



## DETAILED REPORT OF THE 3<sup>RD</sup> AFRICA SMART GRID FORUM

1- 4 OCTOBER 2018

KIGALI RWANDA

### 1. WORKSHOPS AND SEMINARS

The main forum was preceded by several workshops and seminars on 1<sup>st</sup> and 2<sup>nd</sup> October.

#### a) **AFREC Seminar energy efficiency**

The Seminar, attended by some 30 delegates sensitized African policy makers and engineers on the opportunities for and benefits of energy efficiency that the technologies related to smart grids can offer.

#### b) **US –Africa Clean Energy standards program/USTDA workshop: Standards to Promote Interoperability: Interconnection code compliance & correction actions**

This workshop attended by some 80+ delegates provided insight into the technical requirements to ensure interoperability of interconnected power systems in Africa, focusing on the current needs for interconnection of Rwanda's power system into the East Africa network, and set the scene for a continental approach for integration of the Africa power network. Topics covered included Wide-Area Monitoring, Control, and Protection Systems, Power System Optimization using Simulation Tools, Critical Communication & Cyber Security, Software Solutions for Network Stability

#### c) **IEC/AFSEC Seminar on Low voltage DC technology, standards and its role in enabling electricity access in Africa – Facilitated by IEC Ambassador Vimal Mahendru, supported by members of AFSEC**

This seminar attended by 70 delegates examined the current status of LVDC technology, the drivers for its exploitation, and the standardization required. It provided opportunities for decision makers and stakeholders in the African electricity supply to gain more insights into how LVDC technology may be used as one of the enablers for achieving the Sustainable Development Goals.

#### d) **Tutorial - telecommunications network infrastructure for enabling of smart grid - Zwelandile Mbebe– Member of Cigre SC D2**

This tutorial attended by around 50 delegates covered telecommunications infrastructure required to enable Smart Grid. This included fibre optics, transport networks, packet networks, last mile networks, cyber security and their operational support systems. The tutorial referenced some of the work produced by Cigre D2 Work Groups D2.17, D2.28, D2.31, D2.36, D2.38 and the Cigre Utility Communication Networks and Services Green Book. Latest technology trends on the systems supporting these networks were discussed. The tutorial concluded by presenting some of the case studies on network strategies adopted by some of the utilities

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### 2. THE MAIN FORUM - SUMMARY



The main forum brought together 204 participants.

Delegates were from some 31 countries, including 23 African countries:

Algeria, Belgium, Burkina Faso, Cameroon, Canada, China, Côte d'Ivoire, DR Congo, Egypt, Ethiopia, France, Germany, Ghana, Guinea, India, Kenya, Lesotho, Malawi, Mali, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda, United Kingdom, USA, Chad, Zambia, Zimbabwe.

The seven exhibitors were SGCC from China, dVentus from Ethiopia, Cigre (based in France), IEEE (Based in USA), and three local Rwandese companies: Mobisol, BBOX, HOBUKA.

The organizations and companies represented in the forum were: AFREC, AFSEC, AUC, CENELEC, dVentus (Ethiopia), EDF, Eskom, IEC, IEEE, HUAWEI, General Electric, Ghana Ministry of Energy, Landis+Gyr, NEPAD, RTE (France), State Grid Corporation of China, Rwanda Standards Board, Rwanda Convention Bureau, Rwanda Energy Group, Rwanda Ministry of Energy and Water

### **3. OPENING CEREMONY OF THE THIRD AFRICA SMART GRID FORUM 2<sup>ND</sup> OCTOBER 2018**

The Forum was organized by Ministry of Infrastructure in collaboration with Rwanda Standard Board (RSB), Rwanda Energy Group (REG), Rwanda Convention Bureau (RCB) and Africa Electrotechnical Standardization Commission (AFSEC) and brings together standardization bodies, industries, international experts and investors in energy sector.

