PIESA

THE POWER INSTITUTE FOR
EAST & SOUTHERN AFRICA

PIESA

ANNUAL REPORT 2017

The Power Institute for East and Southern Africa (PIESA) is a voluntary regional power utility association established on 28 February 1998. We aim to improve electrification in East and Southern Africa through sharing information, research, technology, skills and experiences for the benefit of customers and suppliers in the electricity distribution industry. The main focus is on technical rationalisation to achieve economies of scale with local manufacturers in an effort to enhance electrification in the region.

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ABOUT

THE POWER INSTITUTE FOR EAST AND SOUTHERN AFRICA (PIESA)

PIESA is governed by a Board of Directors with representatives from each participating utility. The prime responsibility of the Board is to determine the objectives and direction of PIESA

The Power Institute for East and Southern Africa (PIESA) is a voluntary regional electricity industry association established in 1998 to facilitate and coordinate the sharing of information and technology in the specialised areas of:

- Technology and engineering support;
- Applied research;
- Standardisation;
- Environmental management; and
- Technical development and training

PIESA aims to be the catalyst for sustainable regional technological cooperation in expanding the electricity distribution industry for regional growth and development by:

- Encouraging participation by all regional electricity distributors and supporting industries;
- Compiling, optimising and maintaining integrated information systems for technology related to the distribution of electricity including technical equipment specifications and codes of practice that are appropriate for the regional environment;
- Providing a mechanism for continuously capturing the experiences of members in order to improve efficiency;
- Encouraging the use of local resources and manufacture of equipment for use in the distribution industry;
- Promoting applied research in areas that are relevant to the effective performance of members;
- Fostering a culture of technology transfer and skills development among the members;
- Developing strategic alliances and partnerships with other related organisations involved in or with the electricity distribution industry.

PIESA aims to be the catalyst for sustainable regional technological cooperation in expanding the electricity distribution industry for regional growth and development

In a nutshell, PIESA aims to improve electrification in East and Southern Africa through sharing information, research, technology, skills and experiences for the benefit of customers and suppliers in the electricity distribution industry. The main focus is on technical rationalisation to achieve economies of scale with local manufacturers in an effort to enhance electrification in the region.

Membership is open to electric power utilities in East and Southern Africa, manufacturers, suppliers of equipment, researchers, academic institutions, investors, financiers and other associations who wish to participate in PIESA's activities.

PIESA is governed by a Board of Directors with representatives from each participating utility. The prime responsibility of the Board is to determine the objectives and direction of PIESA.

PIESA's core activities are conducted through its four Board Advisory Committees:

- Electrification
- Non-Technical Loss Reduction
- Environmental and Safety Management
- Standardisation

Members currently include electricity distributors from the following countries: DRCongo, Kenya, Lesotho, Malawi, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.

VISION AND OBJECTIVES

Vision

PIESA's Vision is to be the catalyst for sustainable regional technological cooperation in expanding the Electricity Distribution Industry and stimulating the electrification for regional growth and development.

Principal Objectives

To stimulate the electrification of the region by:

- Broadening Membership - Participation from all regional electricity distributors and supporting industries
- Maintaining a centralised integrated information system for technology related to the distribution of electricity
- Developing mechanisms for the continuous capture of experiences of members to improve efficiencies (feedback loop)
- Encouraging the use of local resources and the manufacture of equipment for use in the distribution industry
- Optimising and harmonising technical equipment specifications and codes of practice for the regional environment
- Promoting applied research in areas that are relevant for the effective performance of the members
- Developing a culture of technology transfer and skills development among members
- Developing strategic alliances and partnerships in research, industry and manufacture and other similar organisations
- Compilation of standards and guidelines with the objective of minimising the impact on the natural environment
- Being flexible to the needs of an evolving Electricity Distribution Industry
- Facilitating dialogue relating to the Electricity Distribution Industry
- Promoting energy efficiency
- Operating, maintaining upgrading and refurbishment of assets cost effectively.
- Promoting occupational health and safety.

PIESA's Vision is to be the catalyst for sustainable regional technological cooperation in expanding the Electricity Distribution Industry and stimulating the electrification for regional growth and development.

MEMBERS
OF THE PIESA BOARD

Bukhosi Siso
PIESA board chairman

Vally Padayachee
Executive Officer
PIESA Board

Alfred Kaponda
ESCOM – Malawi

Mohlomi Seitlheko
LEC – Lesotho

Sandile Maphumulo

AMEU – Southern Africa

Simbiso Chimbima

UMEME – Uganda

Benson Muriithi

KPLC – Kenya

Changala Nswana

Zambia – ZESCO

Mobolama Montala

SNEL – DR Congo

Sophia Mgonja

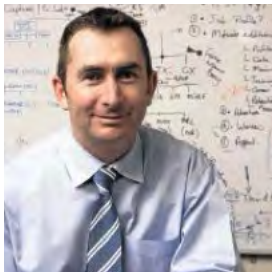
Tanesco – Tanzania

Rick St John

Affiliates

Greg Tosen

IERE - Chairman

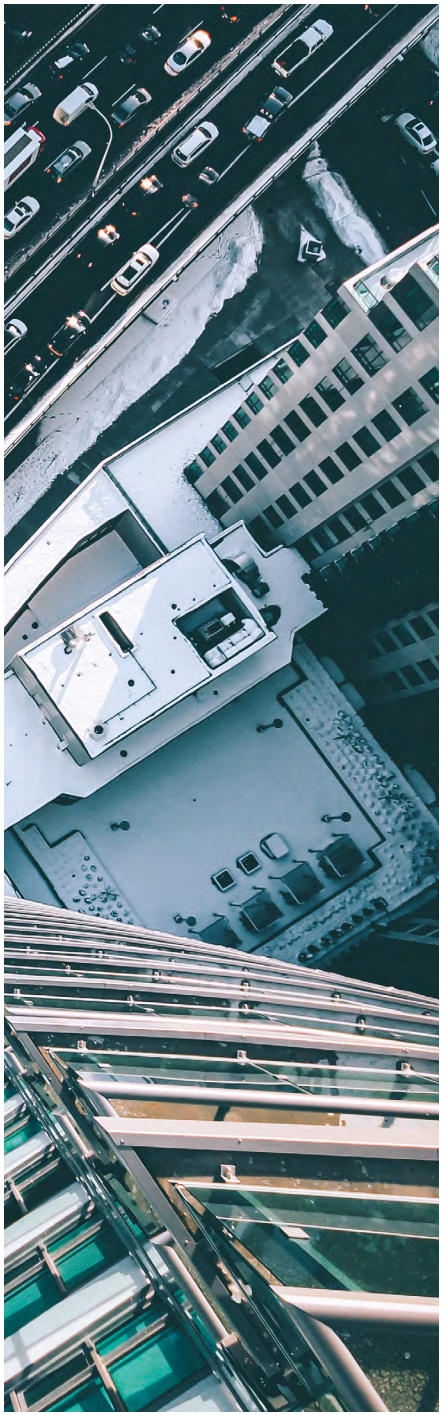


Barry MaColl

Eskom - South Africa

CHAIRMAN'S REVIEW

Engineer Bukhosi Siso
Chairman, PIESA Board



It is that time of the year where I now pen my report as the Chairman of PIESA.

For decades, access to electricity has been a serious challenge in Africa. It still is. 600 million Africans are not connected to an electrical network. African businesses cite electricity amongst the two most severe constraints on their operations.

As the PIESA our member countries are also experiencing significant challenges in respect of power supply and power distribution or delivery. These challenges include the following;

1. Providing and increasing access to electrical energy to eventually 100% of the population. The focus on further electrification will be a priority
2. The ability and capability to raise adequate funding to rollout new and much needed infrastructure by the far majority of our PIESA members let alone the rest of the other African countries
3. Backlogs in respect of maintenance and refurbishment of essential power supply and power delivery infrastructure
4. The population of Africa is growing fast (2.3% per year). At the same time, per capita income levels are rising and Africa is urbanising. These three trends will drive energy demand growth and consumption patterns in the coming decade
5. The other key factor that needs to be considered in the demand analysis is the impact of changing lifestyles. The most prominent feature in the African context is the urbanisation trend. Urbanisation rates are projected to rise by about 20 percentage points by 2050. Almost two-thirds of Africans will live in cities in 2050, compared to less than 40% today
6. Consumers' ability and willingness to pay for electricity will also be key factors in determining electricity demand growth

According to the World Bank meeting the goal of universal access to modern energy in Sub-Saharan Africa remains a key challenge for the first half of the 21st Century. Only 37 percent of Africans had access to electricity in 2015, with marked disparities between urban and rural areas.

According to the World Bank meeting the goal of universal access to modern energy in Sub-Saharan Africa remains a key challenge for the first half of the 21st Century.

Nevertheless, a handful of African countries have begun to show steady progress and have largely embraced multiple supply solutions— from conventional grid systems to emerging technologies in mini-grids and solar home systems.

