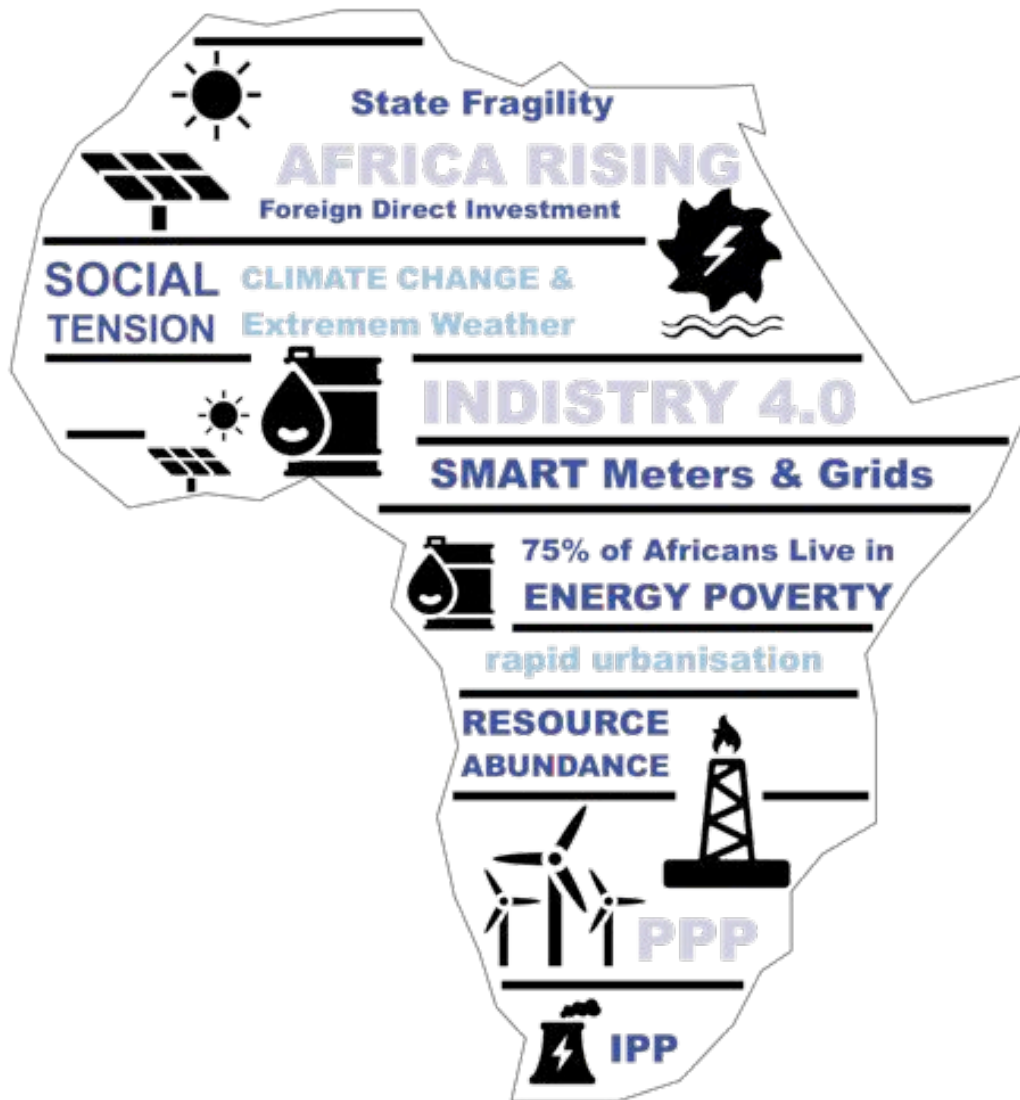


SCENARIOS WHITEPAPER

The Future of Energy and Power Utilities in Africa



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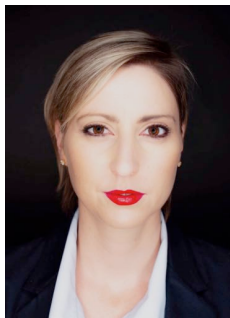
Marius is a member of faculty at the Gordon Institute of Business Science (GIBS) at the University of Pretoria. He teaches scenario planning and strategic foresight, and conducts research on the future of business in South Africa, Africa and BRICS. He consults widely on shared-value strategy and strategic leadership, and holds a Master of Arts in strategic foresight. He is completing a Master of Philosophy in applied social and political ethics and is pursuing a PhD in public leadership.

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1. EXECUTIVE SUMMARY:

SCENARIO 1: THE LIONS OF AFRICA

In 2030, African Utilities have become a pride of agile lions, hunting for new opportunities in collaboration with business and community partners.

SCENARIO 2: HUNGRY HYENAS

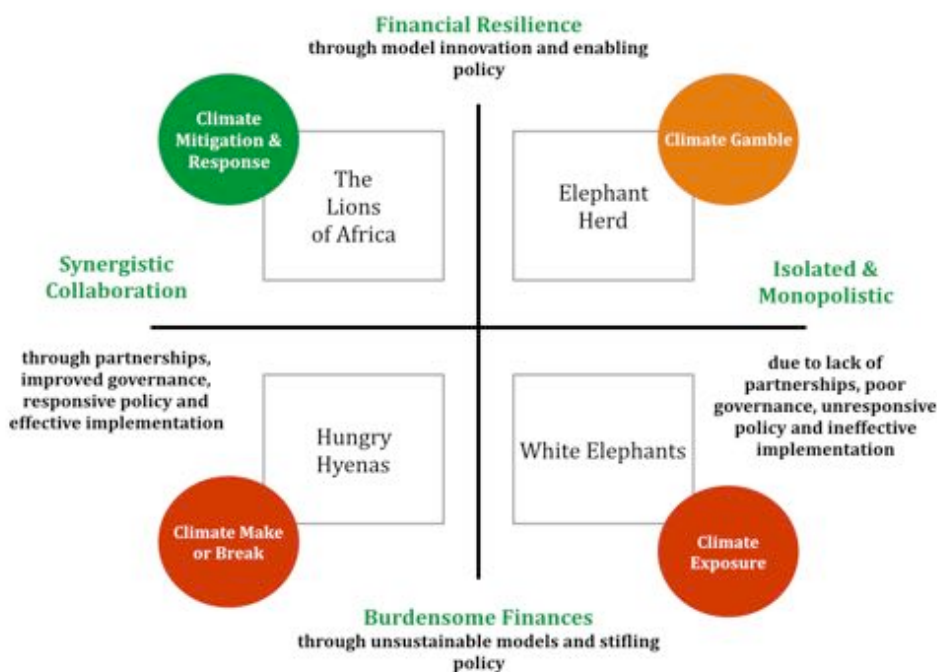
In 2030, African Utilities have become a pack of hungry hyenas, scavenging for short-term returns and manipulating the interests of their business and communities stakeholders.

SCENARIO 3: ELEPHANT HERD

In 2030, African Utilities have become a herd of African elephants, dominating the energy landscape in Africa with bold investments funded from abroad. Businesses and communities have little choice, but to pay a premium to cover the rising cost of sovereign debt that accompanies the rapid expansion of bulk energy infrastructure between 2020 and beyond.

SCENARIO 4: WHITE ELEPHANTS

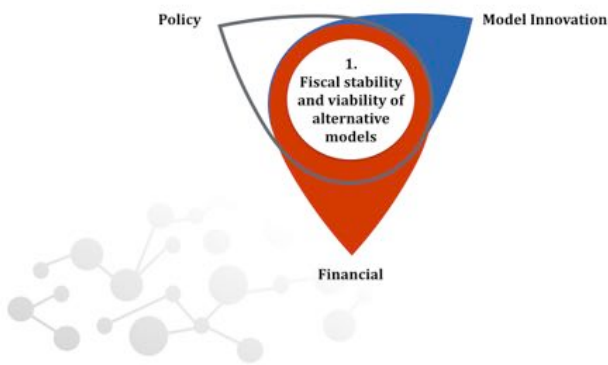
In 2030, African Utilities have become a herd of white elephants, struggling for survival and relevance on a vibrant African continent.



FOUR UNCERTAINTIES FOR AFRICAN UTILITIES

The research revealed that there are four major uncertainties that will determine the future trajectory of African utilities. These four major uncertainties have 3 component factors each that determine their outcome, and have been framed in the form of four key questions, as depicted below.

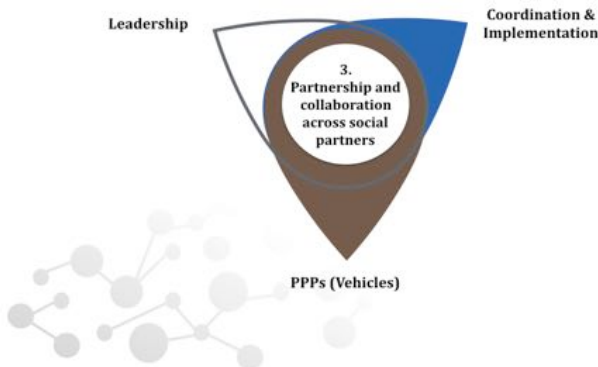
1. Will the precarious fiscal position of utilities be resolved in ways that produce long term sustainability and will viable alternative funding models be created in this process?



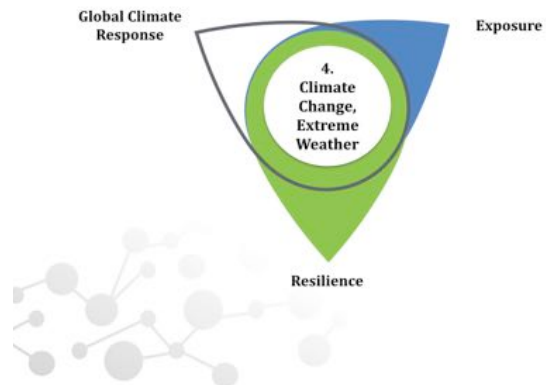
2. Will the low quality of governance in the sector be improved and will this coincide with an appropriate regulatory response that is enabling and facilitating of new opportunities in the sector?



3. Will the private sector and social actors such as communities consider partnership with utilities as an attractive prospect or will they seek to take advantage of new avenues for energy provision in isolation?



4. A wildcard scenario: Will climate change and the effects, such as extreme weather, persist, desist or accelerate, and what will be the effects?



2. SCENARIOS: FUTURE OF AFRICAN UTILITIES

SCENARIO 1: THE LIONS OF AFRICA

In 2030, African utilities have become a pride of agile lions, hunting for new opportunities in collaboration with business and community partners.

This new agility in their operating posture has enabled them to significantly expand their energy mix and diversify their operating models. The development of new financial models for investment, maintenance and revenue generation means that utilities can act more like catalysts for energy production and distribution than the monopolies of old. This enables the proliferation of new bespoke approaches to infrastructure and maintenance in resource constrained markets.

New technology has made a more decentralised approach to infrastructure and logistics increasingly viable, with smart systems significantly improving governance, not only of the utilities themselves, but the public-private partnerships that they enable. Some suggest utilities have become a role-model in the management of the inherent ambiguities of industrial development in so-called Industry 4.0, where the Internet of Things (IoT) has converged with urban infrastructure and logistics. This was evidenced when Huawei smart meters used by the Tunisian Electricity and Gas Company (STEG) were adapted by students from the Technical School in Aswan (Egypt) to utilise TV white space for long-range transmission of data. This allows smart meters to be feasible for low-end customers in areas, where there is inadequate cellular network coverage. This in turn leads to further IoT application in the sector.

As the resultant “SMART” investments roll out, stakeholders talk increasingly about the “democratisation of energy”, as more players develop a stake in the industry. International investors are attracted to the innovative solutions they see being developed on the African continent as utilities incubate new players and small and medium-sized enterprises to maximise their societies’ developmental goals. Utilities now catalyse these benefits across their supply chains.

A particular breakthrough came when the new regional power-sharing and targeted trade agreements for the industry were signed simultaneously between the ECOWAS and SADC countries as well as within COMESA, under the guidance of the AU. These provide utilities with opportunities to leverage their respective strengths in fossil fuels, hydro, solar and nuclear, as well as their institutional and technical capacity, among their counterparts on the continent to maximise regional value creation. Commentators call the shift in the sector no less than a “transformation”. A key enabler of this transformation was the emergence of a new paradigm in regulation and management that swept

the utilities in the 2020s, after the AU President made “**liberation of Africa through energy**” the mantra of the political elite.

The new BRICS Development Bank’s decision to create a specialised “Energy Fund” that focuses on maturing projects on the continent for investment, played a significant role in bringing this political vision to life by crowding in foreign direct investment.

A partnership between the Universities of Cape Town, Nigeria and Kenya to create an “Artificial Intelligence (AI) and Big Data Institute, focused on the development of smart energy systems, and began to bear fruit, when a patent won an international award at the World Energy Council in 2022 in Seoul, South Korea.

Private companies initially tried in isolation to adopt renewable energy to enhance their security of supply. However, the synergy created between the construction industry and utilities, through clever regulation on land use on the part of local authorities, coupled with architecture and the use of incentives on local levies, rallied private sector support for a unified approach to the energy sector in the 2020s. These developments were clearly seen when Victoria Island, Lagos Nigeria became the first fully renewable, integrated SMART city-region on the continent. The Lagos Business School’s programme on “the Business of Energy in Africa” bears witness to the best practice case of Eko Electricity Distribution Company’s (EKEDC) approach of turning Victoria Island into a smart city. The island has since become a node for energy innovation and investment, reminiscent of Silicon Valley’s rise a few decades earlier.

The impact of this trend is particularly significant in new housing developments, as utilities turn rapid urbanisation and the sprawling informal sector into a hive of energy productivity in renewable energy across their value chain, particularly in solar and wind. Through the “Energy for Life Programme”, a regional development fund set up by the World Bank to enable entrepreneurship in renewable energy, owner-run operations previously responsible for illegal connections to the grid in places such as Kibera, Kenya, become micro-entrepreneurs, serving utilities in areas they would otherwise struggle to access. This has immense stakeholder-relations benefits as well as imbedding operational resilience and sustainability into the utilities.

When extreme weather events occurred, such as the 10-year drought in West Africa and the record flooding in Uganda only a year-later, the new energy lions of Africa can respond with resilient solutions in the form of rapid-deployment of energy nodes to support industry and critical public services such as hospitals and clinics. Such adaptability by utilities was unthinkable in the old days of state-led monopolies.

SCENARIO 2: HUNGRY HYENAS

In 2030, African utilities had become a pack of hungry hyenas, scavenging for short-term returns and manipulating the short-term interests of their business and communities stakeholders in the process.

A new extractive approach to the operating posture of utilities hampers them from significantly expanding their energy mix and inhibits the diversification of their operating models. In spite of experimenting with the development of new financial models for investment, maintenance and revenue generation, utilities act more like absentee landlords than public institutions, providing poor service, but demanding high prices for service as a result of the inefficiencies resulting from their entrenched market dominance. This enables the proliferation of poorly planned and politicised infrastructure projects that receive little or no maintenance.

Since new technology increasingly makes a decentralised approach to infrastructure and logistics viable, and smart systems significantly improve options for distribution, utility companies struggle to convince private sector partners to collaborate to harness this potential and develop the public-private partnerships that these developments enable.

