution of LED lamps:

- a. Given the high cost of kWh, households are limiting their choices of use to incandescent lamps of 40 W and 60 W only in order to minimize the consumption of electricity. This is affecting the desired quantity and quality of light required to ensure comfort conditions;
- b. The quality of education and development of activities for gender remain inadequate and uncomfortable;
- c. The duration of the use of light is limited because of the power cuts and also to avoid a high energy bill;
- d. Due to their low efficiency, incandescent lamps are also a source of heat inside the rooms.

(ii) After the distribution of LED lamps:

- a. The light quality is much better by opting also towards the most comfortable correlated color temperature and color rendition depending on the choices of women beneficiaries of the projects;
- b. The operating hours of the LED lamps, the very low cost of the electricity bill, the improved quality of light, allow for the improvement of the quality of life of women, the creation of the new income sources, improving education, etc.



2.4. Assignment and tasks

a) The purpose of the assignment is to assist the EMAE team with the following:

- Design and establish a robust Monitoring and Evaluation framework including a Measurement and Verification (M&V) system, supported by consumer surveys (to identify changes in all electricity user's awareness and behaviour and the impacts of the project) and an analysis to measure the overall impacts from the implementation of the project
- Strengthen the institutional capacity of EMAE to effectively utilize M&E and M&V systems
- Design and implement a robust and user-friendly reporting mechanism to support reporting by stakeholders on the progress of their projects

The aim of the assignment is to design and develop and help implement the LED Program's M&E at the EMAE level (i.e. all EMAE centers) while at the same time assisting its key partners in developing their own M&E framework which can be used for future activities and projects.

b) The Expert main tasks will be:

- Design and develop consumer surveys necessary to measure and analyse the impact of the project
- Capacity building support to project EMAE stakeholders
- Design and develop a master M&E plan for the project, including M&V system
- Help EMAE implement specific M&E plans for the EMAE and participating stakeholders
- Document results and prepare a report based on Tasks (i), (ii) and (iii) described above
- Any other related assignments

The Expert will coordinate with the AFAP and EMAE all the assignments and project documents with regards to data requirements, materials, and deliverables.

c) Reporting requirements

- a- Submit the Inception report 10 days after receiving the necessary information
- b- Capacity Building and Training report
- c- Analysis report of the results of the surveys which will be conducted before and during project implementation
- d- Project M&V and M&E report

Reports will be written in English and submitted in Word and/or Excel

3. FACILITIES TO BE PROVIDED BY THE EMPLOYER

The EMAE/AFAP shall provide all necessary and available information needed to the Consultant.

4. DURATION AND PLACE OF THE ASSIGNMENT: ESTIMATED SCHEDULE AND EXPECTED LEVEL EFFORT

The place of performance of the contract is divided between the Consultant home country and Sao Tomé and Príncipe (STP). The expert is entitled to a per diem when operating outside his/her home country for the purposes of this assignment.



The Consultant must present the costs of renting the necessary equipment/tools to carry out the required measurements and monitoring activities.

The Consultant is allowed to have a field technician/engineer to aid him/her carry out the required measurements and monitoring activities.

The effort required in the mission must be developed in a period not exceeding 60 working days, covering the preparation of the general document, carrying out measurements in S. Tomé and Príncipe, specific document, and training material and including:

- One five-day mission to São Tomé (if operating outside his/her home country) for Training of EMAE and stakeholders, and to start contacts and data collection and analysis.
- One five-day mission to São Tomé (if operating outside his/her home country) to conduct the survey with stakeholders and end users.
- One five-day mission to São Tomé (if operating outside his/her home country) to conduct the post implementation survey.
- One three-day mission to São Tomé (if operating outside his/her home country) for presenting the final report and project findings and conclusions.

5. EXPERTISE REQUIRED AND EXPERT PROFILE

This activity will be carried out under the supervision of the AFAP/EMAE team. The consultant will be a short-term Senior expert and in addition have:

- A university degree in electrical/power engineering or related discipline
- Minimum of 10 years of direct professional experience in the field of M&E
- Proven experience in implementing M&E for energy projects having completed at least 2 similar such assignments
- Familiarity with energy efficiency
- Demonstrated experience in the preparation and leading of trainings in M&E
- Excellent inter-personal skills and command of English.
- Good knowledge of Portuguese Language is required

6. REPORTING

The formal channel of reporting by the Consultant shall be the Project Coordinator at AFAP.

