



U.S. & INTERNATIONAL ENERGY EXPERTS SHARE BEST PRACTICES ON LOSS REDUCTION & REVENUE PROTECTION

METERING, BILLING & LOSS REDUCTION: A REGIONAL WORKSHOP FOR DISTRIBUTION UTILITIES

Dar es Salaam, Tanzania – Senior utility executives, regulators and ministry officials from more than twenty companies and organizations recently participated in a USAID- and Power Africa-funded regional workshop which focused on improving distribution utility performance and solvency. Participants from the Democratic Republic of the Congo, Ghana, India, Kenya, Nigeria, Mozambique, the Philippines, South Africa, Swaziland, Tanzania, Uganda, and the United States met with their peers from utilities, meter and software manufacturers and financial institutions to learn about strategies, technologies, and techniques for improving distribution utility performance. The participants discussed a range of issues, including strategies for reducing technical losses, combatting electricity pilferage and meter tampering, and how to best integrate smart grid infrastructure, new information and data analysis technologies and advanced meters. The participants also learned about the importance of customer service and proactively engaging the community to achieve loss reduction targets and protect the utility’s revenue over the



Workshop participants from all 12 countries gather with international experts in Dar es Salaam, Tanzania.

long term. The utilities that have made the greatest improvements in electricity reliability and energy efficiency have learned the importance of loss reduction, customer engagement, and revenue protection. The workshop highlighted three important topics: the importance of loss reduction to system stabilization; the relationship

between smart metering, AMI and revenue enhancement; and billing and collections best practices, prepayment systems and new technologies.

This program targeted electric utilities from Power Africa Initiative countries. Launched by President Obama in June 2013, Power Africa aims to double the number of people who have access to electrical power in sub-Saharan Africa. Power Africa will bring to bear a wide range of U.S. government tools to support investment in Africa’s energy sector. From policy and regulatory best practices, pre-feasibility studies and capacity building, to long-term financing, insurance, guarantees, credit enhancements and technical assistance, Power Africa will provide coordinated support to help African partners expand their generation capacity and access.

The workshop was organized and conducted by the U.S. Energy Association (USEA) on behalf of USAID.

REDUCTION OF TECHNICAL LOSSES – TECHNOLOGIES AND SOLUTIONS

Each of the participating utilities spoke about their current technical and commercial figures and the steps they have taken to reduce such losses. In TANESCO’s case, improvements to the distribution system infrastructure have decreased total losses to 19 percent of revenue or less in recent years, but Christian Msyani, Ag. Deputy Managing Director for Transmission, explained that TANESCO is still working to reduce technical losses on its transmission system. These problems have largely been caused by extending relatively low-voltage lines beyond their standard recommended lengths. Mr. Msyani described TANESCO’s plan to bolster its transmission network with a 400-kv “backbone” line to serve the large load centers in the country.

Other utility representatives discussed challenges they face with aging, obsolete or faulty transformers, switch gear, and other distribution equipment. Bailey Del Castillo from Visayan Electric Company (VECO) and Joe-Mel Zaporteza from Manila Electric Supply Company (MERALCO) each shared their experiences in the Philippines using data and technology (including distribution automation, SCADA, and distribution management systems or DMS) combined with customer input to prioritize maintenance projects and distribution system improvements. By focusing investments on specific upgrades – from GIS solutions on crew vehicles to undergrounding of selected distribution lines – both companies have been able to use data to address customer concerns and make more impactful improvements. Some of these investments address asset reliability and ease of service restoration after extreme weather, while others seek to limit load shedding or, in the case of undergrounding, make pilferage and wildlife-caused faults less likely. Later in the workshop, Imraan Mohamed from Itron, Gert Booysen from GE Energy Management, and Jayant Kumar from Alstom Grid provided further details regarding the latest technical solutions. The three panelists described how increasingly smarter grid operations can reduce technical losses to negligible levels by finding faults faster, reducing outage time, and collecting, managing, and analyzing data in real time.



Nicholaus Kamoleka, Senior Manager of Sales and Marketing at TANESCO, describes how the utility has reduced its technical and commercial losses over the past several years.