The International Energy Agency and United Nations predict a population of 2 billion in Africa by 2050. Of this, 40% will live in the countryside and 60% in cities. Most will have no access to electricity and clean cooking fuels if energy access trends continue unchanged (IRENA, 2013a). Energy access estimates commissioned by Programme for Infrastructure Development in Africa (PIDA) indicate that only 37% of the eastern African and 25% of the southern African population had access to electricity in 2010 (SOFRECO, et al., 2011)

According to the World Resources Institute ("WRI") more than half of the 1 billion people in the world without electricity live in Sub-Saharan Africa, and rapid population growth is projected to outpace electric grid expansion. For communities across the region, a consistent and affordable supply of electricity can open new possibilities for socioeconomic progress. Mini-grids—electrical generation and distribution systems of less than 10 megawatts—can play a role. These decentralized technologies are expected to bring power to 140 million Africans by 2040. Tanzania is a regional leader in mini-grid development. In 2008, it adopted a ground breaking mini-grid policy and regulatory framework to encourage investment in the sector. Since then, the number of mini-grids in the country has doubled. The national utility (TANESCO), private businesses, faith-based organizations, and local communities now own and operate more than 100 mini-grid systems. Energy leaders across the region can learn from the country's experience.

We would as the PIESA like to see us continuing to implement many initiatives to address the various challenges we are facing but we are constrained by, for example, the availability of much needed funding and other resources . However, IERE has continued to fund us to the tune of US$10,000 to do the project management of a PV project in the Gulu district in Uganda, with our fellow member Umeme and the Rural Electrification Agency in Uganda. We are now progressing with the next phase of this project with further funding.

Standardisation is key to ensuring that utilities are able to supply and deliver much needed power or electricity to its end use customers in a safe and reliable manner. In this respect PIESA has been on a continuous basis helping its members by introducing new and revising and reviewing current or existing standards

In keeping with technology PIESA is also investigating ways of introducing eLearning in respect of training, development and mentoring of professionals and other resources at its member utilities. We would also be investigating the use of mobile applications in respect of, for example, knowledge mentoring of graduate professionals especially unemployed graduate professionals

Of recent and based on some bad experiences at especially EU utilities, PIESA is also embarking on a drive to introduce initiatives to risk mitigate against possible cyber-attacks on smart grids. We are cognizant that up to now we may have been rolling out smart grids and utilizing smart technologies but neglecting to also incorporate risk mitigating protocols against possible cyber-attacks.

With the increasing issues and focus on addressing enterprise corruption and fraud globally on businesses including utilities PIESA will also be looking seriously at how we can assist our members in ensuring that better corporate governance and ethical business conduct etc is also practised. In this regard, we would also focus on ISO 31000 (Risk Management), King IV (corporate governance) etc tools to assist us in achieving the latter intent

The PIESA Board had also approved the definition of "access to electrical energy" for recommended use by the PIESA members.

I also want to take this opportunity of thanking my fellow colleagues on the PIESA Board and the wider PIESA team for all their continued support and hard work they're willing put in ensuring that we as a PIESA continue to serve our members as best as we can.

Best regards

Yours Sincerely,

Engineer Bukhosi Siso

BSc (Elec.Eng), MSc, MBA, C. Eng, MIET, FzweIE, MInstLM

PIESA Board Chairman

FROM THE DESK OF THE EXECUTIVE OFFICER

It gives me great pleasure to write my first report as the Executive Officer of PIESA. I must say I had to literally "hit the ground sprinting – not running". There was very little time to as they say ease into the job given the new and different challenges our PIESA member countries are facing. In this respect the year under review has been characterised by numerous challenges that in essence threatens to impede power service delivery and expanding electrification. The industry that we as the PIESA operate in has been beset by a number of challenges and issues. Some of them include the following:

1. Providing and increasing access to electrical energy to eventually the entire population. The focus on further electrification will be a priority
2. Limited Maintenance Budgets and Funding
3. Lack of Resources especially funding
4. Lack of Knowledge and skills
5. Negligence to O&M practices
6. Decreasing sales of electricity energy
7. Increasing technical and non-technical losses
8. Increasing ingress of renewables especially distributed energy in the energy mix
9. Theft and Vandalism

The year under review has also reflected some initiatives that were and now being undertaken by PIESA to try and address some of the aforementioned challenges.

A significant achievement has been the approval by the PIESA Board of a revised definition of "access to electrical energy". The Board had approved the following:

1. **"Access to electrical energy is the ability to avail energy that is adequate, available when needed, reliable, of good quality, affordable, legal, convenient, healthy & safe, for all required energy services across household, productive and community uses inclusive of a minimum 20 Amps energised power supply in every household (based on WORLD BANK (ESMAP) (latest version)"**
2. **Noting also that energy services includes lighting, cooking, space heating, water heating, cell phone charging, etc**

We are also grateful to IERE for continuing to provide PIESA with much needed funding for key projects and initiatives. In this regard, IERE funding was utilised to implement a solar PV off grid project in Uganda and to hold various workshops, mini conference, advisory group meetings in both Cape Town, South Africa and Kampala, Uganda. We are happy to report that IERE had agreed to fund PIESA to do the project management of the PV installation by an NGO "Light the World" in Northern Uganda. The power will serve a refugee community in Gulu District. The idea is for PIESA to work hand in hand with the NGO and the appropriate local utility (Umeme and the Rural Electrification Agency) to document the project planning and execution for the benefit of members of PIESA.

Significant focus is also on sharing case studies, knowledge and information amongst PIESA members.

PIESA is also investigating ways of introducing eLearning in respect of training, development and mentoring of especially technical and engineering professionals and other resources at its member

utilities. In furtherance we would also be investigating the use of e-mobile applications to mentor graduate professionals with a view to imparting knowledge and experiential wisdom especially to unemployed graduate professionals. As an elaboration the African Union Commission adopted Vision 2063 as a roadmap for continental development. Essentially it aligns thinking from across the continent and distils the vision in a set of seven (7) aspirations.

The Mobile Knowledge Mentoring approach seeks to address Aspirations 6 and 7 of Africa Agenda 2063 especially with respect to the mentoring of graduate professionals in the technical and engineering fields. This collaborative and cooperative model using e-mobile as a tool could be Africa's answer to the huge shortage of skills and competencies in the power and energy sectors.

PIESA will endeavour to make a contribution to and also benefit from the effort.

Another major innovation and utilising technology to enhance communication amongst PIESA members was the initiation of PIESA whatsapp groups. Members have been using these whatsapp groups to great effect and we are looking forward to improving communication by using technology.

As the PIESA we are committed to and where possible arranging field trips, for the committee, to member countries with notable alternative energy projects, similar to the planned trip to Northern Uganda.

PIESA will also be investigating the pros and cons of strategic purchasing and group sourcing of material, for the benefit of PIESA member countries

The use of cost effective off grid and micro grids to expand electrification will also be a priority for PIESA

Standardisation continues to also be a key focus for PIESA especially from a perspective of improving service delivery and fast tracking electrification rollout. In this respect the following is noted:

1. Favourable cooperation with AFSEC continues
2. All member countries continue to share list of commonly used PIESA standards
3. A catalogue of all PIESA standards to be published and made available

Based on some excellent experiences by some members in rolling out smart metering projects, PIESA members are seriously

The Mobile Knowledge Mentoring approach seeks to address Aspirations 6 and 7 of Africa Agenda 2063 especially with respect to the mentoring of graduate professionals in the technical and engineering fields.

exploring the rollout of cost effective smart metering projects in their respective countries. In this regard, a pilot project involving an affiliate and some countries is being investigated for implementation.

There is also an appreciation by most of the PIESA member countries that the existing and traditional business model by utilities of selling energy (kWh) is no longer proving to be a viable business model.

In keeping with global trends PIESA is also investing time and effort to look at, in a very prudent manner, other more viable business models. The latter approach is gaining reasonable acceleration given the increasing ingress of distributed generation for self-generation or own use by certain customers.

Its also common knowledge and a concern that serious backlogs in respect of maintenance and refurbishment of essential power supply and power delivery infrastructure is requiring priority attention by member countries. PIESA will also place this challenge high on its agenda to assist member countries with appropriate support and solutions.

PIESA has been and will also be giving increased focus to increasing its membership base especially the affiliate's membership.

I also want to take this opportunity of thanking the members of the Board of Directors for their continued leadership and stewardship of PIESA, the PIESA Secretariat and all the other members of PIESA and especially those that have assisted in keeping the PIESA ship afloat during the past year under review.

Vally Padayachee

CD (SA); FInstD; FIRMSA; Pr CPM; Pr Cert Eng; MBA; MSc (Eng);

PIESA Executive Officer

ADVISORY
GROUP REVIEWS

PIESA Advisory Groups are to function as forums where members and technology partners can meet and discuss pertinent issues and agree on regional strategies and actions. Each Advisory Group will have a Chairperson to act as the convener, and be responsible, in conjunction with the PIESA Secretariat to call the meetings and set the agenda. A Deputy Chair is to provide continuity in the event of absence of the Chair from a meeting and a Secretary to provide an administration service for the Advisory Group such as agenda and minutes of meetings.

Each Advisory Group will also have a 'sponsor member' who will have a particular interest in the terms of reference of the particular Advisory Committee. This 'Sponsor' shall be a member of the PIESA Board, and will be responsible to liaise between the Board and the Advisory Group and convey specific requests for agenda items from the board.

