

2014 AMEU CONVENTION SUMMARY

Peter Moray, Utilities Telecom Council (UTC), USA

Africa UTC – Promoting Telecoms & ICT – An Essential Ingredient in Energy Networks of the Future

This paper presented at the 2014 annual convention of the AMEU set out the case for establishing the Africa Utility Telecoms Council (AUTC) as an international division of the Utilities Telecoms Council (UTC) based in Washington DC in USA. At present there is no body or organisation within the utility sector which addresses what is rapidly becoming a critical element in the energy and utility value chain. UTC is a global trade association dedicated to creating a favourable business, regulatory, and technological environment for companies that own, manage, or provide critical telecommunications systems in support of their core business. UTC has already established international divisions in America Latina, Canada and in Europe. UTC and the international divisions represent electric, gas, and water utilities; natural gas pipelines; critical infrastructure companies; and other industry stakeholders.

Kevin Kotzen, GreenCape

Economically viable Smart Grids within Municipalities: Lessons learned from local case studies

Smart grids infrastructure in municipalities can improve the efficiency of electricity provision and present new opportunities for economic growth and job creation. This potential business opportunity is currently hampered by barriers that limit municipalities' ability to commit to large scale roll-out of smart grids and associated distributed generation technologies.

These barriers to Smart Grids have many causes, including a lack of national standards which may result in obsolete infrastructure once standards are finalised, and limited knowledge about the capabilities, benefits and financial viability of these technologies.

GreenCape has been conducting case studies in Western Cape municipalities to determine the feasibility of implementing smart grid technologies within these municipalities, identify barriers to implementation, and facilitate the uptake of these technologies.

Jonathan Hunsley, eThekweni Municipality

Journey towards a Smart Utility: an eThekweni Electricity perspective

The benefits of a Smart Grid which include improved customer service, network reliability and improved outage response exceed the current challenges experienced by eThekweni Electricity. This paper discusses the approach being followed by eThekweni Electricity in achieving its objective of a Smart Grid and highlights the challenges being encountered by eThekweni Electricity. These challenges are not unique to eThekweni Electricity but impact on all other Electric Utilities within the South African region. The paper further discusses the achievement of a

fully automated network that can ensure two-way flow of electricity and information. The implementation of various projects to meet the Smart Grid objective is also highlighted.

Hendrik Barnbard, Elexpert

Municipal tariffs: Whereto from here?

Municipal electricity tariffs are in a shambles: NERSA IBT tariffs have created chaos beyond comprehension.

Electricity is being sold at prices below the Eskom purchase cost. More and more low usage customers are increasing the subsidy burden. High usage, overcharged customers are converting to alternative energy sources. NERSA is stipulating large customer tariffs at Eskom plus 20% thus depleting any option of making a surplus. Despite all of this large profits are being hidden.

This paper described these problems and proposed an approach in line with the Government Electricity Pricing Policy where a fair deal is given to all customers and yet the Municipality is ensured of a fair income and profit.

Nathi Mhlongo, Zimele Technologies

Are Lower Prices an Illusion or Reality in a De-regulated Environment?

With more and more delays in the Power Stations build and a threat of power cuts more and more consumers are calling for deregulation of the Electricity market. The private sector is adding even more weight to these calls by engaging with the government and punting potential “win-win” options.

The key questions are

1. Do all the parties fully understand the meaning and implications of a deregulated market?
2. Does a deregulated market really mean reduced rates for the consumers?

The difference between the two markets is actually fairly simple. In a *regulated* electricity market, there is only one main company, which is commonly referred to as the utility. This utility claims ownership of the entire infrastructure including wires, transformers, poles, etc. It has two major responsibilities. The first is to purchase electricity from companies that generate it, and the second is to sell and distribute it to its customers.

In a *deregulated* market, an additional party is involved. The utility still owns the infrastructure, but now, its only responsibility is to distribute the electricity. Deregulated markets permit electricity providers to compete and sell electricity directly to the consumers.

Paul Tuson

Small Scale On-Grid Solar Photo Voltaic Embedded Generation in South Africa – Methodologies to Stimulate the Market

Discussion around small scale solar PV Embedded Generation (SSPVEG) methodologies e.g.: self-consumption, Net Metering and Feed in Tariffs (FITs). Discussed two financial methodologies: Two-part tariffs and “Net Feed In Tariffs” with pros and cons. Two part tariffs include a fixed network/service charge and a kWh energy charge.