COMBATTING NON-TECHNICAL LOSSES – BILLING AND COLLECTION BEST PRACTICES

Many of the utilities discussed their persistent troubles with commercial or non-technical losses in their distribution networks. Commercial losses are broadly grouped into two categories: unbilled energy losses and energy usage which is billed but uncollectable. Unbilled energy losses are typically the result of theft in one form or another. Michael Okai from Electric Company of Ghana (ECG) and Sarvadeva Paul Majumder from Calcutta Electric Supply Company (CESC) shared photographs of various forms of meter tampering and bypassing – ranging from the crude and obvious to the ingenious and difficult to detect. Mr. Majumder also shared photos and experiences of bare-wire electricity theft, which has been common in CESC’s territory on a daily basis but is extremely pronounced during festivals and holidays. Utilities from India, South Africa, and the Philippines each gave different examples of how to

combat electricity theft, but they all stressed the importance of proactively engaging and educating the community, as well as prosecuting those who continue to steal electricity. In particular, Mr. Majumder explained how CESC decided to sponsor street festivals and provide free power during the event in an effort to foster good will in the community and discourage theft. On the other side of the equation, Bailey Del Castillo from VECO explained that

utilities in the Philippines have published the names and photographs of convicted thieves in local news media, alongside apologies from the parties in question, which has helped create a social stigma against electricity theft. Mr. Maphaka emphasized the need to be persistent in making the case – both to the public and to the courts –for why electricity theft is not a “victimless crime” and how the utility’s inability to collect revenue for its services makes it nearly impossible to provide reliable electric power.



Michael Okai, Manager of Revenue Protection for the Electricity Company of Ghana (ECG) discusses the various software systems that ECG has piloted or implemented for use with its prepaid and postpaid metering systems.

customers in stealing electricity for a fee. Eskom has combatted employee dishonesty through a combination of personnel policies, outreach, and technical solutions - including meter reading devices that must be within a specified distance of the meter in order to input data.

On the other hand, most of the utility representatives also cited problems with billed but uncollected/uncollectable energy losses. Speaking about residential customers, Mr. Maphaka detailed Eskom’s long experience and successes with prepaid metering systems. Eskom was a pioneer in the region in this regard, and today South Africa’s major utility has the largest number of customers on prepaid metering systems – more than 4 million customers. The workshop participants were keenly interested in Eskom’s lessons learned: the need for community outreach/buy-in to combat a negative stigma for customers receiving prepaid meters; the best way to utilize remote vending machines for prepaid systems; the need to pilot new meter systems and fully evaluate them before rolling out on a large scale; and the technical specifications for meters to be installed on Eskom’s system that the utility developed in cooperation with the South African Bureau of Standards. Speaking from CESC’s experience, Mr. Majumder provided an overview of the available customer information systems, along with revenue protection best practices for distribution utilities. He recommended penalizing late payments and disconnecting customers who routinely default on payments. Participants were particularly interested in how CESC deals with customers that the utility knows from experience are unlikely to pay, for whom Mr. Majumder suggested charging a security deposit in advance of service.



Joe-Mel Zaporteza, Technical Specialist & System Loss Project Manager with MERALCO, describes his company’s strategies to integrate new technology and increase the efficiency and reliability of its distribution network in the Philippines.

INTEGRATING SMART GRID TECHNOLOGIES

Most of the workshop participants were keenly interested in introducing various smart grid technologies to their distribution systems or upgrading existing systems to increase efficiency, response time, and central control of dispatch and distribution management. They asked many questions of the manufacturers and service providers present: ALSTOM Grid, GE Energy Management, and Itron. Many questions focused on the benefits of pre-paid metering systems and the various ways that utilities can accept payment. Building upon these presentations, Mr.

Maphaka was able to speak about Eskom's lengthy experience with different prepayment systems in South Africa. Mr. Kiiru from Kenya Power and Light Co. (KPLC) highlighted the potential for mobile network-based payment systems for pre- or post-paying utility bills, such as the Mpesa system that is gaining popularity in Kenya. Other questions focused on technical capabilities and features of various systems. For example, participants and presenters discussed the potential benefits of utilizing Automated Metering Infrastructure (AMI), handheld meter reading devices, supervisory control and data acquisition (SCADA), GE's RF "Star" communication architecture versus the RF mesh and power line communication (PLC) systems employed by ALSTOM and Itron, and other smart grid technologies. In particular, many participants were interested in the potential to collect, manage, analyze, and use data about their customers and how they use electricity – something that is rarely done in East Africa at present, but which could greatly improve a utility's ability to manage its network efficiently, avoid outages, and plan effectively for expansions or upgrades.