**The Minister of State in Charge of Energy and Water, Hon. Germaine KAMAYIRESE** officiated the official opening of the 3<sup>rd</sup> Africa Smart Grid Forum 2018 after which officials toured an exhibition for international and continental companies providing solutions and institutional support to enable smart grid implementation.

The delegates were welcomed by the **Director General of Rwanda Standards Board, Raymond Murenzi**, and the **CEO of Rwanda Energy Group, Ron Weiss**.

In an address by **the AFSEC President, Mr KOUTOUA Claude**, he encouraged all African governments and development institutions to invest heavily in quality infrastructure on the African continent and in particular in National Electrotechnical Committees, electrotechnical laboratories and the manufacture of electrotechnical equipment in Africa. He emphasised that the development of interconnection of our electricity, telecommunications, rail, road and other networks from Dakar to Kigali will only be possible if we harmonize our standards.

He further noted that standardization precedes development: No standardization, no development. The era of the 3<sup>rd</sup> Industrial Revolution has arrived. If we do nothing, we will end up with obsolete equipment. Without the possibility of performing operation and maintenance tasks. Africa cannot be on the margins.

He offered sincere thanks and congratulations to the Honourable KAMAYIRESE Germaine, Minister in charge of Energy and Water of Rwanda for having agreed to place this event under her high patronage. He asked that she be AFSEC's interpreter to the President of the



Republic, the government and people of Rwanda, your colleagues in the ministries of energy, industry, national education, trade and foreign affairs of the African continent, and appointed her as AFSEC Ambassador.

**AUC representative Philippe Niyongabo**, representing the AUC Commissioner for I & E H.E. Dr. Amani Abou-Zeid, conveyed the Commission's warm greetings and congratulated the organisers of the forum.

He noted the development of smart grids is sweeping across the electricity sector globally. Africa has no option but to embrace it and take advantage of what it offers to address some of the unique challenges that the sector faces in Africa.

He highlighted the Africa's commitment to UN Agenda 2030 and Africa's Agenda 2063, aiming to ensure provision of reliable, efficient and sustainable energy services to all African populations. He highlight the specific programs of the AUC:

- The African Union Commission's Programme for Infrastructure Development in Africa (PIDA),
- the AU programme for "Harmonised Regulatory Framework for Electricity Market in Africa".
- strengthening the institutions responsible for electricity trade in the continent namely power pools, regulatory authorities and other regional bodies.

These coupled with smart grid development will lead to optimised operation of the network and economically utilise the available generation resources, both renewable and non-renewable, thereby increasing the competitiveness of Africa and attract private sector investments.

He further noted that it is important to ensure that the energy projects under PIDA embrace the smart grid concepts right from their design to implementation. The PIDA has already adopted the concept of "Smart Corridors" that seek to integrate and optimise the operational complementarity of all infrastructure systems – energy, transport and ICT, in one corridor.

AFSEC will play a critical role in ensuring that standardization and conformity assessment are undertaken consistently in order for Smart Grid concepts to be realised. AFUR will also be critical in ensuring that national regulatory bodies have similar best practice capacities of regulating Smart Grid networks.

In this connection, he recalled two decisions of the African Union Specialized Technical Committee held in March 2017 in Lome, Togo:

one - urging all AU Member States to join AFSEC and ensure availability of technical experts to work with AFSEC on standardization and conformity assessment.

another - urging AFSEC to come up with a model National Smart Grid Strategy integrating innovative ICT technologies in the whole energy value chain.

**The Hon. Minister of State KAMAYIRESE** noted that Rwanda was pleased to host the forum and highlighted its importance to continue building awareness and framework to



promote the utilization of Smart Grid solutions in the African electricity sector with a view to developing renewable energy and enhancing security, increasing flexibility, reducing emissions and maintaining affordability, reliability and accessibility of electricity efficiently on the continent. She also noted the potential of Smart Grid technologies as a means to accelerate access to electricity and provide reliable power for the African countries as well as the role of smart grid technologies and impediments against dissemination of technologies, relevant standards and their application along the grid, upstream and downstream of the smart meter, electricity production, transportation and distribution, demand side management, energy storage as well as consumer services among others.