Pursuant to giving effect to the above four advisory groups have been established as follows:

1. Standardisation
2. Electrification
3. Revenue Protection (Non-technical loss reduction)
4. Environmental and Safety management

The participants are mandated by their corresponding utilities and a chairman is appointed to each Advisory Committees by the PIESA Board. The Advisory Committees delegate strategies and executable projects to any or all of the four services secretariats. Information flow and committee administration conducted by an operations manager situated in the general administration secretariat.

In particular, terms of reference for the Advisory Committees would be to inter alia :

1. Meet on a regular basis,
2. Identify pertinent subjects,
3. Debate and exchange information,
4. Network with each other,
5. Develop regional plans, strategies and initiatives,
6. Share experiences and best practices,

The following reflects some of the major achievements of each of the aforementioned Advisory Groups during the ensuing financial year:

1. Electrification Advisory Group

a. Attendance of members to meetings of this Group was also poor

b. A major achievement was the approval by the PIESA Board of the definition of access to electrical energy

c. The definition that was approved by the PIESA Board was the following;

i. "Access to electrical energy is the ability to avail energy that is adequate, available when needed, reliable, of good quality, affordable, legal, convenient, healthy & safe, for all required energy services across household, productive and community uses inclusive of a minimum 20 Amps energised power supply in every household (based on WORLD BANK (ESMAP) (latest version)"

ii. Noting also that energy services includes lighting, cooking, space heating, water heating, cell phone charging, etc

iii. 20 Amps power supply covers the following typical appliances i.e. radio + lights + television + fridge and one of the following at any one time : (iron + double hotplate) or (kettle + single bar heater) or (iron + two bar heater) or small geyser

d. This Advisory Group is also investigating the pros and cons of strategic purchasing and group sourcing of material, for the benefit of PIESA member countries based on value adding experience from other countries

e. The PIESA member Utilities are encouraged to implement the electrification related projects in their respective countries, which have been tried and tested by the other PIESA countries

f. The Electrification Advisory Group also coordinates the sharing of electrification statistics of member countries among the member countries

g. The Electrification Advisory Group will continue with the following initiatives;

i. To share the strategies of other advisory or working groups on the document portal.

ii. To survey members on their electrification %, based on the Board's acceptance of the revised access to electrical energy definition

iii. To explore ways and means to assist member countries to rollout electrification infrastructure much quicker

iv. To assist member countries to raise much needed funding to rollout electrification infrastructure

v. To explore alternative business models given that the current model of selling electrical energy (kWh) is proving to be no longer viable for most member utilities

vi. To investigate the further incorporation of cost effective renewable energy technologies in the energy mix.

vii. Formalising an electrification partnership with POWER AFRICA

viii. To investigate and rollout smart technologies, smart grids, etc with a view to improving service delivery

ix. Significant attention is being paid to training, development and mentoring initiatives especially with respect to the upskilling of personnel especially technical, engineering and leadership personnel

2. The Environmental and Safety Management Advisory Group

a. Attendance of members to meetings of this Group was also poor

b. There was a need to raise the profile of environmental and safety in the various utilities

c. The Advisory Group resolved that to improve the safety and environment culture in utilities, it is also important to briefly discuss important and relevant safety and environmental issues that would benefit the attendees

d. A wayleave guideline has been prepared and circulated to members – still to be finalised

e. The aspect of encroachments was still a cause for concern and requires further investigation to provide relief

f. With respect to Practical Environmental & Social Impact Assessment (ESIA)

Eskom will arrange ESIA presentation and site visit.

g. Training:

i. ZESA will put together a 3 day safety training programme for supervisors. It was also agreed that there should be a site visit and a competency test on the third day of the training.

ii. The relevant local legislative requirement must be included in the training

iii. The cost of the trainer's travel, accommodation and meals will be funded by PIESA.

iv. The pilot utility will be ESCOM (Malawi) who will host and arrange the local logistics.

h. The Advisory Group suggested that each utility should submit a PCB inventory and provided a template to be used which was circulated to all members. The PCB template was workshopped and forwarded to all to populate

i. The Endangered Wildlife Trust (EWT) did a presentation on animal interactions with electricity infrastructure and the various solutions implemented at Eskom and tested to minimise the injury or mortalities of especially birds. Utilities were invited to contact EWT for advice and training relating to animal interactions with powerlines.

3. The Revenue Protection Advisory Group

a. The Advisory Group suggested that the Electrification Advisory Group address the issue about the IPP matters

b. Investigating the construction of a 400kV line from Mozambique

c. The Advisory Group noted that various utilities in South Africa are busy with smart meter pilot projects

d. eThekwini Municipality in SA agreed to forward information regarding their smart metering projects successes and challenges to the committee before the next meeting.

e. Landis & Gyr (Mr Lawrence Juku) to draft a white paper on MD prepaid metering technology

f. NRS 049/2 completed and circulated and to commission standards committee to localise. Issues of prepayment is key. Utilities to study and adopt.

g. Landis & Gyr (Mr Lawrence Juku) to prepare and circulate a white paper on the MD meter technology

h. The Advisory Group resolved to create a PIESA user group for sharing pilot programme information

4. The Standardisation Advisory Group

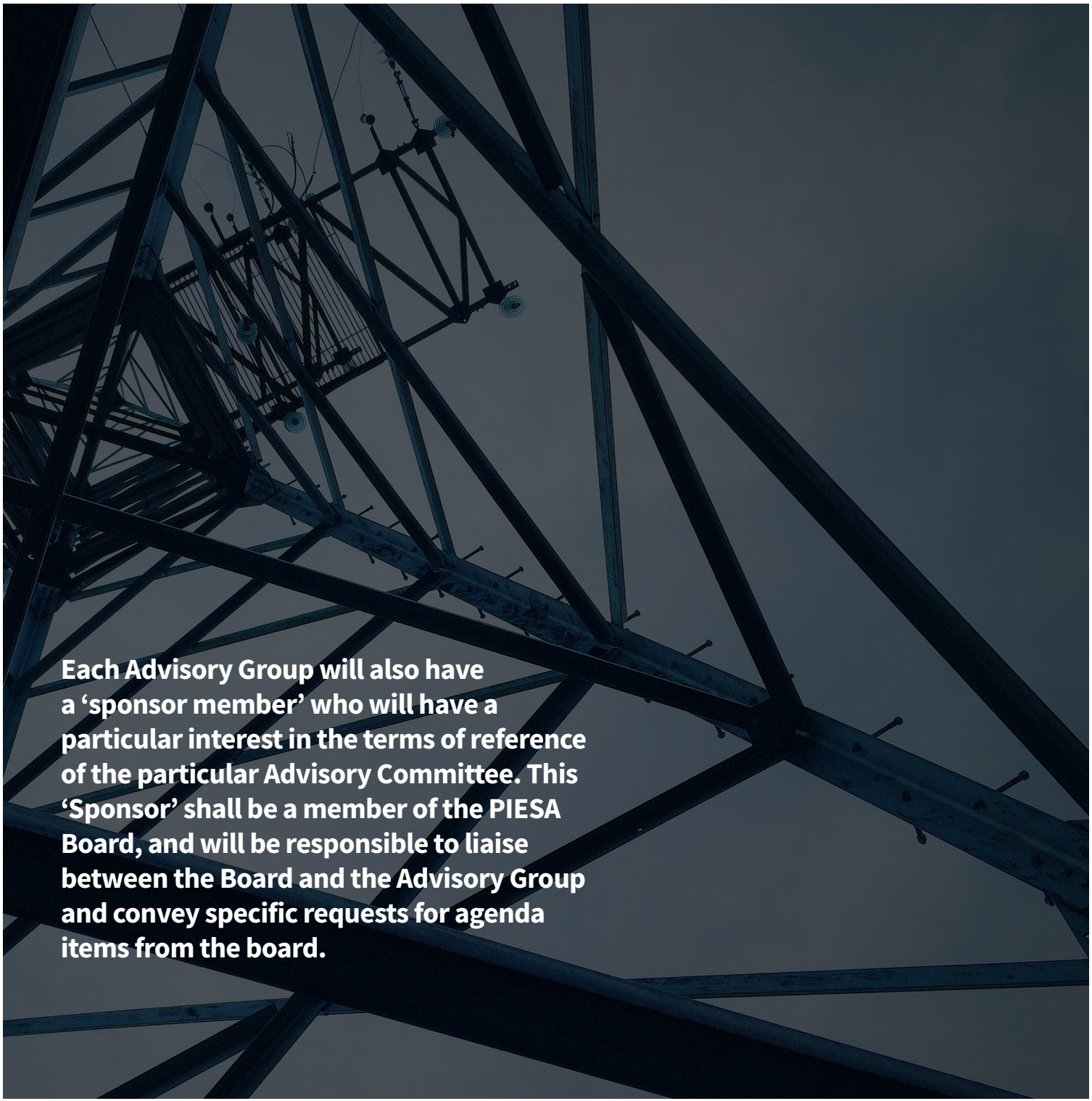
a. To survey members for their standards used for common procurements using the updated list of procurement items drafted in Malawi end October 2016,

b. AFSEC members have the opportunity to comment on new IEC standards and/or comment on proposed changes to existing standards. In order to do so member countries in Africa must organize themselves effectively to be able to have meaningful influence to changes in IEC documents.

c. Technical cooperation agreement between SADCSTAN and PIESA - the agreement is still in place and binding between the two organizations

d. All member countries are to present a list of commonly used PIESA standards for the purposes of Procurement

e. A catalogue of all PIESA standards to be published and made available



Each Advisory Group will also have a ‘sponsor member’ who will have a particular interest in the terms of reference of the particular Advisory Committee. This ‘Sponsor’ shall be a member of the PIESA Board, and will be responsible to liaise between the Board and the Advisory Group and convey specific requests for agenda items from the board.