In one case, the largest mobile network in Zimbabwe, Econet Wireless, successfully implemented a \$250m, 20 MW solar plant with lithium backup batteries for their own consumption and to supply electricity back into the national grid. However, the Zimbabwe Regulatory Authority (ZERA) reacted by temporarily suspending Econet Wireless' licence. Speculation in the media points to the revenue lost by the state-owned Zimbabwe Power Company (ZPC) as the reason behind this controversial decision, with analysts from the energy sector citing statements by politicians that "Econet is engaging in unfair practice and operating outside their mandate as a telco". Econet is now in talks with the Botswana Power Corporation (BPC) to sell power to mines in Botswana from the solar power plant installed south of Harare. Econet hopes to use the revenue generated to hedge against the electricity costs from ZPC used in their mobile network in Zimbabwe, but this does not address their concerns about security of supply. Dr Stefan Schwartzfischer, CEO of BPC responded to questions from *The Guardian*, saying, "The deal with Botswana will be complicated, but achievable. Nothing has been decided yet." In the meantime, the community surrounding the power-station remains in energy poverty, leading to increased cases of theft and vandalism.

Due to the proliferation of such cases, many suggest utilities have become an imposition and hindrance to the benefits of industrial development in Industry 4.0 rather than an enabler. Since the Internet of Things (IoT) has converged with urban infrastructure and logistics in various sectors, strides in renewable energy adaptation have been made elsewhere in the world. Even amid

innovation, such as when a Huawei smart meter used by the Tunisian Electricity and Gas Company (STEG) was adapted by students from the Technical School in Aswan (Egypt) to utilise TV white space for long-range transmission of data, utilities lagged behind in the adoption curve. Though the innovation allows smart meters to be feasible for low-end customers in areas, where there is inadequate cellular network coverage, utilities' insistence on a "winner-takes all approach" means that they are unable to leverage these IoT applications to their stakeholders' benefit.

As businesses and communities try to adopt these "SMART" technologies, they find themselves increasingly burdened by regulation, as utilities strong-arm them and try to retain the state's stake in the industry. International investors that are initially attracted to the innovative solutions they see developed on the African continent, try to bring new players and small and medium-sized enterprises to the deal-making table, but the untransformed supply chains of utilities create barriers and cost pressures that inevitably strangle their smaller partners.

There is great optimism in the industry, when the new regional power-sharing and targeted trade agreements for the industry are signed simultaneously between the ECOWAS and SADC countries as well as within COMESA. These promise to provide utilities with opportunities to leverage their respective strengths in fossil fuels, hydro, solar and nuclear, as well as their institutional and technical capacity, among their counterparts on the continent to maximise value creation. However, red tape, poorly conceived work visa regulations and an ongoing brain drain of industry experts hollow out the initiative's potential. Commentators lament the snail's pace change in the sector, saying "utilities only play by rules that benefit them". A key bottleneck to industry transformation is the dominance of an old paradigm in regulation and management that stifled the utilities' options in the 2020s, after the African Union President popularised the notion that "only African states have legitimacy as providers of energy to their citizens", an extractive mantra that only serves the interests of the political elite.

Though the BRICS Development Bank made a decision to create a specialised "Energy Fund" that focuses on maturing projects on the continent for investment, their vision remains elusive as project after project fall apart, when the partners withdraw their support due to breaches in agreements by the utilities.

Even a partnership between the Universities of Cape Town, Nigeria and Kenya to create an "Artificial Intelligence (AI) and Big Data" Institute, which focuses on the development of smart energy systems, was dissolved, when it was revealed by a global corruption watchdog that the bulk of donor funding had been funnelled back to utility executives and little was in fact being spent on education and research for the sector.

Private companies increasingly strive in isolation to adopt renewable energy to enhance their security

of supply, leveraging the synergy they clearly see between the construction industry and private investment. However, cumbersome regulation on land use, local levies on solar panels and penalties for non-compliance had derailed private sector support for the energy sector by the late 2020s. These developments are starkly demonstrated in Luanda, when Standard Bank had tried to become the “first fully-renewable financial services firm in Africa”, but had to dismantle their rooftop-grids due to inflated fines imposed on them by the new renewable energy watchdog.

The impact of this trend is particularly significant in new housing developments, where instead of utilities turning rapid urbanisation and the sprawling informal sector into a hive of energy productivity in renewable energy across their value chain, they insist on lease-to-own contracts to secure control of the long-term revenue potential and in the process, indebted consumers who were often left with poor quality, poorly installed assets they do not own but have to maintain. The “Energy for Life Programme”, a regional development fund set up by the World Bank to enable entrepreneurship in renewable energy offers some hope to owner-run operators, but illegal connections to the grid in places such as Kibera, Kenya, remain many customer’s first option. This has immense negative stakeholder relations impacts when utilities begin criminalising energy theft. The result is social upheaval, where energy infrastructure often becomes the target for communities to vent their discontent in the form of vandalism.

When extreme weather events occurred, such as the coldest winter on record in Southern Africa, and the extreme temperatures that followed that summer, the hungry hyenas that utilities had become could not respond with sufficient capacity to mitigate the damage to their infrastructure. In many instances, critical public services such as hospitals and clinics therefore have only intermittent supply, even though the rest of the world seems to realise a future of energy abundance.

SCENARIO 3: ELEPHANT HERD

In 2030, African utilities had become a herd of African elephants, dominating the energy landscape in Africa with bold investments funded from abroad. Businesses and communities had little choice, but to pay a premium to cover the rising cost of sovereign debt that accompanied the rapid expansion of bulk energy infrastructure between 2020 and beyond.

Exactly 125 years after his death, the dream of the controversial industrialist Cecil John Rhodes, of having a railway running from Cape to Cairo are supplanted by a multi-segment power-line, connecting the Northern Cape, South Africa with an industrial part in the Sinai, just south of Cairo. After Brexit, the UK reaches out to their Commonwealth partners with renewed vigour in search of increased trade. Through the CDC Group, the private equity arm of Britain's Department of International Development invests heavily into energy corporations in Africa. South Africa's cash-strapped Eskom is the first to make use of the funding opportunity as part of their financial turnaround strategy between 2019 and 2025. Once financial stability had returned, Eskom quickly utilised their foothold in Uganda as a springboard to scale their operations in Rwanda, Burundi and South Sudan. Next came Egypt, which had formed a long-term EU-partnership with German and French utilities, and sought to counter Britain's advance with an offer of their own under the so-called "Merkel Marshall Plan for Africa", to develop regional power infrastructure by 2030.

The credit lines that Brussels extended to African states cause a backlash in the Euro-zone, when a narrative emerges of "Europe First", and for the first time dominates the political discourse in the eastern European EU member-states, and they are forced to exit the deal with Egypt. CDC is there to fill the void and so realises the continental mega-structure when Rwanda enters the fray. The last to join, it does so when it becomes clear to longstanding President Kagame that his government cannot provide the electricity required to power their thriving regional economic growth node without continental collaboration. This is much to the consternation of China that had tried to position themselves as the provider of choice for industrial infrastructure in Africa. With the funds of the CDC Group backing them, South Africa, Rwanda and Egypt are now the powerhouses powering more than 60% of the entire continent.

This monolithic approach to their operating posture enables the expansion of the energy mix of utilities, but favours large-scale bulk and inhibits the diversification of their operating models. In spite of experimenting with less state-dominated models on a small scale, costly construction projects are the order of the day. For these public institutions, which are now faced with having to provide service comparable to their high price demands as a consequence of their debt burden, the result is a decline in public sentiment. The proliferation of long-term build projects stimulates construction and creates low-skill jobs, making them popular with politicians who think short term, but it has the unintended consequence of crushing small industry players.

In spite of new technology increasingly making a decentralised approach to infrastructure and logistics viable, due to smart systems that significantly improve options for distribution, the utilities opt to retain a centralised approach. By doing so, they capture the value for themselves, but do so at the expense of the state's long-term fiscal sustainability.

Some suggest that utilities have become a flywheel of industrial development, but that their old-school approach undermines developments in Industry 4.0, where the Internet of Things (IoT) converges with urban infrastructure and logistics. A notable innovation occurs when a Huawei smart meter is used by the Tunisian Electricity and Gas Company (STEG), and is adapted by students from the Technical School in Aswan (Egypt) to utilise TV white space for long-range transmission of data. However, this technology goes unused, when poor governance in the roll-out halts projects that would have seen real-time governance through big-data becoming a reality. The stakeholders' benefits of innovation remain elusive as utilities revert back to meter reading regimes due to their incapacity to act with agility in the new tech-driven environment.

Businesses and communities, on the other hand, try to adopt these "SMART" technologies, but find the regulatory environment to be burdensome and archaic, driving up their cost of doing business. Utilities inadvertently strong-arm regulators to protect their own stake in the industry and justify their long-term financial commitments. International investors from the private sector look on in dismay as the secondary development opportunities of a more nuanced approach go untapped. Some investors try their hand by bringing new players and small and medium-sized enterprises into the sector, but quickly learn that the structure of utilities' supply chains are often maintained by plutocratic back-room deals that protect the administrators at the expense of the public interest.

In spite of these challenges, the new regional power-sharing and targeted trade agreements that form the bedrock of the interconnection of ECOWAS, SADC and COMESA have a stabilising effect, particularly in the Central African Republic (CAR). In addition to providing utilities with opportunities to leverage their respective strengths in fossil fuels, hydro, solar and nuclear as well as their institutional and technical capacity, among their counterparts on the continent, the agreements facilitate incentives for reduced conflict. This motivates wealthy countries to continue aid-for-energy schemes, as a lever for security enhancement.

However, commentators are often critical of the "monopolistic behaviour" of those who dominate the sector, saying "foreign interests hold Africa to ransom through their local intermediaries". The old paradigm of state-led energy provision and centralised bulk distribution remains intact, with the African Union President stating that "African states have learned their lessons and must now give citizens energy as a first crucial step in development". In reality, the progress in energy provision

comes at the expense of structural opportunities for diversification and creates long-term burdens for the state purse.

The BRICS development bank, seeking to counter Britain, makes the decision to create a specialised “Energy Fund” that focuses on maturing projects on the continent for investment. Many see this development as a welcome opportunity to expand the non-SOE sector that is relegated to servicing the unprofitable urban sprawl, where the majority of Africans now seek a livelihood.

A partnership funded by the BRICS Energy Fund, between the Universities of Cape Town, Nigeria and Kenya to create an “Artificial Intelligence (AI) and Big Data” Institute focused on the development of smart energy systems, sets out to target these areas at the “bottom of the pyramid” to create lean innovation for low-cost adoption. However, private companies increasingly resign themselves to the lock-in effect of utilities having a dominant role and thus forego renewable energy at the expense of the environment and climate change mitigation.

When extreme weather events occurred, such as the super-storm in Nairobi, Kenya in 2023, the impact was devastating for the continental energy system. The herd of African elephants that utilities had become had not only trampled their smaller players around them, but they were unable to adapt to survive in the new normal of extreme weather. Some observers argue that the sector is repeating the mistakes of the structural reform programmes in Africa in the 1970s.

SCENARIO 4: WHITE ELEPHANTS

In 2030, African utilities had become a herd of white elephants, struggling for survival and relevance on a vibrant African continent.

The rapid advances in renewable energy in the 2020s left monopolistic African utilities struggling for survival and relevance. Having committed themselves to long-term, large-scale infrastructure build projects, the utilities are in denial about how rapidly the rule of the game are changing in the sector.

Since new technology has made a more decentralised approach to infrastructure and logistics increasingly viable, with smart systems and smart grids, the private sector has opted to “drop the grid”, where possible. 80% of all new energy production in Africa is now private sector led and community based. In contrast to this development, SOEs in the energy space still hold on to a future based on past trends, where only governments were able to deliver energy at scale.

This archaic perspective led utilities in the 2020s to commit to the construction of no less than 12 mega-projects, including three hydro schemes, five nuclear facilities and four new coal-fired stations on the continent. Arguing that “Africa’s rapid industrialisation will necessitate an abundance of cheap energy”, utility executives in collusion with corrupt bureaucrats set in motion an excess capacity scenario at a huge cost to the taxpayer.

The regional power-sharing and targeted trade agreements championed by the AU reinforce the notion that state-led energy provision is the only path to an industrialised Africa. On paper, the approach appears attractive, but in practice, it discounts state-inefficiency and the complexities of the operating environments. When, for instance, the Kenyan government signed the multi-year deal with Siemens to build a bio-fuel power station to power the east African development corridor, the project experienced unprecedented delays as the infrastructure began to be seen by the public as a symbol of grand corruption instead of progress. Delivery delays ultimately led to Siemens withdrawing from the project in 2024, leaving Kenya to accept harsher terms from China who see the project as an extension of their “belt and road initiative”.

While the narrative of a “united, integrated Africa” still dominates the rhetoric of the continent’s elite, the reality remains that utilities continue to take a narrow and competitive posture to each other, with little regional vision of progress. It has become commonplace that the revolving door affecting energy executives turns on the whims of political interests, and this deeply undermines their institutional capacity.

Africa, now a 70% urban and increasingly cosmopolitan continent with a population of just under 1,7

billion, looks to micro enterprise, the informal sector and household industry for survival. In this context, retailers see household energy production appliances as an opportunity to expand their value proposition, while utilities fail to harness the benefits of the global green energy revolution. As was the case with mobile phones, where Africa leapfrogged much of the developed world in terms of adoption rates, solar packs and embedded materials for renewable energy change the face of Africa's energy consumption. The World Bank reported in 2028 that Africa's energy poverty rates had fallen from 50% to just under 15%, with the proliferation of solar PV reshaping the very notion of "connectedness". A new category of "liveable-energy" is used to describe urban dwellers who are off-grid, but participate in the new digital economy through micro-grids and "personal-PV". One initiative in Dar es Salaam in Tanzania sees the entire fleet of "tuk-tuk" taxis fitted with embedded solar material roofing. While this is inadequate for industrial strength base-load, it powers the mobile internet network that is the mainstay of Africa's new urban individual.

While Africa boasts large reserves of untapped natural resources, a young population of working age, and a conducive natural environment for agriculture in many parts, the lag effect created by utilities' commitment to white elephant mega-projects has delayed Africa's rise once more.

3. TRENDS, DRIVERS AND SYSTEM DYNAMICS

In order to scan the dimensions of the utility environment, eight categories of trends were identified, namely: (1) production & infrastructure, (2) distribution, (3) end users, (4) financing and revenue, (5) tax, legislation and the regulatory environment, (6) labour relations, (7) partnerships and the (8) macro environmental context.

Major Trends

Production & Infrastructure Trends

15 Trends were identified in relation to production and infrastructure:

1. Private sector leads, as affordable renewable alternatives go mainstream due to power-purchase agreements.
2. Innate geological sources such as in hydro, natural gas, geothermal become viable as conflict-related disruptions subside.
3. Public-private partnerships gain momentum as the likes of German, French and EU investment, by the likes of Siemens, and collaboration drives construction.
4. The insecurity-weak-state nexus undermines operations and confidence in the Niger-delta region.
5. Funding and investment remain a core constraint, especially where growth lags or political stability appears tentative.
6. Climate change policy and abandonment of diesel enhances large-scale solar and wind attractiveness, especially in North Africa and East Africa.
7. Small disruptive players seek to leapfrog large slow-changing SOEs using renewable and decentralised storage.
8. Isolated nuclear projects are the result of international relations prerogatives and regime alliances with Russia.
9. Inclusion of energy-related technical skill in curricula, and Chinese-powered projects are leveraged for local skill development.
10. Urbanisation and population growth continue to outpace infrastructure delivery.
11. Land-tenure related tensions frustrate state-led infrastructure delivery.
12. Smart meters converge with mobile phone apps to drive integration of monitoring, management, billing and energy efficiency and customer services such as during power-outages. This enhances accuracy in billing.
13. Conflict of interest and governance irregularities place a drag on procurement processes.
14. Infrastructure maintenance remains irregular, poorly governed, poorly planned and unsafe.
15. Ageing infrastructure is compounded by theft, vandalism and lack of funding for maintenance.

