

BRIEF NOTE ON LOSS REDUCTION PROJECT FUNDED BY EUROPEAN UNION

1. Introduction

The Government of Rwanda received financing from the World Bank towards the cost of the Electricity Access Scale-up and Wide Approach. As part of this funding, Manitoba Hydro International (MHI) was retained in 2012-2013 fiscal year to study losses in the Rwandan electricity generation, transmission and distribution system. From generation to the distribution system, the overall losses figure was 23% at the end of year 2011.

The technical studies conducted on the Rwandan electricity network showed that the present network has high losses in the transmission as well as the distribution networks. The losses will be even higher if additional generation is added to the existing network. To add to this, the present network would not manage to supply additional load required by new developments in the country, particularly in Kigali.

After analysis, MHI came up with some strategic recommendations for a more efficient transmission and distribution of energy with reduced losses (technical and commercial) in the high and medium voltage systems during the system operation. These recommendations include the construction of a 110kv network to secure electricity supply in Kigali City, adding new distribution lines and substations around Kigali to be able to supply the rapid increasing electricity demand. The recommendations include also a number of activities regarding distribution and loss monitoring.

The implementation of all loss reduction strategies proposed by that study was estimated to 60 Million USD. The Government of Rwanda started mobilizing and signed with the European Union, in March 2015, a financing agreement of 23 Million Euros to support the program. Components of this agreement included:

- Construction of 110 Kigali ring Network
- Installation of capacitor banks in Kigali substations
- Installation of Advanced Metering Infrastructure System
- Rehabilitation of old cabins (Kigali Strengthening)

1.1. Construction of 110kV Kigali ring network

110kV Kigali ring network will help to increase the reliability of power supplied to Kigali by providing alternative lines every time there is a fault on the main line. The project also consists of building new substations as well as extending and upgrading existing ones. The entire ring which

will be done within this project is Jabana-Mont Kigali-Gahanga (Mont Kigali and Jabana are both linked at Gikondo) and will be almost 27km long. Mont Kigali substation which is supplying Nyamirambo, Bugesera, Kamonyi and a big part of Muhanga will be extended and upgraded with two 20MVA transformers replacing an existing 10MVA transformer.

The transmission network will also be extended at Gahanga since the medium voltage line already supplying the area is overloaded and has high losses. This will help to satisfy the demand in Gahanga. For reliability purpose, Gahanga substation will be able to also supply Remera and Kanombe. This gives more flexibility to maintain power supply during maintenance of one substation.

At Jabana one bay will be added in order to be able to connect the new line to the existing substation. Birembo substation is supplying Kagugu, Nyarutarama, Kimihurura, Kimironko, Remera, KSEZ, Kinyinya and Gikomero; to increase the capacity of the substation and system reliability, there will be an addition of a second transformer of 20MVA.

1.2.Reactive power compensation

According to MHI study, capabilities of the Kigali network are inadequate to enable the transfer of the energy generated by the new constructed power plants to the consumption centers.

The voltage profile in some areas is very low, which has a negative effect on the quality of supply to the customers, increases losses, and disturbs the system's stability by increasing the risk of voltage collapse.

As an interim measure, a reactive power compensation capacitor bank will be installed at Gikondo 110 kV bus bars.

The implementation of capacitor banks in substations in Kigali area will improve the voltage profile and therefore contribute to the achievement of the objectives of the project.

1.3.Installation of Advanced Metering Infrastructure System

Most of the above mentioned estimated losses (23%) originate from the third network due to un-billed energy consumptions by clients, un-identified faulty meters within the network, overloading of transformers etc. Although the losses are being estimated as above, the utility need to accurately measure & reduce the losses in the Distribution network by comparing the distributed energy to the billed energy and this will become possible by installing SMART Energy Meter at every distribution Transformer with the electricity Network.

Meters will be read from one location. The metering system will have a computerized system to facilitate the analysis of losses.

KIGALI STRENGTHENING PROJECTS

The current Kigali distribution network comprises old transmission lines and distributions substations which are overloaded, and yet the generated power from plants cannot reach to the end users. Therefore, EUCL has specified 17 old cabins to be rehabilitated including 11 cabins funded by the World Bank and 6 cabins funded by EUCL. Aforesaid cabins will be also integrated in the existing SCADA system in order to be monitored by NECC.

Table 1: details of projects progress

No	PROJECTS DESCRIPTION	CONTRACTOR	CONTRACT DURATION	CONTRACT EFFECTIVENESS DATE
1	Supply and Installation of materials for the construction of 110kV line Jabana -Mont Kigali- Gahanga	Eltel Networks TE AB	450 calendar days	17 Oct 2016
2	Supply and installation of Materials for the extension and upgrade of mount Kigali substation , construction of New gahanga substation and installation of second transformer at Birembo substation	Eltel Networks TE AB	450 calendar days	17 Oct 2016
3	Supply and Installation of Advanced metering infrastructure for loss monitoring (Smart meter)	HUAWEI TECHNOLOGIES (Rwanda) ltd & HUAWEI TECHNOLOGIES Company (Nigeria) ltd	365 calendar days	28 Jun 2016
4	Reactive Power Compensation Project (Installation of Capacitor Banks)	Contractor not yet published, it is at notification phase and soon will start		
5	Rehabilitation- upgrade of six (06) switching substation in Kigali	MRI	11 months	31 Aug 2016

6	Rehabilitation of 11 cabins by WB	Contractor not yet published, it is at notification		
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DIFFERENT SITES PHOTOS



Official sites handover for Kigali ring Jabana



Mont Kigali SS site fencing



Six cabin status in January 2017



Installation of smart meters “prepaid meters’