IERE Technology Foresight 2020

Top 20 Emerging Technologies & Top 5 Fringe Technologies

We want and need to acknowledge at the very outset that the information contained in this article has been fully extracted from The International Electric Research Exchange ("IERE") Technology Foresight 2020 Report that was compiled by FROST & SULLIVAN on behalf of IERE (and its membership).

The International Electric Research Exchange ("IERE"), was established in October 1968. With the leadership of the 4 founding members (EPRI, UNIPEDE, CEA and Japan IERE Council), IERE has been promoting information exchange on R&D and cooperative activities among the leading electric utilities of the world for mutual benefit.

PIESA has been the recipient of grant funding from IERE for a number of projects undertaken by PIESA in the last few years. PIESA is indeed grateful to IERE for so kindly making this funding accessible to PIESA to execute the said projects.

For the purpose of this Technology Foresight 2020, the following definitions for "Emerging Technologies" and "Fringe Technologies" were adopted.

Emerging Technologies are new or alternative technologies increasingly adopted by the energy industry, where only emerging technologies that have been commercialized were considered.

Fringe Technologies are technologies considered to have remote possibilities, but could potentially disrupt the energy industry. "BLACK SWAN" technologies are acknowledged as being of increasing importance.

The selection of the Top 20 Emerging Technologies was selected based on the highest votes as received during the IERE Member Survey. However, the sequence of the Top 20 Emerging Technologies and Top 5 Fringe were primarily influenced by two factors; a) Potential for Market Transformation, and b) Likelihood to Impact Industry in 3 to 5 Years (for Top 20 Emerging Technologies), OR 10 years (for Top 5 Fringe).

"The power system is changing at an exponential pace into a highly interconnected, complex, and interactive network of power systems, telecommunications, the Internet, and electronic commerce applications. Virtually every element of the power system will need to incorporate sensors, communications and computational ability.

Emerging Technologies are new or alternative technologies increasingly adopted by the energy industry, where only emerging technologies that have been commercialized were considered.

No longer will society depend primarily on central station power and one-way flow on the grid, since the use of distributed generation, distributed energy storage and smart cities will proliferate. At the same time, the move towards competitive electricity markets requires a much more sophisticated infrastructure for supporting the myriad of informational, financial, and physical transactions between the several members of the electricity value chain that supplements or replaces the vertically integrated utility. Thus the rise of the "utility of the future" is upon us and thus requires a fundamental shift in our current thinking.

The IERE, a non-profit organization, serving the electricity industry across the world as a "global platform" of information exchange and collaboration in electricity technology research, development, demonstration, and deployment (RDD&D).

In particular, IERE has three organizational missions:

- Evaluate innovative and emerging technologies and their implementation
- Help establish corporate strategy related to R&D under changing business climate
- Facilitate technology transfer from developed economies to developing economies

There are many factors driving the rapid changes in the worldwide electric industry today. Increased presence of nonconventional energy sources, advancement of utility grid operations technologies, and further penetration of enabling technologies that support demand-side resources are just few such examples. As an industry-leading organization with global and world-class expertise in supporting and promoting technology innovations in the global electric industry, IERE is in a strong position to provide thought leadership on technology solutions that could shape the future trajectory of the industry.

To this end, the IERE has undertaken a study in which a complete market survey and developed profiles of critical technologies that formed the foundation for our Technology Foresight 2020 report. The objectives for this report include:

- Present the groups of technologies that IERE members identify as critical for the coming decades and addressing climate change
- Provide background information on the selected technologies (costs, development status, etc.)
- Provide information on IERE members' experts and projects related to these technologies" [Greg Tosen, Chairman IERE and PIESA Board Member]

Hybrid renewable energy systems combine more than one renewable energy resource, such as biomass, geothermal, hydropower, solar, and wind to balance energy generation, articularly for areas that are far away from electrical grids.

Top 20 Emerging Technologies

1. Prosumer Technologies

Prosumer technologies are technologies that enable end users to become both consumers and producers of energy. Prosumerism enables consumers to have greater control to choose where, how, and when energy is generated for their consumption.

2. Energy Storage Devices

Energy storage systems store electrical energy in the form of chemical, mechanical, or electrical energy.

3. Big Data Applications

Big Data analytics refers to a set of data management tools, applications, and techniques for effective analysis of big datasets so as to derive intelligence on business operations and customer interactions.

4. Renewable and Distributed Generation

In distributed generation ("DG"), power is generated using small-scale systems sited close to the point of use. DG depends mostly on renewable sources, such as solar, and cogeneration technology, to provide secure and reliable power supply. However, the size of the DG unit is not clearly defined. All generation units installed privately in home and private premises, with the maximum generation capability ranging from 50 to 100 MW, are called DG by the International Council on Large Electric Systems ("CIGRE")

5. Climate Modelling

Climate modelling involves computer-based tools to predict climate behaviour, for instance, possibilities of extreme climate (drought and monsoon), or response of clouds and circulation systems to changes in temperature.

6. Smart Grid

A smart grid is an intelligent grid that can be monitored and controlled by combining automation, communication, and data processing technologies.

7. Wireless Sensors

Wireless sensors are spatially distributed autonomous sensors, mostly battery operated, which are used to monitor three core aspects of the power industry, that is, generation, distribution, and consumption. They play a significant role in increasing the efficiency of the grid by monitoring large areas at low range and low cost.

8. Internet of Things ("IoT")

The Internet-of-Things ("IoT") describes technologies that facilitate the linking of sensors, controllers, and persons over the Internet. An important criterion for a device to become a part of IoT is that it should be assigned an IP address.

9. Electric, Hybrid & Fuel Cell Vehicles

An electric vehicle (EV) is a type of vehicle that utilizes electricity to drive a motor to propel it forward. Electricity is generated either from a battery or fuel cell, most likely operated with hydrogen

10. Lithium-ion Battery

Lithium-ion batteries store electrical energy in the chemical form for later use through electrochemical reactions. They are tremendously popular as power sources for many electronic devices, as they are compact and deliver high power density and high energy density.

11. Smart X

Smart and connected devices play a dominant role in a myriad of applications and technical developments, such as smart grids, connected health, Internet of Things (IoT), and smart homes. They help in collecting data, monitoring, and automating any environment in a seamless way. The Smart X solutions, which include smart cities, smart energy, smart meters, and utilities like thermostats, help to collect and transmit information to a central control unit.

12. Water Resource Planning

Integrated Water Resource Planning (IWRP) is defined as a holistic approach to the management of water systems, which combines water supply, water demand, water quality, environmental protection and enhancement, rate structures, financial planning, and public participation

13. Water Recovery and Reuse

Power plants consume significant amounts of water. The various types of wastewater released from a thermal power plant are cooling tower make-up, boiler feed water, condensate polishing and filtration, cooling tower side stream, cooling tower blowdown, flue gas desulfurization (FGD) wastewater, and dry ash pond effluent.

14. Grid and Home Cybersecurity

Electrical systems are evolving to be more cyber physical in nature. Even the traditional grid has industrial control systems installed for remote monitoring and data collection, where this feature is getting more sophisticated by the day. Hence the need for a better system to secure the data and information generated is also growing.

15. Offshore Wind Energy

Offshore wind energy is preferred for more continuous and higher power generation, compared to conventional land-based systems. The presence of stronger and more reliable winds and flow patterns makes them a better choice and helps in achieving more annual full load hours compared to onshore wind farms.

16. Carbon Capture, Utilization & Storage

The carbon capture, utilization, and storage (CCUS) process involves the capture of anthropogenic carbon emissions from the waste gas released from large stationary point sources before the gas is released back into the atmosphere. The carbon dioxide (CO2) can subsequently be stored or converted later into valuable products such as chemicals or fuels. This method is part of the CO2 point removal process

17. Hydrogen Energy Storage

Hydrogen energy storage is intended to store surplus electricity either from renewable or non-renewable power generation in the form of hydrogen gas, which can be used directly either in a fuel cell or in a hydrogen gas turbine, when the need for electricity arises.

18. Hybrid Energy Systems

Hybrid renewable energy systems combine more than one renewable energy resource, such as biomass, geothermal, hydropower, solar, and wind to balance energy generation, articularly for areas that are far away from electrical grids. These systems can then be augmented by fossil fuelled generators to ensure electrical production. Another important component for hybrid renewable energy is energy storage, in order to balance out intermittency of the generation.