According to her “the forum has come at a time when new technologies are constantly developing and requesting for African continent to take enormous steps to bring all its population into the 21st Century with sustainable and efficient access to electricity. This requires the Africa Electrotechnical Standardization Commission (AFSEC) to work and put more emphasis with support of different partner states and private sectors to bring the knowledge about the new “Smart Grid” technologies and the associated standards.” Adding that “We are expecting to learn a lot from all experts present here and your countries experience on state of the art technologies around the world to inform future development of energy sector with Smart Grid technology in Rwanda and all African countries to enhance synergies among national, regional, and continental actors and cooperation with international partners for the effective application of Smart Grids technologies , and standards and propose measures to pave the way for Smart Grids as a measure to bridge the electrification in our continent.

Minister of State KAMAYIRESE reiterated Rwanda’s commitment to collaborate with other states on the continent to ensure transformation and sustainable development of the African people, and developing Smart Grids to achieve universal access to electricity by 2024.

She said “Our energy policy and strategies has considered also the use of technologies with others initiatives to optimize the performance and efficiency of our electricity networks from power generation, transmission and distribution”.

#### **4. TECHNICAL SESSIONS**

##### **4.1 Overview**

A Plenary session provided the opportunity for the international organizations that were actively supporting Africa’s development in the field of standardization to update the forum: IEC, CENELEC, IEEE and Cigre. The main sponsors SGCC and HUAWEI were also provided an opportunity to address the delegates.

Several countries from other continents (USA , France , China) and several African countries, including Rwanda also presented their own experiences and progress towards smart grid.

The parallel technical sessions were rich in content and diversity of topics, with 28 speakers from USA, Europe, China and several African countries.

##### **4.2 Plenary session**

The plenary session provided an insight of the international organizations that were actively supporting Africa’s development in the field of standardization

Richard Schomberg, IEC Ambassador for smart energy reminded delegates that IEC standards can be globally trusted. He noted that energy demand is increasing in developing



countries and this requires different solutions and standards. In this regard, IEC is giving a lot of attention to off-grid electricity standards and Smart Energy solutions.

Mrs Siglinde Kaiser from DIN representing CEN/CENELEC emphasised that harmonisation of standards is very important to support industry. Member countries support DE & Energy Efficiency solutions and are working on a use case model for intelligent appliances.

Mr Sri Chandrasekaran represented the IEEE, the world's largest professional association with Global membership, which is very active in AFRICA. IEEE brings people and technology together for mutual benefit. Noting that technology is developing at a rapid pace, this introduces many challenges for development of appropriate standards.

Prince Moyo, representing CIGRE, the global expert community for electric power systems, explained that it working on being more active in Africa. They have international study committees and working groups that are dedicated to topics of common global and/or regional interest. CIGRE has an MoU with AFSEC and is committed to development and sharing technical information in Africa.

Mr Wang, Vice President of State Grid Corporation China, stated that their presence in Africa is a priority for SGCC. They have vast experience in many different project types which can be shared. They recognise that standards are very important and the use of them is essential. They can help to alleviate the problem of accessing electricity in Africa with grid extension and off-grid systems.

The plenary session continued with experiences of various countries in application of smart grid technologies, from countries in other continents (USA, France and China) with specific presentations from the main sponsors, HUAWEI and SGCC

Armand Zingero presented on behalf of the Rwanda Energy Group. He noted the successes of achieving an Energy Mix in Rwanda, and the implementation of a smart metering system. Several other projects were in the pipeline.