Fixed network/service component of tariff can cover Use of System (UoS) costs.

kWh energy component of tariff can cover energy purchase costs from Eskom at e.g. a blended Megaflex tariff

Discussed mechanisms to manage reduced municipal revenues resulting from SSPVEG.

Fixed network/service component of tariff can recover UoS costs and Life-Line customer subsidies. Cross-subsidies to other municipal services can be covered by revamped Rates and Taxes tariffs.

Higher Rates and Taxes tariff costs to low-income customers can be mitigated by differentiating Rates and Taxes tariffs based on factors e.g. property size, NMD, geographical area, etc.

Kevin Kotzen, GreenCape

A perspective on distributed generation in municipal networks

Distributed generation, typically in the form of grid-tied photo-voltaic panels installed on rooftops, potentially offers many benefits to society. The falling cost of distributed generation technology has also increased demand for these systems among municipal utility customers.

Among municipal utilities there are concerns about the impact of allowing such generation on their distribution networks, and the challenges, both technological and for the management of revenue, that allowing such generation will bring.

GreenCape is currently engaged in case studies among Western Cape municipalities, investigating the impact of distributed generation on municipalities, and identifying strategies for effective management of the concerns and risks related to distributed generation.

This paper covered the insight gained and lessons learnt from these case studies.

Jaco Alberts, Motla Consulting Engineers (Pty) Ltd

The impact of small scale embedded generation and EEDSM on historically designed networks and how it will affect networks of future cities

Load forecasting methods are based on selecting ADMD values for various load classes, summing the load class load profiles and the application of diversity factors while looking 10 to 20 years into the future. These

factors, especially diversity, are altered through EEDSM and small scale embedded generation initiatives. Distribution networks are not designed to cater for reverse power flow or a diversity-less scenario (e.g. excess solar PV power injection at rooftop level into the grid). The paper investigated the impact EEDSM and small scale embedded generation had on these parameters used for master planning and designs, how it would affect existing networks and which concerns we should address for our future cities in this regard.

Geeven Moodley, Digsilent Buyisa (Pty) Ltd

Typical technical behaviour of LV networks, with varied levels of renewable penetration

Performance of a typical LV network with varied levels of rooftop PV penetration South Africa is still in its infancy with regards to renewable energy and all of this is at transmission and sub-transmission level. However in countries with high penetration of renewables, the bulk of this is at LV level, e.g. Germany has approximately 80% of renewable energy on rooftops.

Current trends indicate that for the renewable market to really take off in South Africa, these levels of penetration need to take place at LV (municipal) level. The question then raised is what technical impacts is this going to have on networks that were designed to transfer power from 'top down'. This paper presented results of studies that showed the typical technical behaviour of LV networks, with varied levels of renewable penetration, and gave some indication as to how to manage these developments.

Kobus van den Berg, Aurecon

Smart Metering Implementation Guidelines

The paper discussed practical implementation processes and guidelines. The tasks of the various parties involved in the roll out process was discussed and the pitfalls described.

The paper explored and explained the choice of a set of standards, communication medium, back office system, SM functionality, effective program management, inter-departmental communication. Establishment of support staff skills is vital to the success of a SM system

Important issues like database cleaning, quality assurance, project roll out plans were discussed from a practical point of view.

Empowerment and change management processes to prepare the various sections and staff were also discussed to point out the impact of new systems on operational staff.

The abovementioned processes was discussed to assist South African utilities to understand the possible impact on their operations as well as ensure that they derive maximum benefit from the investment in new technology

Xolani Lembede, City Power

Revenue generation success story: The case of River Park

Due to low level of payments in low income areas, City Power has been experiencing high levels of electricity theft, network overload and high rates of repeated failures. The ultimate solution to the problem is to educate the customers about the benefits of paying for services and the consequences of abuse and theft of electricity. Experience, however, has proven that it's human nature that once you have experienced free services, you develop a sense of entitlement and it becomes difficult to adapt to paying for those similar services.

