AFRICAN POWER & ENERGY ELITES

2023



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Nicolette Pombo-van Zyl, Editor-in-Chief

WHEN ELECTRICITY AND WATER MIX, YOU CAN CREATE A SPARK

As I write, one of the dominant power and energy topics for 2023 is the continuing global energy crisis, which saw natural gas and oil prices reach record highs. It's a multifaceted emergency that requires innovative financing, policy reform, and keen attention to the interconnectedness of power, water, food and transportation.

The crisis presents an opportunity to reform markets. With global policymakers and stakeholders making a concerted effort to implement the needed changes and solutions, the result will hopefully be reduced carbon emissions and active, sustainable living as circular economy principles become the norm.

However, a warning: if the utility services are unaffordable for the majority, no amount of funding or policy change will alleviate the burgeoning climate crisis. In addressing the multiple challenges, the focus must incorporate redesigning systems while maintaining an affordable, resilient supply that is sustainable for people and the planet.

The transformational shift from fossil-based generation to zero-carbon sources of cleaner energy is already underway in African countries as privately procured distributed energy resources quietly change the lives of far-flung communities. And more importantly, the transition, which in Africa is playing out as first-time energy access through green power, uses innovative solutions suitable to each geographic environment.

Using local energy resources and considering communities' expectations and needs makes for some interesting uses of technology, but more importantly, longevity for the project. This approach also helps mitigate risk – gaining community buy-in can solve problems you may not foresee and be hands on deck to keep the lights on when the original developer is no longer around.

While the proliferation of off-grid projects is helping rural communities gain energy access, it is emboldening to see the issue of poor power connections in peri-urban areas get the attention it deserves. The struggle for grid access is real, not just for the village at the end of the power line, but sometimes the underserved, rapidly urbanised city community too.

Too often, negative stories about a lack of electricity overshadow Africa's embracing of smart technologies in the most unexpected ways. An added benefit of this transition will be jobs related to installing and maintaining the newly commissioned systems and plants.

The eventual productive use of energy, water and transportation will be even more beneficial, which is where the real success lies. With affordable access to utilities (whether traditional or aspiring tech) come much-needed economic activities. However, think of more than just the monetary value in GDP terms; think of better sanitation, health services, children's education and nutrition, access to the Internet and opportunities for aspiring young adults.

This level of progress is evident in this edition of the African Power & Energy Elites through the diversity of the technologies and solutions profiled, which are gradually edging toward the interconnectedness I spoke of earlier. It is exciting to see the inclusion of transportation and water-energy nexus projects that invariably speak to sustainable growth.

My appreciation goes out to everyone involved in the production of the Elites, and special thanks to our partners: Conlog, Power Africa, Engie Energy Access, GoodWe, Ntiyiso Consulting and Prime Alliance.

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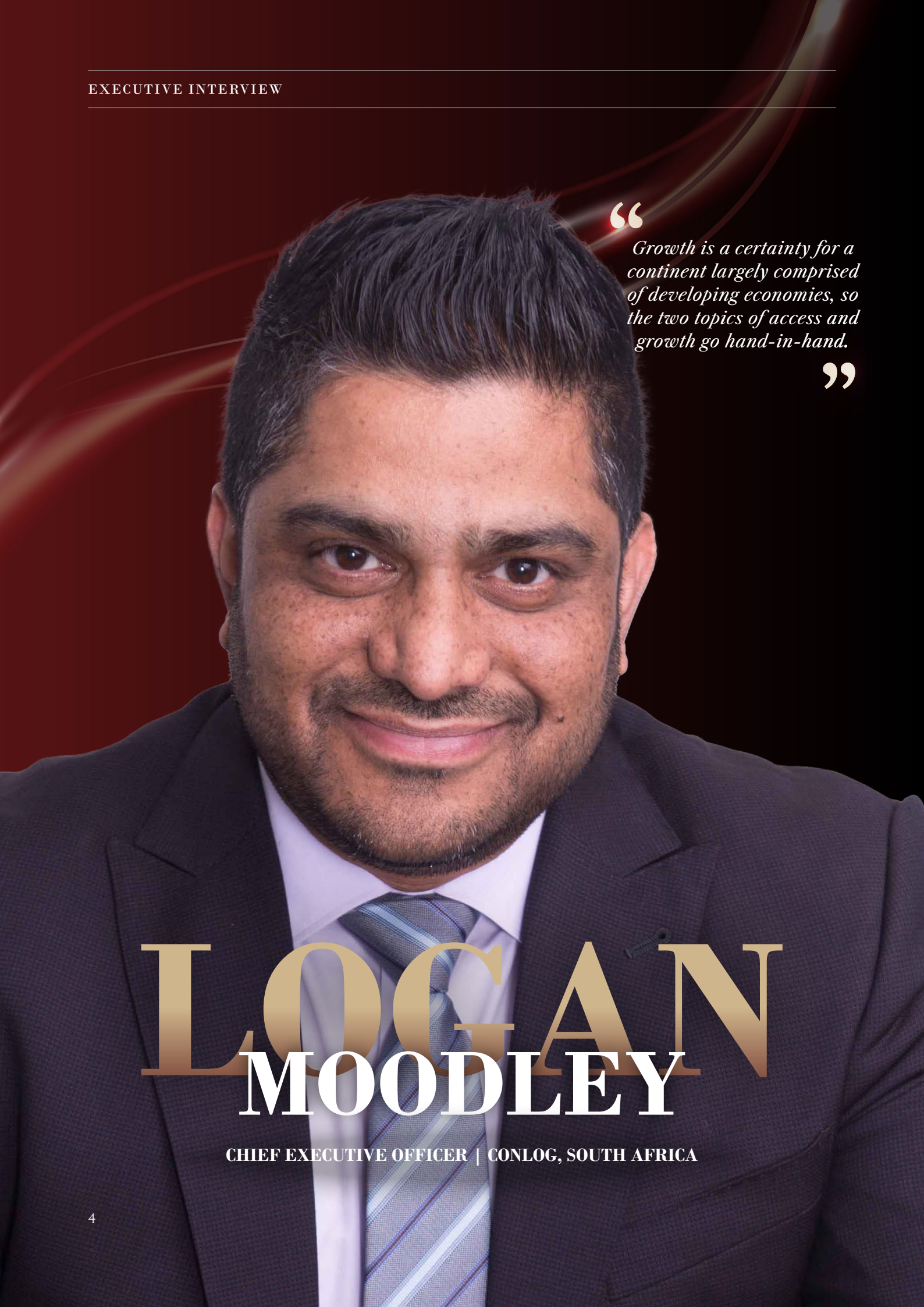
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> *Growth is a certainty for a continent largely comprised of developing economies, so the two topics of access and growth go hand-in-hand.*

LOGAN MOODLEY

CHIEF EXECUTIVE OFFICER | CONLOG, SOUTH AFRICA

Logan Moodley has over two decades of experience in the electricity and smart prepayment metering market. As the CEO of Conlog, his focus is to support the executive and technical leadership teams to deliver innovation in the smart meter arena across Africa.

Solving the problem of energy access requires more than the traditional business approach, states Moodley, who is more passionate today than ever about Access to Energy for Africa's people. "Public-private sector partnerships are essential for delivering success to this important initiative."

Elevating his efforts for forging public/private sector collaboration took place when he was invited to join the Joint Ministerial Advisory Council for Industry Trade and Investment supporting bilateral trade between South Africa and Nigeria. "I strongly believe that this platform is vital in creating a singular focus of how we solve Access to Energy problems on the continent."

In his opinion, the most significant challenge facing the energy sector in Africa remains policy and project certainty. Therefore, working collaboratively to create sustainable programmes is vital. "Collaboration raises investor confidence and private sector participation to address the concerns over energy poverty on the continent," states the executive.

Showing his passion for delivering progress, he emphasises that Access to Energy must become a fundamental right, not a privilege. "Access to energy is widely recognised as a catalyst for growth. Growth is a certainty for a continent largely comprised of developing economies, so the two topics of access and growth go hand-in-hand."

He shares his stance toward innovation and technology, stating his personal productivity strategy is simple: "Fearless adoption of technology to free up as much time as possible that allows me to focus on the big picture challenges for the business."

Referring to himself as a 'techie', he enjoys learning about new tools, apps and devices. This curiosity helps him navigate the growing selection of technology at our disposal. "The choice of one over the other is simple, 'how does it help me?'" Meanwhile, honing his dishwasher packing skills at home has earned him a "tremendous amount of social credit" with his family.

Noting that energy access is transformative, Moodley is proud of how the company's work enriches the lives of others, "this motivates me and everybody in our business, so much so that it underpins our Purpose Statement today."

If an opportunity arose to speak at a global event, his presentation would be titled: *We are not 3rd World; we are forging a new World.* "The people of Africa are resilient, bold, innovative, and our efforts support a new outlook for the global economy and the shape it takes in the coming years; this should be our story, that of our future, not our past."

Asked what quote inspires him, true to his techie profile, Moodley references an earlier Apple Computer advertisement from 1997, which ends with what he thought was a punchy phrase – 'The people who are crazy enough to think they can change the world, are the ones who do'.

"How remarkably simple, yet tremendously inspirational and profound. In a world riddled with challenges, shouldn't we all be bold enough to think that something we'd do to respond to these challenges could, in fact, change the world for the better?"

Meanwhile, if a neighbour asked for advice on setting up a backup power system, Moodley would caution them to only do it after carefully researching their household's exact needs. He says the options available are numerous and rapidly growing, so it's easy to become overwhelmed with the technology options available out there.

Adding to his advice, he says: "Rather, focus on your requirements and structure a plan with a trusted service provider. But whether I could help with the installation of the system would depend on whether my skills to pack the dishwasher would be called on."

INTEGRATED DIGI

Conlog proudly presents the **iDM range**, our feature rich IoT Smart Meter for the modern utility. An integrated cellular modem provides reliable remote connectivity, while a short range radio modem connects to in-home user interfaces and load management devices. The ability of the meter to operate in prepayment or post-payment modes, combined with remote software updates, provides a flexible and future-proof investment.

The APEX range has been designed to meet the needs of Smart Cities, utilising design principles and the highest quality materials already associated with Conlog, ensuring that the range shall exceed the demands of any utility.

KEY FEATURES

Full Smart Meter with integrated Cellular WAN connectivity

Radio Frequency (OMS compliant) LAN connectivity

DLMS/COSEM and IDIS compliant

Pre-paid and post-paid mode

Advanced tamper detection and protection features

Remote firmware updates

APPLICATIONS

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Renewable & SSEG Measurement

Revenue Protection



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TAL METERING

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Single Phase 100A full smart split meter with integrated cellular modem.

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iDM CIU

Multi-utility wireless user inerface with NFC





"Innovation and investment propelling battery energy storage systems are critical for the energy transition."

DAVID THOMPSON

ACTING COORDINATOR | POWER AFRICA, SOUTH AFRICA

Career foreign service officer David Thompson spent four years as USAID Deputy Mission Director in Tanzania, before relocating to South Africa. Prior to USAID and Power Africa, he worked on housing initiatives, infrastructure reconstruction, and a Peace Corp stint in Tunisia.

Power Africa was launched as a US Presidential Initiative ten years ago to catalyse investment and partnership to accelerate energy access in the face of tremendous need. The approach is to link public and private sector goals and resources, connecting investors and entrepreneurs to opportunities that drive technology, policy, financial and social solutions.

So far, they have initiated 85 power projects, connecting first-time electricity to more than 165 million people across 40 countries as they mobilised $23.5bn in energy infrastructure investment. “But we know the need and unmet potential remain immense, so we’re pushing forward more intently than ever with three main strategic objectives as our guide: ending energy poverty, accelerating a carbon-free future, and bolstering Africa and US private sector innovation.”

While Power Africa partners with many US state departments and foreign governments, several joint endeavours are underway with organisations such as the AfDB and Africa50. “But our bread and butter continues to be official partnerships with private sector firms. One of Power Africa’s greatest contributions is our ability to connect businesses with the decision-makers, development partners, and investors needed to end energy poverty; our recently launched US - Africa Clean Tech Energy Network being the latest example.”

He thinks the biggest challenge facing Africa’s energy sector is the lack of a shovel-ready pipeline of large-scale clean energy projects. “There is insufficient capacity and expertise to prepare a sufficient number of projects that are attractive to the private sector in sub-Saharan Africa where regulatory and political risks are heightened, and transaction lead times are long.”

Two examples of their progress in growing the pipeline are their project preparation agency, the US Trade and Development Agency (USTDA), which has funded more than 50 activities under the 2021 Global Partnership for Climate-Smart Infrastructure designed to help unlock more than $65 billion in climate finance in developing and middle-income countries.

Then, in 2022, USTDA approved funding for the Africa GreenCo BESS feasibility study in Zambia to support a project in Sesheke District, Zambia, and other potential sites. However, a problem he sees is the need to de-risk the marginally bankable transition projects to attract private capital in the near term. Also, actors in the financial ecosystem need to take a more coordinated approach to achieve scale.

A new trend grabbing his attention is the blurring of what is considered on- and off-grid. “I think the innovation and investment propelling BESS is critical for the energy transition.” Building reliable and affordable energy storage at scale is vital to transitioning from fossil fuels to clean energy. Globally, storage assets are increasingly being deployed and valued for their diverse benefits (value stacks).

“Network-based storage solutions are already relieving system congestion and offering alternatives to big-ticket grid upgrades. This same equipment, deployed in other applications, controls the variability of higher renewable penetration and shifts the base load levels of renewable generation for four hours and increasingly more.”