Distribution

Five trends were identified in relation to distribution:

1. Democratisation of distribution, both in terms of accountability for governance and transparency in consumer-facing activities - consumers will not pay for bad service.
2. Business and private citizens drive de-centralised production due to rapid solar adoption.
3. Rising complexity in governance as distribution systems decentralise, even as demands for better governance rise.
4. Continued tolerance of illegal connections of non-paid usage due to political populism and rising social expectations, especially in cities.

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|---|
| <p>5. Social tensions flare as intermittent power supply, due to poor supply-chain management and institutional incapacity, disrupts traffic, business and frustrates upwardly mobile citizens.</p> |
| <p><u>End Users</u> Six trends were identified in relation to end users and consumers:</p> <ol style="list-style-type: none">1. Direct to consumers by new producers, led by <i>smart</i> urban developments that threaten state-monopoly in the sector.2. Private sector mitigates risk by adopting independent production, without managing systemic impacts of “dropping the grid” and implications for their social license.3. Theft, tampering and vandalism are criminalised on the premise of “national economic interest”.4. Legislative and regulatory framework struggles to keep pace with change in the sector.5. Partial privatisation unlocks rapid ramp in investment and transformation of state-owned champions in some regions.6. Africa’s energy sector and market gains newfound interest from international investors, technical and management firms. |
| <p><u>Financing and Revenue</u> Two trends were identified in relation to financing and revenue of existing producers:</p> <ol style="list-style-type: none">1. Non-payment by government users, municipalities and state-owned companies severely undermine state producers, placing pressure on the fiscus and leading to a public outcry.2. Increased tariffs to offset government subsidies and losses of state-owned producers unintentionally drive adoption of alternatives. |
| <p><u>Import, Export and FDI</u> Two trends were identified in relation to import, export and FDI:</p> <ol style="list-style-type: none">1. Regional actors improve capacity and enhance regional export and power-sharing cooperation.2. Multi-lateral efforts to enhance continental investment transactions find traction as AU member states prioritise energy as a “catalyst for growth”. |
| <p><u>Corruption</u> Major drive to combat corruption, while entrenched networks and vested interests persist and undermine pragmatic and evidence-based policy.</p> |
| <p><u>Labour Relations</u> Major labour movement backlash as renewable energy and alternatives, both in terms of production as well as management and distribution to state-ownership, undermine job security in the mining sector in particular.</p> |
| <p><u>Context: Macro Environment</u>¹ Six trends were identified in relation to the macro environment:</p> <ol style="list-style-type: none">1. Shift from dictatorship and pseudo-democratic one-party states to technocratic authoritarianism.2. Economic growth and inequality diverging, with urban elites rapidly accruing the benefits of post-industrial development, while the peri-urban and rural poor languish with little opportunity.3. Major fluctuations and volatility in oil price undermine petro-economies and result in turbulence in the regulatory and planning environment as it relates to energy |

¹ European Union Institute for Security Studies. African Futures, Horizon 2025. Retrieved at: <https://www.iss.europa.eu/content/african-futures-horizon-2025>

management.

4. Pocketed manufacturing growth, especially in coastal nodes, incentivises the prioritisation of energy reliability.
5. Rising social expectations, particularly among youth, bring energy provision increasingly to the top of the political agenda.
6. Human capital constraints and brain drain, unless policy and an enabling environment is created to retain and share talent with transnational corporations, specifically in high-tech segments and roles.

Technological: Industry 4.0 and 5.0 (Enabling Systems and Services)

Key technological advances;

- Big Data and the resultant AIR capabilities for smart and responsible management and policy.
- Blockchain and decentralised ledger and token-based transacting through FinTech platforms.
- Drone technology, robotics and 3D printing disrupting the logistics constraints relating to transportation, maintenance, monitoring and distribution. This will enable early warning and the partial decentralisation of maintenance capacity through hub-and-spoke organisation.
- Sensors and the Internet of Things creating real-time data analytics capability embedded in hardware and machinery.
- Synthetics materials, intelligent polymers, nano-materials, nano-tubes, nano-sensors and graphene will alter the relationship between scale, strength, cost-of-production and functionality in fundamental ways.²
- Virtual reality, ultra-thin functional coatings or bioactive surfaces or materials, fuel cells and bio-fuels, RFID-based logistics chains,
- Sharing economy emerging in real-economic terms, through high-trust networks that augment relationships, especially in urban centres.

Climate

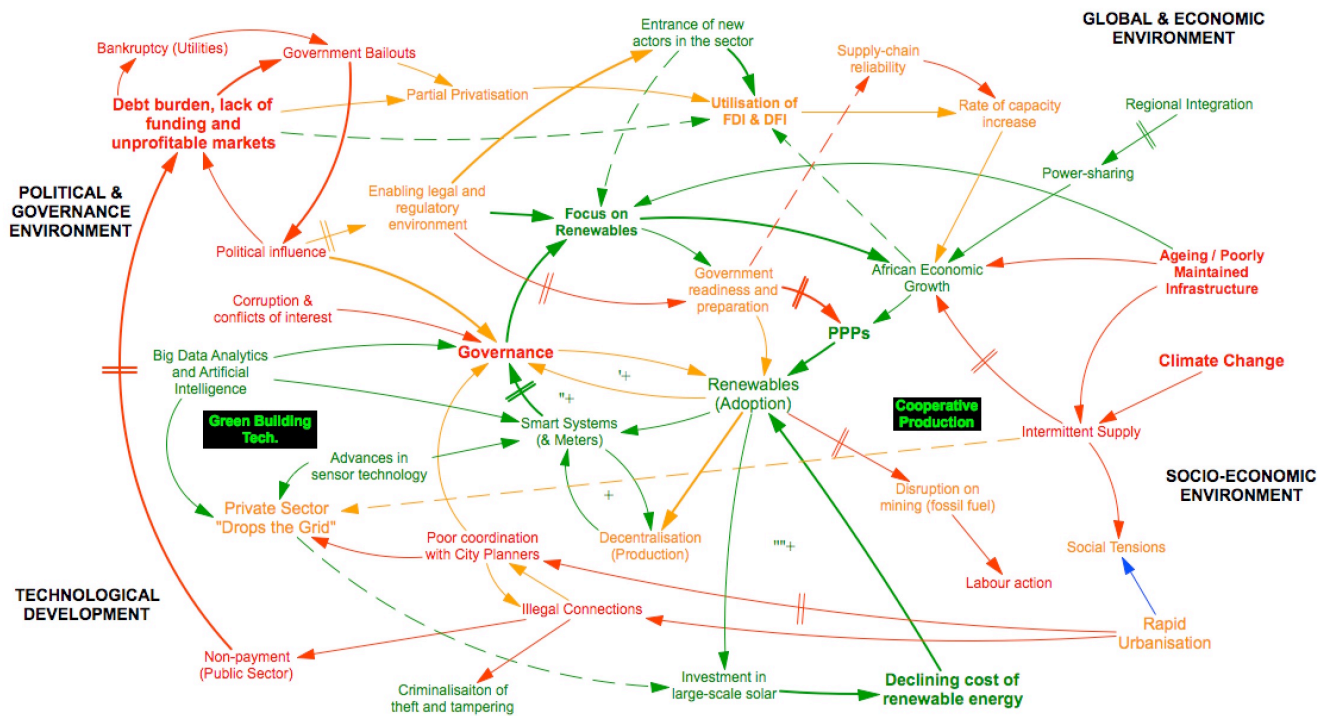
Major resource depletion and land pressures will put pressure on food security and social stability as tensions rise over water scarcity and management.

² Pouris. A. 2012. DTI. Technology Trends, A Review of Technologies and Policies. Retrieved at: http://www.dti.gov.za/industrial_development/docs/Final_Technology_Trends.pdf

SYSTEMS DYNAMICS

Main section contributor, Marius Oosthuizen

In order to understand the interactions between the trends and drivers, and make informed assumptions about the future of utilities in Africa, a systems diagram was created of their inter-relationships. The systems diagram is constructed using an application of systems thinking, or causal-loop diagrams in combination, to articulate an overview of the major dynamics at work and their systemic effects.



Narrative description of the system affecting utilities in Africa

On the periphery of the system are four major contextual domains, namely; the “political & governance environment” (top left), the “global and economic environment” (top right), “technological development” (bottom left) and the “socio-economic environment” (bottom right). These domains reflect ongoing contextual impacts that cause changes in the system and reinforce the dynamics displayed.

In the top left region of the system, the cluster of drivers relating to the **fiscal position** of utilities is displayed. As shown, high debt burdens and lack of funding, compounded by unprofitable markets, lead to the risk of bankruptcy and consequent government bail-outs. In turn, these result in heightened political interference in utilities, which are likely to undermine governance (centre left). Although partial privatisation of utilities becomes attractive, political considerations result in a preference for government bail-outs.

There is a rapid increase in attention paid to opportunities in **renewable energy**, but these are hampered by other factors. Because of poor governance, compounded by high levels of corruption and conflicts of interests, **governance** is likely to remain under strain, leading to the unintended consequences of undermining the creation of an **enabling legal and regulatory environment** for the adoption of renewable energy.

The combined factors of economic growth in Africa, the interest of **new actors in the sector** (from abroad), and the rapidly declining cost of renewable energy (solar in particular) mean that the sector shifts rapidly towards the adoption of renewables. This shift tests the **readiness of governments and preparation** for the management of supply chains in this emerging segment. These factors create an attractive environment for public-private partnerships (PPPs), however, they struggle to maintain the rate of capacity increases required to match economic demand on the continent. This lag is worsened by ageing and poorly maintained infrastructure, which combined with intermittent supply, make “**dropping the grid**” by the private sector attractive, particularly in the form of adoption of privately managed renewable production. This, reinforced by advancements in technology, particularly **artificial intelligence and Big Data analytics (which make new forms of smart systems possible)** rapidly drive down the cost of customised renewable energy solutions. This drives a notable shift towards decentralised production, which as a result of the new technological capabilities, raises the prospect of rapidly improving governance mechanisms. An emergent factor emerging from this cluster of forces is an accelerated rise in **green building technology**.

Rapid urbanisation simultaneously challenges government’s ability to meet social expectations, and strains the ability of utilities to **coordinate their plans with urban planners**. The consequence is a rapid rise in illegal connections, non-payment and in some instances, even non-payment by government users and distributors. This produces the emergent prospect for **cooperative** production, but poses significant management and viability questions.

A major external factor is the effect of **climate change and extreme weather**, which undermines supply chains, infrastructure and occasionally disrupts development efforts. Longer-term views foresee this factor leading to enhanced migration and feed into the informal effects of urbanisation as described above.

From the systems analysis, 11 key leverage points emerge that have the potential to drastically alter the outcomes of the system; these are clustered through a process of qualitative synthesis into four key uncertainties, as follows:

1. **Fiscal stability and viability of alternative models:** Will the precarious fiscal position of utilities be resolved in ways that produce long-term sustainability and will viable alternative funding models be created in this process?
2. **Governance and regulatory readiness:** Will the low quality of governance in the sector be improved and will this coincide with an appropriate regulatory response that is enabling and facilitating new opportunities in the sector?
3. **Partnership and collaboration across social partners:** Will the private sector and social actors such as communities consider a partnership with utilities as an attractive prospect or will they seek to take advantage of new avenues for energy provision in isolation?
4. **Climate Change: A wildcard / shock scenario:** Will climate change and the effects thereof such as extreme weather, persist, desist or accelerate, and what will be the effects?

These major uncertainties set the backdrop for the alternative future scenarios for African utilities.

4. DISCUSSION OF TRENDS:

Main section contributor, Elrich Linde

As stated above, in order to scan the dimensions of the utility environment, eight categories of trends were identified, namely: (1) production & infrastructure, (2) distribution, (3) end users, (4) financing and revenue, (5) tax, legislation and the regulatory environment, (6) labour relations, (7) partnerships and the (8) macro environmental context.

Production & Infrastructure

To the person on the street, reliable production of electricity and distributing energy to end user at an acceptable price are essentially what energy utilities are all about. Yes, there are many complexities and intricacies to making it happen, but if energy utilities manage to achieve that, then the average person will go on with their lives without giving the existence of energy utilities a second thought. This would leave the utilities with the freedom to focus on improving doing their work within their own timeframes and budgets. Should the utilities fail to produce and distribute energy reliably and at an acceptable price for their clients, then life gets difficult for everybody, for clients, civil society at large, the utilities and for governments.

Fifteen trends were identified in relation to production and infrastructure. These trends are listed below, followed by a short discussion.

1. Private sector leads, as affordable renewable alternatives go mainstream due to power-purchase agreements.
2. Innate geological sources, such as in hydro, natural gas, geothermal become viable as conflict-related disruptions subside.
3. Funding and investment remain a core constraint, especially where growth lags or political stability appears tentative.
4. The insecurity and weak-state nexus undermines operations and confidence in the Niger-Delta region.
5. Public-private partnerships gain momentum, for example German, French and EU investments, such as Siemens, and collaboration drives construction.
6. Climate change policy and abandonment of diesel enhances large-scale solar and wind attractiveness, especially in North Africa and East Africa.
7. Small disruptive players seek to leapfrog large slow-changing SOEs using renewable and decentralised storage.
8. Isolated nuclear projects are the result of international relations prerogatives and regime alliances with Russia.
9. Inclusion of energy-related technical skill in curricula, and Chinese-powered projects are leveraged for local skill development.
10. Urbanisation and population growth continue to outpace infrastructure delivery.
11. Land-tenure-related tensions frustrate state-led infrastructure delivery.
12. Smart meters converge with mobile phone apps to drive integration of monitoring, management, billing and energy efficiency and customer services, such as during power outages. This enhances accuracy in billing.
13. Conflict of interest and governance irregularities place a drag on procurement processes.
14. Infrastructure maintenance remains irregular, poorly governed, poorly planned and unsafe and;

15. Ageing infrastructure is compounded by theft, vandalism and lack of funding for maintenance.

Most African countries cannot keep up with the demand for electricity. Governments have limited resources for a host of complex issues, with electricity being only one of them. Every decision has multiple possible intended and unintended effects, and therefore government institutions usually take longer to make decisions and embrace new initiatives. In short, governments and state-owned enterprises (SOEs) need to avoid making mistakes to stay in power. The private sector, on the other hand, needs to be nimble and quick to embrace opportunities and new technologies to survive.

The falling cost of renewable energy and related technology is quickly changing the landscape for power generation globally. This is most evident in the drop in photovoltaic (PV) solar technology cost. With the average plant implementation time of two years to get the electricity onto the grid, this change in technology is simultaneously a great opportunity, but can also be viewed as an unknown, unregulated industry and therefore an inherent risk to slow, risk averse SOEs.

This is where public private partnerships between SOEs and independent power producers in the renewables sector are probably the solution for both the public and private sectors. An example is the South African Government that recently signed agreements with another 27 IPPs, worth \$4,7bn. By creating a power purchase agreement (PPA) between the IPPs and SOEs as the off-taker, the SOEs do not contribute financially or carry any of the risks during the engineering, procurement and construction (EPC) phase of the plant. If there are delays or anything goes wrong during the EPC phase, this rests in the hands of the private sector. The SOEs only pay once the IPP's renewable plant feeds power into the grid. In creating the PPA, government therefore passes the risk of the EPC phase onto the private sector.

