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Kenya Power

ENVIRONMENTAL AND SOCIAL ASSESSMENT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

FOR

KENYA POWER'S KENYA ELECTRICITY MODERNIZATION PROGRAMME (KEMP) SUPERVISORY CONTROL & DATA ACQUISITION/ENERGY MANAGEMENT SYSTEM; DISTRIBUTION SYSTEM ENHANCED FLEXIBILITY COMPONENT

PREPARED BY

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The Environmental and Social Management Plan (ESMP) has been prepared by Environment and Social Unit, Safety, Health and Environment Department (SHE), Kenya Power, Nairobi. The ESMP has been prepared based on an overall environmental and social assessment, which includes (i) the general baseline at project areas (ii) Evaluation of potential environmental and social impacts of different project components and subcomponents and (iii) Assessment of environmental practices in different ongoing and completed projects.

This standardized ESMP provides the guidelines for the preparation of all mitigation plans to respond to the anticipated project impacts, once the specific substation locations are identified.

1. INTRODUCTION

The proposed Kenya Electricity Modernization Project (KEMP) intends (a) to increase access to electricity; (b) to improve reliability of electricity service; and (c) to restore Kenya Power & Lighting Company's financial sustainability.

The upgrade of the Supervisory Control and Data Acquisition/Energy Management System (SCADA/EMS) will finance upgrades of the SCADA/EMS by incorporating key existing substations to the system and installing additional switchgear in medium voltage distribution networks to enhance flexibility in operations.

In order to further enhance flexibility of the distribution system the Project aims to achieve 90 percent automation of the networks in Nairobi by installing a total of 1000 load break switches in assets operating at 11, 50 and 66 kV, with associated RTUs and communications features enabling remote control and operations.

The Supervisory Control and Data Acquisition/Energy Management System (SCADA/EMS) consists of equipment at the National and Regional Control Centres (NCC and RCCs), Data Collection equipment at various substations namely Remote Terminal Units (RTUs) and associated Telecommunication System mainly Multiplexers (based on installed 1300 km of fibre), Power Line Carrier Equipment, radios and a Network Management System at NCC.

Optimal performance of the SCADA/EMS system is achieved by making sure that any new component or extension of the existing power infrastructure is incorporated in the system and also that the system has dedicated support from the Manufacturer. Due to expansion of the electrical infrastructure and in order to integrate new substations into the SCADA/EMS system there is need to install new RTUs and procure Support Services for the system.

The objective is to improve and maintain system reliability, availability, flexibility and expandability and to integrate new Substations that are continuously being commissioned incorporating the SCADA/EMS system, and through the installation of load break switches. .

An Environmental and Social Management Plan (ESMP) for development projects provides a logical framework within which identified negative environmental and socio–economic impacts can be mitigated and monitored. In addition, the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. This document comprises environmental and social management plan (ESMP) for the above mentioned components of the proposed KEMP project[1]. The ESMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of the following project phases: design, construction, operation and decommissioning.

[1] Separate Environmental and Social Management Frameworks have been prepared for the Peri-Urban Electrification and Off-Grid Electrification components, given their increased level of complexity.

The standardized ESMP outlined below addresses the potential negative impacts and mitigation measures associated with the SCADA/EMS/enhanced flexibility project components during construction, operational and decommissioning phases, based on the common environmental impacts and mitigation measures of the expected negative impacts associated with electrical infrastructure.

The ESMP specifies the mitigation and management measures which the proponent will undertake and shows how the project will mobilize organizational capacity and resources to implement these measures.

The KEMP project will adhere to all National Environmental Management Agency (NEMA) regulations and the World Bank Group Environmental Health and Safety Guidelines[2]:

These Guidelines cover the following elements:

- **Environmental** -- e.g. Air emissions and ambient quality, energy conservation, wastewater and ambient water quality, water conservation, waste management, noise, contaminated land
- **Occupational Health and Safety** **--** e.g. Physical, chemical, biological and radiological hazards; Personal Protective Equipment (PPE); Special Hazard Environments; Monitoring
- **Community Health and Safety** Water Quality and Availability. Safety of Project Infrastructure, Life and Fire Safety, Traffic Safety, Transport of Hazardous Materials, Disease Prevention, Emergency Preparedness and Response
- **Construction and Decommissioning** Environment , Occupational Health and Safety, Community Health and Safety

The Project also adheres to the principles outlined in World Bank Operational Policy 4.01 - Environmental Assessment. This policy ensures that World Bank-financed projects are environmentally sound and sustainable, and that negative environmental impacts are avoided wherever possible, and/or mitigated.