19. Nuclear Power Gen III+

Generation III reactors have improvements over Generation II reactors in terms of thermal efficiency, modularization, and fuel technologies. The main differentiation in terms of function design and operation between the previous generations and the Generation III+ reactors include better design in terms of simplicity and ruggedness, better safety measures that require minimal active control and manual intervention, and reduced chances of reactor core melting.

20. Virtual Power Plant

A Virtual Power Plant (VPP) brings together a number of power sources, distributed, storage and conventional, and also communication and control technologies together to ensure reliable power supply. The major differences between distributed power generation and Virtual Power Plants (VPPs) are the interlinking of sources and better demand management in the latter case.

A Virtual Power Plant (VPP) brings together a number of power sources, distributed, storage and conventional, and also communication and control technologies together to ensure reliable power supply.

Top 5 Fringe Technologies

1. Artificial Intelligence

Artificial Intelligence (AI) is focused on developing humanlike cognitive capabilities such as learning, reasoning, problem solving, planning, and self-correction for machines to enable them to perform cognitive functions efficiently.

2. DC Grid

The three main components of DC (direct current) grids in the future would be solar panels and solar farms, energy storage systems, and the integration of electric vehicles (EVs). The output for the first two components would be DC power while the power required to charge EVs would be DC. The main function of the DC grid is to enable the deployment of solar solutions such as rooftop, building integrated photovoltaics (BIPV), and solar farms. This infrastructure would also come handy in regions where the adoption of EVs is high.

3. Advanced PV

Development of advanced photovoltaic (PV) is taking two different routes, either 1) the low-cost, lightweight, transparent, and flexible route, mainly by using different materials or increasing the efficiency, or via 2) advanced silicon-based solar cells.

4. Advanced Nuclear

For the purpose of this review, advanced nuclear technology refers to Generation IV (Gen IV) reactors, small modular reactors (considered to be Generation III+, and typically below 300 MW) and nuclear fusion. The first two systems refer to nuclear fission processes while the latter refers to the nuclear fusion process. All three technologies refer to generation of electricity from a controlled thermonuclear process, where the released energy from the thermonuclear process is used to generate electricity.

5. Artificial Photosynthesis

Artificial photosynthesis is a process, which mimics natural photosynthesis, where fuels and chemicals are produced using carbon dioxide, water, and sunlight. It is used to refer any process that captures and stores energy from sunlight in chemical bonds of a fuel.

ELECTRIFICATION
IN AFRICA IS STILL A CHALLENGE

According to The Energy Sector Management Assistance Program (“ESMAP”) access to energy and economic development go hand in hand. The ESMAP is a global knowledge and technical assistance program administered by the World Bank. Its mission is to assist low and middle-income countries to increase know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth. Since its inception in 1983, ESMAP has supported more than 800 energy-sector activities that promote poverty reduction, economic growth and low carbon development in over 100 countries. Improving electricity supply and distribution boosts economic growth, creates jobs, and expands the reach of educational and health services.

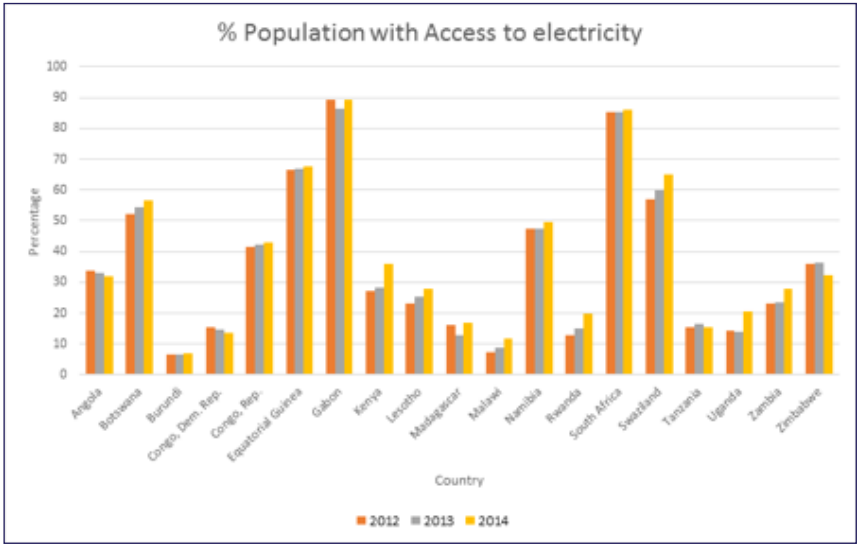


Figure 1

Source: World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program.

ELECTRIFICATION (2014)

COUNTRY	POPULATION (Million)	ELECTRIFICATION (%)
Angola	29	30 – 35
Kenya	49	35 – 40
Uganda	42	15 – 20
Tanzania	56	15 – 20
DRC	79	10 – 15
Malawi	18	10 – 15
Zambia	17	25 – 30
Zimbabwe	16	30 – 35
Mozambique	29	12 – 15
South Africa	56	85 – 90
Botswana	2,5	55 – 60
Burundi	11	5 – 10
Rwanda	12	15 - 20

Figure 2

Unfortunately, more than 589 million people in Sub-Saharan Africa (SSA) live without access to electricity: only 35 percent of the population in SSA has access, compared with 96 and 78 percent in East Asia Pacific and South Asia, respectively (Figure 2). For most Africans, electric power is inaccessible, unaffordable, or unreliable. The lack of both quality energy services and access to modern sources of fuel—such as natural gas, liquefied petroleum gas (LPG), diesel, and biofuels—traps them in a world of poverty. According to Figures 1 and 2 the majority of PIESA member countries reflect an access to electricity of less than 50% with respect to electricity energy for the years 2012, 2013 and 2014

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According to the World Bank without access to electricity, the pathway out of poverty is narrow and long.

According to the World Bank without access to electricity, the pathway out of poverty is narrow and long. The current pace of progress is not moving fast enough: 1,06 billion people globally still do not have access to electricity, and 3,04 billion people still rely on solid fuels and kerosene for cooking and heating (IEA and World Bank 2017). Despite significant progress in recent decades, achieving universal access to modern energy services by 2030 will not be possible without stepped-up efforts by all stakeholders.

This inaccessibility to modern energy in SSA touches all sectors of society—health clinics cannot refrigerate vaccines, students find it difficult to read after dark, and businesses have shorter operating hours (see also Figure 3). Even Africans with modern energy face unreliable and unpredictable supplies for which they must pay high prices.

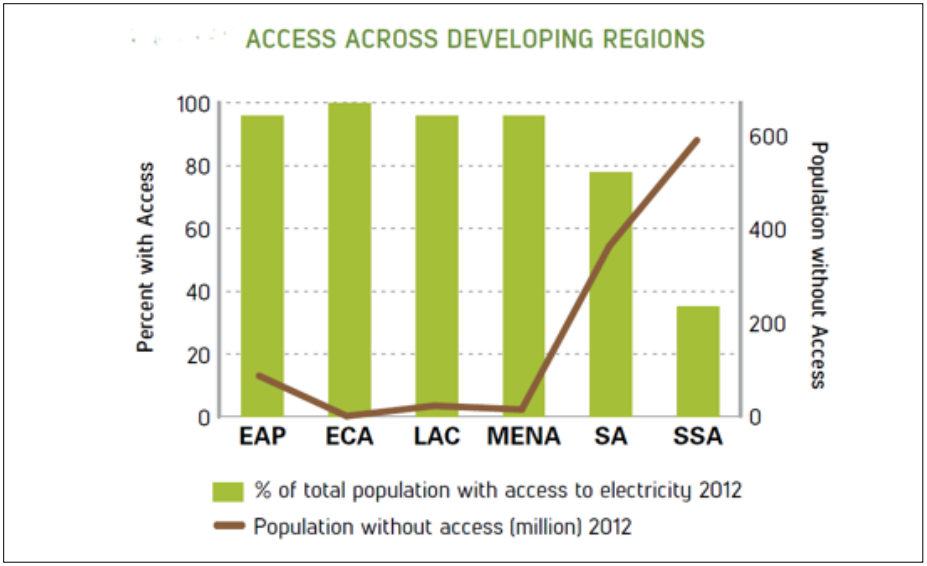


Figure 3

Source: World Bank Group/ESMAP/AFREA

LEGEND:

EAP	-	East Africa and Pacific Region
ECA	-	Europe and Central Asia
LAC	-	Latin American and Caribbean
SA	-	Southern Africa
SSA	-	Sub Saharan Africa