Samuel Orij presented on behalf of HUAWEI. He explained the role of New ICT , the road to digital transformation as a megatrend of all industries. In the field of smart grid and eco systems the innovative One-stop ICT solutions provided from HUAWEI, such as the Smart PV plant solution in China with new ICT – smart microgrid

China's smart grid experience (State Grid Corporate of China – SGCC). Presenter Mr HAifeng GAO

- Smart grid started in China in 2009: SGCC has a successful and varied experience in the development of smart grid infrastructures and wants to support Africa in the construction of its smart grids.
- SGCC's smart grid infrastructure is composed of UHV transmission lines and interconnection lines in Direct Current (DC) and Alternating Current (AC); renewable energies generation (solar, hydro, wind) and their integration; electrification by network and off-grid solutions; digital substations and many associated utility solutions.
- SGCC has a significant and active participation in the development of standards in the fields of UHV and smart grids and want to assist Africa in this area.

France's smart grid experience (Think Smart Grids Association) Presenter Mr Olivier Gabette

- The development of smart grids in Europe has been framed by the implementation of directives, regulatory texts and working groups encouraging European standardization bodies to continue efforts in the development of smart grid standards;
- The development of smart grids in France enjoys strong support from the Government;





- France has built a varied ecosystem including all players in the value chain of smart grids (R & D, Manufacturers, Consultants, Installers ...) grouped within the Think Smart Grid association
- France is very experienced in the implementation of pilot projects and demonstrators and has now moved into the implementation of large scale projects for the industrial deployment of smart grid solutions.
- Africa can draw on France's experience in building its smart grids in the areas of smart meters, pilot projects and demonstrators, integration of variable renewable energies, flexibility and demand response, management and operation of distribution networks, data management and electric vehicles.
- The French power system is in transition –with 3GW wind and solar added in 2017 only – the promises of digital technologies – France has 10% of global market share in Smart Grid- with 100 million euro for R&D every year. Since 2013 there is a road map for Smart Grid in France.

#### USA's smart grid experience (Presenter Robby Simplson, IEEE Standards Association)

- USA has a very varied regulatory environment and a smart grid ecosystem;
- USA is pioneering the development of smart grids starting with the introduction of smart meters and associated infrastructure (AMI), providing for increased consumer engagement (demand response, load control , price communication , and usage information) .
- Feedback from the USA experiences on smart grids focuses on:
  - development of standards and technical specifications (Zigbee Smart Grid, IEEE 2030.5, Open ADR, Green Button ...) for the interoperability and integration of different equipment, quality and safety;
  - demand management and automation of electricity distribution
  - development of Distributed Energy Resources (DER), which is becoming increasingly important because of the lower costs of solar energy
- IEEE association wishes to support Africa in the development of its smart grids in setting standards and technical specifications, sharing of lessons learned, technology transfer and capacity building.

### **4.3 Session 2A - Smart Grid Initiatives in Africa countries**

#### Rwanda: AMI project in EUCL experience –presenter Damas Rurangwa

- Rwanda bases the development of access to electricity on network extension and off-grid solutions with the aim of achieving universal access to electricity in 2024;
- smart meters and associated infrastructure (AMI) are the solution for Rwanda to fight against theft and fraud of electricity and improve performance;
- the project to replace electromechanical meters with smart meters has three (3) phases and concerns public distribution transformers and consumers;
- The expected results of the AMI project in Rwanda are a better performance of the electricity system (efficiency improvement), gains in operating expenses, better knowledge of electricity consumers and loads by the analysis collected data
- The points of vigilance for the success of an AMI project are:
  - In addition to technology (smart meters and AMI), there should be strong involvement of all stakeholders, adoption and implementation of legislation, consumer awareness and information;
  - the effectiveness of communication systems;
  - the use of open systems



Côte d'Ivoire: Wide Area Measurement System (WAMS) project on the Côte d'Ivoire Energy Transmission Network – Presenter N'KOU N'kou Paterne

- Côte d'Ivoire's WAMS project contributes to improving the operation and maintenance of the interconnection network between Côte d'Ivoire and Mali, Senegal and Mauritania
- the design of the WAMS project was based on the results of the CIGRE / IEEE Task Force on Stability Classification
- the implementation of WAMS will allow control center to control the synchronism angle of the interconnected network of Côte d'Ivoire by synchronizing a network of multiplexers, servers, GPS, devices; PMU, etc
- the WAMS project will improve:
  - the continuity of electricity supply;
  - the load shedding plan and special protection schemes;
  - the incident analysis;
  - the reliability of telemetry acquisition