The KEMP Project is proposed as category B Partial Assessment - assigned to projects that are likely to have limited and reversible environmental impacts, that can be readily mitigated. There are no significant and/or irreversible adverse environmental issues anticipated from the investment sub-components to be financed under the Project, as the nature of civil works is limited in the most part to the construction of low voltage lines to connect new customers; the installation of switchgear and SCADA/EMS systems in substations (the subject of this standardized ESMP); and off-grid electrification.

[2] http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES

2. OBJECTIVES OF THE ESMP

The main aim of the ESMP is to ensure that the project complies with applicable national environmental and social legal requirements and World Bank's environmental and social safeguards, as applicable. Further, the ESMP aims at identifying environmental and socio economic benefits of the project as well as identifying any potential adverse environmental and socio economic impacts. To mitigate the adverse impacts and enhance project benefits the ESMP describes measures that will be taken to prevent, minimize, mitigate and or compensate for adverse environmental and social impacts.

3. SCOPE

- To optimize the SCADA/EMS system and enhance system flexibility, KPLC plans to:
    - Procure, install and commission SCADA/EMS system and RTU in order to accommodate the expanding power infrastructure.
    - Procure Support Services for the SCADA/EMS system.
    - Install a total of 1000 load break switches in assets operating at 11, 50 and 66 kV, with associated RTUs and communications features enabling remote control and operations, to achieve 90 percent automation of the networks in Nairobi.

4. BENEFICIAL IMPACTS OF THE PROJECT

The proposed Supervisory Control and Data Acquisition/Energy Management System (SCADA/EMS)/Distribution System Enhanced Flexibility project will improve and maintain the system's reliability, availability and expandability and will assist KPLC in optimally maintaining the system and to integrate new Substations to the SCADA/EMS system that are continuously been commissioned. Several Substations are currently under construction under the World Bank financed Kenya Electricity Expansion Project (KEEP) and there are other contracts for new projects under KPLC, KETRACO and KenGen that will need to be integrated into the system. **The overall objective of the SCADA/EMS system is to ensure optimal performance of the electrical system to ensure reliable and quality power supply to improve customer satisfaction.**

This will provide a milestone in spurring social and economic development in the country and will greatly help in achieving the objective of the Vision 2030 within the shortest time possible. Some of the socio-economic benefits expected to accrue from the provision of reliable and quality electrical power supply include but are not limited to:-

Employment opportunities

During implementation of the project various employment opportunities will be available. These include procurement and installation of The SCADA/EMS equipment, load break switches, and associated

telecommunications systems. Stable, quality and reliable power supply will attract a considerable number of job opportunities across the country. This will go a long way in easing unemployment in the nation while the revenues received will create demand for other goods and services causing a trickledown effect to the entire economy.

Education

Access to more reliable electricity at the household level and schools will lead to improvement of education services. Children will have opportunity to extend their study time because of better lighting system at home and in schools. Further, access to power will facilitate development and equipping of Laboratories in schools, promote use of laptops as well as introduction of ICT in the learning environment.

Reduction of pollution associated with use of thermal power, kerosene and wood fuel:

Stable, reliable and quality electricity supply from the National Grid would ensure less or no people use diesel generator sets, reduced reliance on kerosene both for lighting and cooking and reduced use of wood fuel and charcoal and improved use of electrical appliances like cookers and electric irons. Consequently, this results in less carbon dioxide being released to the environment while less use of charcoal means reduced destruction of forests.

Improved standard of living

The implementation of the KEMP project will result in more customer connections to the national grid. Access to electricity will change the standard of living of the people as they can use domestic appliances like iron boxes, fridges, television sets, washing machines to mention but a few. Use of electricity for lighting implies that the people will not be exposed to smoke arising from use of tin lamps which predisposes people to respiratory diseases.