The private sector is usually confident that they can mitigate these risks and as long as they have a solid PPA in place, they also tend to find the necessary capital to construct the renewables plant. This is often achieved by a combination of equity and debt finance to fund the project. Since the bulk of the cost of renewable energy power plants is incurred during the EPC phase, compared to thermal energy, where the ongoing operational cost to fuel the plant are the major cost over the lifetime of the plant, this transfer of risk during the EPC phase – when looked at in isolation – makes for a very appealing prospect for both the public and private sectors.

Africa is rich in resources. Significant new discoveries of oil and gas fields have the potential to improve millions of lives, if harnessed properly. Unfortunately, conflict-related disruptions often hamper utilising these finds. When conflict subsides, opportunities can be embraced to an extent, where countries can become leaders in their field in Africa. An example of this is Kenya, the African leader in geothermal energy with an installed capacity of 579 MW. The second largest geothermal producer in Africa, far behind Kenya, is Ethiopia with 7.3 MW. It is believed that the countries lying on the East Africa Rift System have the potential to produce upwards of 4000 MW of geothermal energy. Lying on the East African Rift System allows easier access to the internal heat of the Earth that is used to create geothermal energy. Countries like Rwanda, Djibouti and the Union of Comoros have now joined the African league of geothermal power producers and are receiving funding to help exploit this potential. Getting funding, however, is not an easy task when there are conflict-related disruptions happening in the country, as the risks are just too high for investors.

In 2017, Shell released a report that highlighted that its operations were still threatened by insecurity in the Niger Delta and it remains a major concern with persisting incidents of crime, vandalism, threats from militant groups, host community agitations and offshore piracy. According to Shell, illegal refining and third-party interference are the main sources of pollution in the Niger Delta, and 90% of the spills in excess of 100 kilograms were caused by third-party interference. Though a significant improvement from 2015, when it lost the equivalent of 25,000 barrels of crude oil a day due to 93 sabotage-related spills, in 2016, it lost the equivalent of 5,660 barrels of crude oil a day due to 45 sabotage-related spills.

Establishing an effective energy network in a country is a long and costly undertaking and one that is very difficult to achieve without external investors. African countries would be wise to take heed of two statements that Walter B. Wriston, former chairman and CEO of Citicorp (later became Citigroup), made:

“Capital goes where it is welcome and stays where it is well treated” and “Countries don’t go bust”.

Investors are always looking for opportunities to invest in a country. Governments should show that investors’ capital is welcome by making it easy for them to invest. When investors are allowed to exit the investment after a fair term, with a decent return on investment (ROI), it is likely that they will reinvest that money in the next project as their capital will be treated well. Zimbabwe is an example that countries ‘do not go bust’. It had the second highest hyperinflation on record in 2008, but now foreign investments are starting to flow back into the country under new leadership. That means there is hope for many other African countries that are in dire need of capital to kick off energy projects.

International organisations are keen to partner with governments on implementing large-scale energy projects. This can be seen in Egypt, where Siemens is building the world’s largest energy plant for \$9,4bn. These three gas-fired plants will be able to provide electricity to 45 million people. Also, in Egypt as part of its \$US 500 million framework to support Egypt’s renewable energy development, the European Bank for Reconstruction and Development (EBRD) is financing 16 new solar power plants with a capacity of 750 megawatts. Once completed, it will be the largest solar site in Africa. In Ghana, Siemens is looking to install a “waste-to-energy” plant; and in Burkina Faso, West Africa’s largest solar power plant (55-hectare plant) will be able to churn out 33 megawatts, enough to power tens of thousands of homes. This €47.5m plant has been funded with €25m in donations from the EU and a loan of €22.5m from France’s development agency.

Policy change is often the catalyst for change to take place. An example is Egypt that possesses an abundance of land, sunny weather and high wind speeds, making it a prime location for renewable energy. The renewable equipment market is potentially worth billions of dollars and Egypt intends to supply 20% of generated electricity from renewable sources by 2022. Of this, wind energy will provide 12%, hydro power 5.8%, and solar 2.2%. The solar energy plan aims to install 3.5 GW by 2027; including 2.8 GW of PV (photovoltaic) and 700 MW of CSP (concentrated solar power). The strategy also plans to generate 7.2 GW (12% of generated electricity) from wind by 2022. The plan envisions significant private sector involvement, noting that the private sector will take the lead on 67% of the plan. Over the next three to five years, the Ministry of Electricity and Renewable Energy plans to add 51.3 GW to the currently installed capacity.

Mobile phone technology allowed Africa to leapfrog the need for fixed-line dial-up and ADSL connections that preceded mobile technology. Likewise, new technology is allowing small players to leapfrog slow-changing state-owned enterprises (SOE) by embracing renewable energy and decentralised storage options. SOEs run the risk of becoming the dial-up equivalent of energy and becoming irrelevant if they refuse to acknowledge and utilise new technology to stay current. As an example, in November 2017, Tesla completed a \$50m, 100 MW battery backup system implementation in South Australia in 100 days. A report by McKinsey and Co presented at the recent Australian Energy Week conference claimed that Tesla's 100 MW / 129 MWh battery has now reduced grid service costs by 90%, taking over a 55% share of the state's frequency control ancillary services (FCAS).³ Put in context, in a single day in October 2016, Southern Australia spent more than \$4,5m in regulation services, costing the state more than \$50m between 2016 to April 2018. On 18 December 2017, the battery backup system responded to a loss of 689 MW within a fraction of a second, where alternatives options would have taken minutes to respond and adjust. Not only is it therefore outperforming the alternatives, it is also estimated to have made an estimated \$1,4m from this by buying power when the prices are low and selling when the prices are high.⁴

Nuclear energy stays a topic of contention the world over. Memories of the Chernobyl and Fukushima nuclear disasters questions, if nuclear should really be considered a renewable energy and whether it is a vital component to the energy mix required in Africa. An example of this in South Africa is, where \$4.7bn worth of investment by 27 independent power producers (IPP) were held up for more than two years under the administration of former President Jacob Zuma who favoured a highly suspect nuclear deal with Russia. Rosatom, Russia's nuclear agency says that it has memoranda of understandings with Egypt, Kenya, Nigeria, Sudan, Zambia and Uganda. Egypt is the only country that has a concrete plan in place for a 4.8GW nuclear plant. Uganda probably has the highest nuclear ambition, aiming to have 30GW of nuclear power by 2026. That is more than 16 times the nuclear power existing in Africa at the moment, being the Koeberg nuclear plant in South Africa of 1.86GW.⁵

Most African countries are experiencing "brain-drain" as their brightest people move abroad for higher pay for their skills. Rapid technology changes place further demands on in-country skills. It is encouraging to see that some African countries are responding positively to these challenges. Egypt started a first-of-its-kind renewable energy curriculum at technical schools to ensure they have the required skills to develop, implement and maintain existing renewable energy plants. Large-scale energy projects are also an opportunity to bring foreign skills into the country for a period of time and allow for skills to be transferred to locals. An example of this can be observed in South Sudan, where the Chinese partners are establishing a power pole factory with the intention of developing the transmission network, but at the same time transfer knowledge to the locals. Likewise, in South Africa, the Renewable Energy Independent Power Provider Programme (RE IPPP) mandates not only a certain percentage local ownership in renewable projects, but also for appropriate transfer of skills to the local communities during the project.

³ Gheorghiu, I (2018, May 14). South Australia's grid service costs slashed 90% by Tesla battery. Retrieved from <https://www.utilitydive.com/news/south-australias-grid-service-costs-slashed-90-by-tesla-battery/523436/>

⁴ Harmsen, N (2018, April 6). How Elon Musk's big Tesla battery is changing Australia's power landscape. Retrieved from <http://www.abc.net.au/news/2018-04-06/tesla-battery-outperforms-coal-and-gas/9625726>

⁵ Winkler, H (2018, May 16). Why nuclear power for African countries doesn't make sense. Retrieved from <https://www.fin24.com/Opinion/why-nuclear-power-for-african-countries-doesnt-make-sense-20180516>

Urbanisation is having an effect on societies globally, but in contrast to most Western countries, population growth in Africa is increasing rapidly alongside urbanisation, and the combination continues to outpace infrastructure delivery. In Nigeria, the largest economy in Africa based on GDP, the population is approximately 196 million people, equating to 2.35% of the world's population. Put differently, 1 out of every 43 people in the world is Nigerian. In an African and global perspective, it is therefore very relevant to keep track of Nigeria's energy requirements when one talks about urbanisation and infrastructure delivery. The population growth rate for Nigeria is 2.6% (compared to 0.7% in the USA), that is over 5 million people added to the population per year. Its installed power capacity is 13.34GW⁶, but on most days, Nigeria only generates 4,000 MW.⁷ Over the six-year period from 2010-2016, Nigeria's installed capacity increased from 8,303MW to 13,339MW, a 60.7% increase from a low base. When one considers that during the same time the population increased from 158.58 million to 185.99 million⁸, (a 17,3% growth from a high base), one can see the problem. Installed capacity went down from 0.00004MW per person in 2010 to 0.00001MW per person in 2016. In other words, at the end of 2016, every person only had 25% of the power available that they had in 2010. With the population growth rates in Egypt (2%), Ethiopia (2.5%) and Ghana (2.2%), one can conclude that a similar trend is happening all over Africa.

Land remains close to people's hearts and it is a challenging topic to address. When it comes to state-led land purchases to roll out infrastructure projects, there is also the risk that some will try to take advantage of the system. An example of this is in Uganda, where a 225 km transmission line is one of the biggest energy projects to be funded by the Kingdom of Norway, but the project has been stalled through inflated land costs. While the project spokesperson believes that the land prices are overly inflated by greedy individuals, it is likely that the individuals owning the land believe that they have the right to ask higher prices since there is an external demand for the land. When considering that current PV solar technology requires 3.2 hectares of land to produce 1 megawatt power and that 1 megawatt on average powers around 650 homes, it means that to provide power to 1 million homes, one will require 32 million hectares of land. Considering that the average farm size in Gauteng Province in South Africa is 427 hectares, it will mean that the equivalent of approximately 7,500 farms needs to be allocated and purchased, where needed. However, Gauteng does not have that many farms of that size. On the quest for expanding renewable energy in the various African countries, it is not difficult to imagine that there will be many contentious negotiations to be had with land owners in order to roll out power-related infrastructure programmes.

With nearly one third of power produced in Africa never properly billed to customers, it is in utilities' best interest to make the investment and roll out smart meters and smart grid systems, where possible. Where the power is billed, it is often billed incorrectly or contested by the client as billed incorrectly, delaying payment for power produced. Meter tampering and illegal connections are also major challenges for utilities. This is very evident in Nigeria, where the suggestion was made to declare tampering with meters a criminal offense. In an attempt to improve the challenges surrounding metering, Tunisia partnered with Huawei, the Chinese technology manufacturer to develop and implement smart meters. The integrated metering solution will include meter data management software and technology to enable connectivity between the smart meters and the utility firm. The development will ensure optimised revenue collection through accurate billing as well as reduce electricity

⁶ Retrieved from <http://global-climatescope.org/en/country/nigeria/#/enabling-framework>

⁷ Retrieved from <https://www.usaid.gov/powerafrica/nigeria>

⁸ Retrieved from <http://worldpopulationreview.com/countries/nigeria-population/>

theft as a result of meter tampering. It is expected that the utility's customers will be able to use energy more efficiently with access to real-time data. The smart meters will also pave the way for new business models, including demand response and energy efficiency programmes, help manage the grid network in real time and improve its customer services through a reduction in power outages.

Globally, for good reasons there is growing emphasis on organisational governance. Executives are responsible to steer the organisation on behalf of their shareholders in order to maximise the shareholders' return on investment and thereby increase shareholder wealth. In the case of an SOE, the executives play this role to maximise the investment of society at large, for the good of the entire society. When SOE executives are not strictly adhering to that responsibility or even outright ignore it for personal gain, it has a negative impact on the entire country. South Africa's main power supplier Eskom is currently dealing with supplier contracts that were arguably not signed with the best interest of the country in mind. The result is that once these contracts became public knowledge and part of the State Capture enquiries, the coal suppliers found themselves in operational trouble, which in turn put pressure on the required stockpiles needed to prevent load shedding as South Africa was heading into winter. In another example, an executive was accused of serving concurrently on the board of Eskom and an IPP during the time that the IPP was selected to provide power to Eskom, creating a conflict of interests. These governance irregularities end up negatively affecting the utility's procurement process and society at large.

In Nigeria, six employees and twenty-two other people died over a three-month period due to electricity defects. There might be a number of reasons for these tragic deaths, but a key contributor could be that the different power generating companies (Gencos) and distribution companies (Discos) are under tremendous financial pressure and as a result, maintenance is not performed at an acceptable standard and under acceptable conditions. While management performance certainly plays a role, there are always other risks to consider that could cause poor infrastructure maintenance. The largest risk is probably overtrading and it is especially likely to happen when SOEs privatise. Privatisation should therefore be extremely well planned and executed.

During privatisation, the state sells its very expensive SOE assets to the private sector. The state also tends to become the regulator that sets the rules that the newly privatised companies need to operate within. In the case of energy utilities, this will include areas the privatised company will service, the customers in that area and the assets that they will buy and have to maintain. The privatised company usually has to raise foreign debt to be able to purchase these very expensive assets. Therefore, from day one, they are not only under operational pressure, but also exposed to interest rate and currency fluctuation risks. This means that if the local currency devalues against the foreign currency of the debt, the financial pressure compounds. There is very little room for error in the new privatised company that is often staffed by the same people who worked there while it was an SOE. The equity has changed, but not the mindset of the employees. When the privatised company cannot pay their debt, government bail-outs are not that forthcoming as it used to be when it was an SOE. The result is that crucial aspects like maintenance are not getting the attention they require, upgrades are not taking place as they should, leaving the infrastructure ageing with ad hoc repairs taking place. Ageing infrastructure is a challenge for most utilities and often leads to blackouts. This is further compounded by theft and vandalism, while there is no funding available for maintenance. This is a vicious cycle that can easily spiral downwards for any utility finding itself in this kind of situation.

Distribution

The five trends that were identified in relation to distribution are listed and discussed below.

1. Business and private citizens drive de-centralised production due to rapid solar adoption.
2. Rising complexity in governance as distribution systems decentralise, even as demands for better governance rise.
3. Continued tolerance of illegal connections of non-paid usage due to political populism and rising social expectations, especially in cities.
4. Social tensions flare up as intermittent power supply, due to poor supply-chain management and institutional incapacity; this disrupts traffic, business and frustrates citizens.
5. Democratisation of distribution, both in terms of accountability for governance and transparency in consumer-facing activities - consumers will not pay for bad service.

Advancements in technology, especially of solar PV, allow for businesses and private citizens to adopt solar power more readily. Individuals who have a mortgage on their home are more likely to obtain finance from their bank to install solar PV for their home. The benefit to the homeowner is that the power generated is determined at their mortgage interest rate with the potential to fix that interest rate over a 20 to 30 years in some countries. Apart from the maintenance required, the cost is fixed and not determined by the utility prices that are influenced by how well management runs the utility.