South Africa: Smart Grids in megacities: Global and African experiences

De-colonising Technology for African Utilities: An eThekweni Electricity case –Presenter Jonathan Hunsley

- The case study involves the design and implementation of a strategic plan for an electrical utility company.
- African electricity companies, customer-oriented companies, must begin their transformation to adopt a smart business strategy in order to adapt to the new needs of their customers and to face the challenges.
- The Project consists of establishment of a think tank within the company, use of diagnostic and assessment tools (Benchmarking), establishment of a long-term vision, analysis of the gaps and development of a strategic plan and deployment framework.
- The smart company will also have to implement a strategy for acquiring and implementing the functionalities of smart electrical systems (ERP, GIS, SCADA, smart electric meters, AMI, fiber optics ...)

Egypt: Egyptian Experience: From Power Shortage, to an agile Smart Grid –Presenter Dr M Soliman

- In 2014, Egypt experienced a shortfall in the production of electricity that led to the rationalization of electricity
- The Egyptian Government has adopted a strategy to address this imbalance of production relative to consumption by:
  - adoption of a reform of tariffs and development of solar PV on roof with an FIT for residences
  - use of the private sector to increase electricity production
  - massive investments in the fight against theft and fraud (smart electricity meters and prepaid meters), energy efficiency (use of SHP and LED lamps for street lighting), in transmission and interconnection lines
- this ambition and realistic plan has allowed Egypt to achieve rapid results and to have a surplus of electricity production. Egypt has not experienced any load shedding since May 2015

The session concluded with a Round table “Think Smart Grid” The challenges and opportunities for remote and islanded networks use cases : Round table facilitated by Valérie-Anne Lencznar from *Think Smartgrids*

Speakers included Moussa Bagayoko from Yélé consulting, Tewfik Timeridjine from Schneider Electric, and Eleonor Chabod from EDF International Networks

It was highlighted that the term Microgrid covers a multitude of realities.



Whether it is isolated microgrids, connectable and islandable microgrids or multi-energy microgrid, each segment will be the subject of a technological solution and a specific business model.

The EDF Group and its network operator subsidiaries have had to implement these type of systems in an operational way. Experiences and their lessons were shared, with particular attention to Non-Interconnected Areas.

#### **4.4 Session 2B – Power quality and energy management**

NGOGA B Juliua fro Rwanda (Xi'an Jiatong University presented on The implementation of Unified Power Quality Conditioner (UPQC) technology to mitigate both current & Voltage based power quality problems in modern distribution grids

The computer simulations based on the FFT analysis results prove the correctness of the UPQC tech. and therefore it can be implemented to agive a more reliable and Quality power supply to consumers, in particular for application of renewable energy sources.

Prince MOYO, Eskom, South Africa presented on A Battery energy storage (BESS) progarn at Eskom, South Africa

The opportunity to use the technology development and reducing costs of electrochemical energy storage to support the various use cases was explained. Eskom had identified 47 sites for implementation of BESS in a first phase for 200MW/800MWh (55%) of storage. With the technical specifications largely complete, procurement would start.

#### **4.5 Session 3A –Transmission and Distribution**

Sherwin Harris , General Electric presented on the topic Digitization of Energy Transmission and Distribution in Africa. He highlighted the “3Ds”

Decentralization: Economically competitive small, distributed power systems are being installed in increasing numbers.

Decarbonization: Low-carbon technologies such as wind and solar are exceeding growth expectations.

Digitization: Asset, facility and fleet level, Internet-enabled applications are proliferating.

Also he highlighted the benefits and opportunities for smart grid solutions in the Sub Saharan region. And outlined the steps utilities and industries can follow as they are building a smart grid.