Opportunity for business development

Availability of reliable power for more customers provides opportunities to establish small micro enterprises such as salons, barber shops, charging of phones, welding, baking, use of electric sewing machines, agribusiness like poultry farming among others. The incomes earned by these people will create demand for other goods and services hence promoting accelerated growth in the economy.

Increase in Revenues

The implementation of the project will boost income streams accrued from increased sales of electricity by KPLC. These revenues will go to system reinforcement to ensure reliable quality supply while some of it goes to the government as taxes which results to improvement in service provision by the government to its citizens.

Security

There will be enhanced security in the country arising from well-lit social, commercial and individual premises. With the implementation of the project, the level of security will increase across the country. This

is as a result of more security lights which helps keep off opportunistic crimes while other people are able to use electric fences.

Communications

Improved communication amongst the communities and connectivity to global facilities through internet, mobile technology etc. all powered by reliable and quality electricity.

Improved gender relations at homes and communities

Most tensions within families and communities revolve around resources, overwhelming tasks, time burdens and low quality of lives. With reliable and quality electricity, significant improvement of life will be evident – mechanized tasks and efficiency; time burdens will be significantly reduced – leading to investments in more income productive activities; leisure activities will be more readily available, e.g. television and radio. Women's access to information will be greatly enhanced and empowerment facilitated through increased media access

5. POTENTIAL ENVIRONMENTAL AND SOCIAL THREATS TO SCADA/EMS SYSTEM/ DISTRIBUTION SYSTEM ENHANCED FLEXIBILITY

Dust, Dirt, Water Leakage, Corrosive agents:

SCADA/EMS equipment being electronic can be damaged by over exposure to dust, dirt, water, corrosive agents, and other fluids and should be installed in appropriate locations and or enclosures and protected from above environmental agents.

Risk of sparks/fire from live installations

Potential adverse impacts related to fire hazards can result from the project. The live conductors can cause short circuiting in case corroded conductors get into contact, water on exposed live parts or into the electrical equipment, or malicious damage from terrorism activities.

Dry agent fire protection systems for SCADA/EMS equipment and other electrical installations will be installed to lower the risk and damage caused by electrical fire.

Electronic threats:

This could be due to voltage transients, radio- frequency, ground potential difference and electromagnetic pulse.

Data security and Physical damage of hardware

Access to SCADA/EMS must be controlled and monitored. Support services from the manufacturer will be necessary to maintain a high system availability and also for KPLC to benefit from the manufacturer's research and development efforts.

6. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF SCADA/EMS SYSTEM/INSTALLATION OF LOAD SWITCHES

The upgrade and new installation of the SCADA/EMS system requires installation of Central servers loaded with various SCADA applications, Rear projections units, uninterruptable Power Supplies (UPS) Remote Terminal units (RTUs) and other operator equipment within Power Substation installations. Minimal environmental and social impacts result from this process, and the installation of load switched, with the exception of disposal of obsolete equipment and Occupational Health and Safety issues for Substation operators. Most Substations are automated and therefore social impacts are virtually non-existent.
The following should be observed to minimize environmental impacts of installation of SCADA/EMS equipment and load break switches.

Solid waste management:

- Procure quality and certified equipment with test certificates and warranty. Support services should be availed from certified sources. This will ensure longevity of the system and reduction of solid waste generation.
- Solid Waste mainly of packaging and wrappings should be disposed through licensed waste handlers. Where possible re-cycling and re-use should be promoted.
- Obsolete SCADA/EMS equipment should be disposed off through a registered and licensed Electrical Waste handler for recycling and not to be disposed into a landfill.
- Promote waste segregation for obsolete equipment by marking non-hazardous IT waste for Keyboards, flat screens, base units and hazardous waste consignment notes for CRT monitors and rechargeable batteries.