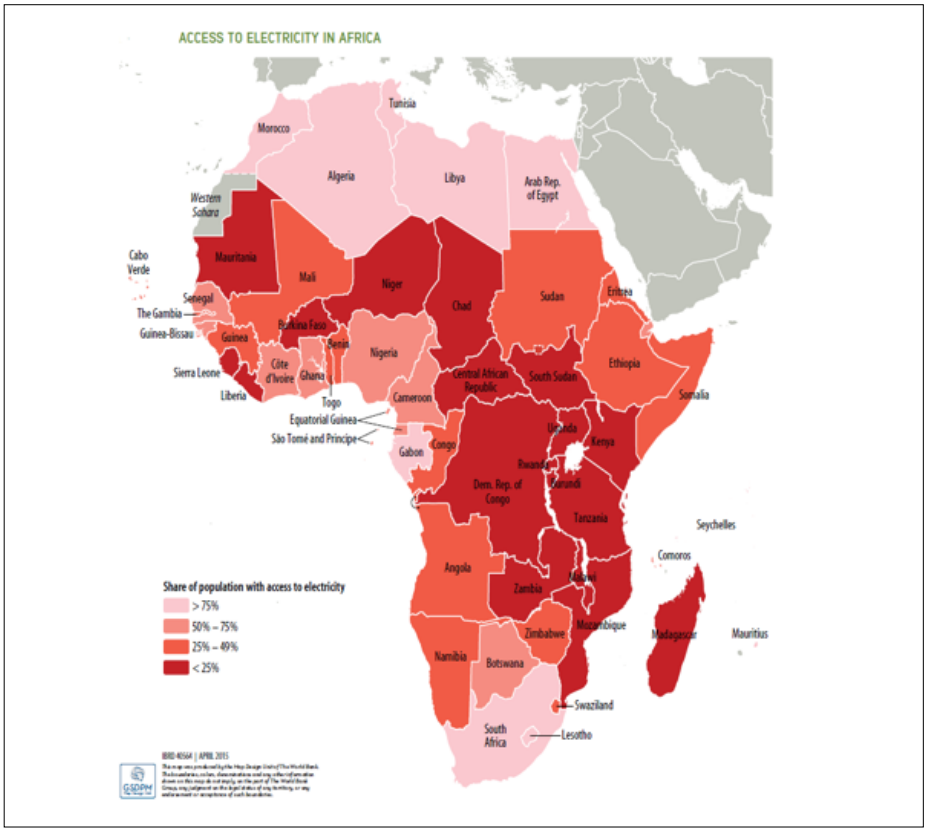


Figure 4

ACCESS TO ELECTRICITY IN AFRICA

Source: World Bank Group/ESMAP/AFREA

According to ESMAP and AFREA Africa is well endowed with energy resources. Ensuring that they are available at the exact time, place, and form in which they are needed will remain a significant challenge for years to come. According to Figure 4 very few African countries reflect an access to electricity of >75%. Approximately 30% of the African countries reflect access of <25% while another approximately 30% reflect an access to 25% to 49%.

MOBILE KNOWLEDGE MENTORING –

A SCALABLE SOLUTION FOR ACHIEVING THE 7 ASPIRATIONS OF AGENDA 2063.

"The Africa We Want"

Executive Summary

We stand at a truly magnificent metaphorical African dawn of the greatest revolutionary disruption in the potential for large-scale human learning and development in the history of humankind.

Agenda 2063 presents a very compelling vision of "The Africa We Want" at a time when tsunami-like societal and generational changes and the Internet of Things (IoT) and other technological advancements are transforming the world of work at the speed of need. The African Union Commission adopted Vision 2063 as a roadmap for continental development. Essentially it aligns thinking from across the continent and distils the vision in a set of seven (7) aspirations.

The Mobile Knowledge Mentoring approach presented here seeks to address Aspirations 6 and 7 of Agenda 2063 especially with respect to the mentoring of especially graduate professionals in the technical and engineering fields. This collaborative and cooperative model using e-mobile as a tool could be Africa's answer to the huge shortage of skills and competencies in the power and energy sectors

The 7 Aspirations contained in Agenda 2063 articulate a strategy of self-empowered and self-governing professional people development with measured and transparent accountability:

"Citizens will actively participate in the social, economic and political development and management. Competent, professional, rules and merit-based public institutions will serve the continent and deliver effective and efficient services. Institutions at all levels of government will be developmental, democratic and accountable" (Source: Agenda 2063 – The Africa We Want – April 2015).

Furthermore, Agenda 2063 identifies that in order to fully achieve the 7 Aspirations and the effective implementation of the African Industrial Development Action Plan, a critical success and sustainability factor will be the self-capacitation and capability for Africa to catalyse its own "education and skills revolution and actively promote science, technology, research and innovation, to build knowledge, human capital, capabilities and skills to drive innovations for the African century" (Source: Agenda 2063 – The Africa We Want – April 2015).

Closer to home in South Africa, the National Development Plan (NDP) and the associated Strategic Integrated Projects (SIPs) as well as the more recent Nine-Point Plan present elaborate short, medium and long-term strategies for an integrated and inter-dependent approach to the infrastructural and people development needs of our sub-continent.

And yet our own recent SA Minister of Higher Education and Training, Blade Nzimande, told a Department of Labour (DoL) Employment Equity (EE) and Transformation Indaba gala dinner on 18 April 2013 that "South Africa has spent R57-billion over the past 10 years through the Sector Education and Training Authorities (SETAs) in various training programmes, but the country does not have much to show for this investment".

In our rapidly transforming world of constantly changing social and scientific norms and values, in which the parallel convergence of multiple technologies has produced science fiction-like communication, cooperation and collaboration capabilities,

the world of learning and development has been irreversibly transformed for the better. The modern mobile "African" learner and aspirant young professional in Africa will have access to previously undreamt of learning and development opportunities.

However, the associated risks that come with these opportunities are also very real. There is an increasingly pervasive view that ubiquitous access to information on-demand reduces the need for the same levels of traditional academic and administrative rigour, as well as the timeframes associated with the long-established paths to professional registration and full competence.

The Internet and Smartphones in particular, have created confusion amongst the modern learners and young candidate professionals, whom research indicates are generally overwhelmed, frustrated and confused and often unable to differentiate between what represents information and what constitutes knowledge. Sound professional judgement is an intricate and complex balancing act requiring the confident understanding and application of semantic learning and the scientific constructs of a particular discipline, as well as the integration and synthesis of episodic learning acquired through multiple learning experiences and brain-sensitising associations developed over time. The experiential wisdom required to become a confident, competent and capable young professional cannot be fast-tracked, as life's greatest lessons are not learned in the classroom or on the Internet.

It is by no means the fault of the young that experience and professional maturity takes time to distil – however, it is often the fault of the employers and employer associations and institutions who do not address this experiential learning journey appropriately.

This short article introduces an elegant and massively scalable solution for the people of Africa and the realisation of Agenda 2063 Aspirations (as originally depicted in the author's 5C's Holacratic Contribution Model shown in Figure 1).

The Power Sector in Sub-Saharan Africa represents a compelling case in point, as without addressing the people and professional needs of this nation building sector, the future will be very bleak indeed.

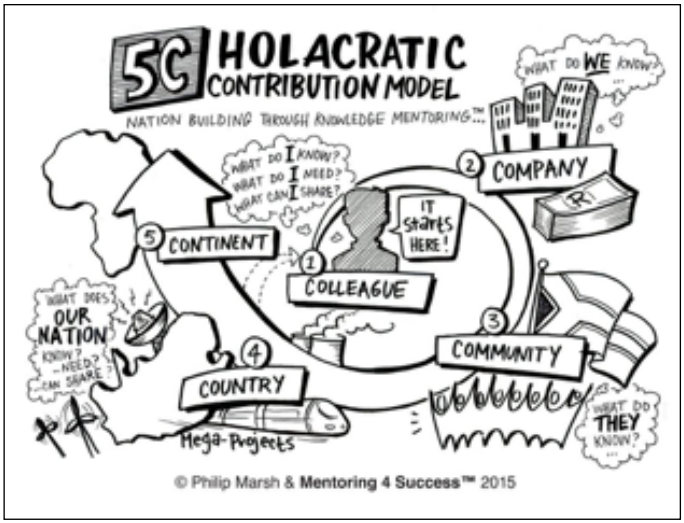


Figure 1 – The 5 C's Holacratic Contribution Model (Marsh

The Burning Platform and the Case for Change

As mentioned we stand at a truly magnificent metaphorical African dawn of the greatest revolutionary disruption in the potential for large-scale human learning and development in the history of humankind.

The consistent hallmark of all highly developed and successful civilisations since the dawn of humankind has always been the ability to teach, share and pass on the collective knowledge gains, academic achievements, great discoveries and inventions and most importantly, the situationally relevant and contextually rich experiential wisdom of the current generation to the next.

And yet, even with our perceived societal and scientific advancements, the unacceptably high incidence of predictable, repetitive and increasingly costly mistakes across the business and public sectors indicates that our long-cherished traditional and theoretical models of teaching, learning and knowledge sharing are ineffective and unsustainable.

The historical focus and reliance on old teaching methods and searchable chunked content in the form of policies, procedures and training manuals have just not worked. The rules and systems-oriented approach to individual, organisational and community learning and knowledge exchange, which included the almost mechanistic gathering, capturing, packaging and sharing of large amounts of disconnected content without context, have been shown to offer sub-optimal learning and knowledge transfer, if any.

Mobilising the entire value chain of an industry's or even a nation's situational knowledge and experiential wisdom, towards a common vision such as the Agenda 2063 Aspirations must surely rank as one of the greatest priorities facing Africa.