If called upon to deliver a keynote address about Africa’s energy sector, he would go with *Our World’s Better Tomorrow Relies on Africa as a Vital Contributor, not as a Beneficiary.* “I’m not sure this title says anything an attendee of Enlit Arica or reader of *ESI Africa* wouldn’t already know, but it goes to a mindset that needs to take better hold across the development and business communities outside Africa.”

“Powering and empowering the potential of sub-Saharan Africa, in particular, will have an outsized effect on the next generations of people and technology worldwide. Simply managing or viewing Africa as a place that offers global resources while posing worldwide threats won’t cut it.”



CONLOG

www.conlog.com

EXPECT INNOVATION FROM SMART METERING TECHNOLOGY

The water and electricity metering market are an essential element to Africa's development, and while value over cost is a consideration, the element of functionality adapted to local conditions requires careful consideration for a fit-for-purpose metering solution.

With service delivery being the main objective for utilities and municipalities, investing in the correct tools to accomplish the task is essential. Thus, selecting the best fit-for-purpose metering solution will ultimately grow revenue and improve service delivery.

Furthermore, the provision of water is a basic human right, while the provision of electricity is vital to enable a comfortable standard of living. The provision of both services requires a significant investment from the utility, typically billions of dollars. Electricity and water meters, therefore, become the 'cash register' of the utility, enabling return on investment.

At Conlog, the company's commitment to the domestic economy, coupled with African innovation, has enabled it to build and maintain a successful business to support utilities to achieve its purpose and development a stable 'cash register'.

While metering, whether post or prepaid, has long been a gateway to revenue collection and management for utilities, anything that can impact the accuracy of a meter, or a subsequent bill will compromise revenue collection and protection in one way or another. Compromising the 'cash register' of utilities includes errors in billing, inaccurate meter readings or outright tampering and theft.

It is vital to therefore ensure that the meter is as accurate, robust and reliable as possible; that it remains 100% functional; that vending is facilitated seamlessly; and that revenue management and protection operate in tandem, advises Conlog.

FINDING THE METERING SOLUTIONS THAT FIT YOUR UTILITY'S NEEDS

It is critical that utilities select a fit-for-purpose metering solution based on current and perceivable future requirements. Unfortunately, in many cases, the metering solution implemented is based on an excessive feature set promoted by service providers and not on

the ability to provide the required functionality reliably.

It is also critical that the products or service provider selected have a proven history of providing products that perform reliably in the environment in which they will be deployed. Unfortunately, in working with the utilities, Conlog often sees feature-rich products from Asia and Europe that are unable to perform reliably in African conditions.

These feature-rich products are the result of market shifts from basic prepaid meters to smart meters. While the shift is clearly evident and necessary, it is the implementation of suitable solutions in local markets that falls short. Conlog advises that correctly implemented smart meters enable dynamic demand management and remote tamper detection – two features that are critical in managing the available grid capacity and reducing non-technical losses.

Apart from the benefits to utilities, research has found that the implementation of smart metering devices, whether for the consumption of water or electricity, can promote consumer energy savings of 15-26% overall. One of the reasons is that smart meters illustrate the immediate consequence of one's consumption.

CONLOG AT THE FOREFRONT OF TECHNOLOGY CHANGES PUSHING METERING INNOVATIONS

Maintaining an acceptable level of meter connectivity has always been a challenge, considering the varying population densities and existing grid conditions. PLC technologies require a 'low noise' grid, whereas RF technologies require a well-regulated spectrum – both of which are difficult to achieve in developing economies.

Fortunately, connectivity is a technology segment that has seen significant growth across Africa, which is clearly evident in the speed and reach of internet access.

Within cellular communication technology, there have been several innovations in recent years. For example, Conlog is most excited about NB-IoT and LTE-M, two technologies which have been developed and rolled out precisely to enable machine-to-machine communications, which includes smart electricity and water meters.

As such, Conlog has adopted these technologies in their new line of products, which will enable simultaneous connectivity to tens of thousands of meters – perfect for large-scale demand response applications.

In another trend pushing market innovation, distributed energy resources (dominated by small-scale solar PV) and micro-grids have driven a change in specification of smart meters. Regarding this change, utilities are now challenged in replacing older generation electricity meters, that support the measurement of import energy only, with smart versions which can register bi-directional energy flow.

Meanwhile, water metering has its own set of challenges. Previous generations of mechanical water meters worked well if the quality of water was good, and the supply remained uninterrupted. Unfortunately, these conditions do not exist in most developing countries. To combat the issues, Conlog is promoting the adoption of water meters utilising static measurement technologies.

This type of technology is unaffected by water quality and can differentiate between the flow of air or water and remain accurate throughout its lifetime. Conlog has combined this water meter technology with a highly resilient electronic valve, which becomes the building block of a utility's water demand management programme.

MORE THAN A METERING COMPANY

Conlog offers holistic solutions to utilities to improve efficiencies in energy management through their quality products and services. All their products meet and exceed the highest international standards, such as the International Electrotechnical Commission (IEC), and the Standard Transfer Specification (STS).

The company is established as a global leader in metering solutions for utilities, municipalities and property management companies, with a footprint spanning South Africa, South America, the Middle East and Africa at large, having sold to over 90 utilities that are benefiting from the company's offering. Conlog has also installed over 10 million smart meters in households around the world, making them the largest installed base.

The company's smart meters aid its customers in utility management, revenue protection, load management and demand management with a solid focus on big data analytics and smart city solutions. Their engineering standards approach to manufacturing offers opportunities to elevate the quality of smart metering in South Africa, leading to economic growth and job creation



www.engie-energyaccess.com

CARBON CREDITS: EXPANDING AFRICA'S OFF-GRID SECTOR

As a key player in the off-grid renewable energy sector, ENGIE Energy Access leads the way in applying the efficiency of digital tools to create alternative financing for achieving a sustainable economy.

Access to clean energy in Africa remains a principal problem. Given that 80% of people living without access to energy live in Africa, there is an urgent need to find alternative means to speed up the accessibility to renewable energy. At the 2022 UN Climate Conference (COP27), climate financing was identified as a vital alternative option with the unveiling of the African Carbon Markets Initiative.

The initiative seeks to open more access to clean and renewable energy on the continent, helping to achieve sustainable economic growth. In addition, it will encourage the creation of voluntary carbon markets across Africa, clarify government responsibilities, set out market incentives and establish a clear regulation of the climate financing sector.

This timely initiative responds to an emergency situation. Owing to the COVID-19 crisis and demographic evolution, the number of people living without access to electricity is now increasing. Even more alarming is that this increase will continue to the end of this decade if the sector does not receive additional funding. As such, the World Energy Outlook estimates that an additional 26 billion dollars per year are required to meet SDG 7.

ENGIE Energy Access's decision to adopt carbon credits stems from the problem of financial viability it faces as it provides last-mile solutions through a PAYGO (pay-as-you-go) model.

Gillian-Alexandre Huart, CEO of ENGIE Energy Access, states that "achieving the UN Sustainable Development Goal 7 of universal access to energy by 2030 is largely falling behind" because of technical, regulatory and financial issues. With financial issues atop these hurdles, unlocking carbon markets and the need to amplify the intensity for more alternative answers has become significantly major. "Our ambition is to contribute as a leader in the sector to catch up, while exploiting the $2 billion Voluntary Carbon Market (VCM) to its full potential. Thanks to increasing traditional and, in this specific case, alternative funding,

means we will meet our target to impact 20 million people by 2025."

With CarbonClear, a data-driven and innovative carbon offset certification company, ENGIE Energy Access will further raise funds for energy provision by issuing and selling carbon credits. Under the terms of the partnership agreement, CarbonClear will be using its innovative and fully digital offsets model to certify the carbon offset generated from the solar kits distributed by ENGIE Energy Access to rural and off-grid communities living in sub-Saharan Africa.

ENGIE Global Energy Management & Sales (GEMS) – the energy management and sales division of the ENGIE Group will assist ENGIE Energy Access in selling these credits to climate-conscious organisations wanting to offset their greenhouse gas emissions with projects that have a high social and environmental impact. The partnership targets to issue 500,000t CO2e of offsets

Through an IT integration between CarbonClear and MySolGo, the last-mile distribution software used by ENGIE Energy Access to monitor its PAYGO operations, Micro Carbon Avoidances (MCAs) are created, which are made available to corporate buyers wishing to compensate for their CO2 footprint. The carbon calculations applied are based on the established UN Clean Development Mechanism (CDM) methodology and are third-party verified by DNV.

This new partnership will further tackle major financing handicaps and accelerate the growth of ENGIE's off-grid operations in sub-Saharan Africa. The goal is to not only create leeway for adequate financing but also drive the reduction of greenhouse gas emissions in Africa.

ENGIE Energy Access's goal to reduce carbon waste in Africa and increase the adoption of clean energy solutions involves providing access to and productive usage of mini-grids and portable solar home systems (SHS) and clean cooking at an affordable rate. The sale of carbon credits is pivotal for mobilising the needed capital to scale. The play here is that as the company benefits from increased sales, they also empower customers financially to reduce their default rate and meet their repayment rate.

Steven Fleurus, Head of Finance at ENGIE Energy Access, explains that "carbon credits are an important lever to optimise the affordability of our products and provide Africans living in off-grid settlements or businesses seeking alternative sources of energy better access to ENGIE's solutions, thus supporting the growth of a sustainable economy in various markets."

The company will continue to light the way for the adoption of clean and renewable energy. This path will lead to more partnerships and the implementation of novel initiatives. The precedent set here displays the value of combining digital technology with alternative funding solutions, such as the sale of carbon credits. It unintentionally connects to the African story of "ubuntu", which, for contextual reasons, can be interpreted as the need for collaboration between African leaders, climate sector players and industry leaders in forming more productive and innovative solutions to accelerate the growth of Africa's off-grid economy.



NTIYISO CONSULTING GROUP

www.ntiyisoconsulting.co.za

TIME RIPE TO RETHINK WAYS COUNCILS GENERATE REVENUE

For any council or municipality to function optimally, it needs residents and businesses to consistently pay for services, writes Miyelani Holeni, Group Chief Advisor at Ntiyiso Consulting Group, whose mission is to empower institutions that enable Africa's development.

If residents do not pay for services, municipalities will definitely not be able to provide the services that their residents require. Those of us who survived the deadly COVID-19 pandemic that stole two years of our existence, livelihoods, savings and loved ones are still trying to regain our bearings and the respective trajectories we were on before the onslaught.

And while the world is gradually opening up, loadshedding and water-shedding have entered the fray in South Africa, causing untold damage to all businesses and households, while municipalities have not been spared.

As it stands, infrastructure disrepair, backlogs and under-investment have prevented optimal revenue generation. Daily, we are witnessing how ever-rising interest rates, inflation, and job losses severely batter the economy. All these elements have led to the rising cost of living, which has resulted in many citizens finding themselves in a position where they cannot afford basic expenses, including paying municipal service bills.

For local government stakeholders, the time is ripe to relook at how income is generated from the communities that are under severe financial strain and how this revenue is appropriated wisely to provide all involved with the greatest cushion against these challenges.

Municipalities have to rethink how they price their services, how they measure residents' usage, how they bill and collect against those services, and lastly, how to exercise effective credit control and debt recovery methods. Municipalities need to go back to the principles of revenue management and the value chain thereof with an understanding that a revenue division represents the business side of local government.

The revenue value chain is about achieving four goals that include predictability through management, completeness of revenue (through billing and collecting every rand), protection of revenue following defined processes and growth.

Perhaps the time to start thinking about how to integrate this value chain – not just as a concept but in reality – has arrived. Planning and designing a dwelling is the first step in defining a revenue generation plan. Municipalities have to master each one of the revenue value chain components in order to achieve the set targets or thresholds.

For any municipality to function optimally, its residents must pay consistently for the services they receive. On revenue collection, the municipalities must consider several factors, including an assessment of the Customer Relationship Management Policy. This policy is the municipality's strategic position on how it intends to develop better customer relations and automate customer interaction to achieve better turnaround times.

Municipalities must realise cash flows from billing customers accurately by implementing billing integrity and quality assurance processes. This is evaluated by, among others, ensuring that all revenue line items and all customers are billed every rand of consumption every month without fail.

Furthermore, municipalities should also be able to efficiently generate income from a diverse pool of available and innovative revenue sources to improve the revenue base. The process has to use revenue data science techniques to analyse complex volumes of municipal data to identify revenue leakages and discover opportunities to increase revenue from existing and, importantly, new sources.

In the context of revenue, data science is about utilising data analytics across all the revenue collection and management phases to create dashboards that will indicate how and when revenue is generated. Revenue management and increase require a scientific, entrepreneurial discipline to design, test and grow new revenue lines.

In addition, municipalities have to employ more skilled revenue professionals who are innovative and can apply a systems-thinking approach to revenue generation, conversion and sustaining revenue. Likewise, municipalities should have automation of systems to drive efficiency and have an end in mind.

They have to set targets and adhere to those established targets so that money constantly flows into the municipal coffers.

Lastly, officials within the municipalities are required to practice the highest levels of discipline when it comes to governance to safeguard the expenditure of revenue, including the grants under their care to meet the service delivery mandates and to develop infrastructure that will support the growth of the local economy. In addition, municipalities must implement the "science" of revenue management to achieve completeness of revenue and eliminate revenue leakages in the value chain. Using these strategies is how they will become sustainable.





AFRICAN POWER & ENERGY ELITES

LEADERSHIP

“Africa needs to connect more. The AfCFTA should exist as something other than a document. When we accomplish this, we can fulfil our visions and dreams.”