In Zimbabwe, the largest mobile telecoms provider, Econet Wireless, was granted a license to produce and consume its own power for their operations with the potential of feeding power into the grid, if needed. Econet is investing \$250m into a 20 MW solar plant with lithium batteries. As a point of perspective, this is the equivalent of 5,4% of Malawi's total power capacity, moving to decentralised production and consumption, and not necessarily relying on traditional distribution networks. In Nigeria, however, headquarters of banks and international oil companies (IOCs) that suffered total power outages from the grid supply have switched to alternative power sources. Though they consider this expensive and investment unfriendly, they have no choice but to ensure that their businesses keep running. The decline in solar power cost might convince these corporates to find more permanent alternative solutions and ensure stable power supply.

With decentralisation, more players are looking after their own interests. More players bring more complexity in the governance required. To make it more challenging, decentralisation is often the result of a crisis or looming crisis, where electricity supply is failing its users, resulting social tension flare-ups. In a very connected world, not having a dependable power supply is no longer acceptable. People desire to improve their lives. This is no different in Africa, where protests are taking place on a daily basis as an outcry against poor service delivery. People find different ways of expressing that frustration as seen by protests of angry woman in Nigeria who believed that their husbands were not staying at home at night because there was no electricity that would help with cooling down their home. Likewise, utility workers had to hide as angry youths in Niger State continued to protest what they termed, 'worst electricity supply situation ever in the history of the state'. Their attitude is understandable, as already discussed, that at the end of 2016 the available installed capacity per person was 25% of what it was per person in 2010. It is in situations like these that businesses and individuals seriously consider generating their own power. Therefore, instead of decentralisation being an effective strategic rollout, it becomes a reactionary process with everyone on the back foot. During this critical time of decentralisation,

appropriate legislation and improved internal governance is required, but as both are lacking, utility staff and citizenry make up their own rules.

Governments cannot afford to allow utilities to collapse and it is perceived that SOEs and critical service providers tend to be bailed out when in trouble. That means that even if nearly a third of the power generated in Africa is never properly billed, illegal connections and non-paid usage will most likely continue to be tolerated. That is especially true, where the provision of power is attached to political promises and in cities, where the social expectation is that everyone should have electricity.

End Users

Four trends were identified in relation to end users and consumers. These are listed and discussed below:

1. The private sector mitigates risk by adopting independent production, without managing systemic impacts of “dropping the grid” and implications for their social license.
2. Direct to consumers by new producers, led by *smart* urban developments, that threaten state-monopoly in the sector.
3. Legislative and regulatory framework struggles to keep pace with change in the sector.
4. Theft, tampering and vandalism are criminalised on the premise of “national economic interest”.

Businesses require reliable provision of electricity to operate. When that does not happen and they choose to continue with their business in that location, they reduce their energy requirements with the latest technology (i.e. LED lights) and often make sure they have reliable electricity by generating their own. When it is clear they can do it themselves in a cost-effective way, there is the risk that they will drop off the grid entirely. Losing multiple large businesses as customers has a financial impact on the utility that could place the utility in a difficult position. As a case in point, the City of Cape Town in South Africa experienced a water crisis during 2017/2018 and urged the people to reduce their water consumption. When the people reduced their water consumption with 50%, the City was faced with a 50% shortfall in their revenue from water consumption. When the City tried to make up the shortfall by increasing the water tariff with 50%, they were prevented from doing so by the courts.

Smart cities are developed across the globe. Such cities are designed to be as resource efficient as possible for the people who live, work and play in the cities. People who tend to live in smart cities tend to be conscious about minimising their own carbon footprint. It is therefore understandable that renewable energy, mostly solar PV and wind energy is designed as part of the smart city’s infrastructure and when the state-monopoly is not playing in this industry, it creates a void for new producers to step in and supply electricity directly to the customer.

The legislative and regulatory framework struggles to keep up with these changes. As an example, in South Africa Eskom tried to force everyone with the generating capacity of less than 1MW to declare and register it with Eskom. After a public outcry, Eskom hastily retracted that decision. In the same way, utilities are grappling with how to handle illegal connections and vandalism, ranging from tolerating it to trying to criminalising it through legislation.

Financing and Revenue

Two trends were identified in relation to financing and revenue of existing producers.

1. Non-payment by government users, municipalities and state-owned companies severely undermine state producers, placing pressure on the fiscus and leading to a public outcry.
2. Increased tariffs to offset government subsidies and losses of state-owned producers unintentionally drive adoption of alternatives.

Non-payment is a challenge that most utilities face and when one SOE owes money to another, the pressure ends up entirely on the fiscus. Eskom South Africa revealed that municipalities owed them a combined amount of R6b in 2016 that escalated to R13,5b in 2018, while Eskom itself is struggling to pay its mammoth debt of R300b.⁹ This debt is so large that the entire country runs the risk of being further downgraded by the ratings agencies, should Eskom not handle this debt correctly.¹⁰ As SOEs try to recoup their losses and minimise government subsidies by increasing tariffs, they unintentionally drive users to adopt alternatives. These alternatives are typically the use of solar PV for individual homes, but some schools have even moved to using hydrogen-based energy.

Import, Export and FDI

Four trends were identified in relation to import, export and FDI. These are listed and discussed below.

1. Regional actors improve capacity and enhance regional export and power-sharing cooperation.
2. Multi-lateral efforts to enhance continental investment transactions find traction as AU member states prioritise energy as a “catalyst for growth”.
3. Partial privatisation unlocks rapid ramp in investment and transformation of state-owned champions in some regions.
4. Africa’s energy sector and market gains newfound interest from international investors, technical and management firms.

Various African countries have agreements in place to import and export power to each other. It is also good to see that some countries such as Ghana have increased exporting electricity to neighbouring countries. Africa also continues to see international investors investing in the energy sector all over continent. Where some investors might be leaving Africa, the investments in energy are showing a different trend. Partial-privatisation plays a large part in drawing in local and foreign investments to a region. An example can be seen in South Africa, where President Cyril Ramaphosa and others have indicated that some of the SOEs might undergo some form of privatisation during the same time that he initiated a major investment drive for foreign investment into South Africa.

Corruption

Corruption has unfortunately been part of the history of SOEs. There is, however, a major drive to combat corruption. Entrenched networks and vested interests, however, persist and undermine pragmatic and evidence-based policy.

⁹ Dentler, L & Nicolaidis, G. (2018, January 30), Eskom profits down by 34%, debt sitting at over R300bn. Retrieved from <http://ewn.co.za/2018/01/30/eskom-profits-down-by-34-debt-sitting-at-over-r300bn>

¹⁰ Omarjee, L. (2018, April 18), R13.5bn municipal debt burden 'really beyond Eskom'. Retrieved from <https://www.fin24.com/Economy/Eskom/r135bn-municipal-debt-burden-really-beyond-eskom-20180418>

Labour Relations

There is a major labour movement backlash taking place as renewable energy and alternatives are gaining momentum. This is aimed against both, production as well as management and distribution of renewables and for state-ownership instead of public private partnerships. There is a belief that renewable energy will undermine job security in the mining sector in particular. While renewables will influence jobs in the mining industry, research showed that renewable energy creates jobs 12 times faster than the rest of the economy in the US¹¹. There is no reason why that should not be the case in Africa. Renewable energy in general also creates better working conditions than those of coal mining.

Context: Macro Environment¹²

Six trends were identified in relation to the macro environment.

1. Shift from dictatorship and pseudo-democratic one-party states to technocratic authoritarianism.
2. Economic growth and inequality diverging, with urban elites rapidly reaping the benefits of post-industrial development, while the peri-urban and rural poor lag behind with little opportunity.
3. Major fluctuations and volatility in the oil price undermine petro-economies and result in turbulence in the regulatory and planning environment as it relates to energy management.
4. Pocketed manufacturing growth, especially in coastal nodes, incentivises the prioritisation of energy reliability.
5. Rising social expectations, particularly among youth, bring energy provision increasingly to the top of the political agenda.
6. Human capital constraints and brain drain, unless policy and an enabling environment are created to retain and share talent with transnational corporations, specifically in high-tech segments and roles.

Technological: Industry 4.0 and 5.0 (Enabling Systems and Services)

Key technological advances;

- Big Data and the resultant AI capabilities for smart and responsible management and policy.
- Blockchain and decentralised-ledger and token-based transacting through FinTech platforms.
- Drone technology, robotics and 3D printing disrupting the logistics constraints relating to transportation, maintenance, monitoring and distribution. This will enable early-warning and the partial decentralisation of maintenance capacity through hub-and-spoke organisations.
- Sensors and the Internet of Things creating real-time data analytics capability embedded in hardware and machinery.
- Synthetics materials, intelligent polymers, nano-materials, nano-tubes, nano-sensors and graphene will alter the relationship between scale, strength, cost-of-production and functionality in fundamental ways.¹³

¹¹ Samuelson, K (2017, January 2017) Renewable Energy Is Creating Jobs 12 Times Faster than the Rest of the Economy. Retrieved from <http://fortune.com/2017/01/27/solar-wind-renewable-jobs/>

¹² European Union Institute for Security Studies. African Futures, Horizon 2025. Retrieved at: <https://www.iss.europa.eu/content/african-futures-horizon-2025>

¹³ Pouris, A. 2012. DTI. Technology Trends, a Review of Technologies and Policies. Retrieved at: http://www.dti.gov.za/industrial_development/docs/Final_Technology_Trends.pdf

- Virtual reality, ultra-thin functional coatings or bioactive surfaces or materials, fuel cells and bio-fuels, RFID-based logistics chains.
- Sharing economy emerging in real-economic terms, through high-trust networks that augment relationships, especially in urban centres.

Climate

Major resource depletion and land pressures will put pressure on food security and social stability as tensions rise over water scarcity and management.

5. POLITICAL CONTEXT OF AFRICAN UTILITIES

Main section contributor, Ronak Gopaldas

Utilities, due to their prominence in the state-owned enterprise landscape by virtue of their strategic economic role, are widely exposed to political developments. In this section, we consider the major political developments in key regional centres; Nigeria, South Africa, Malawi, Botswana, Zimbabwe, Mozambique, Uganda, Burkina Faso, Namibia and South Sudan. We look at developments as they relate to demographics, succession and elections.

Africa's democratic landscape has changed dramatically in the last two decades. Prior to 1990, peaceful and democratic transfers of power on the continent were rare and multi-party elections largely outlawed. Today, predictable and constitutional transfer of power between competing parties are more commonplace and all but a handful of African states hold multi-party polls at regular intervals. This has raised hopes that Africa would benefit from the "democratic dividend" and translate these gains into a sustained period of "bottom up" growth, industrialisation and urbanisation, which will deliver jobs and prosperity to its fast-growing younger population.

Yet, despite the African continent's strong GDP growth compared to a slower global recovery post-2008/9, only a handful of African countries have managed to make substantial inroads into reducing inequality. Growth has thus been *exclusive* and entrenched structural barriers to upward mobility. Large wealth gaps between the rich and the poor continue, with a fragile middle class on the continent struggling to stay above the poverty level. This is exasperated by weak and fluctuating currencies, as well as turbulence in the oil price in the last few years.

Now, societies across the world are grappling with non-inclusive growth, and the yawning global inequality gap has come sharply into mainstream discussion. In Africa, the continent with the youngest population and highest birth rates globally, this call has been heard clearly as the unequal benefits of rising economic growth threatening to spill over into major societal problems, if left unaddressed. This is particularly important considering Africa's potential demographic dividend, which could well translate into a demographic disaster, if opportunities for inclusive economic growth are not harnessed. A rapidly urbanising, often uneducated, unemployed youth bulge does not bode well for political stability.

Against the backdrop of "politics of the stomach", it is important to unpack some of the key trends that will shape the political environment in Africa in 2018 and beyond.

These are as follows:

- Demographic disconnect,
- Succession,
- Elections.

However, an important caveat must be highlighted – like its physical landscape, the political environment of Sub-Saharan Africa is diverse, varied and complex. There is no one-size-fits-all approach and the continent features some good, some bad and, of course, some ugly likely outcomes.

Demographic disconnect

There are very few African leaders under the age of 65, and even fewer under 60; yet, according to the Population Reference Bureau, 41% of Africa's billion citizens are under the

age of 15. There are almost as many youth on the continent as the combined population of Canada, the United States and Mexico. In all, a staggering 70% of the population is under 30.

Since 2011, Africa has seen uprisings in Egypt, Tunisia and Burkina Faso. The common feature in these revolts was a united opposition against complacent, long-serving leaders and governments alienated from their citizens and unresponsive to their needs. The rapid spread of protests and rising public anger ultimately resulted in a regime change in all three countries.

The combination of easy access to social media, the proliferation of mobile phones and youthful anger should make African autocrats increasingly uncomfortable. With increased demands for accountability, most despotic African leaders view these trends as a threat to their style of governance as it exposes the fundamental tension between the open culture of millennials and the button-up culture of government. This tension is likely to be expressed in the expectations of Africa's population on the performance and service delivery of major institutions, among which utilities companies are an obvious target.

Succession

'Third-termism' continues to dominate African politics. Between 2000 and 2015, 15 African leaders had tried to remain in power by changing their countries' constitutions to remove presidential term limits. With Congolese President Denis Sassou Nguesso, Rwandan President Paul Kagame and Burundian President Pierre Nkurunziza all having already amended their constitutions in recent years to pursue controversial third terms in office, this is a trend that is likely to persist.

The sudden passing of long-serving leaders represents a risk due to increased uncertainty and could precipitate a political crisis and economic upheaval. Due to the power vacuum that results, and the need for a realignment of patronage accumulated in networks under the outgoing leader, typically, the passing of a leader results in uncertainty about whether these transitions will be orderly or disorderly, violent or nonviolent, and whether they will usher in wholesale change or a maintenance of the status quo.

Although improved constitutional structures to manage a forced succession or moves to place an heir-apparent in a politically advantageous position have created a clearer platform for steering such transitions, the departure of overbearing rulers in these regimes will undoubtedly leave a vacuum that will be hard to fill. Utility companies that require long lead times for project delivery, require political stability and certainty to secure funding, and depend on political support for effective governance and operations, are likely victims of this upheaval.

Elections

2017 was a mixed bag politically for Africa, as noted by Alex Vines of Chatham House. Regional leaders from the Economic Community of West African States ensured that President Yahya Jammeh obeyed the will of the Gambian people to end his 22-year reign. President Robert Mugabe was forced from office, the only leader independent Zimbabwe had known in its 37 years. In Angola, José Eduardo dos Santos, also president for 37 years, ended his own tenure, enabling a smooth transition. Meanwhile, Kenya's Supreme Court made history by declaring the result of the August election void and post-conflict Liberia saw protests through the courts and not on the streets, resulting in the first peaceful transfer of civilian presidents since 1944.

With several elections across Africa in 2018, political dynamics will again be at the forefront of investors' minds. The usual themes of fiscal slippage, currency weakness, policy inertia, corruption and the prospects of systemic violence in and around election time will resurface. Zimbabwe, Cameroon and Mali will be the most interesting of these to watch. The high levels of mobile phone and internet penetration of the last decade will result in these developments being more openly reported than any time in history. While this bodes well for the strengthening of transparency, accountability and ultimately, governance, it does raise the spectre of increased risk aversion as images of isolated instances are likely to be seen by outsiders against a backdrop of concern about the continent's long-term prospects for stability.

The divergence between sub-regions is another noteworthy trend to watch. While West Africa continues to make democratic strides with peaceful handovers of power, many countries in East Africa are displaying signs of autocracy, albeit taking an increasingly technocratic approach to governing. Meanwhile in Southern Africa, reform is the dominant theme, where new leaders of liberation movements in Angola, South Africa and Zimbabwe are steering their economy along more pragmatic economic paths, while having to manage their rear-guard, where factional politics and entrenched interests complicate their policy choices. This turbulence will continue to be felt across the boardrooms of utility companies.