The Power Sector in Sub-Saharan Africa represents a compelling case in point, as without addressing the people and professional needs of this nation building sector, the future will be very bleak indeed.

Introducing Nation Building through Mobile Knowledge Mentoring™

Nation Building through Mobile Knowledge Mentoring™ was born out of an award winning paper and presentation delivered by the author at the 2015 Global Knowledge Management Congress in Mumbai, India.

"Knowledge Swarms and Experiential Hives – a nation building solution to address the scarce and critical skills and knowledge needs of developing societies" introduced the need to mobilise the national "knowledge-force" via mobile connectivity to not only a common knowledge content hive, but equally importantly, a collaborative community of experts and peers who could share and exchange context on demand, anywhere and anytime (as depicted in the original graphic shown in Figure 2).

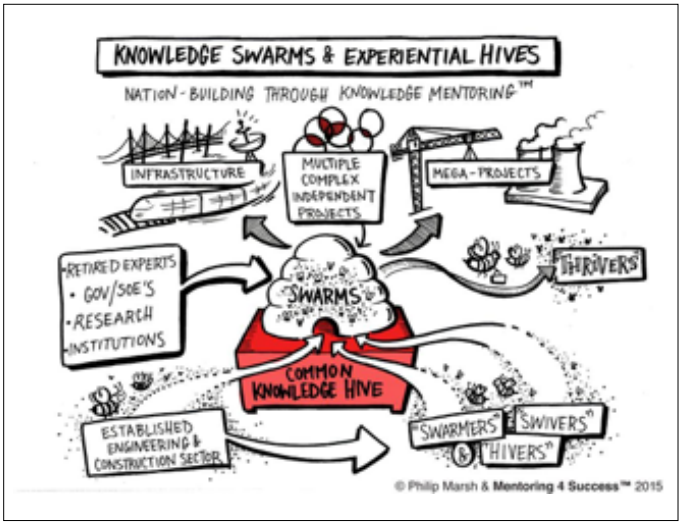


Figure 2 – The Knowledge Swarms and Experiential Hives Model (Marsh)

Whilst developing the Nation Building through Mobile Knowledge Mentoring™ model, methodologies and mobile technological enablers, the author carried our extensive international research as well as with selected existing clients in the built environment in Southern Africa and specifically in the engineering and construction sectors, in order to benchmark the needs and expectations of the multiple stakeholders.

There are some consistent trends across the various professional sectors, both locally and internationally, which are leading to a general reduction in both the quantity and quality of confident, competent and capable young professionals and these can be summarised as follows:

- Time, distance, logistical separation, lack of venues and facilities, lack of internal capacity and capability, expert dependency and people differences are the 7 most consistent challenges and barriers to effective large-scale knowledge sharing, across multiple industry sectors;
- The modern mobile millennial learner is not motivated by the traditional baby boomer values of building a long-term professional career – they seek mobility, constant change, interesting challenges and high levels of autonomy; professional registration creates the perception of being tethered to a company or a country, which in turn fosters an element of emotional rebellion;
- The role and status of the professional person in society has been significantly diluted over the last 30 years – this is borne out by the growing disparity between the pay and perks of highly qualified and experienced technical professionals and the exorbitant incentives, pay and perks which unqualified, yet highly talented youngsters attract in the digital disruption domain;
- The traditional and outmoded approaches to candidacy and professional development of short courses, process-based workshops, compliance mentors and milestone monitoring without corrective intervention are clearly failing the professions; access to an administrative website with an impressive library of forms and flows, attendance on a 1 or 2 day workshop with an ageing or retired professional facilitator and the allocation of a company appointed mentor (whom the candidate more often than not never gets to meet until submission time) is no longer an attractive or effective solution to such a critically important and strategic national imperative;
- Political turmoil, cultural misunderstandings and career uncertainty often creates an unfortunate lack of trust between “the sources” who have the knowledge, experience and relationships and “the seekers” who desperately need to acquire and develop their own knowledge-base; the perceived lack of a trusted and transparent agenda often creates a form of cognitive dissonance in which either the message or the messenger are not trusted, which performance management and compliance rules will never rectify;
- The negative perceptions and pressures associated with increased levels of responsibility and accountability are not well articulated and balanced with the opportunities and potential benefits of career enhancement and advancement that professional registration should unlock;
- Project pressures, reducing margins, global competitors, constant restructuring and all the other organisational challenges of accelerating change significantly reduces both the capacity and capability of most organisations to effectively manage professional candidacy development appropriately;
- An increasing reliance and dependency on a reducing and ageing expert knowledge-force results in less time being spent on scarce and critical skills and knowledge transfer, which directly impacts the growth and development of young candidates, leading to increased levels of unfiltered internet and peer connectivity and the perpetuation of “old habits”;
- Reward and / or recognition for engaged commitment of experienced experts and mentors is not a greed-based behavioural expectation or barrier, as often portrayed by some sectors of society; the respected knowledge-force is generally only too willing to share, but traditional class room methods, costly storage and search repositories and elaborate taxonomies have proven to be both ineffective and unsustainable;
- Knowledge is best acquired in relationships of trust and with an element of fun and gamification involved – the basis of all accelerated learning through early childhood; these same brains are with us for the remainder of our lives and yet traditional compliance-based learning and development methodologies try to force an infinite number of learning opportunities and styles through the same rigid sheep-dip and tick-box process of rules and systems;
- Limited availability of engaged knowledge resources and / or inappropriate selection and pairing in traditional mentoring approaches often leaves mentees being trapped in a willing expert’s own domain dependency and an unintentional form of cognitive encasement built over a generation of developing their own (perceived or justified) expert status;

Extensive research and practical experience from multiple large-scale knowledge mentoring and critical knowledge transfer interventions over the last 20 years carried out by the author's own organisation provides conclusive evidence that only the wisdom of the collaborative will accelerate the effective empowerment, capacity building, skills transfer and job creation that is so critically needed in Africa.

Mobile Knowledge Mentoring will provide the capacity and capability to do this at scales and levels of sustainability never before dreamed possible.

The future of KNOWLEDGE is not going to be about the OWNERSHIP of Content…but it will be about the speed and ease of ACCESS to Context. Technology might make it all possible – but People will really make it Happen!

Figure 3 – The Modern Mobile Millennial Learner

Figure 4 – An elegant mobile mentoring model for sponsored community and country development

Acknowledgement

This extract is based on a book and a series of articles on Nation Building through Mobile Knowledge Mentoring™ written by Philip Marsh (B.Sc(Eng); Pr.Eng; Dipl.Bus.Man; G.D.E; M.S.A.I.C.E; M.I.C.E; M.I.Struct.E; C. Eng; A.I.P.M; CKM; CHRP) - Group Managing Director - Mentoring 4 Success (Pty) Ltd group.

MEMBERSHIP
CATEGORIES AND ELIGIBILITY

Membership of PIESA is open to the electricity industry. The number of members from time to time shall not be limited, but shall at no time be less than five (5). Membership may not be assigned or transferred to any other person, company or concern.

Membership is obtained by paying the prescribed contributions as stipulated in Article 14.2 following the acceptance by the PIESA Board of the applicationfor membership.

PIESA has the following categories of membership: Full Members are organisations that:

(a) Generate, transmit, distribute or buy and sell electricity; or

(b) Represent an organisation contemplated in (a).

- Coordinate with like-minded organisations e.g. SADCSTAN, UPDEA towards the common goal of harmonised standards;
- Participate in training activities, exchange programmes and development projects;
- Participate in regional workshops and conferences, and network with strategic decision-makers in the electricity industry;
- Provide opportunities for market growth and economies of scale for regional manufacturers and suppliers of equipment and services.

Affiliate Members are organisations or individuals with an allied interest to PIESA, and would include, inter alia, manufacturers and suppliers of services or equipment to the electricity distribution industry, researchers, consultants and financiers.

Benefits to members include:

- Access to and participation in the development of standards for the electricity distribution sector;
- Sharing of information, technology and skills and, in particular, experiences gained from pilot projects and implementation of new technologies, and local solutions to recurrent problems experienced in the region;
- Network with like-minded organisations, joint research activities and access to information from international research organisations e.g. IERE, EPRI, SAPURAB;
- Influence the development of standard specifications appropriate for the region through active involvement in the Advisory Commitee;

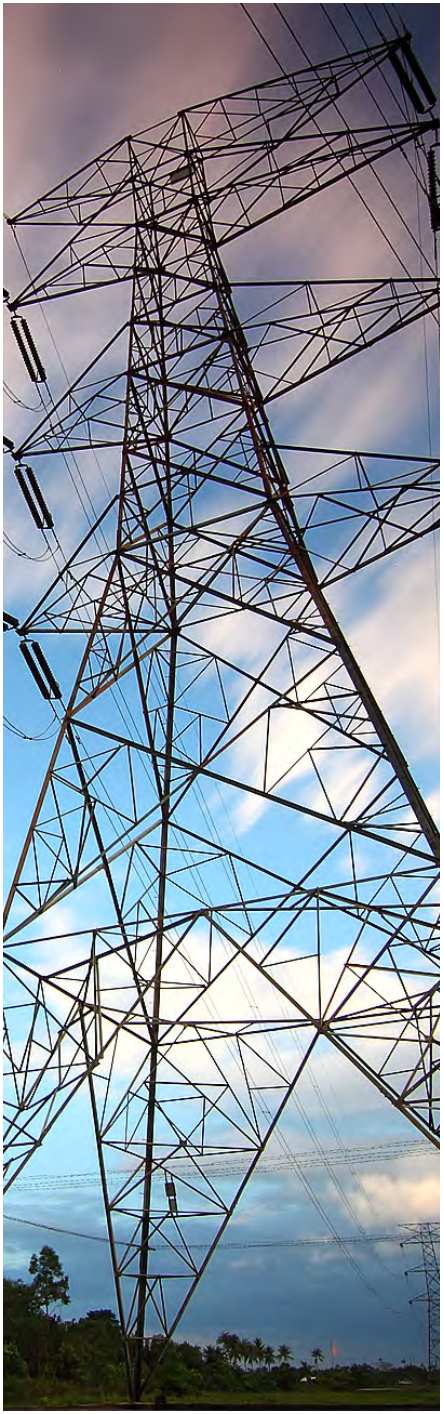
Affiliate Members are organisations or individuals with an allied interest to PIESA, and would include, inter alia, manufacturers and suppliers of services or equipment to the electricity distribution industry, researchers, consultants and financiers.