ADEBOLA ANOFI

CEO & LEAD CONSULTANT | WHITE CONSULT TECHNOLOGY, NIGERIA

A registered electrical and electronics engineer with a track record in the power and ICT sectors, Adebola Anofi is a keen public speaker and advocate for persons living with physical disabilities in Africa.

The lead consultant for White Consult Technology and facilitator for White Consult Training Institute, Anofi focuses on reducing the carbon footprint created by burning fossil fuels and improving lives by providing renewable energy for uninterrupted power supply.

Through his company, he has provided solar power to close on 5,000 homes after eight years of operation. In addition, the organisation has installed high-powered solar streetlights on major roads which had been crime hotspots. Keen on empowerment, Anofi has upskilled about 50 people through his solar installation training institute, increasing their chances of finding employment.

He also led and supervised a team of technicians on re-activating the 12kW solar inverter power generation at the Office of the State Surveyor-General in Lagos State, Nigeria.

For Anofi, the lack of funding, poor industrialisation, an unfavourable foreign exchange system and the absence of well-equipped technical institutions are just some of the problems bedevilling Africa's power and energy sector. But, he believes achieving adequate funding, complete metering of facilities and a re-orientation of the entire energy sector's philosophy around what they do, is the way to rise above the continent's issues.

He is excited about the recently signed constitutional amendment allowing Nigeria's 36 states to generate, transmit and distribute electricity in regions already covered by the national grid. He regards innovations in smart metering, along with increased use of automation and control, as the technologies that will allow Nigerians to take full advantage of this latest legal change.

If Anofi were ever called up to deliver a lecture addressing the state of Africa's energy sector, he would concentrate on trying to answer why the people of Africa have no interest in the vast resource potential of the continent. "Africa is blessed with large pools of natural resources, but Africans do not have an interest in it till the Western world defines it." For Anofi, the answer lies in implementing the African Continental Free Trade Area (AfCFTA), "Africa needs to connect more. The AfCFTA should exist as something other than a document. When we accomplish this, we can fulfil our visions and dreams."

He is greatly motivated by the feedback from clients and partners and the positive employment rate experienced by graduates from his training institute. However, his reasons for working in the energy sector are much more profound.

After graduating from Lagos State University, Anofi lived in a community where people operated diesel generators every night in 2009. "There were cases of people choking to death on exhaust fumes, explosions from fuel slips, theft of generators and inexplicable illnesses caused by the carbonised environment," he said, describing the living conditions.

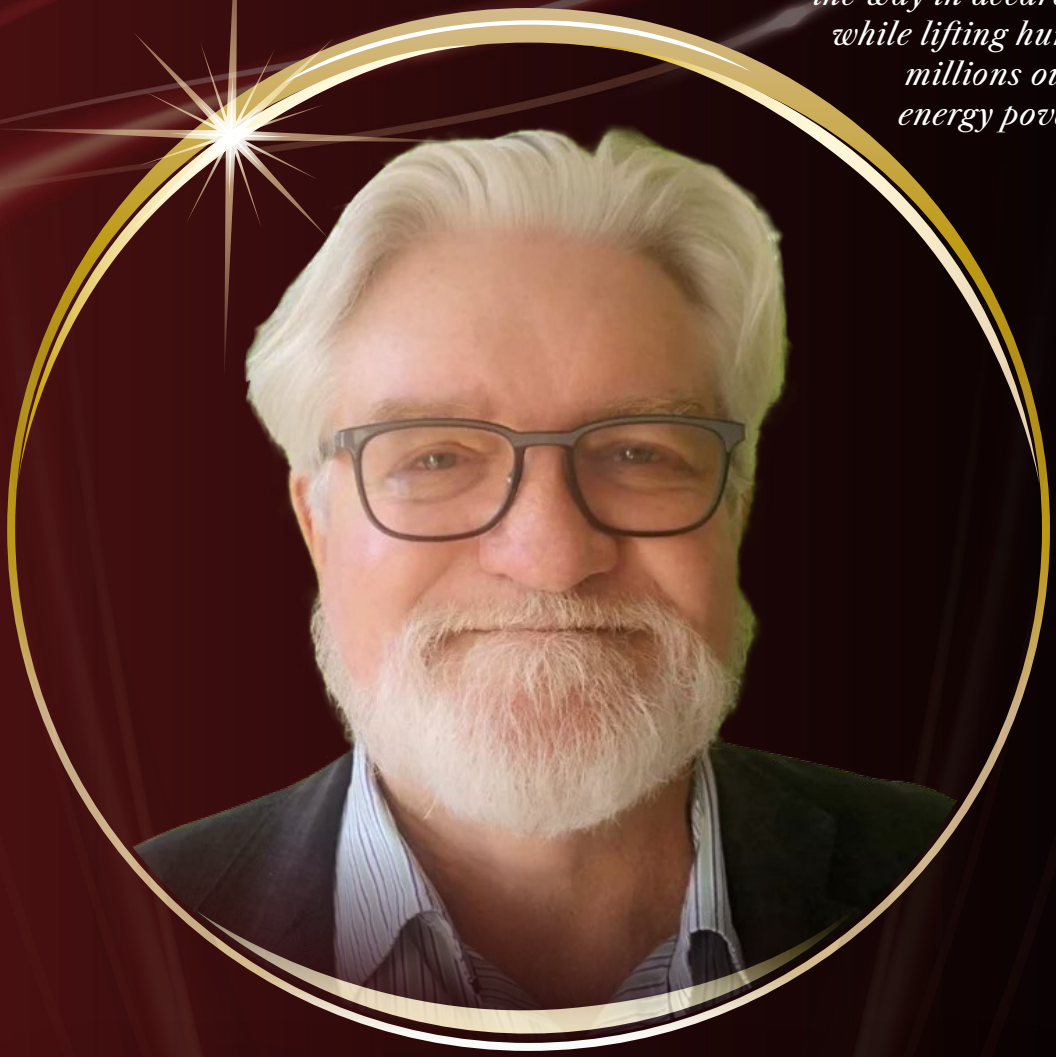
"I was really disturbed by this and tried to create electricity using a car battery. The success led to my career shift to working in renewable energy."

He is literally the person the neighbourhood will turn to if they want to get a new, greener backup plan: "As a consultant, I advise and orientate people daily on the benefits and reasons to move from fossil fuels to renewables, and even assist in setting them up or recommending solutions about what they should buy."

If he were energy minister, his first action would be to ban diesel generators outright. "It will increase the possibility of the main power supply functioning as it ought. It would also help shift the focus to a more sustainable, clean and safer power source."

His favourite motivational quote comes from Nigerian President-Elect Bola Tinubu (who will assume office in May 2023): "A screwdriver is a tool worthy of creating fortune in the hands with knowledge."

“Despite being a fraction of the cause, Africa can lead the way in decarbonisation while lifting hundreds of millions out of energy poverty.”



CLYDE MALLINSON

CO-FOUNDER | ENERGY MATHEMATICS, SOUTH AFRICA

Clyde Mallinson is the co-founder of Energy Mathematics. With 17 years of experience in clean energy and earth resources under his belt, he is driven by Earth's future and the economic transformation that disruptive energy brings.

Mallinson believes that the biggest challenge facing Africa's energy sector is a need for more appreciation for the speed of the disruption underway in the global electricity-supply industry. Knowing this, Mallinson suggests that the most impactful solution may be to implement a policy that facilitates the democratisation of energy ownership in parallel with the installation of distributed generation technologies, "literally empowering people while powering the country," he adds.

The rapid installation of citizen-owned, large-scale, storage-backed, wind and solar projects would showcase the potential. Mallinson believes this would also serve to educate the incumbent policy and decision makers who appear to be stuck in "last-century energy thinking".

As such, if invited to speak at an international event, his keynote address's title would be *Unlocking sustainable energy potential in Africa: Riding the disruption wave unencumbered by legacy infrastructure.* The focus of this speech would be that many countries cannot move towards the "new energy future" as quickly as needed due partly to insufficient natural, sustainable energy resources.

He explains that many countries have much greater inter-season variations in supply and demand. In addition, they have already invested trillions of dollars in last-century technologies, many of which are at risk of becoming obsolete stranded assets.

Mallinson's everyday work revolves around systems thinking in the energy sector to create a critical understanding of the entire energy system - from electricity generation to the electrification of everything. It is quite fitting that his children refer to him as "the estimator" due to his dedication to modelling energy systems and scenarios.

"At the same time, the 'system' also encompasses socioeconomic and sociopolitical fields. Properly understanding the health and climate costs of meeting our energy needs in a business-as-usual fashion is essential. All too often, these costs are ignored, or treated as externality costs for economists to ponder, rather than measured in units of human suffering."

In his work, he remains motivated by the possibilities presented by facts and science that show "it is possible to increase the electricity output of Africa at least twentyfold". Based on these same facts, he maintains that, despite being a fraction of the cause, Africa can lead the way in decarbonisation while lifting hundreds of millions out of energy poverty and significantly reducing health problems caused by poor air quality.

Mallinson's appreciation for the value of energy access in people's everyday lives has led to growing awareness and uneasiness, which he says has been brought into sharp focus by recent encounters.

One such encounter was meeting with community activists from informal settlements besieged by the pollution plumes of Mpumalanga's coal-fired power stations while they live in energy poverty. "My lasting memory is how they cannot get jobs in the nearby coal mines or the coal-fired power stations because they fail the medical examinations due to respiratory ailments."

He also appreciates the book *Zen and the Art of Motorcycle Maintenance* by Robert M. Pirsig, as it speaks to high-quality engagement to seek and find value. He especially appreciates that the book encourages nonconformist thinking and challenges the status quo. "In the context of South Africa, the book can be modernised to 'Zen and the Art of Power Station Maintenance'," he jokes.

If he were to be declared his country's energy minister, his first decree would be that, within the next decade, the energy transition should be rapidly unfolding to ensure the democratisation of the energy system. He says this could transform the economic situation of millions of people previously excluded from asset ownership. He imagines an Africa where its people own the means of electricity production, and the continent leads the world in a just transition embodied by just transformation.

“Companies have the means and ability to get it done quickly while maintaining a strong business case ... many small installations quickly add up.”



DUNCAN PALMER

CHIEF EXECUTIVE OFFICER | STI NORLAND SOUTH AFRICA, SOUTH AFRICA

Duncan Palmer has had a renewable energy-focused career dating back over a decade, with more than 10 years on solar specifically. As CEO of STI Norland South Africa, Palmer aims to drive continuous improvement in the energy industry to provide solutions with long-term returns.

As the renewable energy market takes off, Palmer says he knows he is in the right industry as "energy is genuinely something to get excited about". Palmer anticipates that "massive growth is yet to come" and looks forward to being a part of implementing changes.

As a South African, Palmer has firsthand experience of an energy deficit's impacts and believes that solar power can ease the burden of energy insecurity, so much so that his Golden Retriever is named Solar. "Living in South Africa, loadshedding is a constant reminder as it negatively impacts daily life and is currently the most significant factor preventing economic growth," Palmer commented. "Every watt of solar power installed helps ease the burden on 60.9 million people."

Despite his desire that solar has its day in the sun, Palmer acknowledges there is still a need for coal and nuclear in South Africa's energy mix. However, he considers that a harmonised ecosystem needs to be created between diverse energy sources to transition to friendlier generation capacity and address climate change.

As a big proponent of energy efficiency, Palmer advocates, first and foremost, for forming good energy habits and implementing effective energy systems. This strategy aligns with his favourite inspirational quote: "The small changes can have a massive impact" from Malcolm Gladwell's The Tipping Point. On this premise, Palmer stated that if he were to deliver a keynote address at an international event, he would title it: *Africa, beyond the crossroads.* Given its current energy availability, he said this keynote presentation would focus on identifying Africa's potential opportunities to ensure future energy security.

As someone who believes that his skillset lies in finance, specifically in corporate and tax structures, Palmer also considers that financial strategies can provide faster solutions to Africa's energy sector challenges. He proposes zero-rated renewable equipment, including modules, inverters and batteries for small-end users. Just as South Africa previously considered zero-rating all solar PV modules, he suggests that VAT be fully refundable upon proven claim and that a percentage of PV system costs be deemed a tax deduction against personal income. Removing this expense would encourage investment in renewables.

Though Palmer acknowledges that "quick and Africa are not normally associated with each other, and there is, unfortunately, no easy solution" to address Africa's energy challenges, he does believe that education at a government level would be highly beneficial. Palmer suggests that additional education in technology, best practice, external funding avenues and policy development at a government level could create more effective guidance. "The guidance and, most importantly, the desire must come from governments during the early phases until there is systemic momentum," he said.

If Palmer were to take the role of energy minister himself, he would promote an attractive time-of-use-based feed-in tariff to purchase electricity from the private sector for a fixed time frame. "This can be aligned with a time-of-use net metering policy for each customer willing to contribute," Palmer notes. "Companies have the means and ability to get it done quickly while maintaining a strong business case. Yes, it's not without its challenges, but many small installations quickly add up, even when only considering residential systems."

According to Palmer, allowing and supporting embedded generation and promoting wheeling, at a fee, through state infrastructure can have a significant positive impact on the entire energy sector. He noted that people and businesses are keen and entrepreneurial, but policymakers need to create an environment where they can flourish. In the long-term, Palmer expressed that his blue-sky vision for Africa's power and energy system would be to achieve decentralised energy generation on a community-level scale. This vision will include centralised power facilities for communities' housing amenities such as refrigerators, cooking spaces, TV theatres, power points, internet hotspots, and swappable batteries for power at home.

"What drives my stance is the notion that no business is safe, and no career is secured if we are not continually striving for better."