Country analysis

- Nigeria

President Muhammadu Buhari announced on 09 April his candidacy for the position of presidential flag bearer for the ruling APC coalition, ahead of Nigeria's 2019 elections. Amid rumours of the president's ill health in 2017, reports were rife of senior figures within the APC positioning themselves for a presidential bid, should Buhari be rendered incapacitated. The announcement therefore averts a messy succession battle in the party ahead of the 2019 poll.

Buhari's announcement means that the incumbent could serve a second presidential term, should APC delegates collectively assent to his candidacy during the party's forthcoming national elective conference (NEC) – the date of which has yet to be disclosed – and should he indeed emerge victorious in the 2019 ballot.

The news has elicited a mixed reaction. On the one hand, investors reacted favourably since this provides a level of certainty, within which they can operate. However, many remain underwhelmed by Buhari's candidacy, given the poor economic performance of the economy under his tenure, a period, during which a weak oil price and prominent terror-related insecurity have hampered government initiatives. Buhari's first term was characterised by clumsy policy own goals and uncertainty, and an economy operating in auto-pilot. The hope that a second term (if it happens) will see a more pragmatic economic policy stance adopted, includes a push to decrease Nigeria's oil revenue dependence and the formalisation of key industrial sectors to improve the investor climate that surrounds them.

In the run-up to the election, the usual questions regarding renewed militancy in the Niger Delta and security in the north of the country, and the preparedness of the Independent Electoral commission will emerge as dominant themes. The health of the opposition PDP and their choice of flag bearer will also determine how close the 2019 election will be. However, with the campaign cycle now underway, policy inertia should therefore be expected as politicking takes centre stage. In spite of these internal dilemmas, Nigeria will

continue to assert a leadership role in ECOWAS, both economically and more importantly, politically.

Utilities in Nigeria: Reform of the energy sector in Nigeria will remain a perennial issue, given its huge drag on productivity. However, substantive change is unlikely to be achieved in the near term, given the political cycle and the associated sensitivities involved in making wholesale changes – particularly to cost reflective tariffs – in an election year. Post-election, the prospects for reform of the Eko Electricity distribution company will largely depend on the policy orientation and political will of the incoming administration, and their willingness to tackle the structural impediments and governance issues in the Nigerian energy sector. Effective reform will create new winners and undermine the interests of longstanding benefactors of an essentially inefficient industry structure. This will be difficult to resolve, given the complexity of the governance environment, complicated by regional tensions within Nigeria itself.

- South Africa

Key personnel appointments, reformist rhetoric and a directional shift in policy have collectively established a political environment characterised by more integrity, less uncertainty and greater conduciveness to business in the early days of the Ramaphosa presidency.

The associated optimism has been reflected by positive economic indicators during President Ramaphosa's early tenure. For one, in its March assessment, Moody's staved off fears of South Africa's removal from the World Government Bond Index by affirming the country's investment grade rating at Baa3 and assigning a stable outlook. The International Monetary Fund similarly revised the country's growth projection for 2018 from 0.9 percent to 1.7 percent, while business confidence reached a new high, and bond and currency markets rallied in the early part of the year. This optimism will wane into the next quarter.

Nonetheless, there have been policy and personnel-related 'stumbling blocks' and associated risks that the broad market seems to be gradually taking note of. Truer signals of the short-to-medium socio-political and economic trajectory under Ramaphosa will be determined by the following: The manner, in which his administration navigates ongoing labour disputes and the impending 'strike season' in relation with consolidation requirements; the contents of the revised mining charter; the outcome of the committee on land reform in August and the subsequent ruling on expropriation without compensation; and the restructuring of state-owned enterprises and associated privatisation. These immediate challenges will become more acute as South Africa nears the 2019 election cycle, during which the African National Congress (ANC) will be pressed by vocal opposition parties to take a more populist rhetorical tone, while maintaining fiscal discipline to secure economic growth.

Utilities in South Africa: A new political regime under President Cyril Ramaphosa has shown support for the independent power producers (IPPs) and a strong emphasis on good governance and anti-corruption at SOEs. This is likely to lead to widespread personnel changes at the likes of Eskom and a renewed focus on operational efficiency, partnership with the private sector and possibly partial privatisation as part of a recapitulation process. The removal of political and regulatory bottlenecks in the renewable energy segment will unlock rapid growth and interest in investment, but these will be somewhat hampered by an unresponsive regulatory environment and a lack of alignment at an industry level.

- Malawi

Former president Joyce Banda returned to Malawi on 28 April after a four-year exile in the United States. Her arrival ahead of the 2019 general elections suggests that Banda may attempt to contest the presidential ballot. However, attempts by Banda to return to Malawian politics could be scuppered by the ruling administration of President Mutharika, stoking already heightened tensions between the government and the political opposition.

The circumstances are ripe for the seasoned Malawian politician to launch a presidential bid – after only one term, Peter Mutharika has faced mounting criticism from the political opposition and civic society organisations on allegations of corruption and malgovernance. This culminated in a countrywide anti-government campaign on 27 April.

Dormant fault-lines within the DPP hierarchy have also started to resurface after the wife of former president Bingu wa Mutharika, Callista Mutharika, threw her support behind DPP Vice President, Saulos Chilima, claiming that President Mutharika was “too old” to hold office. In response, the incumbent claimed that Chilima was “too weak” to run as the ruling party’s flagbearer and nominated himself as the DPP candidate on 30 April, prior to the party’s electoral congress.

Banda’s return and possible presidential run sets up a potential three-horse race between herself, President Mutharika and Lazarus Chakwera ahead of the 2019 election.

Utilities in Malawi: Malawi’s energy and economic situation is dire, despite good intentions – the short-term outlook remains uninspiring and fraught with governance failures and contending interest-groups. Anger has been boiling over continued electricity blackouts for the 10% of Malawian households that are connected to the grid and are supplied by the state-owned Electricity Supply Corporation of Malawi (Escom) or the private Electricity Generation Company (Egenco). EGENCO, which claims that there has not been enough rains for the company to generate enough power, will come under mounting pressure to deliver reliable power to a fledgling economy.

Since 2016, the government has incorporated a new state-owned company, the Electricity Generation Company (Egenco), which will take over generation assets from the Electricity Supply Corporation of Malawi (Escom). This is an important step towards reforming its moribund power sector and together with new legislation and serious moves toward developing independent power producers (IPPs) – which may yield positive results in the longer term.

However, institutional reform is key for Malawi, given there are question marks around the political will and competence to achieve this in the near term. These reforms are key indeed to attracting partnerships and investment for Independent Power Producers [IPPs] into the country.

- Botswana

Vice President Mokgweetsi Masisi was sworn-in as Botswana’s interim president on 01 April. His inauguration follows the mandatory resignation of President Ian Khama on 31 March, following the conclusion of his ten-year incumbency. As decreed by the constitution, Masisi, who also held the education and public affairs cabinet portfolios, will govern Botswana until general elections are held in 2019.

Given the forthcoming election and the increasing threat posed by the opposition, President Masisi will be forced to take a more decisive stance against corruption. The spectre of the

election could also see the advancement of populist economic policy alternatives, aimed at garnering votes. This is likely to unfold through greater transfer spending, public wage increases and expansionary monetary policy. The issues of diversification and youth unemployment are also likely to rank high on the list of priorities.

Utilities in Botswana: Transforming BOC from its current operating status towards greater financial viability as a power utility will need to be a key priority for the incoming President. BPC has made operating losses for years due to high import costs, non-performing assets and operational inefficiencies. That has seen the company rely on government subsidies to stay afloat, but it has of late begun slashing costs as part of a turnaround plan. The Botswana Power Corporation (BPC) has increased electricity tariffs by 10% since April 2018 as part of the financial consolidation drive.

The loss-making utility is trying to recover costs and meet the cost-reflective tariff deadline. The company aims to be able to operate without a government subsidy from 2020 and has enlisted new, strategic leadership to achieve this. It is believed that the external expertise will assist BPC to ready itself for competition in the electricity sector in line with government's decision to open up the market to independent power producers. With the setting up of an electricity regulator, BPC will also be assisted to prepare itself to operate within a regulated environment. The ingredients are present for the utility to effect a reasonable turnaround, but the political impact of the elections will likely delay the much needed reforms.

- Zimbabwe

In April, the government of President Emmerson Mnangagwa extended an invitation to poll observers from 61 countries and international bodies to oversee the country's upcoming July general elections. The invitation – the first to be extended since 2002 – is the latest among a series of gestures towards reform by the Mnangagwa administration.

Apart from the invitation of foreign electoral observers to oversee the July ballot, reforms in the political arena have been somewhat static, if not absent entirely. Despite gesturing towards greater inclusivity, Mnangagwa shunned a proposition by the late opposition leader, Morgan Tsvangirai, to establish a multi-stakeholder transitional government. Instead, Mnangagwa unilaterally established a cabinet that was populated with Mugabe-era figures, who were implemented in past political violations and instrumental to Mnangagwa's ascendance. This points to an attempt by the Zanu-PF to retain their entrenched position and may undermine efforts at enhancing governance generally.

On the economic front, commencing with a charm offensive to international investors at the 2018 World Economic Forum, a pragmatic Mnangagwa has advanced initiatives to remedy the economic nationalism, isolationism and sanctions that crippled Zimbabwe's domestic market under Robert Mugabe. Most notably, in his 2018 budget speech, Minister of Finance Patrick Chinamasa announced a partial repeal of the Indigenisation and Empowerment Act, which mandated the transfer of 51% of foreign firms' equity to the state. This is a vital step to secure any long-term interest in industrial investment, but is unlikely to result in a reversal of economic fortunes in the short term.

On the diplomatic front, President Mnangagwa and fellow diplomatic envoys have engaged key Western interests in a bid to ease sanctions and facilitate re-integration into the international political economy. While the Western contingent – mainly comprising United States senators and European Union representatives – noted improvements under

Mnangagwa, it reiterated that full economic rapprochement is contingent on the observance of free and fair elections.

Utilities in Zimbabwe: In keeping with the reform thrust of the Mnangagwa administration, cabinet agreed that a single Zesa board would be established to take charge of subsidiary companies including the Zimbabwe Electricity Transmission and Distribution Company (ZETDC), Zimbabwe Power Company (ZPC) and Zesa Enterprises (Zent) whose boards would be dissolved, as part of reforms for state enterprises. Although a positive directional step, this move alone is not enough – unless there is also a renewed focus on privatising entities, strengthening corporate governance structures and employing more competent people on the board instead of creating one board, this will not be sufficient to yield the results required. Zimbabwe’s energy sector faces a decade-long struggle to reform internally, sufficiently to attract the talent, expertise and investment to secure long-term energy security, and take advantage of new emerging opportunities in renewable energy.

- Mozambique

President Filipe Nyusi is seeking to consolidate his power base both within the government and his governing FRELIMO party. However, he is being challenged by loyalists close to his predecessor, which has caused significant policy inertia.

Mozambique’s economy has been on a rapid downward trajectory since 2014 – made considerably worse by the 2016 discovery of around USD 2 billion in undisclosed loans to the government – and the associated default in repayments, which together prompted a severance of aid by international donors. Accountability for the misuse of this total loan amount has not been forthcoming, despite the release of an audit report by Kroll, and with a recent reproach by lenders, is likely to remain elusive.

A new programme with the IMF will likely be a precondition for donors to resume budget support to the country. Reengagement with the Fund will also enhance policy credibility and go some way toward bridging the “trust deficit” that has occurred between Mozambique and the investment community since the discovery of the country’s undisclosed debt. However, given its continued standoff with creditors, this still seems some way off. Political developments are unlikely to derail plans for the development of the country’s massive offshore natural gas reserves. An estimated three trillion cubic meters of gas reserves in the Rovuma basin makes Mozambique’s liquefied natural gas (LNG) deposits potentially the third largest in the world. However, gas production is only expected in 2023 and investment decisions by foreign oil companies and auxiliary suppliers have been delayed due to economic concerns.

Utilities in Mozambique: The financial performance of EDM represents contingent liability for the government of Mozambique, particularly given the precarious state of its balance sheet. The gridlock with creditors and the IMF means that there is uncertainty around the direction of policy and consequently, any major funding and structural reform in the energy sector will not be forthcoming until this is resolved. For EDM, there are several key priorities, which require urgent attention including the need to a) establish an effective and fully functional regulatory board, b) to introduce fully cost reflective tariffs and c) ensure continuous provision of reliable and efficient supply of electricity to the general populace, as well as to the economy in general. Despite enormous energy potential, the country currently lacks technical skills and resources, and requires strengthening of the institutional environment for this potential to be realised. Mozambique now needs to put in place investment friendly policies especially for the benefit of foreign investors and partners, yet at present, there are significant constraints to achieving this.

- Uganda

President Yoweri Museveni, who has ruled in Uganda since 1986, recently provided his assent to the amendment of Article 102 (b), which saw the removal of age limits regulating the eligibility of sitting Ugandan presidents and those seeking to vie for the highest office in the state. In conjunction with the so-called 'Age Law Bill', another change encompassed under the Constitutional Amendment Bill (No. 2) was an increase of the presidential term from five to seven years.

In the coming weeks, Uganda's legislature will also vote on amendments to the country's tax code ahead of the new financial year in July. The government has supported these changes as part of efforts to narrow the budget deficit, while the opposition has alleged that they are motivated by a political agenda. The intersection between tax-related grievances and those linked to the repeal of age limits could induce anti-government protests and flash-points.

While a number of the proposed amendments in the tax bill have been deemed contentious, those targeting social media activities in particular – have drawn outrage. This is in cognisance of social media's centrality to political expression and dissemination of ideas in Uganda, especially given the clampdown on public assembly.

Policy changes in authoritarian settings such as Uganda are seldom limited to the technicalities of the macro-economy. As noted, the tax proposals occur against the backdrop of the passing of [contentious bills](#) to remove presidential age limits and extend legislative terms, which are currently under review by the constitutional court, in addition to a long history of [state antagonism against opposition voices](#).

Utilities in Uganda: Although Museveni's continued reign represents policy continuity, rising political tensions and a lack of certainty around succession threaten to puncture Uganda Electricity Generation Company Limited's (UEGCL) ambitious goal to become the leading power producer in the Great Lakes region. Like most other state utilities on the continent, UEGCL faces the challenges of achieving cost reflective tariffs, maintaining sound financial health, diversifying its energy mix and ensuring operational and investment efficiency. It is unlikely that the long-term investment, regional partnership and support will be forthcoming without significant political reforms that support transparency and good governance.

- Burkina Faso

Since the ouster of long-serving President Blaise Compoare in 2014, Burkina Faso has endured somewhat of a bumpy ride. After the initial euphoria of the ouster, a transitional government was put in place to oversee the transfer of power to a new government. However, by September 2015, Burkina Faso was once again shaken by profound forces, including the coup attempt by security forces and the subsequent popular resistance to it by the population. However, despite these tensions, the country continued on an increasingly democratic path, and elections were successfully concluded. Now under the leadership of President Christian Kabore, the country has continued to make broadly positive strides. Kabore has emerged as a unifying figure with political legitimacy and has adopted a reformist economic agenda.