Occupational health and Safety

- Only trained, competent and authorized staff should operate and man the SCADA/EMS system
- Follow electrical Safety rules and regulations. Safe working procedures should be observed at all times.
- During installation and maintenance of the SCADA/EMS equipment use appropriate personal protective clothing and equipment.
- Periodic medical tests especially eye tests for the controllers exposed to the Visual Display Units should be conducted annually. Rotation of staff and minimal exposure hours to the Visual Display Units will enhance eye protection. Use of flat screens with anti-glares should be promoted.
- Observe OSHA 2007 regulations
- Maintain clear markings and hazard communication signals and where necessary install auto closure systems to aid in case of emergencies
- Proper servicing and maintenance of equipment to ensure their optimal performance and safety

7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

No.	Potential negative impacts	Mitigation measures	Monitoring activities and surveillance	Responsibility for Monitoring	Performance Indicator	Timing	Estimated Cost (Ksh)
1.	**Solid Waste Management**	• Procure quality and certified equipment with test certificates and warranty. • Support services should be availed from certified sources. • Solid Waste mainly of packaging and wrappings should be disposed through licensed waste handlers. • Where possible re-cycling and re-use should be promoted. • Obsolete SCADA/EMS equipment should be disposed of through a registered and licensed Electrical Waste handler for recycling and not to be disposed into a landfill. • Promote waste segregation for obsolete equipment by marking non-hazardous IT waste and hazardous IT waste appropriately.	Inspection	Supervising Engineer Contractor	• Test certificates and warranty • Support services • Contracts with Licensed waste handlers • Re-use/ Re-cycling records • Waste tracking documents • Waste segregation and consignment notes	Implementation &operation	1,250,000
2.	**Occupation safety and health hazards.**	• Only trained, competent and authorized staff should operate and man the SCADA/EMS system	Inspection	Safety Engineer; contractor; Technical Engineer	• Authorization certificates	Construction Operation &decommissioning	550,000

No.	Potential negative impacts	Mitigation measures	Monitoring activities and surveillance	Responsibility for Monitoring	Performance Indicator	Timing	Estimated Cost (Ksh)
		• Follow electrical Safety rules and regulations. Safe working procedures should be observed at all times. • During installation and maintenance of the SCADA/EMS equipment and load switches use appropriate personal protective clothing and equipment. • Periodic medical tests especially eye tests for the controllers exposed to the Visual Display Units should be conducted annually. Rotation of staff and minimal exposure hours to the Visual Display Units will enhance eye protection. Use of flat screens with anti-glares should be promoted. • Observe OSHA 2007 regulations • Maintain clear markings and hazard communication signals and where necessary auto closure systems in case of emergencies • Proper servicing and			• Number of accidents • Appropriate use of PPEs • Medical test records • Hazard communication signals		

No.	Potential negative impacts	Mitigation measures	Monitoring activities and surveillance	Responsibility for Monitoring	Performance Indicator	Timing	Estimated Cost (Ksh)
		maintenance of equipment to ensure their optimal performance and safety			• Service certificates‘		
3.	**Risk of fire**	• Provide dry agent fire protection systems	Inspection	Safety Engineer/ Project Engineer	• Appropriate Firefighting appliances in service	Construction, Operation and decommissioning	500,000
Total cost for implementing environmental and Social management Plan							2,300,000

8. PUBLIC CONSULTATIONS.

Installation of SCADA/EMS systems and load switches will be undertaken in existing electrical infrastructure mainly substations and associated telecommunication equipment. **There is therefore no need for Public consultations for this project, as there will be no environmental or social impact on the neighbouring populations.**

9. RESPONSIBILITY AND INSTITUTIONAL ARRANGEMENTS

The responsibility of implementing the ESMP falls directly on the implementing agency which is the KPLC. The main departments involved include Infrastructure development, Procurement, Safety health and environment department among others.

10. ESTIMATED COST

The estimated cost of implementing the ESMP is Ksh 2,300,000.00.

11. IMPLEMENTATION SCHEDULE AND REPORTING

The implementation of the standardized ESMP will take place from the planning stages to ensure quality equipment and support services is sourced, through implementation, commissioning, operation to decommissioning phases. Once monitoring of ESMP begins the officers responsible will report all issues identified to respective heads of departments or authorities and corrective/ remedial actions taken without delay to ensure optimal performance of the SCADA/EMS system while promoting environmental sustainability.