FESSOR MBANGO

MANAGING DIRECTOR OF ENGINEERING | ITEM ENGINEERING, NAMIBIA

Fessor Mbango is a registered engineer with a career spanning over 26 years. He is currently a managing director at ITEM Engineering. He formerly held positions including Chairman of the Africa Utilities Technologies Council (AUTC), Vice Chairman of the Association of Electricity Distribution Undertakings (AEDU) and CEO of Erongo RED, Namibia.

For inspiration, Mbango often looks to Maya Angelou's quote, "You may not control all the events that happen to you, but you can decide not to be reduced by them." These words bring life to his vision of a self-sufficient and interconnected African power sector, with reliable data and statistic sources to push an accelerated shift to affordable and clean energy. He asserts that the lack of data on Africa and the weaknesses in analysing the data in the context of rapid urbanisation, digitisation, demographic transition, and other significant trends have unique implications for the continent.

While putting research and development first, "my focus is on a confluence of existing, new and emerging technologies that span Namibia's infrastructure and services, such as energy, water, transportation, administration, education, and safety, to make the country more intelligent, interconnected and efficient," states the engineer. As a starting point, he advises revisiting renewable energy policies that mandate progressive uptake of infrastructure development. "African countries should amend or develop sustainable policies on the provision of government's support to private and institutional investors in non-financial and financial terms."

Likewise, he enthuses that Africa should create policies that encourage engagement with development banks to increase transparency and reassure citizens and the private sector on the security, viability and potential benefits of energy infrastructure projects. As such, if he were to give a speech on behalf of Africa at a global event, his presentation would emphasise The Missed Frontier, because Africa has the youngest population and a largely untapped market. "Investors are still adding premiums to loans, thus raising tariffs needed for project viability to off-takers. This minimises roll-out and extends the energy deficit/climate change mitigation inertia. So many missed opportunities," he elucidates.

Even so, Mbango remains positive, believing in untapped opportunities and feedback through strategic foresight, by scanning the environment, considering the likelihood, and assessing the potential impact of a myriad of interconnected forces driving change. But stressing: "And doing what's right in a world full of ethical dilemmas and strategic trade-offs."

Describing the moment of positive change, he reveals how rural and informal settlement communities accessing affordable solar energy for lighting and cooking gave him hope by migrating from lighting using fossil fuel to solar lighting, and children studying using solar lighting. "Considering the health and safety risk surrounding using such fuels and candles, this was a relief." He adds that solar technology has brought relief (financial and non-financial) to rural, peri-urban and urban communities alike. "Nowadays, people can communicate and use smart technologies irrespective of where they are and where they are from."

Helping a neighbour choose a back-up power system requires a renewable energy response, states Mbango. However, given progress in battery storage, he would make the installation a primary power source rather than a back-up solution. Considering his years of experience and practising as an engineer, he is in an advantageous position to theorise and execute the plan.

Lastly, he would like to see new baseload power plants developed with enough surplus capacity, using cleaner fossil fuel technology to provide for all in Namibia while expanding and refurbishing ageing electricity networks to address generation shortages and the transfer of surplus power to neighbouring Southern African countries.

He concludes that everyone is part of a hyper-competitive business environment in a world of volatile, disruptive change where good ideas are a new currency. "This means that a leader should be innovative enough to achieve sustained value creation, maintain success and stay relevant into the future. Hence, what drives my stance is the notion that no business is safe, and no career is secured if we are not continually striving for better."

“Solar and battery technology has achieved a price point and sufficient development to be able to bring affordable, quality electricity to all.”



FRANK SPENCER

HEAD OF DEPLOYMENT | BUSHVELD ENERGY, SOUTH AFRICA

Working across the Southern African renewable energy business for more than 20 years has given Frank Spencer an overview of the whole production aspect of the sector, which he is putting to good use, realising the value chain for Bushveld Energy's push into batteries.

As an engineer with a master's degree in inverter technology, qualifying in the late 1990s, Spencer realised early in his career that technical solutions alone would not solve energy problems. That led him to complete a philosophy degree in sustainable development in the late 2000s.

While also a board member of the South African Photovoltaic Industry Association (SAPVIA), Spencer is now very much wrapped up in setting up the entire value chain for vanadium redox flow batteries in South Africa. This is from mining the mineral to manufacturing all the battery components and assembling them, then delivering them to local utility-scale battery projects. "This gets me really excited as we have to solve the interlinked problems in South Africa of poor electricity supply, energy poverty, skills and unemployment."

The first time he felt the effect of what first-time energy access could do for someone was on a trip to a mountain village in Lesotho in the mid-2000s. The village was only accessible by a 4x4 vehicle, which didn't faze the skilled motor mechanic.

"The local pastor had a small solar PV system, just enough to power some lights in his house and the community area and charge cell phones. Before that, there was no electrical lighting in the village, and the only way to communicate would be a six-hour walk to the nearest community with a phone." The village fortunately had line of sight to a cellphone tower across the valley.

"It was transformative to see how a little light and a little comms had brought such benefit to this village that they could now have evening activities, as well as effortlessly talk to the world."

To him, the biggest challenge facing the continent's energy sector is the link between poor political and weak regulatory environments. "Solar and battery technology has achieved a price point and sufficient development to be able to bring affordable, quality electricity to all, but governments are often caught up in antiquated thinking around electricity models of the last century while also allowing themselves to be influenced by the vested interests of the incumbent fossil fuel industries."

In Spencer's view, the focus should be on adopting clean, distributed renewable energy technologies, as this can unlock local economic development and SME development and produce clean, carbon-neutral goods, which the rest of the world is starting to insist on.

Given his thinking that electricity matters are too often excessively regulated by government, Spencer is of the opinion that the private sector should be given more leeway to act as "there is a significant investment that can be unleashed while also developing local skills to build, install and operate renewable energy plants."

He adds that policies should adapt to become more agreeable to the private sector while pushing for local skills development and technology transfer.

Spencer, a keen conference speaker, would tailor a presentation on Africa's energy sector dependent on his audience. For instance, if he were to address an international audience, his topic would be Africa's climate renaissance. "I would unpack how Africa can grow and energise while skipping any need for fossil fuel based on thermal power."

He explains that the international community still needs to realise what a green powerhouse Africa could be. "We have a narrow window to solve our climate problems, and Africa can do this faster than other continents while also significantly growing her economies."

Being keen to share his knowledge, Spencer has helped friends and family with backup installations for the parts he can do legally. "My general recommendation in Cape Town is to get as large a solar PV system as you can fit on your roof, with a sufficiently sized battery to avoid loadshedding." His advice centres on the City of Cape Town's plan to soon buy electricity from residential consumers at an attractive rate. "I don't recommend a backup battery alone because it uses more electricity than it produces. It actually makes loadshedding worse if not coupled with local generation, such as rooftop solar."

"Through solar power installed in my home and office, I can access even more opportunities to provide electricity access to people in Nigeria without light. Solar Electricity is Powerful."



GLORY OGUEGBU

CEO | RENEWABLE ENERGY TECHNOLOGY TRAINING INSTITUTE, NIGERIA

Glory Oguegbu is an award-winning climate and energy entrepreneur and founder of the Renewable Energy Technology Training Institute (RETTI) and RETTI Virtual University for Energy Education. She is a keen coach and mentor to the next generation of African Energy Leaders who will drive a sustainable energy transition.

Oguegbu has no problem recommending installers who have come through her training centre to friends or neighbours. Not only would she prefer to recommend trained engineers if a neighbour decided to install a solar system, but she'd be happy to train said neighbour on energy conservation and efficiency to ensure they got the best out of their systems.

She is an eager advocate for the power of solar. Not only is it a chosen profession, but she feels it can solve many of Africa's challenges, primarily addressing energy access and the transition to a cleaner, stable and more predictable power source.

"Financing for climate-related projects around the world reached an estimated $632 billion in 2019 and 2020, according to the Global Climate Initiative. Only $19 billion came to Africa, including just $2 billion from the private sector."

Oguegbu stresses that Africa can look to its 60% hold of the world's solar capacity for quick gains. "It means that Africa could lead in the space of solar power technology for electricity generation. We can focus on solar power for a more stable electricity."

She states that innovative financing mechanisms, such as green bonds, crowd-funding, and public-private partnerships, can help mobilise the necessary investment to build new energy infrastructure.

The moment Oguegbu truly appreciated what a difference solar energy access could make to someone started innocuously enough. She spoiled her parents with a two-day hotel stay to celebrate her father's 74th birthday, but it was really to get them out of the house to install a solar system.

Sharing her moment of appreciation for energy access, she says: "It was the look on my father's face when he explained the burden that I took off his shoulders. When he explained the stress of buying diesel and repairing the generators, how much they had spent on living without electricity for eight years, he nearly cried with relief."

"That was the moment I realised the huge difference solar power could provide to those living off-grid. That is my own story, not lifted from elsewhere. It happened to me."

While so many living in Nigeria currently don't have access to solar power, she explains that solar has changed her life. Because of that, "I am able to be efficient and effective in my work and access opportunities to provide access to electricity to more people in the world. Solar energy is indeed Powerful!"

She believes implementing feed-in tariffs to promote renewable energy should really be strengthened within African countries, and that government should remove fossil fuel subsidies. However, she understands the need for holistic thinking rather than just honing on one idea if she were the energy minister in Nigeria. The first thing she would insist on would be to upgrade the country's energy infrastructure.

"This will promote the ease of integrating renewable energies into the power mix. The outdated infrastructure includes the national grid, transmission lines, and distribution networks. Upgrading this infrastructure can help increase the energy system's reliability and efficiency, reduce losses, and improve access to electricity."

Her vision for Africa is for a powered continent "with the people willing and able to pay for electricity, instead of stealing it, and getting the service they paid for. In this new Africa, stakeholders would not find corruption in the electricity sector."

But, till that day comes, she'll keep on publishing and sharing articles on energy and climate, watching her fellows from the Climate Leadership Fellowship and Africa Fellowship for Young Energy Leaders electrifying their communities, and taking guitar lessons so she can keep on singing.

“Electrical power is the blood of any economy. By making power accessible, cheap and reliable, countries are able to attract foreign investments and grow economically.”



JAMILA KOMBE

LEAD | USAID-FUNDER POWER AFRICA - EAST AFRICA PROGRAM, ETHIOPIA

Jamila Ally Kombe is an electrical engineer with more than 20 years' experience in power systems planning as well as energy systems engineering. She is a Board Director at the South African Energy Storage Association (SAESA) and Lead of the USAID-funder Power Africa - East Africa Energy Program (EAEP) portfolio.

Jamila Kombe's father would often tell his family about what it was like to grow up in a village with no access to electricity. Then, family trips throughout Africa in the 1980s brought home to her that a lack of energy access was not some homespun fairy tale, but a reality in which many are living.

Experiencing this lack of energy access was the start of Kombe's motivation to improve the lives of others by creating electricity access for those less fortunate that still burns brightly, decades later. She believes powering up Africa is the only way to unlock economic growth and thereby alleviate poverty.

"Making electricity accessible to the entire continent will enable development, create jobs and improve the living conditions of many Africans," say Kombe, who loves nothing better than a good challenge. "It will also lay the foundation for a better future and opportunities for the youth and future generations. Electrical power is the blood of any economy. By making power accessible, cheap and reliable, countries are able to attract foreign investments and grow economically."

She anticipates energy storage is about to play a big role in the African energy sector's future. Her Masters in Engineering was on energy storage, and she currently serves as a director of the South African Energy Storage Association (SAESA).

"Often, when one speaks of energy storage, most people think about batteries. However, there are also other technologies like pumped storage power stations (for example, Drakensberg pumped storage scheme) that have been functioning for over 40 years. The application of energy storage is also critical in resolving network congestion as well as forming part of practical solutions resulting in the deferment of infrastructure investment within utilities at distribution level."

Having worked across East and Southern Africa, Kombe feels one of the biggest challenges facing Africa's power sector development is the financing of major infrastructure assets such as cross-border transmission powerlines interconnecting two different countries. "The advantage of cross border transmission powerlines range from technical and economic, to addressing climate change and energy source diversification initiatives."

"The opportunities available for Public-Private Partnerships (PPP) and other innovative mechanisms to fund some of the cross-border transmission powerlines should be considered amongst alternatives to fund such major infrastructure projects because they can alleviate some of the funding constraints facing the region."

This is why she thinks a functional PPP framework to attract potential funders and investors would be the best kind of policy adjustment any government could make in Africa.

Her vision for Africa is an interconnected continent with energy markets spanning from Southern Africa to the furthest tip of North Africa.

"Africa has hydro, solar, wind, geothermal and gas, to name a few of these energy sources scattered in the various parts of the continent. But what will enable the continent to tap into this abundant and cheap energy is investing in constructing critical transmission interconnectors between countries."

While she is constantly recommending Mark Manson's *The Subtle Art of not giving a F*ck* as a reality check to friends and family, the unacknowledged dog whisperer ("I am sure if I did not become an engineer, I would have been a veterinarian") can't help but get involved if anyone asks about becoming more self-reliant through a backup power system.

Not only would she recommend a reliable supplier, but she would make sure they follow through by driving them to the shop and establish they are fully conversant with the product before setting them loose to install it. Though, just to be doubly sure, she would be sure to point out where the power plug was before settling back into her own kitchen to whip up a celebratory snack.

“Quick gains can be made by increasing investment in renewables, strengthening energy infrastructure, and deploying mini-grids to rural and urban areas.”



MOSES OYENIRAN

QUALITY, HEALTH, SAFETY AND ENVIRONMENT SPECIALIST | IKEJA ELECTRIC PLC, NIGERIA

Moses Yisau Oyeniran is a graduate of electrical and electronics engineering and has specialised in power system engineering, business leadership and management for over 15 years. Fondly known as Olumose, he is a member of several professional bodies and believes there would be a reduction in workplace accidents if safety campaigns were compulsory, so making his work his passion was an easy step.