Members

- AMEU - Association of Municipal Electricity Utilities (Southern Africa)
- ESCOM - Electricity Supply Commission of Malawi
- KPLC - Kenya Power and Lighting Company
- ESKOM - South African electricity supply company
- LEC - Lesotho Electricity Company
- SNEL - Société Nationale d'Électricité
- TANESCO - Tanzania Electric Supply Company Limited
- UMEME - Umeme Company Limited
- ZESA – Zimbabwe Electricity Supply Authority
- ZESCO - Zambia Electricity Supply Corporation Limited

Affiliate Members

- Aberdare Cables
- Circuit Breaker Industries
- Hi-Tech Transformers Maintenance
- Linegear
- Landis + Gyr (Pty) Ltd
- Lucy Electric South Africa
- Metal Frabicators - Zambia PLC
- Powertech Transformers
- Reinhausen South Africa
- Schneider Electric
- Siemens Southern Africa
- TE Connectivity
- ZEST WEG Group



FINANCIAL *STATEMENTS*

Approval of the Board

The financial statements set out on the following two pages.

The Board are responsible for the preparation and fair presentation of the financial statements of The Power Institute for East and Southern Africa, comprising the statement of financial position at 28 February 2017, and the statement of comprehensive income for the year then ended, and the notes to the financial statements which include the basis of accounting and other explanatory notes, as set out in the audited statements.

The Board are also responsible for such internal control as the Board determines in necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error, and for maintaining adequate accounting records and an efficient system of risk management.

The Board have made an assessment of the ability of the association to continue as a going concern and have no reason to believe that the business will not be a going concern in the year ahead.

The auditor is responsible for reporting on whether the financial statements are fairly presented in accordance with the basis of accounting described in the financial statements.

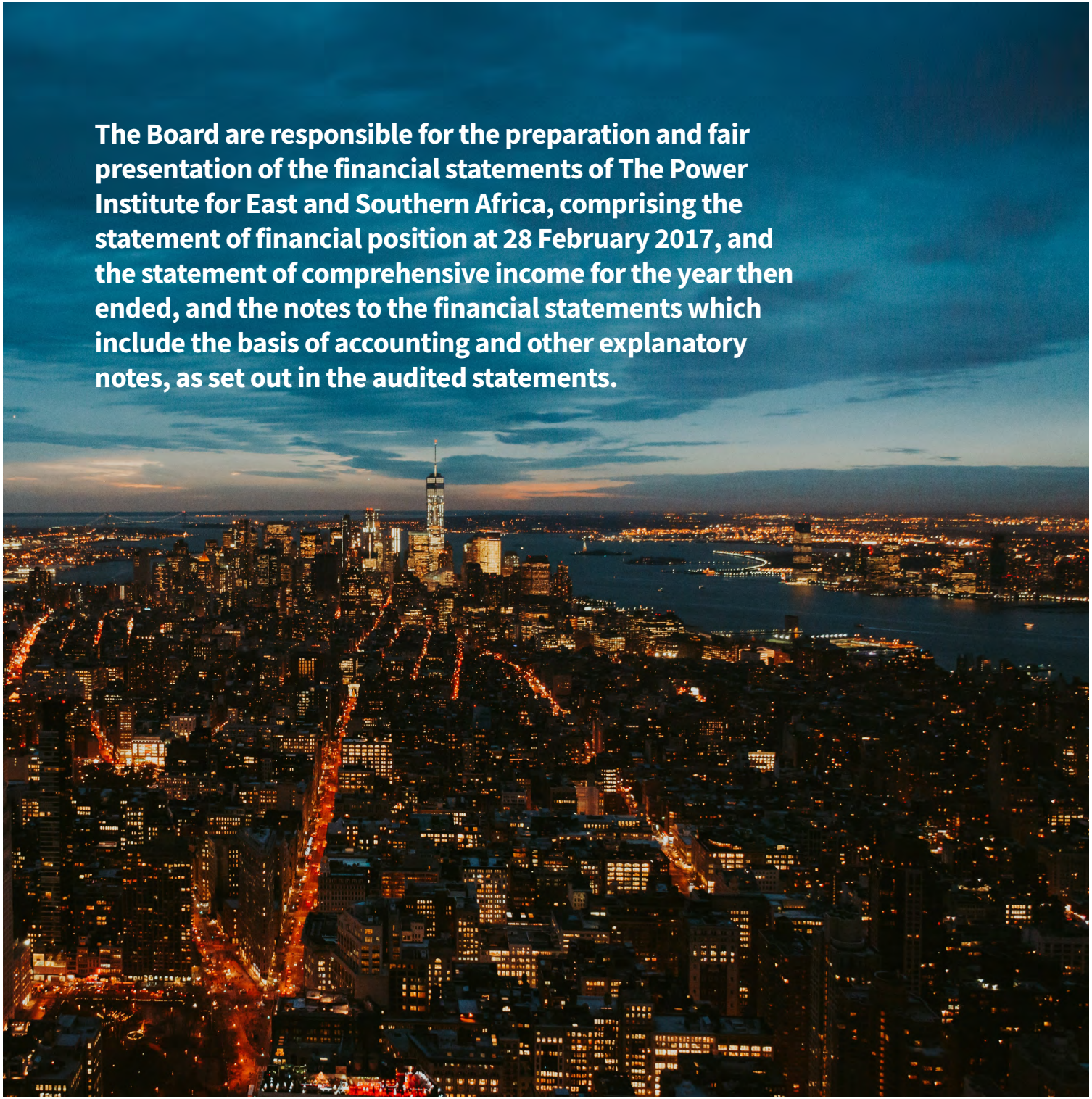
Approval of financial statements

The financial statements of the Power Institute for East and Southern Africa, as identified in the first paragraph, were approved by the Board and signed by

_____

Chairperson

The Board are responsible for the preparation and fair presentation of the financial statements of The Power Institute for East and Southern Africa, comprising the statement of financial position at 28 February 2017, and the statement of comprehensive income for the year then ended, and the notes to the financial statements which include the basis of accounting and other explanatory notes, as set out in the audited statements.



Statement of Financial Position

at 28 February 2017

	2017 R	2016 R
Assets		
Current assets		
Trade and other receivable	**558 998**	913 724
Cash and cash equivalents	**292 286**	265 568
Total assets	**851 284**	1 179 292
Reserves and liabilities		
Reserves		
Accumulated funds	787 480	1 102 984
Current liabilities	63 804	76 308
Trade and other payables	31 000	43 504
Education fund	32 804	32 804
Total accumulated surplus and liabilities	**851 284**	1 179 292

Statement of Comprehensive Income

for the year ended 28 February 2017

	2017 R	2016 R
Revenue		
Membership fees	**1 067 159**	1 175 574
Interest received	**28 204**	38 088
Conference fees and sponsorships	**311 718**	615 276
Education programme	**0**	5 651
Total Income	**1 407 081**	1 834 589
Expenses	**1 722 585**	1 788 326
Annual report	**9 058**	11 422
Auditors remuneration	**31 000**	27 500
Bad Debts	**200 404**	50 000
Bank charges	**8 888**	8 582
Conference and Working Group expenses	**87 482**	278 589
Marketing	**1 450**	22 000
Printing and stationery	**4 914**	5 176
Secretariat fees	**1 163 000**	1 163 000
Secretarial Services	**0**	4 500
Subscription fees – IERE	**103 592**	70 474
Travel - international	**24 424**	50 726
Travel - local	**16 300**	15 269
Website and communication costs	**11 961**	11 638
Venue costs	**60 112**	69 450
Net (Deficit)/Surplus	**(315 504)**	46 263
Taxation	**0**	0
Net (Deficit)/Surplus for the year	**(315 504)**	46 263
Retained income at the beginning of the year	**1 102 984**	1 056 721
Retained income at the end of the year	**787 480**	1 102 984

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