Other presentations in this session were

Smart Substations at the heart of smart grid, by William Phung RTE , France;

The current status if digital metrology systems at SGCC and the measurement architecture of the 3<sup>rd</sup> generation intelligent substation by XiongQianzhu, China EPRI;

Application of digital substation in power delivery networks in Africa, by Martin Kaih Kasanga, Grenoble-INP.





#### 4.6 Session 3B ICT and data management

##### Handling of legacy end de

vices and services on utility packet networks, Mbebe –Eskom , South Africa

- TDM Emulation is a method by which a TDM circuit is transported transparently through a Packet Switched Network (PSN)
- ITUT, IETF and MEF have published recommendations for implementing TDM emulation for both PDH and SDH
- Interface converters can be experimented with but test need done to be with the actual equipment.
- Latency is the biggest challenge and it gets costly to upgrade packet switched networks, IP should be the long term solution.

##### The Convergence of ICT and the Energy Sector, Walter Waziri Jonathan – Kenya

- There is a opportunity for manufacturing / assemble in Africa to ensure it fits our needs.
- Many Africa Utilities have started to introduce ICT for visibility of their electrical system.
- We need to ensure affordability, reliability, compatibility and there is a variety of architecture to select from thus simulation test upfront is essential and it is better done locally.
- The communications media plays a major role and a challenge in Africa, it needs to considered and established upfront.

##### Internet of things solution architecture, Guo Shen, China EPRI

- Security is very important as IoT is a new concept and cost effective reliable comms is essential.
- China is introducing a new concept Cloud App–Co App-Node App and have done several demonstrations.
- The future IoT can be used for various requirements e.g. Asset management, trouble shooting, system OPS, etc

##### Digital Transformation for a better world of energy, Tewfik Timeridjine

- Data is the new energy of the future, we will use info to be more efficient in the future.
- Smart Grid of tomorrow needs to be more secure, reliable, efficient & cost effective.
- The way forward is integrated solutions on a open IP/OT systems
- No Automation solution fits all needs but there is cost effective break points for when & what to do.
- Digital transformation has success enablers that must be adhered to and always use standards

#### 4.7 Session 4A –Smart metering



Daniel Gizaw , dVentus, Ethiopia presented the smart metering systems for Africa that dVentus has developed , which take account of the specific requirements to cater for Africa conditions

Nathan Williams , Carnegie Mellon University presented on Application of data science to mini-grid smart meter and survey data

He focus on data collection from mini grids in East Africa, noting that there is lots of experimentation and innovation in the sector, and rich datasets are being collected with smart meters. Also that data available in near real-time through mobile network. This is leading to improved predictive load forecasting

Shawn Papi, Eskom South Africa presented an overview of the AFSEC Guide 02, Application of standards for smart metering in Africa which was released at the forum

The guide

- provides guidance to African utilities with regards to the application of smart metering standards recommended for adoption by AFSEC TC13;
- Provides a basis for the design and deployment of **interoperable smart metering** systems across the African continent based on open standards;
- Highlights new regulatory requirements in relation to the safe operation and maintenance of smart metering systems, particularly issues such as remote load management and cyber security;
- Provides guidance on contracting and procurement of smart metering systems based on AFSEC metering standards;
- Provides guidance to African utilities on the design and deployment of IT infrastructure required as part of smart metering systems.

Roland Hill, Lands+Gyr presented on Safety standards and ongoing safety testing of modern metering products

He summarized the history of safety testing of meters , from Black Box - Type Test - Risk Assessment – PEI systems – Functional safety

He stressed that there was a growing need for consideration of AMI meter lifetime safety. and the concept of ongoing safety testing. He gave a summary of forecasted improvements to IEC 62052-31.

The UK judgement related to every manufacturers legal “Duty of Care” was cited, emphasising that compliance with a relevant code of practice or regulatory instrument may not always be sufficient. Delegates were urged to support their national safety initiatives and to learn more about the various conditions that lead to can lead to thermal safety hazards in metering products.