Over the years, Oyeniran has been involved in various sectors pertaining to power, ranging from rural electrification projects, telecoms and Nigeria's oil and gas sector, but can proudly say it's all been "while strictly adhering to safety and without lost time due to injury." His work at Ikeja Electric reduced staff and third-party injuries to 5% and brought fatalities down to zero from 2019 to 2021, an improvement over the previous years. A firm devotee to continual training, he likes lecturing. He has delivered occupational health and safety training, including to community groups where he saw how crucial energy access is to improving people's lives and enabling economic growth.

Oyeniran was part of the team that developed accident prevention tools and relevant procedures at Ikeja Electric and more recently the disco's Business Continuity Plan during the COVID-19 pandemic, where he carried out a monitoring exercise for total compliance. "In Nigeria, we have a slogan – Up NEPA – when the electricity supply returns. No matter how down you feel, joy accompanies light," explains Oyeniran. Given half a chance to present a paper at an international conference on behalf of Africa, he immediately rattles off three topics and explains each one's relevance.

Achieving sustainable safety culture in the power industry: "There are high accident rates in the power industry – electricity workers need to change their unsafe cultural behaviour toward handling operational electricity activities. There is also a poor public perception towards the danger of electricity. If not addressed, the danger will increase as electricity access rates grow." *Awakening sleeping giants—a panacea to our energy paradox:* "How to elicit the untapped potential inherent in Africa, how to use it to solve Africa's energy crisis." *Unlocking Africa's energy potential – opportunities and challenges:* "It reflects Africa's current state of power. We have a lot of energy potential, but unfortunately, we find it hard to harness and use our potential."

In his view, the biggest challenge facing Africa's energy sector is the lack of access to reliable and affordable energy facing a significant portion of the continent's growing population, especially sub-Saharan Africa which accounts for 76% of global figures with access to electricity for domestic usage. "Also, the electricity infrastructure is weak and outdated in Africa, which makes it difficult to meet the huge, growing demand." He believes that quick gains can materialise if we increase investment in renewable energy sources, strengthen energy infrastructure, and deploy mini-grids to rural areas and clusters in urban areas such as housing estates. "Collaborating with willing electricity distribution companies (discos) can help to provide economy of scale."

As an enthusiast for setting standards (he is actively involved in Ikeja's Integrated Management Systems Certification Project), he thinks the biggest legislative change to help Nigeria's energy sector would be the promotion and implementation of policies that encourage investment in renewables, motivate local lenders and stimulate FDI from global sustainable companies and agencies. "Also, whole power reform, including unbundling the entire energy value chain, would improve reliability and efficiency and encourage private investment. Then, increasing Nigeria's no-licence cap of 1MW could help reduce barriers to scale alternative energy sources. And, the democratisation of consumer metering is important," said Oyeniran. He thinks technologies such as auto-reclosers to limit downtime; fault current indicators; using thermovision cameras; and supervisory control and data acquisition (SCADA) are some of the most critical technologies to enable his safety above-all-else approach to work. But, if his neighbour wanted a backup power solution, he'd first suggest "get solar PV and a generator", and the second thing would be to offer help with the installation.

"No matter the size, every company and household needs alternative ways to keep the lights on and mitigate carbon emissions."



NTOMBI MANYIKA

GLOBAL CHAIRPERSON: GREEN ECONOMY | CIRCLE OF GLOBAL BUSINESS WOMEN, SOUTH AFRICA

Ntombi (Ntombekhaya) Manyika is a project manager with almost two decades of experience in the construction industry. Her focus is on energy efficiency, waste management and green buildings as ways to fight against global climate change.

Manyika first became aware of energy's impact on people's health and comfort when she started designing and building green buildings. The BTech Quantity Surveyor describes her youth: "I grew up in a small town - Graaff-Reinet in the Eastern Cape - where the weather is always extreme. If it's cold, it becomes frigid; when it's hot, it becomes scorching; when it rains, it floods."

Her large family lived in an extremely small house during her childhood, and everyone suffered from allergies and skin problems. "I got to thinking that these allergies had a lot to do with the lack of space and the town's extreme climate." She adds that the moment she discovered that her childhood thinking was indeed correct - energy access directly impacts health - that's when "I really appreciated what a difference energy access could make to people's lives."

When she started her company, she wanted to create an environment where people and the planet could thrive without harm. "So, we recycle tyres to manufacture roof slate for roof coverings." She believes in the maxim 'green is the new gold', which forms the company's slogan, 'we build clean, we build green.'

"The green economy is defined as low-carbon, resource-efficient and socially inclusive. It can focus on sectors like forestry, farming, mining, fishing, health and many others. Still, that focus is on creating wealth without disturbing the environment or causing harm to the health of people. After all, a healthy mind stimulates growth."

A mother to two daughters she describes as "beautifully talented", Manyika is passionate about the growth and development of young professionals. As such, she is a certified coach with COMENSA, the non-statutory professional body for coaching and mentoring in South Africa, and is currently working on doing SMME mentorship as a service, to add to her qualification completed through the Yalusa coach training programme.

For her, Africa's biggest challenge is the deprivation and missed economic opportunity caused by pollution, environmental damage and drudgery. "Compounding these challenges is Africa's vulnerability to climate change which means that traditional pathways to increasing energy supply, based on the burning of fossil fuels, will become increasingly unviable."

She adds that the continent should focus on natural ways of sourcing energy, such as renewable energy sources including wind and solar. She thinks the most notable policy change any African country could make would be to address access to affordable power to stimulate economic growth. Her message to an international audience is that the green economy, defined as low carbon, resource efficient and social inclusive, is focused on sectors like forestry, farming, mining, fishing, and health, which "are sectors that create the wealth we need but with sustainability top of mind."

Manyika points out that energy efficiency principles and greening buildings aren't only for Fortune 500 companies. This is why her work speaks to solutions that people desperately need, especially in the times we are living in. "No matter the size, every company and household need alternative ways to keep the lights on and mitigate carbon emissions. The environment needs preserving as we face climate change, and increased pollution is causing serious health issues."

She believes making homes green addresses the challenge of climate change by mitigating the heat a standard building emits into the atmosphere. On a macro scale, it can help address individuals' health. "Studies show how air and water pollution cause so many diseases, and people are developing allergic reactions as global warming increases."

Her motto in life is "we learn till we die", motivated by a quote by South African motivational speaker Antony Jennings who said: "I have always felt that the minute I stop growing is the minute I start dying." True to her motto, Manyika participated in the 2022 EDGE (Excellence in Design for Greater Efficiency) training hosted by the International Finance Corporation (IFC) and Green Building Council South Africa (GBCSA).

“It is essential to recognise that a one-size-fits-all approach is not appropriate for addressing Africa’s energy challenges.”



TULIKENI NDADI

SENIOR TECHNICAL ADVISOR | GIZ OFFICE, NAMIBIA

Tuliikeni (Tuli) Ndadi is an Engineer with a Masters in International Mineral Resource Management from the UK, with certificates in project management and development finance. Passionate about sustainably driving Africa's growth, she firmly believes the continent's natural resources will help us reach our SDGs.

A family visit in 2012 taught Ndadi a life-altering appreciation for the critical importance of energy access. "While my cousin and I were the same age, her standard of living in a remote village in the north of Namibia was vastly different from mine. The village had no access to electricity or communication networks, severely limiting their access to education, healthcare and basic amenities."

For Ndadi, this was a stark reminder that without energy, hospitals cannot function effectively, children cannot study at night, and food security is compromised due to a lack of storage and processing facilities. "This experience sparked my passion for working towards achieving universal energy access in Africa, as I believe it is a fundamental driver of socio-economic development and the key to unlocking the continent's vast potential."

Despite being rich in natural resources and human potential, 70% of Africa's population suffers from poor sanitation facilities, 41% of its people live on less than $1.25 a day, and only 15% of the rural population has access to electricity. "Whether it's through promoting renewable energy, advocating for inclusive policies, or engaging with stakeholders at all levels, I believe that every action can make a difference in building a brighter future for Africa."

While she acknowledges that the continent is characterised by remarkable diversity, with unique challenges and opportunities characterising every country's energy sector, she also sees shared energy concerns. "The majority of the continent's population today lacks access to sustainable sources of electricity. This stems from the insufficient capacity for power generation, poor management of energy infrastructure, and difficulty in attracting investments to the sector, in mentioning a few issues. Moreover, serving low-income users is a significant challenge, as is the lack of access to energy in rural areas."

To overcome these challenges, Ndadi stresses the need to focus on quick gains, such as improving infrastructure, increasing investments, and enhancing the regulatory environment to encourage private sector participation. "However, it is essential to recognise that a one-size-fits-all approach is not appropriate for addressing the energy challenges facing the diverse countries and regions of Africa. Tailored solutions must be developed to suit each country's specific needs while working towards the common goal of achieving universal energy access."

As an energy professional, she is always on the lookout for innovative technologies and strategies that can be used to improve access to energy access and address energy poverty. She is excited about developments in green hydrogen technology's potential to deliver energy while addressing decarbonisation goals. She is even more enthusiastic to see what her home country of Namibia will do in this sector.

While she may work in the energy and development space, Ndadi is a keen artist who uses painting as an outlet to promote mindfulness and creativity as she goes about the exacting work of an engineer.

She draws on pan-Africanism to sustain her vision that the continent can achieve universal access and harness its resources for economic liberation. "My belief is that this access to energy will lead to significant improvements in the socio-economic development of Africa, especially in rural regions. This will lead to access to better health care systems, youth education, and clean, sustainable water."

If allowed to address an international convention on behalf of Africa, the title of her speech would be *Light in the Darkness: Unlocking Africa's energy riches for a brighter future*. She explains that this title reflects the paradox of plenty that characterises much of Africa's energy landscape. "Despite being endowed with abundant natural and mineral resources, many African countries suffer extreme poverty and energy deprivation. This paradox highlights the need to unlock the continent's energy riches and harness them for the socio-economic development of its people."

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AFRICAN POWER & ENERGY ELITES

RISING STARS

As a Petroleum and Energy postgraduate student, I have the opportunity to develop new ideas and technologies that could revolutionise the industry.



KOKOUTSE GAWOU

POSTGRADUATE M.PHIL. CANDIDATE | THE UNIVERSITY OF CAPE COAST, GHANA

Kokoutse Gawou is one of the millennials that is going to have to solve Africa's energy problems and not just talk about them like his favourite lecturers. He is currently working on a project titled "The Prospects of Blue and Green Hydrogen Energy Production in West Africa".

A postgraduate M.Phil. candidate in Petroleum and Energy Studies at the University of Cape Coast, Ghana, a Co-founder of Hydro-Green Tech and President of the Student Energy Chapter & Student Energy Fellow, Gawou epitomises the dichotomy of Africa's energy trilemma.

Work experience in the oil and gas industry has opened his eyes to how many energy resources are available to industrialise the continent. But, at the same time, exposure to solar mini-grids and digital solutions to solve energy access problems on the ground attracted him like a teenager to TikTok. "When we travel to other countries and see the extent of access to energy firsthand, it can be a powerful wake-up call. For example, seeing people living without or with little electricity or cooking with traditional fuels like wood or charcoal can highlight the importance of energy access and its impact on people's lives."

He does not see a difference between green and brown energy sources. Instead, what is important to him is the lack of access versus the potential for power, constantly just out of the grasp of those around him. "For those working in the energy industry, understanding the importance of energy access is part of the job. Seeing how energy access can improve people's lives, create economic development, and drive progress can be a motivating factor for many people."

He sees the energy sector as one of the most essential industries in the world and hopes to impact the industry and society significantly. "The energy industry faces many challenges and problems, such as climate change and the need for sustainable energy sources. It is constantly evolving, and there is a need for new and innovative solutions to meet the challenges it faces. As a Petroleum and Energy post-graduate student, I have the opportunity to develop new ideas and technologies that could revolutionise the industry."

For him, the biggest challenge facing Africa's energy access is the need for more reliable, affordable energy. "To address this challenge, quick gains should be focused on increasing energy access by deploying decentralised renewable energy solutions such as mini-grids and off-grid solar systems. These solutions can quickly and cost-effectively provide electricity to rural and remote areas where grid extension is not feasible or economical."

Gawou adds that increasing energy efficiency in the industrial, commercial, and residential sectors can help reduce the demand for energy and lower costs for consumers. He believes adopting energy-efficient technologies, a circular economy, and building codes and policies promoting energy conservation will lead to progress.

"Improving the regulatory and investment climate for the energy sector can attract private sector investment, facilitate technology transfer and innovation, and create jobs and economic growth for Africa. This includes streamlining the permitting process, reducing regulatory uncertainty, and promoting public-private partnerships."

Gawou thinks one potential legislative change that would significantly impact Africa's sector would be the adoption of supportive policies and regulations for renewable energy development and deployment.

"The lack of supportive policies and regulations has been a major barrier to their adoption and deployment. Therefore, policy and legislative changes such as feed-in tariffs, net metering, tax incentives, and regulatory frameworks that promote investment in renewable energy can encourage private sector investment and innovation in the sector, accelerate the deployment of renewable energy technologies, and help drive down costs."

Given half a chance, he would be the one lobbying for change from the inside, subverting expectations, and being that one student who always knows where to find the lights on. Because he was the one who not only explained to that neighbour how to install the backup power system but ensured they had a backup plan too.

"The African network has sufficient power to meet the needs of those connected. Now, let's implement off-grid solutions and fully exploit Africa's vast RE resources."



