

ETHIOPIAN SMART METERING WORKSHOP

Addis Ababa, Ethiopia - The Workshop on Smart Grid introduced participants to best practices in smart grid and advanced metering. Topics discussed included:

- Efficient and competitive technologies to tackle reduction of technical and commercial losses;
- Technologies and techniques for improving distribution utility performance, focusing on technical and financial issues;
- Strategies and approaches of U.S. and international utilities on how best to integrate smart grid technologies/systems and customer information systems; and
- Incentives for, and technical and economic challenges to, implementation of advanced meters and smart grid infrastructure.



Workshop participants from Ethiopian Electric Utility, Ethiopian Electric Authority, with international experts in Addis Ababa, Ethiopia.

MOVING TOWARD A MODERN ENERGY SYSTEM IN ETHIOPIA

Daniel Gizaw of dVentus Technologies highlighted the need for a more modern energy system with a smart grid in Ethiopia. Demand has grown tremendously in Ethiopia and the forecast is for up to 34,000 MW demand by 2030 which will require excellent grid management. In addition to the increasing demand, the continent as a whole is growing fast, reliability of energy is extremely poor, and efficiency is bad. A smart grid can help solve these problems. Smart grids are flexible, economic, secure, and improve customer service. The first step towards a smart grid is installing smart meters.

Mr. Gizaw then discussed smart grid architecture and available smart meters. Currently, dVentus has single and three phase smart meters and digital water meters with communication and data management. These meters can indicate how bad the power factor and voltage are, which is more than just a simple meter or server. Smart meters are also a sound business decision in Ethiopia as in ten years EEU would add \$700 million in income by decreasing losses. The dVentus meter, manufactured in Ethiopia, works with backend systems from other manufacturers and would allow for energy auditing— following volt meters all the way down to the meter to see discrepancies to detect tampering.



Daniel Gizaw of dVentus Technologies discusses the current situation of electricity in Ethiopia and details how smart meters will help with forecasted demand.

CHALLENGES WITH PREPAID METERS

Alexander Von Maravic of Siemens outlined prepaid metering, while detailing benefits and challenges. A centralized prepaid solution with connected smart meters (without STS) allows for a more automated and integrated system. However, both traditional prepaid meters and prepaid smart meters present technical challenges. With a

traditional prepaid system any changes need to be made at the meter—such as tariff management, connection and disconnection, as well as modifications of thresholds or emergency credits. Additionally, a traditional STS prepaid metering system does not allow for tamper detection or postpaid metering. While a smart prepaid system can help alleviate some of these issues there are still a few technical challenges—such as difficulty with meter communication, system and data management, as well as security challenges.

Many of the challenges discussed will hamper EEU’s ability to decrease system losses as they wouldn’t be able to disconnect a meter remotely, they are cost intensive in terms of labor, and there are no tamper detection or alerts on prepaid like there are on smart meters. Prepaid meters also cannot have multi-tariff billing and it is very difficult to change the tariff on them. Other challenges are that you must have a retail environment to pay and there is no post-paid metering which large consumers sometimes need.

BENEFITS OF SMART METERS

Smart meters present a number of benefits over traditional prepaid systems. When smart meters were installed in South Africa, some municipalities increased their revenue by 10% by discovering locations that were un-metered or had defective meters, allowing for correction of customers who were on the wrong tariff, and identifying customers that were bypassing the meter and stealing power. With such high losses, smart meters would allow EEU to focus on the biggest technical losses first and take steps to mitigate, which would make a big impact initially. Udayan Ganguly of CESC specified how unbalancing is a huge part of losses and that smart meters can analyze changing load profiles to determine what the technical losses are.



Alex Von Maravic and Martin Kuhlmann, both of Siemens, outlined the differences between traditional prepaid meters and smart prepaid meters

Siemens presented smart prepaid systems as a solution for EEU. Smart prepaid meters would improve the overall customer experience by allowing customers to access information regarding their electricity usage and be alerted when they are close to their limit. Additionally, as

Ethiopia scales up electricity demand over the coming decade, data management will be increasingly important for EEU—a full smart metering system would give the utility the data they need to improve and expand service. Both dVentus and Siemens discussed smart metering systems, but disagreed in importance of the system as a whole. Siemens outlined that a backend system and software were necessary to maximize functionality of the smart meter, while dVentus disagreed and highlighted that installation of smart meters should be the priority for EEU, rather than implementation of a whole smart meter system.

COMMUNICATION NEEDS FOR SMART METERS

Currently, the telecom network does not cover 50-60% of Ethiopia, and data lines are frequently interrupted. Workshop participants repeatedly raised questions about what communication was necessary to utilize smart meters. Siemens stated that various communication tools can be used, such as 3G, 2G or LG if desired, and that Siemens manages the network and communication as well by having multiple service providers and putting high antennas on from the beginning to get better reception. However, there currently aren't many service providers in Ethiopia right now. Siemens stated that the meter is very reliant on having a decent signal and that wireless communication could be used.