Economically, the International Monetary Fund (IMF) recently noted that the Burkinabe government is implementing economic reforms to maintain macroeconomic and financial stability, as required under the terms of an Extended Credit Facility (ECF). This situation indicates that the economy has been resilient to external shocks, including domestic terrorist activity and drought conditions. However, the lending body did suggest that efforts

need to be maintained to reduce the sizeable fiscal deficit – making investment in capacity by utilities operators a near impossibility.

Worryingly, however, since March 2015, more than 80 acts of terrorism have been recorded in Burkina Faso, with the country's northern Sahel region worst affected. Violence is being orchestrated by three separate Islamist extremist groups operating in the country, which – despite sharing a primary operational zone – differ in terms of operational capacity and choice of target. The geographic extent and frequency of Islamist extremist activity are anticipated to increase in the immediate term, while major cities such as Ouagadougou will remain susceptible to sporadic mass casualty attacks.

Utilities in Burkina Faso: Positive relations with multilaterals and external development partners bodes well for the on-going structural reform on the Burkinabe economy – of which energy sector reform is a key component.

Burkina Faso produces only about 60% of the electricity it consumes and just 20% of the overall population is connected to the grid. Many people use wood or butane gas bottles as their primary source of energy. Yet last year, West Africa's biggest solar power plant went on-stream (Zagouli) as Burkina Faso, one of the world's first, inaugurated a novel scheme to boost renewables and cut energy dependence on its neighbours. Other schemes in the pipeline include two solar plants, one further west at Koudougou of 20 MW and a 10 MW version at Kaya, northeast of the capital. It is likely that these ambitious and critical installations will become a controversial target of terror activity, as security measures are ramped up in regions most-affected.

Technocratic and ambitious leadership, under the auspices of IMF programme, should see incremental strides made in Sonabel's financial and operation performance. However, the country remains one of the world's poorest and underdeveloped, with institutions generally weak and skill levels extremely low. Directionally, the shift is positive, but the operational environment will remain challenging for businesses, especially with a growing security threat.

- Namibia

Namibian President Hage Geingob sacked two senior government ministers who challenged him during the ruling party's last leadership contest at the end of 2017. He dismissed Minister of Home Affairs, Pendukeni Iivula-Ithana, and Youth Affairs Minister, Jerry Ekandjo, both of whom have served in government since Namibia's independence in 1990. Geingob has cemented his control in the party since the congress, where his close allies also won three top positions.

Initially praised for reform-oriented policy, President Geingob has made a number of U-turns from previous pronouncements, especially regarding land and the New Equitable Economic Empowerment Framework (NEEEF), which have been perceived as policy flip-flop. These U-turns have also been seen to show inconsistencies and misalignment at government level and have resulted in uncertainty.

Having lost its investment grade credit rating last year, the Namibian economy requires remedial action. Indeed, Moody's cut Namibia to junk, blaming the country's growing fiscal imbalances, increasing debt burden, limited institutional capacity and risk of renewed government liquidity pressures.

The main risk for the economy, with its over-reliance on the extractive sector, lies in the slow recovery of world demand for commodities, affecting both growth and fiscal revenues.

In 2017, mining production was lower than expected due mainly to a decline in international uranium prices. The slow pick-up in Angola, one of Namibia's main trading partners and client for services, is a particular risk. The sluggish performance of South Africa's economy poses another potential vulnerability, but conversely a positive trajectory for the SA economy under new leadership could provide a much-needed boost for Namibia.

Utilities in Namibia: Diversification of sources and types of electricity will be the key priorities for the current Namibian government going forward. With its abundant resources such as uranium, gas, strong wind velocity and solar, Namibia has opportunities to become a key energy player in the SADC region, in likely partnership with South Africa. Indeed, Energy Minister Alweendo announced that his ministry is busy with a 20-year strategic plan for power supply and management, which prioritises alternative energy resources. However, currently Namibia still imports 60% of its electricity, which according to the country's energy minister is "not tenable".

The outlook for the sector is fairly positive – compared to the rest of the region, Namibia is the only Southern African country, which is close to achieving the cost-reflective tariffs and, Erongo RED has established itself as a key player in the region. The hope is that the regional reform momentum seen in neighbours in Angola and South Africa could catalyse positive contagion for Namibia too.

- South Sudan

South Sudan gained independence from Sudan in 2011, following a decades-long civil war that claimed more than two million lives. Today, the country again finds itself in the midst of a prolonged and violent conflict.

South Sudan's latest civil war began after Kiir, an ethnic Dinka, accused his former deputy Riek Machar, an ethnic Nuer, of attempting a coup. Fighting has since killed more than 50,000 people, with the Sudan People's Liberation Army (SPLA) and the SPLA-in-Opposition (SPLA-IO) the main parties to the conflict.

Peace talks have continuously failed, and the security situation is unpredictable at best in many parts of the country. The nation is largely divided along ethnic lines – especially since the creation of new states, now a total of 32 – and traditional front lines are changing into widespread guerrilla warfare, with numerous militias also involved in the fighting.

The world's youngest nation, already grappling with a crippling famine, now also faces the threat of cuts to donor aid. The Trump administration in the US recently announced that it will initiate a comprehensive review of its assistance programmes to South Sudan to ensure its aid "does not contribute to or prolong the country's ongoing conflict or facilitate predatory or corrupt behaviour".

The move follows the imposition of a controversial arms embargo against the South Sudanese government as well as the imposition sanctions against as many as 15 organisations operating in the country's mainstay oil sector.

Utilities in South Sudan: As a result of the perpetual conflict and crisis, prospects for investment in the country and in particular energy sector reform, remain bleak. The country's weak institutional capacity, poor governance and huge reliance on external financing mean that any changes from the status quo are unlikely, with a deterioration in **South Sudan Electricity Corporation's (SSEC)** operational and financial health a more plausible scenario.

Factors hampering the effectiveness of independent power provider (IPP) programmes in renewable energy

As is the case in South Africa's IPPs, the percentages of state, black economic empowerment (BEE) and community shareholding requirements creates complexities for foreign development institutions (FDI) to manage and slows down the investment process. This is due to increased perceived risk, and increases in the required return on capital and debt finance.

To combat these complexities, local governments need to have adequate finance structures (i.e. the Development Bank of South Africa, in this case, to assist the so-called community shareholders (who have a required minimum of 2,5%) and BEE shareholders (who have a minimum of 12%, with a target of 20%) in funding the purchase of shares for these mega projects.

A further complication is that during the first phase of IPP installations, a high number of components tend to be imported because the international EPC (engineering procurement construction) company is often unaware of which products are available or could be manufactured locally. This undermines the goal of localisation of the value-chain and leads to losses in local revenue.

Furthermore, in many cases it has taken around 17 years before the initial debt is paid and the utility only then starts making money. Only then will the community and BEE shareholders really start seeing a return on their shares. Simultaneously, shareholders are typically locked into a three-year period, but tend to sell their shares after 3 years, based on future cash flows, to conservative funds like pension funds in order to obtain the return on their investment.

The non-community/BEE shareholders, on the other hand, tend to have a harder time to extract themselves from such projects due to the minimum community and BEE shareholding requirements, and thus have to find other players in the same category to buy their shares with a long term view.

This raises the crucial political question of when wealth transfer to Africa actually takes place. In addition, since an installation typically takes around two years and, as is often the case, skilled international workers, speaking a foreign language, focus on getting the installation done within project timelines, how many skills are truly transferred to local workers? There is also the concern that these utilities will eventually be internationally owned rather than locally as a result of these dynamics.

The regulatory and compliance required to achieve it all is complex and costly. One comment was that a wind energy industry preparation required 5,000 pages of original documents with seven copies.

TRENDS BY CATEGORY

Main section contributor, Elrich Linde

PRODUCTION:

Energy sources

Southern Africa – Independent power generation with possibility of feeding back into the grid

Example Zimbabwe

The Zimbabwe Regulatory Authority (Zera) has granted the country's largest telecoms company, Econet Wireless, a licence to construct and operate a solar plant at its Wilovale site in Harare for the purposes of generation and supply of electricity for own consumption, but connected to the national grid.¹⁴

North Africa – 20% renewable energy by 2022, with the private sector providing 67%

Example Egypt

Egypt possesses an abundance of land, sunny weather and high wind speeds, making it a prime location for renewable energy sources. The renewable equipment market is potentially worth billions of dollars. Egypt intends to supply 20% of generated electricity from renewable sources by 2022, with wind providing 12%, hydro power 5.8%, and solar 2.2%. The solar energy plan aims to install 3.5 GW by 2027; including 2.8 GW of PV (photovoltaic) and 700 MW of CSP (concentrated solar power). The strategy also plans to generate 7.2 GW (12% of generated electricity) from wind by 2022. The plan envisions significant private sector involvement, noting that the private sector will take the lead on 67% of the plan. Over the next three to five years, the Ministry of Electricity and Renewable Energy plans to add 51.3 GW to current installed capacity.

i. Hydro

East Africa – Expansion in Hydro (but also oil & gas) to increase capacity

Example Uganda

Umeme, according to the source at the Energy ministry, has since 2014 been working on plans for expansion in preparation for a more lucrative phase in Uganda's electricity generation, when the Karuma and Isimba Dams are commissioned later this year. The company, which already has current loans from the World Bank's International Finance Commission, reportedly plans to borrow close to 1.2 trillion shillings in loans for network expansion as it eyes the Karuma and Isimba Dams generation. Karuma, Isimba and other planned hydro-power dams, as well as the developments in the oil and gas sector in Uganda are, according to those in the electricity sector, likely to be much more sought after now than in 2005, when Uganda was faced by electricity shortages.¹⁵

¹⁴ Kathinimure, T. (2018, April 19). Econet gets power generation license. Retrieved from <http://www.chronicle.co.zw/econet-gets-power-generation-licence/>

¹⁵ URN. (2018, April 3). Why Umeme is lobbying for early renewal of concession. Retrieved from <http://dispatch.ug/2018/04/03/umeme-lobbying-early-renewal-concession/>

Southern Africa – Expansion in Hydro (but also oil & gas) to increase capacity

Example Mozambique

"Mozambique has abundant and yet largely unexplored natural resources and for us to be able to tap all these, we will need power for those projects and families; hence the plan to invest \$16 billion by 2030 is achievable and do-able," he told a media briefing in the central province of Zambezia late on Sunday. According to the official, for many decades the energy sector was characterised by decline, disruption and initial post-war reconstruction; however, this situation is now changing rapidly. The Cahora Bassa Hydro Dam (HCB) with 2,075 MW is one of the largest hydropower installations in Africa. It has also become clear that Mozambique has large sedimentary basins of natural gas – on-shore, three large reserves of gas in Pande, Temane and Buzi have been discovered and off-shore, the Rovuma basin is now being explored because of the probable existence of major gas and oil reserves in the southern province of Inhambane. Magala added that over the last couple of years, this has attracted substantial foreign direct investments in large energy-intensive industries, as well as in the mining, exploration and transformation sectors. "Several new large energy projects are planned or already under construction, including the construction of new hydro dams namely, Mphanda Nkuwa, Cahora Bassa North and new power plants at Benga, Moatize, Moamba, Kuvaninga and Ressano Garcia". He added: "Realistically, we believe Mphanda Nkuwa to come around in 2019. It will be for internal consumption and exports." In Mozambique, coal miners, including Brazil's Vale and Rio Tinto, plan to build plants using waste coal to generate electricity to power their projects. In future, they may also sell power to the national grid. Magala said gas-to-power plants should also help fill the supply gap, with some 300 MW of gas-fired power plants under construction and due by 2020. Recent mega gas discoveries are expected to spur the development of similar projects by the turn of the decade, which would likely be based near the offshore Rovuma basin in the north.¹⁶

ii. Thermal

North Africa – Large gas-fired plants (World's 3 largest powerplants)

Example Egypt

Cairo - 25 January 2018: The Ministry of Electricity and Renewable Energy announced that the world's three largest power plants in the Upper Egypt governorate of Beni Suef, the new capital city, and Al-Burlus will be inaugurated next June. The construction of the power plants came as part of the German conglomerate company Siemens' €8 billion (\$9.4 billion) memorandum of understanding (MoU) to build three cycle gas-fired plants in Egypt, each capable of producing 4,800 megawatts of electricity and housing eight units a piece. Mahmoud el-Naqib, Vice President of Egypt's Electricity Holding Company, revealed that construction has begun on three steam turbines, accompanying the three stations that are already completed. Naqib also added that 4,800 megawatts of power was produced from Siemens' power plants in a record time, adding that another 1,200 megawatts of power will be added to the National Grid for Electricity by the end of March from the three Siemens stations. "The three units, which are of a 14,400-megawatt electric capacity, are currently under trial operations to ensure that they are safe and free of any technical faults." He also added, "The three stations are expected to provide 45 million citizens with the necessary power. It will also save the domestic budget about \$1.3 billion per year as the result of the subsequent reduction of fuel usage." During her visit to Egypt last February, German

¹⁶ APA-Maputo (2017, August 14). Mozambique utility to invest \$16b in electricity expansion. Retrieved from <http://apanews.net/index.php/en/news/mozambique-utility-to-invest-16b-in-electricity-expansion-by-2030>

Chancellor, Angela Merkel, alongside President Abdel Fatah al-Sisi, inaugurated the first phase of the Siemens power plants.¹⁷

West Africa – Stronger Public / Private Partnerships required to secure Thermal Power supply needed to prevent loss of energy and revenue

Example Nigeria

“The power sector lost an estimated N1,121,000,000 on January 14, 2018 due to insufficient gas supply, distribution infrastructure, transmission infrastructure and water reserves.”¹⁸

Example Ghana

A Deputy Minister of Energy, Mohammed Amin Adams, told the Jubilee Partners government will not entertain too many shutdowns of the floating processing storage and offloading (FPSO) vessels. He said the continuous shutdowns have a serious effect on government’s revenue; hence directed the partners to devise ways of solving the problem permanently. “The shutdowns have so much effects on us. Even when gas from Sankofa comes on stream, the shutdowns will still have an effect in terms of revenue that we get to undertake development activities. Therefore, it is in our interest to work together and ensure these problems are permanently resolved,” he told them. He said the ministry was working hard to ensure that there was a seamless shift from the shutdown period to the point, where gas will be stored for Jubilee.¹⁹

Example Ghana

Nigeria has cut daily gas supplies to Ghana to half the 123 million cubic feet per day contracted to flow through the West Africa Gas Pipeline (WAGP). “We are getting barely half of what we have been contractually promised, which is not good enough,” said Kweku Andoh Awotwi, Tullow Oil Ghana’s new managing director and chair of the country’s principal state-owned power utility, the Volta River Authority (VRA). “There are many reasons for this, including the vandalising of pipelines in the Niger Delta and the fact that we have not paid our bills,” he added.²⁰

Southern Africa – Fracking and Gas power

Example Botswana

Botswana, where the company’s resource is located, relies heavily on its mining industry for economic wealth. Miners use about 34% of power consumed in the country, which currently produces no gas domestically. The African nation instead relies heavily on imported expensive diesel and electricity. Botswana Power Corporation estimated in 2015 that there was an 8,000-megawatt power generation shortfall, which presented a US\$1.6 billion (A\$2.08 billion) sales-a-year opportunity for the CSG market. Strata-X hopes to target

¹⁷ Hassanin, D (2018, January 25). World’s 3 largest power plants are being built in Egypt. Retrieved from <https://www.egypttoday.com/Article/3/41067/World%E2%80%99s-3-largest-power-plants-are-being-built-in-Egypt>

¹⁸ Yusaf, A. (2018, January 23). Why Nigeria is Africa’s worst electricity supply nation. Retrieved from <https://newtelegraphonline.com/2018/01/nigeria-africas-worst-electricity-supply-nation/>