LYDIA SHANGU

FOUNDER & GM | SBS PETROLEUM RESEARCH INSTITUTE, SOUTH AFRICA

Lydia Shangu holds a master's degree in communication sciences and a bachelor's in geology from the University of South Africa. Through her leadership as the founder and general manager of SBS Petroleum Research Institute, she seeks to address a range of challenges faced by Africa's investors.

Shangu believes that Africa's most significant challenges include acquiring financing for energy projects and achieving universal access to modern energy. Therefore, she suggests that the energy industry should focus on expanding national electricity networks and avoiding low-quality materials. This is especially pertinent as she appreciates the difference energy access makes in people's lives.

She shares how she first came to appreciate this when she learned that 15% of the world's population lives without electricity access. Based on 1990 research papers, she found that just over 71% of the global population had access to electricity, and in 2016, this rose to over 90%.

"When I broke this down to average daily change, it means that in an average day over the last 12 years, we had 315,800 people who had access to electricity for the first time in their lives." If she were a minister, her first decree would be to make renewable energy a national priority and set a strict target for a percentage of electricity to be produced from resources such as wind, solar, geothermal, tidal and hydropower.

As Shangu's talents and skills lie in research, she is driven by this skill to diagnose problems, search for new strategies and analyse and generate new ideas. "We have environmental issues directly associated with energy production and use, in particular air pollution, climate change, water pollution, heat pollution and also solid waste disposal, which affect fuel supply and the physical resilience of existing and future energy infrastructure."

As such, if she were invited to present a keynote address at an international event, she would title it *Shaping the renewable energy transition in Africa*. Her presentation's focus would be the opportunities for innovative power development and improvements in the lives of billions in communities.

"We have already witnessed how the energy transition has played a vital role in the African region's rapid and creative economic growth." Through research, she would measure the ambitions and progress of the energy transition members in Africa in achieving global, regional and country-sustainable energy goals and discuss the possible solutions to addressing key innovation challenges.

She is also intensely interested in enabling organisations and partners to develop forward-looking businesses from a business, customer and brand perspective. Shangu leverages her experience and expertise in marketing, energy, petroleum and media through her company to develop advanced mutually beneficial and long-term relationships with her clients.

"The thing that keeps me motivated for my work is the fact that I always come up with creative ideas for improvement. I'm also keen on coaching others and developing my professional networks." Similarly, Shangu is inspired by Steve Harvey's New York Times bestseller, *Act Like a Success, Think Like a Success.*

Overall, she reveals that her blue-sky vision for Africa's energy market is to build a long-term plan to expand access to reliable and affordable energy using diversified sources and speed up the implementation of critical energy projects in Africa. "The African network has sufficient power to meet the needs of those connected. Now, let's implement off-grid solutions and fully exploit Africa's vast renewable energy resources."

Allowing herself to dream big, Shangu would ideally like to see an electrification rate of 85% by 2030 on the continent.

However, to achieve these goals, she acknowledges that regional integration needs strengthening to increase energy supply and demand efficiency and effectiveness. National funds also need to be improved through regional integration, effective management of assets, mobilisation of available resources and commitment to driving GDP growth through electrification.



AFRICAN POWER & ENERGY ELITES

PROJECTS

GOMA HYBRID SOLAR

DRC

For Nuru, commissioning the Goma smart power plant was the first step in a large-scale project to forge economic and social development. In February 2020, six months after construction, this 1.3MW hybrid solar project was ready to supply outlying areas of Goma City that were side-lined from electrification projects. Since commissioning, the installation attracted several institutions that saw it as a viable solution to community problems.



A 1.3MW capacity smart hybrid solar power plant located in the Kivu Province capital, Goma City, DRC. This plant uses high-quality Tesla lithium battery packs to serve 2,100 households, SMEs, C&Is and social institutions.



The Goma Hybrid Solar plant in the Democratic Republic of Congo is currently the largest off-grid mini-grid in sub-Saharan Africa. The 1.3MW plant is one of four smart solar sites with a combined capacity of 1.693MW operated by Nuru. These plants combine three energy sources: solar modules, batteries and diesel generators.

Each site includes several lightning rods and weather sensors that feed data into the Tesla algorithm. These sensors correlate information between changes in weather and consumption data at any given time.

In 2022, the focus was to provide 24/7 service, which resulted in a 99% system uptime for the 2,600 connections (15,000+ direct beneficiaries), 740 businesses and 109 social and community services. The sites reportedly avoided 700MT CO_2e, delivered over 1,485MWh along with 433 streetlight installations, and employed 90 people. Nuru's technicians are qualified to do the necessary maintenance on installed Tesla Powerpack batteries.

The strength of large-scale hybrid solar models lies in the possibility of adding capacity as demand increases and, above all, interconnecting between sites and with other sources such as hydropower. In 2024, Nuru plans to increase the Goma site's capacity to 5MW and source cleaner back-up generator fuel.

KAXU SOLAR ONE

SOUTH AFRICA

Built by Spanish multinational Abengo, the KaXu Solar One plant, covering an area of 1,100 hectares (2,718 acres), is the first concentrated solar power (CSP) project in South Africa to use parabolic trough technology. Mirrors in a parabolic trough are used to concentrate solar energy onto a receiving tube filled with heat-absorbing fluid, which transfers the energy into steam that drives a conventional steam turbine.



100MW solar thermal plant integrating a two-tank, indirect, molten salt-based thermal storage unit. The project consists of 1,200 parabolic trough solar collectors, each measuring 7.62m (w) by 152.4m (l) by 3.05m (h).



The name KaXu means open skies, which reflects the solar plant's geographic location near the town of Pofadder in the Northern Cape Province, South Africa. Each of its parabolic trough solar collectors comprises ten modules, integrating 28 pivoting concave mirrors for a total of 336,000 parabolic-shaped mirrors.

The CSP plant's entire output is purchased by the country's state-owned power utility Eskom under a 20-year power purchase agreement (PPA). This PPA was one of the first to be awarded in 2011 under bid window 1 of the Renewable Energy Independent Power Producers Procurement Programme.

It generated 4,500 construction jobs when built over two years and once it came online in March 2015, created 80 permanent jobs. The solar thermal field is expected to remain in service until 2035.

KaXu Solar One has an annual output capacity of 320GWh, services 80,000 homes and offsets 315,000t of CO2 a year. It conveys electricity to Eskom's Paulputs Transmission Substation via a 5km-long 132kV overhead transmission line.

Power generated at this CSP plant can be stored and discharged at any time, keeping it running during times of reduced sunshine and allowing it to extend power production for up to three hours after sunset at full capacity. It also requires around a quarter of water consumption compared with similar solar plants.

OLKARIA GEOTHERMAL PROJECT

KENYA



Hot magma bodies come up to less than 6km deep below the surface of the East African Great Rift Valley. The Olkaria geothermal field's thermal resources in Hell's Gate National Park in Kenya are found at depths between 600m and 3km underground, running at temperatures as high as 350°C. Ultimately, Kenya wants to increase its installed geothermal power capacity to around 10,000MW by 2037 to form the bulk of its energy mix.

With 863MW of geothermal power on tap, Kenya is ranked seventh globally on IRENA's renewable energy statistics for 2022 and shows its engineering capability through the Olkaria facility.



The Olkaria Geothermal Project started with the commissioning of Olkaria I (pictured here), the first geothermal power plant in Africa – comprising three units of 15MW each between 1981 and 1985. The plant has averaged an availability factor of more than 95% since commissioning and is connected to the national grid via a 132kV transmission line.

The country drilled Olkaria II's wells between 1985 and 1993, but the power station was only constructed in 2000 when funds became available. It works on a single flash plant cycle with a 7.5t/h/MW steam consumption. The turbines are single-flow six-stage condensing with direct contact spray jet condenser. The power generated is transmitted to the national grid via a 220kV double circuit line.

Olkaria III is a 48MW power plant run by IPP Orpower Ltd, which also sells the power to utility company KPLC. While Olkaria IV (140MW) and Olkaria I units 4 & 5 (140MW) work together as one power station, the project's largest.

Olkaria V was officially commissioned in July 2022 to put 172MW onto the grid. Also, formally commissioned that month, Olkaria I Additional Unit (AU) 6 Geothermal Power Plant injects an additional 86MW into the national grid, making it the largest single unit in the facility. The facility is complemented by the KenGen-owned 15 wellhead generation plants at Eburra (2,3MW) and 14 at Olkaria (5MW).

SEDIBENG SOLAR PV PROJECT

SOUTH AFRICA



14,000 ground-mounted solar PV panels provide 6.5MW of power directly to a brewing facility. The 19- hectares project generates 17,000MWh annually and is the largest freestanding solar plant within the Heineken global group.

The Sedibeng grid-connected power project's solar panels incorporate single-axis tracking technology to follow the sun. At the same time, the plant is directly connected to the facility to reduce the brewery's carbon impact by 30%. The project complements Heineken's *Brewing a Better World* goal to effect net zero and to increase the company's share of renewable energy in production to 70% by 2030.



The 6.5MW Sedibeng grid-connected solar plant at the Heineken SA brewery will reduce the site's CO2 emissions by over 10,000 tons over the estimated 25-year lifespan of the plant. Adding to the company's sustainability profile, the company will not use the treated water from the reclamation plant in the beer itself but for service water and cleaning around the brewery.

Designed, built, commissioned, owned and operated by SOLA Group, the ground-mounted solar PV project (pictured here) is valued at around R95 million, with AIIM as partner equity funder and Nedbank as debt provider.

The power plant began producing power in May 2022 and is the largest freestanding solar plant powering a brewery in South Africa and, indeed, the largest in the Sedibeng district municipality. Unlike other embedded commercial and industrial (C&I) solar projects in South Africa, this one is not found on a rooftop or covering a parking lot but is instead built in a lush field covered in wild grass.

The construction of the plant took around seven months, during which time 127 job opportunities were generated. Of that, 100 were filled by people from the local Sedibeng community, including technicians, construction crew and general workers. Currently, community members attend to the 14,000 solar panel cleaning and vegetation control to maintain optimal plant performance to generate the approximate 17,000MWh annually.

TEGES SOLAR PLANT

ZIMBABWE



The TEGES minigrid phase II is a 5MW solar power plant in Zimbabwe with net-metering capabilities. The project's first phase comprises 157kWp supplied by a solar PV array of 336 modules and a 300kWh battery energy storage system.

In Zimbabwe, the TEGES solar plant is being developed at St Patrick's Mission, a community with a high school, church, hospital and other facilities, where a critical power shortage has led to frequent power cuts and abrupt blackouts. Trinity Church Wall Street was instrumental in the funding of the first phase, which was completed in May 2022, thus improving energy access for the community through its educational, health and agricultural programmes.



TEGES is a joint venture between the Anglican Diocese and Tatanga Energy. Phase 1 of the project (157kW and 300kWh BESS) provides electricity to critical Mission infrastructure including a boarding school, hospital, staff housing, seminary quarters and a school farm which collectively serve a community of approximately 20,000.

Development is now underway for the second phase of the minigrid, which aims to commission a 5MW plant. The power plant is beneficial as remote and rural areas' electrification rates are 16% (national average at 42%). The subsequent abrupt outages in the school community affected the quality of the school's education system, the clinic's functionality and the district's security. Therefore, installing the solar minigrid provides a concrete solution to the community's power problems. The electricity generated during this project phase will achieve reliable access while feeding excess electricity into the national grid via a net-metering arrangement.

The biggest hurdle is the lack of development financing due to the limited funding capacity of the majority owner – the Anglican Church; therefore, Tatanga Energy's primary role is to lead the development and fundraising of the project. During its construction, the project, which is Located near Gweru in the Midlands province, created jobs for unskilled and semi-skilled locals, and aided the environment, saving approximately 5,034 kg of carbon emission and reducing the school's carbon footprint.

E-LONGLIFE SMART PUMPS

MALI





E-Longlife Energies Nouvelles offers prepaid off-grid electricity access in rural areas and has locations across Mali, Niger and Chad. The Mali collective in the Kolondieba commune services 150 members, the majority of whom are middle-aged to senior women. By teaching members to automate water pumping, they can nourish their gardens and fields to support local farming businesses.

The project provides 4-8kWh of off-grid solar PV to power hydraulic pumps. These automatically draw water from local wells for small farm irrigation in rural and remote areas.







Mali currently has 78% of basic water coverage, and 80% of Malians are employed through farming, so this project's off-grid hydraulic wells help build growth through practical solar PV solutions.

Each installation includes a solar power system, equipment and irrigation training, monthly subscriber energy use analysis, remote monitoring, GPS and customer service or equipment maintenance. The project boasts one of the lowest investment rates for electrification in Mali.

The project allows the solar system to be leased (from 25,000 Fcfa monthly) or purchased (from 2,5 million Fcfa), with associations and other partnerships encouraging lower prices which helps meet the needs of lower-income households. Specifically, E-Longlife has partnered with the Association of Women Gardeners in Mali.

With the combination of solar power and digital technology, the project capitalises on the modernisation of agriculture to create opportunities for developing new businesses and jobs and furthering gender equality. So far, the project has had a stable track record of creating new businesses by making sustainable electrification available. Through its rental, purchase, or rent-to-own services, the project has used solar energy to electrify schools, health facilities, businesses and households, creating jobs and facilitating upgraded family lifestyles in rural populations.

PAY-N-PUMP

UGANDA



In Uganda, over 70% of the population relies on agriculture for their livelihood, yet only 10% of irrigable land is being irrigated. Also, fluctuations in rain patterns and severe droughts add to farmers' low crop productivity. This led to Aptech Africa identifying the need for smaller solar-powered water pumps. However, most small-scale water pumps are still outside the price range of what an average farmer can afford.