RESULTS & RECOMMENDATIONS

Over the course of the workshop, participants were able to meet with their African peers and discuss the varying technologies, strategies, and best practices presented. Upon workshop completion, participants laid out their recommendations, which included:

- The participants from **Swaziland Electric Company (SEC)**, **TANESCO**, and **Zanzibar Electric Company (ZECO)** will make use of pilot programs to test future adoptions of new technologies and metering, metrics for analyzing system performance, and identifying necessary improvements before full-scale implementation. They will also make use of the technical specifications already developed by Eskom and the South African Bureau of Standards. This model for adopting new technologies was presented by Maboe Maphaka based upon **Eskom's** experiences deploying prepaid meters and learning how to specify the most appropriate and robust equipment from suppliers.
- The **Energy Regulatory Commission (ERC)** of Kenya and the **Energy and Water Utilities Regulatory Authority (EWURA)** of Tanzania plan to work more cooperatively with their respective utilities to set up a test bench with more efficient and robust meter testing procedures - something modeled after the **Visayan Electric Company (VECO)** and **Manila Electricity Company (MERALCO)** relationship with the Philippines' regulator, presented by Bailey Del Castillo and Joe-Mel Zaporteza.
- The participants from **Kenya Power and Light Company (KPLC)** and **TANESCO** will recommend improvements to their customer service and community engagement programs, based on best practices described by **Calcutta Electric Supply Company's (CESC)** Sarvadeva Paul Majumder and **Eskom's** Maboe Maphaka.
- The **Electricity Company of Ghana (ECG)** will seek to streamline their metering programs and reduce the number of systems they employ across their service area.

WORKSHOP PARTICIPANTS

- African Development Bank (AfDB)
- Alstom Grid
- Calcutta Electric Supply Company, Limited of India (CESC)
- Electricidade de Moçambique (EDM)
- Electricity Company of Ghana (ECG)
- Energy and Water Regulatory Authority of Tanzania (EWURA)
- Energy Regulatory Commission of Kenya (ERC)
- Eskom of South Africa
- GE Energy Management
- Ibadan Electricity Distribution PLC of Nigeria (IBEDC)
- Industrial Promotion Services of Uganda (IPS)
- Itron
- Kenya Power and Light Co. (KPLC)
- Manila Electric Company of the Philippines (MERALCO)
- Millennium Challenge Corporation Compact II

- Ministry of Finance of Tanzania
- Société Nationale d'Electricité of the Democratic Republic of Congo (SNEL)
- Swaziland Electricity Company (SEC)
- Tanzania Electricity Supply Company (TANESCO)
- Visayan Electric Company of the Philippines (VECO)
- West Nile Rural Electrification Company of Uganda (WENRECO)
- Zanzibar Electricity Corporation (ZECO)

WORKSHOP SPEAKERS

- **Agnes Wachie**, Senior Electrical Inspector, ERC
- **Amour Kinanga Ngwaba**, Division Manager, National Control Center, SNEL
- **Babu Ram**, Chief Power Engineer, African Development Bank
- **Bailey Del Castillo**, Associate Vice President, Head of Customer Services, VECO
- **Christian Msyani**, Ag. Deputy Managing Director – Transmission, TANESCO
- **Jayant Kumar**, Global Smart Grid Program Director, Alstom
- **Eduardo Ali Pinto**, Commercial Manager, EDM
- **George Thagichu Kiiru**, Deputy Manager, Installation Inspections and Fraud Control, KPLC
- **Gert Booyesen**, Software Solutions Leader, Africa, GE Energy Management
- **Imraan Mohamed**, Marketing Manager, Sub Saharan Africa, Itron
- **Joe-Mel Zaporteza**, Technical Specialist and System Loss Project Manager, MERALCO/ IBEDC
- **Len Schaller**, Product Manager, Pre-payment Meters, Itron
- **Maboe Maphaka**, Senior Manager, Energy Trading and Sales Forecasting, Eskom
- **Michael Okai**, Manager, Revenue Protection, ECG
- **Nicholaus Kamoleka**, Senior Manager of Sales and Marketing, TANESCO
- **Oscar Ankunda**, Projects Manager, WENRECO
- **Sam Mzileni**, Customer Services Manager, SEC
- **Sarvadeva Paul Majumder**, General Manager, New Initiatives, CESC

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