Authorities have to strike a balance between the electricity usage and bylaw enforcement. The utility has to recoup the consumption related costs, protect the infrastructure from vandalism and monitor the consumption patterns for the purpose of detecting theft; however all the efforts will only succeed with the community's buy in, hence the importance of vigorous community awareness initiatives.

Paul Renshall, Total Utilities Management Services Pty Ltd (TUMS)

Transforming Municipal Services – Delivering Smart Metering while Securing Revenue

The paper looked at how TUMS has embarked upon the smart meter roll out across the City of Tshwane to all customers (approx. 500k+) residential, commercial and industrial) through an innovative off balance sheet transaction. The paper described the background to the project, the technical solution overview, the benefits provided, the challenges faced and the key successes to date.

Wasim Dawood, Conlog

Synopsis: Smart metering solutions for the future of African utilities and the world

Africa is a land of possibilities, teeming with opportunities, yet countless challenges stand in the way of realising its full potential. One of the key concerns is the electrification of the continent, the lack of which, limits its economic and societal development.

Large scale meter tampering, illegal meter connections and the lack of accurate electricity metering information greatly hinder utilities from effectively meeting their service delivery requirements. Smart metering has been touted as the solution to the world's electricity woes, whilst this may be true for developed countries; a solution for Africa must consider the African market, in which we encounter a lack of communication infrastructure, standards and interoperability.

Conlog, a pioneering metering solutions company, understands the needs of the robust African market. Years of research have led to the development of a ground-breaking solution, created for Africa, by Africans. The Conlog Advanced Metering Infrastructure (AMI) solution; Iridium+ combines the latest technological advancements to create a basic Smart solution that is practical, realistic and scalable for the African market.

Traditionally most metering solutions are provided as standalone systems, the utilities only interaction with the meter being provided by manual meter reading. This has proven to be very ineffective and there is an urgent call for two-way communication between the meter and utility with real-time energy consumption data. Data that is accurate and relevant will enable the utility to identify areas of concern and take the necessary action.

Jon Kincaid-Smith, SolarTricity

Smart meters v Smart hot water control systems

Solartricity has broken new ground through the development of a dynamic, web enabled, smart hot water control system. Through implementation across a population of over 8000 domestic geysers our system produces unprecedented insight and data into hot water load profiles and consumption during peak and off-peak demand times. Knowledge of this behavior, until now, was very limited – typically based on the calculated effects on sub stations following (say) a traditional ripple relay intervention. These however could only speculate on the effect of factors such as ripple relays that may be bypassed or not functional or indeed of the effects of other electrical appliances.

There has been much interest on the part of municipalities for the incorporation of smart meters. Our paper, however, would seek to interrogate the benefits and limitations in the South African context of the implementation of smart meters, against that of implementing a smart hot water control system. There is a place for both - but these need to be understood and evaluated in terms of which is most appropriate, both in terms of cost and functionality for different demographics and in the context of localized infrastructure. The bankable savings of a smart hot water control system through the diversion of 'time of use tariffs', needs furthermore to be weighed against the alternative effects, both social and economic, of marking up 'time of use tariffs' using a smart meter.

This presentation focused on the potential for Eskom IDM technical approval and IDM load funding towards such projects. In terms of the smart hot water control system, address points of security architecture, unique functionality (including the ability to read geyser temperatures and to set rules according to which load is harnessed), as well as back-end testing systems and reporting.

Geeven Moodley, SALGA

Net-Metering Concept

During meetings in the offices of SALGA with AMEU as a reference group on 25. 07. 2013 and 07.11.2013, possible options for a legal and technical framework for the connection of rooftop-PV systems in South Africa have been discussed.

The net-metering concept is proposed on the base of these discussions. The following main aspects should to be considered, by standard conditions for Small Scale Embedded Generators:

- Ensure safety of operating personnel.
- Ensure that impact on power quality in local distribution networks is low.
- Low administrative overhead so that also private customers can participate in it.
- High security of investments into Small Scale Embedded Generators (mainly rooftop PV systems).
- Export tariff that provides sufficient incentive to avoid illegal connection of Small Scale Embedded Generators.
- Export tariff that is sufficiently low for not creating an additional burden to overall electricity costs.
- Tariff that provides an incentive for timely generation of electricity.
- Low overhead costs for additional equipment, such as meters etc.
- Fair coverage of costs of grid usage.