A 500W solar water pump and irrigation solution using smart technology to offer PAYGo water-as-a-service to small-scale farmers. Installed at no cost, the system also offers agronomist advice and full maintenance.



The PAY-N-PUMP solution combines the use of mobile technology with remote access and monitoring enabling farmers to invest in the solar-powered pump with an affordable down payment. The farmers then pay installments aligned with the local harvest season to activate the pumping system. With 83 systems currently in the field, one case study saw a 250% increase in crop yields.

Other benefits for farmers include reduced manual work and improved expenditure of time, enhanced crop resilience, and income-generating opportunities by complementing staple foods with high-value crops, and one village reported a drop in domestic violence as a result of improved incomes.

During installation, farmers are encouraged to rent out systems to cater to basic needs other than making their monthly payments. Currently, the plan is to modify the system and include a charging port plus lights such that it is holistic and can be relied on especially for farmers who are not connected to the grid. Overall, the project has created jobs for the youths (agents) who earn a commission. Agents are also taken through multiple technical and business development training to enhance their skills and enable them to operate smoothly.

This all-important PAYGo water-energy nexus project has also helped improve the technical capacity of the community within which the systems have been installed.

SUREWATER

GHANA

Grundfos established the Ghana Water Initiative (GWI), one of their initiatives under the strategic business unit SafeWater, to design and test a new approach to water service delivery in rural communities. GWI has begun two clean drinking water pilots, part of a larger project to develop commercially viable solutions to provide water services to underserved communities in the West African country and reach one million people with clean drinking water by 2026.





Dispenser bottled water available at kiosks and ATMs reduces plastic waste from single-use containers while providing clean drinking water for previously inaccessible communities.



Ghana Water Initiative's pilot project in 2020, launched in partnership with the Community Water and Sanitation Agency at Abomosu (a town in the Atiwa West District, Eastern region of Ghana), provides clean water access to around 8,000 people through smart water self-service Automated Teller Machines (ATMs) and household connections.

The second pilot launched two years later in Otoase (a small settlement 20km northwest of Nsawam), includes a water bottling plant to provide SUREWATER mineral water, making clean drinking water affordable and accessible both in Otoase and beyond.

The centralised bottling plant can produce 400 bottles per day. The aim is to provide clean water to citizens of Otoase as well as residents in Nsawam (capital of the Nsawam-Adoagyire Municipal District, a district in the eastern region of south Ghana) and other parts of Accra, through smart water ATMs and home connections.

SUREWATER is packaged in 18.9-litre containers designed for multiple uses and costs $4.74 when bottles and water are purchased, while subsequent refills cost $0.97 for water only. The water is sourced from the ground and undergoes a robust treatment process, including reverse osmosis. The provision of bottled water aims to improve water security, and it has a greener environmental impact than the alternative, which is the excessive use of single-use plastic sachets across Ghana.

GBANGBA MINIGRID

NIGERIA



A 90kWp solar hybrid energy access project at Gbangba Village, Niger State, northern Nigeria, combines green infrastructure with smart capabilities and mobile money for remote monitoring, customer service and payments.

Gbangba Village, with a population of about 4,000, is predominantly an agricultural community with a flourishing agri-processing industry and a strong need for cold storage and cooling solutions. The minigrid, developed by Engie Energy Access, supplies power to over 400 households, a health centre and school, and more than 25 commercial and productive use customers, including grocery shops, a bakery, water boreholes, welders, carpenters and tailors.



During the development phase, the initial demand analysis indicated an estimated 178 connections could be made at the start of commercial operation and 468 by year five. However, the project connected more than 400 customers by month nine and is already on course to exceed the year five target in their second year.

The Gbangba minigrid's biggest challenge was demand stimulation. This was met by setting up an appliance finance scheme to help potential customers access appliances and increase economic activity. Over 20 customers, of which half are women, now use cold storage and agri-processing appliances.

The developer initially solved the challenge of managing the nighttime load through batteries, which quickly became over-taxed. Therefore, they implemented suitable demand-side management strategies to reduce the strain and manage consumption while maintaining a more than 95% reliability factor.

The plant supplies power to more than 400 households, including a health centre and a school. Then there are the 25 commercial and productive use customers. In addition, a business incubation programme started, targeting income-generating energy uses and supporting entrepreneurs with training and equipment to start new businesses. Pilot schemes in electric motor refit for agri-processing have been implemented with 35kW of electric motors installed in the first phase.

MOPO HUBS & BATTERIES

NIGERIA



This off-grid project provides a pay per use battery rental service, charged by solar power hubs, to give consumers daily household energy on a flexible basis. This solution offers a lower cost and lower carbon model than local alternatives, which include petrol motorbikes, petrol generators and disposable battery-powered torches. The next step is to introduce cleaner generators and e-mobility across Africa.

Through the project's innovative rental model, customers rent smart lithium-ion batteries at a low cost and in 24-hour increments, making it easier for low-income households and businesses to access electricity as and when needed.



As of September 2022, this Mobile Power project had 500,000 monthly rentals across several countries, connecting over 220,000 people to clean energy for the first time and with an installed RE capacity of 0.62MW. The company hosts 165 hubs, of which almost 90 were installed in 2022 alone.

Where the company operates with local partners, these are communities (homes and businesses) and motorbike taxi drivers renting the batteries. MOPO Batteries are managed by MOPO Agents, who earn commission on their portfolio of battery rentals. At the same time, an in-house Mobile Power team carries out the EPC and O&M of the hubs and battery portfolio. The solar-powered MOPO Hubs offer two rental types: a 50Wh and a 1kWh battery for household, commercial and e-mobility use. The solution benefits over 50,000 active customers and has seen over 10 million rentals in four countries, with 12% month-on-month revenue growth in 2022. Camco-managed REPP led the Series A funding, and since then, Reinhart and All-on (Shell funded) joined the numerous international and local partnerships supporting the project.

An interesting lesson is that bottom-of-the-pyramid customers don't use energy every day. On average, domestic battery rentals per user equate to one rental every five days, evidencing the benefit of Mobile Power's flexible business model to customers with low disposable income.

SIGCINENI SOLAR ESWATINI

The Sigcineni Off-Grid Solution project began as a small-scale off-grid pilot study into the use of solar technology to meet rural electrification objectives, especially as some rural communities are far from the national grid and need alternative options. This project includes a 200kWh battery energy storage system (BESS) and is one of several ongoing projects by the Eswatini Electricity Company to improve the country's electricity access rates.



A stand-alone mini-grid with a centralised 35kW solar PV plant with a 200kWh lithium-phosphate BESS, smart meter system, and an LV reticulation network designed with aerial bundled conductors.







This smart 35kW mini-grid solar project, estimated at R3.5 million, was commissioned and operational on 1 January 2021. It has evolved to supply power to 22 dispersed rural households via its reticulation network. The project also uses smart metering infrastructure to remotely monitor the plant and household energy usage and allows the implementation of load curtailment.

To avoid a situation of total plant unavailability, as the battery storage discharges beyond certain threshold limits, the system automatically curtails load so that households sustain power supply to essential and critical loads like lighting, phone charging and refrigeration. Households pay for electricity through a standard domestic tariff.

For this project, local residents remained a strategic project partner. The Eswatini community were also involved through education on the construction of the power plant and the benefits it can unfold. However, the project struggled to influence energy usage patterns through community training sessions. The project has also dealt with the issue of inspiring the productive usage of energy as it experiences excess energy output during the day while the community's energy usage remains minimal.

As such, the next phase of the project will be to work with the UNDP to finance an initiative to leverage the possibility of generating more power during the day and putting this power to productive use.

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BULK SUPPLY POINT

GHANA

The Millennium Challenge Corporation and Millennium Development Authority appointed SMEC, a construction engineering company, to address Ghana's constrained T&D systems to deal with the country's unreliable power supply. The five-year programme was geared towards improving the operation and finances of the Electricity Company of Ghana by reducing technical losses and improving the quality and reliability of electricity in Greater Accra and its environs.



An air-insulated switchgear bulk supply point (BSP) 330/33kV; a gas-insulated switchgear BSP 161/33kV with STATCOM; two primary substations equipped with 2x39MVA transformers each and 33/11kV switchgear; and a Meter Management System to control up to six million smart meters.



The project includes the construction of 1,400km of LV distribution lines, 400 new transformers and extending MV lines to reduce technical losses across Greater Accra. The $316 million project includes a geographic information system mapping distribution assets, an AC testing laboratory and rehabilitation and reinforcement of distribution systems to increase connections of new traders. Root Cause Analysis was used to identify the challenges while power system modelling software and process analysis tools were deployed to ensure the most effective designs in reducing power loss challenges after completion.

The Pokuase BSP project is currently the largest BSP in Ghana and the most technologically advanced in Online Control and Monitoring. It was designed with a 40kW, roof-installed, grid-tied solar PV plant that supplements the power consumed by the substation. The Kasaoa BSP (pictured here) is one of the few gas-insulated switchgear substations in West Africa and is designed with a 60kW, roof-installed, grid-tied solar PV plant.

With 580MW to be evacuated from Pokuase BSP, the total number of circuits needed required a more than 80-metre wide wayleave using traditional towers. A combination of the SMEC-designed tower type and undergrounding of some of the circuits resulted in wayleaves of 30 metres, which means fewer people affected and fewer financial resources spent on wayleave acquisition.

E-MOTION AFRICA

TANZANIA

Based in Tanzania, E-Motion Africa partners with local companies and Arusha Technical College to retrofit internal combustion engines and build new skills towards a sustainable future. Through this process, the programme has employed 10 local staff and intermittently employs over 15 temporary staff for project installations. The e-safari vehicle's 55kWh battery pack provides between 50-300 kilometers of range per full charge.



The project converts internal combustion engines (ICE) to electric vehicles (EV) and offers a portable charging system that can be used wherever electricity or solar power is available.



This project was inspired by eco-friendly tourism practices wherein silent and zero emissions e-safari vehicles provide an organic ambience and holistic naturistic experience. The project's mission is to revolutionise the Tanzanian tourism industry by reducing the environmental impact of its vehicles in a manner that has proved cost-effective to its safari tour operators.

Since its birth, the project has retrofitted over 15 e-safari vehicles and launched 10 charging points between Arusha and Serengeti National Park. The company aims to be able to transform the bulk of 4x4 and utility vehicles brands.

E-Motion has expanded its mobility offering to include retrofitted electric motorbikes, three-wheelers and public buses. Despite its main challenge of global battery price changes, the project has also improved the charging terminals that allow the batteries to charge in under 30 minutes.

The project has had capital injections of over $500,000 from its local Tanzanian partners: Hanspaul Group, Gadgetronix, DL Consulting and Arusha Technical College, which nurtures young and innovative engineers.

At present, the project is in its production phase. Still, it intends to expand its services into other East and Central African countries which have expressed interest, including Rwanda, Kenya and the Democratic Republic of Congo.

MALILE MADAGASCAR



Hybridisation of three large-scale heavy fuel oil power plants with 10MW, 12MW and 20MW solar PV in Diego, Mahajanga and Toamasina. The first phase, completed in 2022, delivered 5.7MW across all three sites, with plans for the second phase (36.3MW) in Q3 2024.

The hybridisation of three large-scale heavy-fuel oil power plants with solar PV in Madagascar is as much about reducing CO2 emissions as it is to make a single energy source more climate resilient and increase Malagasy energy security through diversification. The Malagasy company Ocean Trade handles the EPC and O&M, while Enelec, the HFO Independent Power Producer, purchases the power and on-sells to the national utility JIRAMA.



Installing the solar plants close to the existing power plants means they take advantage of the existing infrastructure, significantly reducing costs and the environmental impact of the development.

The $8.5 million project is being carried out in two phases to meet deadlines set out by the Malagasy government. First, project financing for phase two relies on non-recourse debt, which is a complex and time-intensive process in any business environment.

With 75% of the country's power generated from heavy fuel oil (HFO) and diesel plants, the government is keen to reduce its dependence on fossil fuels. Challenges ranged from administrative delays for land and permitting of staff turnover within the national utility, which necessitated negotiating the PPA anew each time the utility introduced new management.

So far, hybridisation of the Diego plant has made it possible to use three generators instead of four during the day, reducing fuel consumption as they rely on the 2.4MW produced by the solar plant (the Toamasina plant is pictured here). Developer LIDERA Green Power generated job opportunities through sub-contractors during the first phase of building, and for each project site, 100% of employees were local. Recently, the developer started providing streetlights in the communities where it operates and made donations of well water in the communities that have requested them.

UPPER BLINKWATER MINIGRID

SOUTH AFRICA



Rural electrification in South Africa has usually been via conventional Eskom power lines or low voltage solar home systems. Some geographically isolated communities have never stood a chance of grid connection because of low electricity demand, population density, and the high cost and technical difficulty of grid extension. However, the hybrid Upper Blinkwater Minigrid pilot project in the Eastern Cape Province shows the way for far-flung rural areas.

The project comprises 75kWp solar PV modules, 21kW wind power, 130kWh battery storage, and a diesel backup generator linked to 57 households outfitted with smart prepaid meters integrated into the municipal billing system.



This pilot project, located in a small rural village in the Raymond Mhlaba Local Municipality, was constructed between 2018 and 2020 as part of a multi-organisational collaboration between South African and German government departments, academic and research institutions, international development agencies and engineering firms. The system consists of smart metering devices with the ability to measure real-time data from every component, including household consumption, solar, wind and diesel generation and battery state of storage, and a state-of-the-art weather station. The measured data is fed to the minigrid controller, which is set up to automatically store the data. The future expectation is to develop productive use of energy projects and local businesses.