#### **4.8 Session 4 B : Renewable Energy & Off-grid Systems**

Ghana Experience – Critical factors for successful mini-grid electrification – Ing. Mahu Seth Agbeve

- Ghana produces 4GWH of which 54 MW comes from Renewable Energy (solar)
- The penetration of users was facilitated by introduction of zero connection fee



- The mini/micro grid contributed to electrification to regions of difficult terrains.
- The public sector business model led to successful implementation

Micro grid Investment Risk Assessment Tool -Bobson Rugambwa, Lefu Magelepo - Carnegie Mellon University Africa, Kigali, Rwanda

- A software to help in supporting investors looking for finance
- Application in technology, bankability & Equity.
- Today's application is limited to solar but others RE will be added.
- Still in development but very promising to provide a consistent approach.

Rural and Off-Grid Electrification: Global & African Experience , Sherwin Harris General Electric, South Africa

- Challenges – global population (1 billion and its growth rate of 2.4)
- Challenges on generation and T&D
- Strategy. Micro Grid and flexible service delivery or Business Model micro grid
- Solution is in optimal use of productive & active customer participation.

**4.9 Session 5 –Challenges, opportunities and financing of smart grid in Africa**

BARRIERS AND PROSPECTS OF SMART GRID ADOPTION IN GHANA Presented by Amevi Acakpovi.

The experience in Ghana led to the following recommendations

- Introduction of Smart Grid Concepts in educational program. Original Equipment Manufacturers such as GE, Motorola, Eaton, Schneider etc., should collaborate with academia to share skills, software and expertise.
- Awareness and sensitization campaign for increase commitment Regulation on interoperability, Net metering implementation policies as well as smart meters deployment in residences.
- AFSEC should advise WAPP on the adoption of selected standard for interoperability

Industrialization approach for smart grids presented by Eleonore CHABOD, EDF

The presentation outlined a study examining methods for evaluating the benefit costs of smart grids functions, as a key step in the industrialization of the first Smart Grids solutions

This study continues with concrete and consistent work to ensure the industrialization of Smart Grids functions and successful first large-scale deployments

The roadmap thus established makes it possible to prioritize the strongest value creation levers for the operator and all the players in the electricity system.

Smart Grid –What is the business case? Prince Moyo, Cigre

He discussed the various definitions of smart grid, giving a concise overview of the factors that can be improved that lead to a business case for smart grid:

Reliability, Power quality, WAMS, Network operations, Operator dispatch, Energy efficiency, energy conservation, eTransport, Analytics and asset utilization, FACTS, environment, ,



safety and productivity. Improvements in these factors can be achieved using the available technologies such as Smart meters, energy storage, NewICT, etc.

## 5. PANEL DISCUSSION

The closing panel, facilitated by the **AFSEC President KOUTOUA Claude**, comprised

**Richard Schomberg, IEC Ambassador Smart Energy**

**Atef Marzouk, Executive Director, AFREC**

**Professor Elmissiry, NEPAD**

Three main questions were posed to stimulate debate

- i) How to develop a SMART GRID strategic plan?
- ii) What mechanisms exist at the NEPAD, AfDB, etc. level to support African countries in the SMART GRID programme?
- iii) SMART GRID programmes implemented in Africa have a strong impact on climate change, can they not benefit from the green funds made available to developing countries?

**Richard Schomberg** shared his experience from many countries, advising that no one size fits all, and that any strategy will inevitably involve systems thinking that cuts across traditional organizational silos. Hence all stakeholders should be involved to ensure all loops are closed.

It was necessary to have a conceptual approach defining the results to be achieved, avoiding defining solutions and technology. The use of 'use-case methodology' proved to be helpful and should be used. Organizations like IEC can help.

He advised to consider using both a top-down and a bottom-up approach when defining needs. These needs should be scalable and harmonized across stakeholders – hence standardization is vital.