Mr. Ganguly discussed the communication options CESC uses. CESC has its own communication network and reserves cellular for the areas where CESC doesn't have its own communication. He stated they could use PLC but feels it has problems and might not be the best option. However, in multi metered buildings it might work. Mr. Gizwan of dVentus stated they plan to use PLC for communication in Ethiopia. Participants questioned whether it is possible to have different communication modules. Mr. Ganguly replied that it is but that manufacturers at first didn't like it. He also said above ground optical fiber and broadband on overhead lines could also work for EEU.

DECIDING BETWEEN PREPAID AND SMART METERS: THE CESC EXPERIENCE

Mr. Udayan Ganguly of CESC described his utility's process and decision to move to smart meters. CESC conducted a series of evaluations to determine customer satisfaction with service and their meters— 55% of respondents said it was hard to recharge their prepaid meter, and 36% of respondents would prefer internet vending. CESC's evaluations led the utility to reexamine their installation of traditional prepaid meters and explore how a smart meter system would improve service and customer satisfaction. In the last eight years, CESC has only put in eighty-nine traditional prepaid meters. All other installations have been smart meters, which came out to about 2,000 smart meters added. The next plan is to add 65,000 smart meters and then 200,000.



Udayan Ganguly of CESC speaks on the importance of an integrated smart meter system during the panel session with all of the speakers.

Mr. Ganguly stressed the EEU needs a mindset change and must move away from short sighted view that it is just a meter and look ahead fifteen years or more. Smart meters generate a lot of inputs and data, and whatever costs are incurred, the benefits outweigh the cost. The

payout timeframe for CESC is around five years. He also cautioned against the current line of thinking by several participants that perhaps they should install smart meters without the AMI infrastructure as that is rather pointless.

ROAD FORWARD

All four presenters joined a panel discussion to highlight steps Ethiopia must take to create an enabling environment. The key is to create a framework first and consider how smart meters can and will be beneficial and determine the goals and objectives of installation. Siemens suggested EEU go through the complete design and come to an understanding of where they are going and what they want out of smart grid, from issues they need to work on all the way down to the meter. EEU will also need an integrated backend system to manage the smart meter network. All four presenters emphasized that communication is paramount.

Mr. Ganguly cautioned that after smart meters are installed, tampering shifts to inside the meter and tapping underground, which are hard to detect. However, EEU would be able to analyze the information coming from the meter and use logic based programs to catch problems and theft. EEU should also place smart meters where they know they have high losses to start. He emphasized that strong punishment for theft is also essential to deterrence.

RECOMMENDATIONS

- Ethio telecom has just started mobile money. This should be expanded in Ethiopia and the utility should use mobile money for payment as the phone will alert you if your account balance is low.
- EEU needs to work with the local telecom and internet providers to improve access not only in rural areas, but throughout the country.
- The new IRP package at EEU needs to be coordinated as well.
- EEU needs to design a roadmap and look at where they want to go. Identify the drivers, get stakeholder consensus, and then get technology solutions.
- The World Bank representative suggested EEU create a department to manage the metering system, take the data, and get it to the right people.
- Mr. Ganguly of CESC recommended Ethiopia work with a managed service to begin with as it will take less labor and knowledge on their part. As EEU becomes familiar with smart meters and smart grid, they could take over these functions.
- Mr. Ganguly of CESC recommended Ethiopia not wait until the utility is privatized before installing smart meters—they should start now.

RESULTS

- How many of you believe you should go for smart meters? 19 (thought they should before this as well);
- How many of you feel you should do prepaid smart meters without backend? Everyone agreed that a backend system was necessary;
- Pilot project approach best? Everybody;
- 16 believe benefits of installing a smart meter system outweigh costs of installation and maintenance;
- Are there any areas you think would be good for pilot? Areas outside of Addis Ababa have lots of outages – this would help find problems. Or high loss areas (The World Bank is currently conducting a study on high loss areas). Gene Lin of USAID proposed areas such as the neighborhood of Bole, where new condos going up be considered.

SPEAKERS

Alexander Von Maravic, Siemens

Martin Kuhlmann, Siemens

Udayan Ganguly, CESC

Daniel Gizaw, dVentus

WORKSHOP PARTICIPANTS

1. Michael Carr, GIZ
2. Esmehair Eshete, EEU
3. Kidanua Abera, UNDP
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5. Tariku Worku, EEU
6. Asfaw Bekele, EEU
7. Wendfraw Chekol, EEU
8. Nega Kifle, EEU
9. Binyam Atrafe, EEU
10. Masresua Asfaw, EEU
11. Tinsae Wondimu, EEU
12. Mengistu Asres, EEU
13. Dereje Getachen, EEU
14. Abdurazak Mohammed, Ethiopian Energy Authority
15. Ebisa Regasa, MoWIE
16. Mizan Welderufael, EEU
17. Azeb Girma, EEU
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