The mini-grid also saw the contractor initially do O&M work for a year as they taught the Raymond Mhlaba Local Municipality how to care for the plant's assets. No national policy and funding framework for mini-grids existed when the project was developed and constructed, so grant and donor contributions from numerous partners funded it. During the COVID-19 pandemic, close communication was vital to keeping the project on track; a single owner engineer integrated the diverse technical components throughout the project cycle; and a single social facilitator maintained a close relationship between the community and all partners. Deep consultation was enriching, to the point where the community could participate in the design's sign-off.



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Founder of Electricity Lawyer

Ivie Ehanmo is a renowned multi-jurisdictional expert in the energy sector with over 14 years of experience where she has been involved in a wide array of complex transactions for multiple clients in Nigeria and across Africa.

She is the Founder of Electricity Lawyer (EL), a novel data-driven research, legal and regulatory service provider offering tailored aggregated tools, resources, solutions and services, cutting across power markets in sub-Saharan Africa for better-informed decision-making by stakeholders. Ehanmo provides expert legal, regulatory, governance and transaction advisory support to global institutions and agencies such as the World Bank, USAID, Millennium Challenge Corporation, UNOPS, United Kingdom Nigeria Infrastructure Advisory Facility, USTDA-funded projects, and the Energy for Growth Hub. She is a Legal and Regulatory Consultant for Energy Market and Regulatory Consultants (a member of the MRC Group) and a Partner within the Energy and Infrastructure Projects Unit at the law firm of George Etomi & Partners.



KUDA NDHLUKULA

Executive Director | SACREEE

Kudakwashe (Kuda) Ndhlukula is the Executive Director of the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) whose mandate is to promote market-based adoption of renewable energy and energy efficiency technologies, practices and services contributing to the sustainable development agenda of the region.

Prior to his role at SACREEE, he held senior positions at the International Renewable Energy Agency (IRENA) in Abu Dhabi and at the Renewable Energy and Energy Efficiency Institute (REEEI) in Namibia.

In these roles, spanning over 20 years, he formulated and executed various landmark projects. While at REEEI, projects included managing the off-grid energisation programme, the conceptualisation and prefeasibility of a CSP project, wind mapping, renewable energy and energy policy and regulatory frameworks, the Green Building Council Namibia training of installers and energy experts.

Ndhlukula is a Certified Energy Manager and Certified Energy Auditor. He possesses an MSc in Renewable Energy Engineering and an MBA, amongst other qualifications.



OGHOSA ERHAHON
Energy Transition & Sustainability Advisor

Oghosa Erhahon navigates possibilities for a low-carbon future through energy and sustainability. Currently, she is a Hydrogen Advisor with the GIZ Hydrogen Diplomacy team exploring low carbon and future fuels (PtX). Her expertise includes regulation, project and programme development, decarbonisation pathways and sustainability strategy.

Erhahon is a qualified Barrister and Solicitor of the Supreme Court of Nigeria. She has a Masters in Oil, Gas and Mining Law from Nottingham Trent University, UK and has experience as the Assistant Project Coordinator to the Commonwealth Professional Fellowship at the Institute for Energy Systems, Edinburgh.

She has been recognised in international features such as Woman in Energy, TEDx talk on #CarbonNeutrality and is the co-author of 'Touching Hydrogen Future'. She is a committee member for the Women in Green Hydrogen Network and a member of the Bretton Wood Committee where she works on the future of finance.



ROBERT MUBIRU

Senior Engineering Consultant | KERAM Enterprises

Robert Mubiru is an experienced power systems electrical engineer and utility manager, with a track record spanning utility reform, business development, change management, network operations, loss reduction, capacity assessment and planning, and quality standards execution.

Mubiru is an accomplished distribution utility professional handling the entire suite of asset creation. This covers technical aspects (network/plant development and operations), and commercial aspects (revenue cycle, loss reduction) activities throughout his career, including at four utilities: Rwanda Energy Group (REG), Uganda Electricity Board (UEB), Uganda Electricity Distribution Company Limited (UEDCL) and UMEME Ltd.

He recently supported REG with capacity development assessment and planning, organisation restructuring, technical and commercial loss reduction strategy development, annual maintenance and outage plans development, and execution of a distribution management system.



THAVA GOVENDER

Chief Executive | Babcock Ntuthuko Engineering

In nearly three decades of working in the energy sector, Thava Govender has experienced the full ambit of the electricity supply value chain.

His involvement in the energy sector started in the early ’90s as a graduate-in-training for Eskom, having been granted a bursary to complete a degree in Chemistry and Biochemistry. Govender also completed an honours degree in Energy studies and completed the Advanced Management Programme at Harvard Business School. Since then, he has held various management positions, including Power Station Manager, General Manager and Chief Executive for Rotek and Roshcon. Govender was Group Executive for Eskom’s Generation Division, Eskom Transmission and Customers Services, and acting Group Executive for the Sustainability and Risk Divisions. He is a past President of GO15, the association for Very Large Power Grid Operators, which represents more than half of the world’s electricity demand, as well being a Board Member of the US-based EPRI (Electric Power Research Institute).



WANGARI MUCHIRI

Coordinator | GWEC Africa WindPower

Wangari Muchiri is a renewable energy engineer and energy planning expert based in Kenya. She currently works as a Programme Development Manager, focusing on Renewable Energy Innovation for off-grid and peri-urban communities. Over the last eight years, Muchiri has gained international experience consulting in renewable energy, green buildings and sustainability.

Muchiri also sits on the board of the Kenya Green Building Society, where she heads up the technical committee ensuring the real estate sector in Kenya is sustainable. She holds a Bachelor of Engineering (Renewable Energy) from the University of New South Wales in Sydney, Australia, and a Masters of Engineering (Energy Planning and Policy) from the University of Technology, Sydney.

In 2019, Muchiri was selected as one of the Obama Leaders for Africa, by the Obama Foundation. She was also selected as a participant in the Women in Wind Global Leadership Program in 2019 and was named a Top Woman Under 30 in STEM (Science, Technology, Engineering and Mathematics) by the Mawazo Institute during Africa Science Week.

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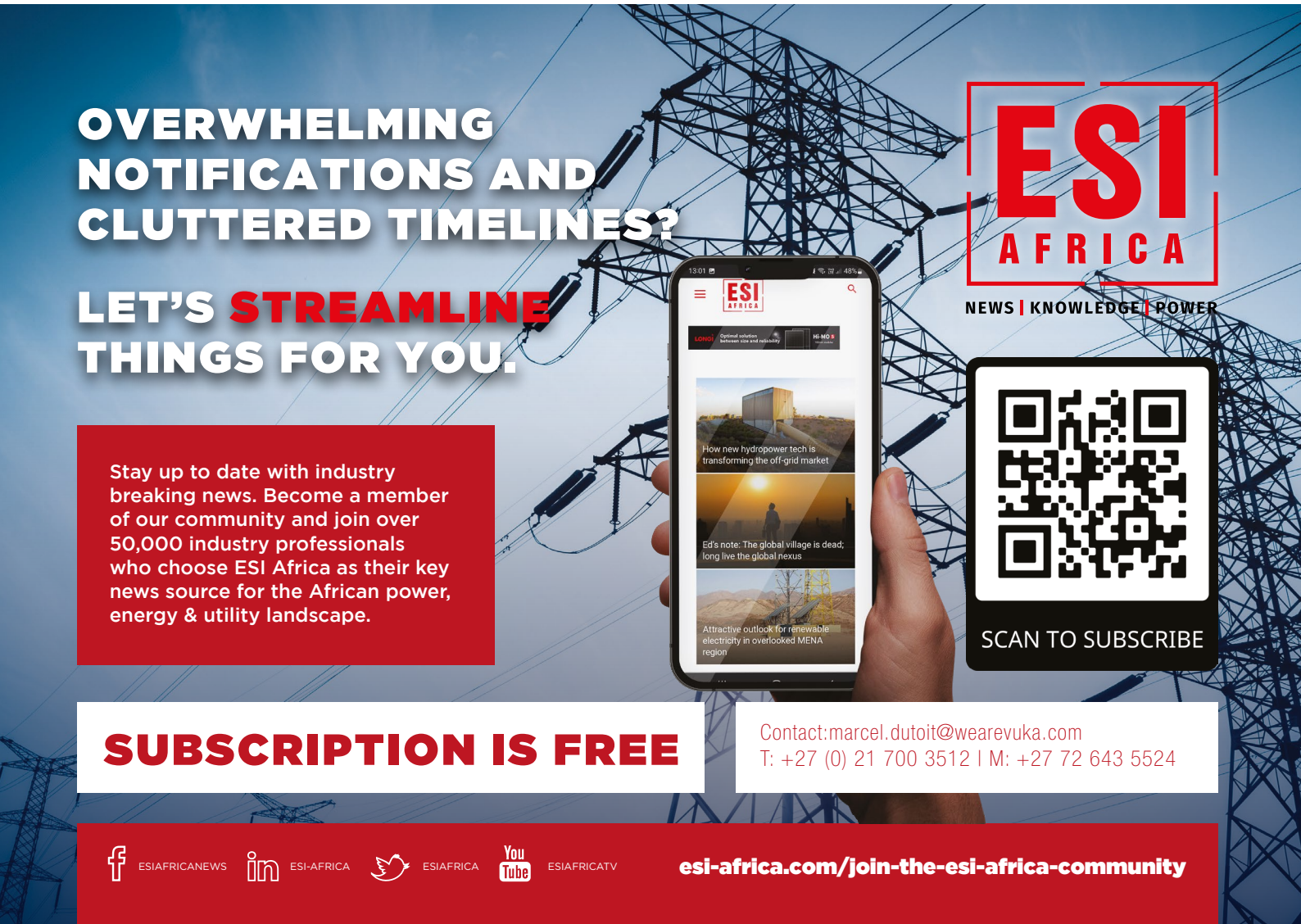
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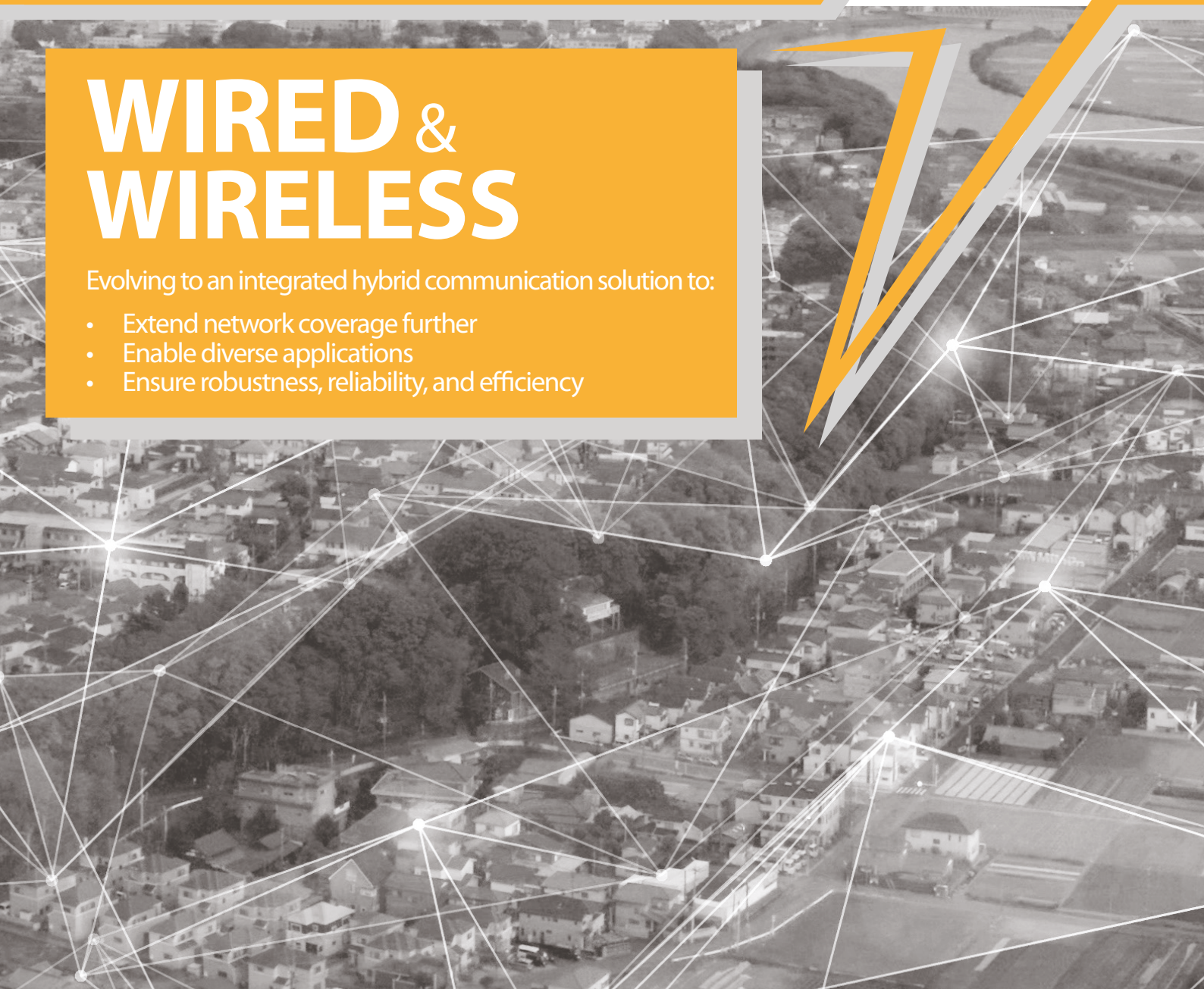
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