**Atef Marzouk, AFREC**, provided background to the work that AFREC had achieved in the area of African Energy Statistics in collaboration with the EIA, noting the important role that reliable statistics and data played in planning and design of the energy sector. Thus AFREC would support the implementation of smart grid, as well as continuing to support AFSEC as its subsidiary body responsible for continental standardization in the electricity sector.

**Prof Elmissiry, NEPAD** gave further insight regarding smart grid strategy, emphasizing that it was necessary for the various stakeholders to have the same understanding of what smart grid was, taking into account that strategic needs to be in place at a national regional and continental level. He concurred with Mr Schomberg that no one size fits all. It was necessary to decide what are the priority areas, – short term, medium term, long term.

It was critical that the priority areas were areas where all concerned could identify with. Cost benefit analysis should be used to justify the implementation, taking account of the options to upgrading existing infrastructure or provide new. He emphasized the importance of the involvement of all stakeholder. The end result should always be that energy is available, affordable, and accessible.

He emphasized that AFSEC should take the lead initiating a national smart grid strategy, while taking into account the regional and continental aspects.



Comments from the floor included the point of providing space for start-up companies in the implementation of smart grid

Regarding funding and accessing donor funding and loans, delegates were reminded that there is while accessing external funding may be an option there was no free money. It was noted that when country initiates a project or program using its own resources, it is more likely to attract support from donor agencies.

It was also stated that the AU's future strategy was as far as possible to use its own means and resources so that "Africans to develop Africa" .

## **6. CLOSING**

In his closing speech, the AFSEC President , KOUTOUA Claude shared some of the lessons learned during the forum

1. Africa is not starting from scratch.
2. There is a real awareness of the Smart Grid concept through the quality of the debates. It can be noted that many actions have been undertaken in Africa since the first forum in Abidjan.
3. It is important to share the experiences we have received. Africa must take advantage of smart grid technology to develop.
4. The industrialisation of Africa's electricity sector should be supported
5. Support should be given to African start-ups in the Smart Grid sector.
6. Africa needs to build the capacity of African experts through training activities in the field of Smart Grids.
7. Each African country must develop a 5-year Smart Grid Strategic Plan and implement it quickly as China has done.
8. Electrotechnical investment promotion agencies should put in place mechanisms to accelerate the implementation of Smart Grid in Africa.
9. We are now convinced that: "No standardization, no development".

He thanked the various supporting institutions and companies notably:

- THE IEC,CENELEC, IEEE, CIGRE, the State Grid Corporation of China with its very strong delegation and the quality of the speakers, HUAWEI
- the African Union African Energy Commission (AFREC/AU) for the support and provision of the financial resources necessary to promote our activities, and the National Electrotechnical Committee of Rwanda.

Also thanked were the session chairs and rapporteurs, the speakers and all the distinguished delegates, sponsors, exhibitors, translators and press for honouring us with your presence and the work done to raise awareness. He asked them all to continue their work as AFSEC Ambassadors.

Finally he thanked the Rwanda Organizing Committee for the perfect organization from the reception to the closing, and the Rwanda Government, the Minister of State in charge of Energy and Water.





The DG of RSB, Raymond Murenzi officially closed the forum on behalf of the Rwandan Government.

## 7. RECOMMENDATIONS

1. AFSEC to follow through the decision of the AUC STC to develop a guide /national smart grid strategy' taking into account that 'no one size fits all', and the need for integration at a regional and continental level. Funding support from AUC to be secured if necessary.
2. African member states to act on the decision of the AUC STC for all member states to become members of AFSEC, establishing active National Electrotechnical Committees
3. Support should be given to African start-ups in the Smart Grid sector.
4. Africa needs to build the capacity of African experts through training activities in the field of Smart Grids.
5. Each African country must develop a 5-year Smart Grid Strategic Plan and implement it quickly as China has done.
6. All African governments and development institutions to invest heavily in quality infrastructure on the African continent
7. Electrotechnical investment promotion agencies should put in place mechanisms to accelerate the implementation of Smart Grid in Africa
8. To consider a fourth Africa Smart Grid Forum in Southern Africa in two years' time (2020)