Dr Willem du Toit, Saftek Technology

The impact of the new health and safety(construction) regulations on municipal and design electrical engineers

The new construction regulations place new emphasis on municipal and municipal design engineers' responsibilities. The need for such engineers to comprehend the impact that these regulations and the effect such regulations will have on their involvement in maintenance and reticulation projects of municipal nature is imperative. Such impact will not only be limited to the design phase of projects but will include responsibility for both the safe installation of engineering designs as well as the usage and maintenance of the end product.

Robbie van Heerden, Eskom

Eskom: System Status overview

Provided an overview of the electricity system and challenges associated with the security of supply. Shared the emergency protocols and need to partner with all municipalities and key industries in protecting the integrity of the system.

Riaan Swanepoel, City Power

City Power master planning philosophy

The formalisation of a long term Network Master Plan of the existing Electrical Infrastructure and to ensure the most effective and reliable networks. Taking into account factors such as Geographical load forecasting, Regional Spatial Development Frameworks and the City's 2040 Growth and Development Strategy. Considering suitable standards that will ensure the most economic network that meet reliability standards

Standards and creating an accurate budget model to ensure proper financial forward planning.

Hennie Nel, Ventyx

Higher performance of the future T&D networks using Asset Health

This paper discussed the importance of applying asset health strategies for T&D networks to meet market and regulator requirements market, regulatory, owners etc. stakeholders' requirements of a reliable and high performance network. The Networks of the future needs to be operated closer to its limits without risking outages or even a breakdown. At the same time the regulators press to keep tariffs flat. How can this be achieved?

The paper provided data from real utility installations and show amazing results of what can be achieved.

Stuart Webb, City Power

Security of Supply for the City of Johannesburg

This paper provided a brief history of City Power, the electricity utility which distributes power to consumers within the City of Johannesburg's licenced area of supply, and described the various options available to mitigate the impact of future load shedding should this be necessary to maintain the stability of the national grid.

Louis Pieterse, City Power

Reliability modelling of the City Power networks using a simplified approach

City Power's Engineering Operations performance targets have traditionally been informed through benchmarking with overseas utilities, but this approach to target setting has proved to be inadequate for City Power's target setting.

Eskom Distribution developed a simplified reliability modelling approach to inform the designed performance level of their networks¹. This approach was used by City Power and applied on the networks under their control. Where necessary, changes were made to the approach relative to the initial Eskom Distribution approach in order to accommodate the different standard configurations of the City Power networks, e.g. special considerations for the predominantly cable networks.

The outcome of this reliability modelling enabled the Engineering Operations division to propose reasonable “expected” SAIDI and SAIFI target ranges for the City Power networks, as well as facilitated better understanding of the expected performance of all networks (feeders and substations). The outcomes of the study was also used to inform network criticality maps, indicating which networks are the major contributors to system SAIDI and have major differences between actual and expected performance.

Mvuleni Bukula, Nelson Mandela Bay Municipality

Local government in the Eastern Cape developing technical scarce skills for road to professional registration with statutory bodies

National Treasury has introduced a new grant for municipalities with the objective of building and improving their technical and management abilities in the delivery of infrastructure. The grant is aligned to the national outcomes and is designed in such a way that it supports Outcome 5 *“a skilled and capable workforce to support an inclusive growth path”* and Outcome 9 *“a responsive, accountable, effective and efficient government system”*.

It is one of the strategic support interventions and also a sustainable solution to shift from gap filling practices and curb the shortage of competent and capable skilled professionals in the built environment. This grant aims at supporting the government drive to encourage municipalities to engage in processes of reforming the built environment, utilising the funding and other investments and the creation of jobs for newly qualified graduates. This is a schedule 6 grant known as the Infrastructure Skills Development Grant (ISDG) and its main purpose is to train technicians, technologists and engineers in the built environment until they become professionally registered with recognised professional bodies/councils. The duration of the programme is 3 years and all costs are borne by NT.

Tom Phillips, Inspired Interface (Ltd)

Countering the dire shortage of technical personnel in South Africa

The scarcity of appropriately qualified technical personnel has meant the power industry has had to look at other means of getting the job done. This is often in the form of a variety of software packages.

Tom highlighted many of the popular packages but more than that, showed the benefits of system integration and how there are many unintentional advantages in doing so.