¹⁹ Sourced from 3News.com. (2018, March 28). Shutdowns of FPSOs taking a toll on government revenue – Minister reveals. Retrieved from: <https://www.ghanaweb.com/GhanaHomePage/business/Shutdowns-of-FPSOs-taking-a-toll-on-gov-t-revenue-Minister-reveals-638331>

²⁰ Morgan, B. (2018, April 5). Ghana’s WAGP gas supplies cut by half. Retrieved from http://www.upstreamonline.com/hardcopy/1464152/ghanas-wagp-gas-supplies-cut-by-half?utm_medium=email&utm_source=free_article_access&utm_content=213022739

Botswana's expanding electricity, manufacturing, and raw materials industries, if it can establish sufficient gas reserves from its appraisal efforts.²¹

iii. Geothermal Energy

East Africa – New entrants in African league of geothermal power producers

Example: The tiny East African countries of Rwanda, Djibouti and the Union of Comoros have joined the African league of geothermal power producers, in a field still dominated by Kenya after applying and getting funding to commence surface studies and drilling operations from the US \$115 Geothermal Risk Mitigation Facility (GRMF) fund, which is administered by the African Union (AU). The countries, which also seriously suffer energy shortages, have less than 20% of their population with access to electricity, according to estimates by the World Bank and the AU, despite studies showing that they sat on steam power potential in upwards of 4,000 MW. Their ability to exploit the potential, however, has been hindered by a lack of funds, making them resort to the GRMF financed by Western donor countries and banks. Alongside Kenya and Ethiopia, the countries have jointly won a US \$36.7 million funding for a total of seven different projects at an evaluation meeting convened at AU headquarters in Ethiopia on June 17. Being part of a third round of funding applications from the GRMF established in 2012...the 11 countries in the East African Rift System — Ethiopia, Kenya, Rwanda, Tanzania, Uganda, Burundi, Comoros, Eritrea, Democratic Republic of Congo, Djibouti, and Zambia are members of the mitigation fund. GRMF was established with the aim of reducing barriers to investment in the sector to attract both public and private investment. The facility is financed by the EU-Africa Infrastructure Trust Fund, the German Ministry of Economic Cooperation, the German KfW Entwicklungsbank and the UK Department for International Development. Grants under the GRMF cover costs of infrastructural development, including water, access roads and power. Also included are surface studies, exploration, drilling and well testing. Despite the huge steam potential in the region's rift valley system, only 586 MW of steam has been harnessed, with Kenya leading with an installed capacity of 579 MW, followed by Ethiopia with 7.3 MW.²²

iv. Solar Power

North Africa – Large scale solar plants funded by international bodies

Example Egypt

As part of its \$US 500 million framework to support Egypt's renewable energy development, the European Bank for Reconstruction and Development (EBRD) announced that it is financing 16 new solar power plants in the country with a capacity of 750 megawatts. The plants are located at a solar site in the vicinity of the Benban village in Upper Egypt, which – once completed – will be "the largest solar site in Africa," with a capacity of 1.8 gigawatts, a statement released by the Bank read. The new plants are expected to reduce Egypt's carbon dioxide emissions by 900,000 tonnes per year. In a previous statement, the bank said that

²¹ Ellis, A. (2018, April 6). Strata-X Energy increases Botswana resource by 240%. Retrieved from <https://smallcaps.com.au/strata%E2%80%90energy-increases-botswana-resource/>

²² Waruru, M. (2016, June 23). More African Countries Embrace Geothermal Power, Receive \$37M in Funding. Retrieved from <https://www.renewableenergyworld.com/articles/2016/06/more-african-countries-embrace-geothermal-power-receive-37m-in-funding.html>

these “will also be the first private utility-scale renewable projects in a sector that is otherwise dominated by the use of hydrocarbons.”²³

Example Egypt

The Asian Infrastructure Investment Bank (AIIB) announced that it will provide as much as \$210 million in debt financing in order to “tap” the renewable energy potential of Egypt. In a statement, the Beijing headquartered AIIB said the project would comprise 11 solar power plants with an “aggregate” capacity of 490 megawatts and would help the country to meet its pledges under the Paris Climate Agreement. “Investing in clean, renewable energy is a big part of our strategy to promote a sustainable and low-carbon future for Asia,” D. J. Pandian, the AIIB's Vice President and chief investment officer, said.²⁴

Western Africa – Solar Power plant funded EU and France

Example Burkina Faso

Zagtouli – West Africa's biggest solar power plant goes on-stream as Burkina Faso, one of the world's poorest countries inaugurates a novel scheme to boost renewables and cut energy dependence on its neighbours. The 55-hectare plant at Zagtouli on the outskirts of the capital Ouagadougou will be able to churn out 33 megawatts, enough to power tens of thousands of homes...The 47.5 million euro cost of the plant has been funded via 25 million in donations from the European Union and a loan of 22.5 million from France's development agency. Cegelec, part of the French firm Vinci Energies, built the facility, designed to be a pilot scheme. “With the financing terms that we have, the price per kilowatt-hour is considerably cheaper than for thermal production, which will allow us to reduce operating costs within Sonabel,” Nana said.²⁵

Southern Africa – New non-traditional players entering the market (Risk of leapfrogging existing utility companies not embracing renewable energy)

Example Zimbabwe

The Zimbabwe Regulatory Authority (Zera) has granted the country's largest telecoms company, Econet Wireless, a license to construct and operate a solar plant at its Wilovale site in Harare...for the purposes of generation and supply of electricity for own consumption, but connected to the national grid...has begun the process to invest more than \$250 million into a solar power systems project amid indications the corporate has placed orders for nearly 20 megawatts. It is said to have already replaced most of its conventional power systems with solar power and lithium batteries. Zimbabwe is touted to be heading for a game-changing era through the exploitation of lithium, which is also used in the manufacture of electric vehicle batteries, whose global demand is growing.²⁶
[Perspective Point – 20 Megawatts is equivalent of 0.3% of Nigeria's total capacity and 5.4% of Malawi's total capacity]

²³ Staff Writer (2017, November 30). 16 New Solar Power Plants to Enrich Egypt's Renewable Energy Sources. Retrieved from <https://egyptianstreets.com/2017/11/30/16-new-solar-power-plants-to-enrich-egypts-renewable-energy-sources/>

²⁴ Frangoul, A. (2017, September 5). Egyptian renewable energy projects get \$210 million boost. Retrieved from <https://www.cnbc.com/2017/09/05/egypt-renewable-energy-projects-get-210-million-boost.html>

²⁵ AFP (2017, November 28). Burkina Faso launches Sahel region's largest solar power plant. Retrieved from <https://www.news24.com/Africa/News/burkina-faso-launches-sahel-regions-largest-solar-power-plant-20171128>

²⁶ Kathinimure, T. (2018, April 19). Econet gets power generation license. Retrieved from <http://www.chronicle.co.zw/econet-gets-power-generation-licence/>

Example South Africa

South Africa signed long-delayed renewable energy contracts worth \$4.7 billion with independent power producers, in the first major investment deal under President Cyril Ramaphosa. The signing of power purchase agreements for the 27 mostly solar and wind projects was held up for over two years under ousted president Jacob Zuma, who favoured a plan to build additional nuclear power plants. It was also the subject of a last-minute legal challenge by the NUMSA labour union and Transform RSA lobby group, but a court rejected their application for an urgent interdict. The signing represents a victory for Ramaphosa, who has promised to unlock investment and kick-start economic growth since replacing scandal-plagued Zuma in February. “This will bring much-needed policy and regulatory certainty and maintain South Africa’s position as an energy investment destination of choice,” the energy ministry said in a statement. Ramaphosa, a wealthy businessman, has prioritised revamping the economy and turning around struggling state-owned enterprises like utility Eskom, which will purchase power from independent producers as part of the deals agreed on Wednesday. Opponents of the renewable contracts argued that Eskom could not afford the additional financial burden and that they would lead to job losses in the coal sector. South Africa relies on coal-fired plants for more than 80% of its electricity generation, while renewables contribute around 7%.²⁷

v. Wind Energy

North Africa – Large scale wind energy project funded by EU, German Development Bank and French Development Agency

Example Egypt

In an effort to boost renewable energy in Egypt and establish Egypt as a leading player in environmental development, the Ministry of Electricity and Renewable Energy initiated a LE 5 billion project to build the largest wind farm in the Middle East, located in the Suez Bay, funding the project through investments of several international entities, reported Al-Ahram Arabic website. Mohamed al-Khayat, general manager for the Renewable Energy Committee, signed the first agreement to build the wind farm, through funds that will be provided by the European Union (EU), the German Development Bank, and the French Development Agency. The EU will be providing a €30 million grant in the first phase, out of its total dedicated fund of €115 million. The German Development Bank, meanwhile, will be supporting the project with a €72 million loan. The French Development Agency will be providing a €50 million loan.²⁸

vi. Waste to Energy (Technically probably thermal)

Western Africa – Waste to Energy (This is an emerging global trend)

Example Ghana

He also disclosed that Siemens has the technology, which stakeholders in the waste management sector can leverage on to convert waste to energy. Siemens’ workshop brought together stakeholders in the energy sector to discuss issues including project

²⁷ Reuters (2018, April 5). South Africa signs \$4.7 billion of delayed renewable energy deals. Retrieved from [https://www.businessghana.com/site/news/politics/162513/South-Africa-signs-\\$4.7-billion-of-delayed-renewable-energy-deals](https://www.businessghana.com/site/news/politics/162513/South-Africa-signs-$4.7-billion-of-delayed-renewable-energy-deals)

²⁸ Tawfeek, F. (2018, January 2). Egypt to build the largest wind farm in the Middle East. Retrieved from <http://www.egyptindependent.com/egypt-to-build-the-largest-wind-farm-in-the-middle-east/>

financing, next-generation power plant for Ghana “Time for F-class GT” and Siemens’ value propositions for the biomass and waste to energy.²⁹

Example Ghana

Together with Rotan Energy, Mr Acheampong said Siemens would develop and build the most “efficient” and environmentally friendly thermal plant in Ghana with the capacity of about 660 megawatts.³⁰

vii. Diesel

East Africa – Move away from expensive diesel backup, where possible

Example South Sudan

"The main objective of this project is to increase the supply capacity and reliability of the power distribution system in Juba. Access to the grid will replace the use of generators by the population, allow supply of energy at more affordable prices and, hence contribute toward economic growth and poverty eradication in South Sudan," Mathok said during the inauguration of the plant along the Yei road in Juba.³¹

viii. Nuclear

North Africa – Nuclear go ahead

Example Egypt

Alexei Likhachev, the Chief Executive Officer of the Russian state nuclear corporation Rosatom, said that construction work at the Egypt’s al-Dabaa nuclear power plant can provisionally start in 2020. “If we proceed from the schedule initiated by presidents (of Russia and Egypt) on December 11, this will provisionally take place in 2020,” Likhachev told Russian state news agency Tass. Onsite preparatory work has already been underway, the top manager added. Russian President Vladimir Putin signed a contract with Egyptian President Abdel Fattah al-Sisi in December to commence the construction of the Dabaa nuclear plant. The contract was also signed by Egypt’s Minister of Electricity, Mahmoud Shaker, and Likhachev. Rosatom also said the plant, Egypt’s first, would be built at Dabaa in the north of the country and is expected to be completed by 2022. Russia will loan Egypt \$25 billion to finance building and operating the plant. Egypt will pay an interest rate of 3% annually. Instalment payments will begin on October 15, 2029.³²

East Africa – FDI Partners develops infrastructure and transfer skills in the process

Example South Sudan

"This factory will create positive impact on the construction of the national grid in South Sudan. It is owned by South Sudanese business people, but currently it has been taken over

²⁹ Addo, K. (2018, April 18). Dumsor Over! Ghana has over 25% installed power on standby – Former GRIDCO Boss. Retrieved from <http://www.peacefmonline.com/pages/local/news/201804/349838.php>

³⁰ GNA, (2018, April 19), Ghana making steady strides to boost power supply – Former Gridco boss. Retrieved from <https://www.myjoyonline.com/business/2018/april-19th/ghana-making-steady-strides-to-boost-power-supply-former-gridco-boss.php>

³¹ Xinhau (2018, April 17). Chinese-built electricity poles plant inaugurated in South Sudan. Retrieved from http://www.xinhuanet.com/english/2018-04/17/c_137115743.htm

³² Al-Yohum, A (2018, March 30). Dabaa nuclear power plant construction will start in 2020, says Rosatom chief. Retrieved from <http://www.egyptindependent.com/dabaa-nuclear-power-plant-construction-will-start-2020-says-rosatom-chief/>

by Power China for a brief period of one year," he said. "We shall do as we did before to recruit more local technicians, engineers and labourers during the construction period, so that they are there in place for similar projects in the near future. We shall make more efforts to improve these local staff's working environment and realise sustainable development of Power China and Sino-Hydro in South Sudan," said Wang.³³

North Africa – Renewable Energy Curriculum at Technical Schools

Example Egypt

The Egyptian Government launched a first-of-its-kind renewable energy curriculum at technical schools in the southern city of Aswan and the Red Sea resort town of Hurghada, to encourage students to specialise in renewable energy and train them for jobs in the country's growing solar and wind power sectors. The three-year certificate programme, which was developed by the Egyptian Ministry of Education and the US Agency for International Development (USAID), seeks to benefit over 300 technical school students. Now being piloted at two technical schools in Aswan and another one in Hurghada, the coursework will also be implemented in 57 schools in nine other governorates.³⁴

- a. Infrastructure
- ix. Grid

West Africa – Grid capacity not growing fast enough for population growth or economic development requirements (Economic Risk, Reputational Risk, Porter's Competitive advantage of nations)

Example Nigeria

Aubja Electricity Distribution Company: Available reports show that more than 50% of African businesses surveyed cite inadequate power supply as a major infrastructural challenge that dampens development. The situation is more challenging in Nigeria, as many businesses have relocated to neighbouring countries due to poor electricity infrastructure and rising cost of production. Also, power shortages are adjudged a major deterrent to SMEs' development, culminating into rising unemployment and civil disturbances.³⁵

Example Nigeria

The global electricity supply watchdog, Spectator Index, provided details on reasons it ranked Nigeria, Africa's biggest crude exporter, as the worst in electricity supply on the continent. The agency had earlier released a 2017 index, in which it also ranked the country as the second worst nation in power supply in the world last year. Out of the 137 countries examined in the study, Spectator Index said in a report released on its Twitter handle, Yemen ranked as worst electricity supply nation in 2017, followed by Nigeria, Haiti, Lebanon and Malawi, in that order.³⁶

³³ Xinhau (2018, April 17). Chinese-built electricity poles plant inaugurated in South Sudan. Retrieved from http://www.xinhuanet.com/english/2018-04/17/c_137115743.htm

³⁴ Farouk, M (2018, February 27). Egypt launches renewable energy curriculum to boost promising sector. Retrieved from <http://www.al-monitor.com/pulse/originals/2018/02/egypt-launches-renewable-energy-curriculum.html#ixzz5DPo0JXZz>

³⁵ Tarkaa, D. (2018, April 10). Looking at the plight of Bwari residents in access to power supply. Retrieved from <https://leadership.ng/2018/04/10/looking-at-the-plight-of-bwari-residents-in-access-to-power-supply/>

³⁶ Yusaf, A. (2018, January 23). Why Nigeria is Africa's worst electricity supply nation. Retrieved from <https://newtelegraphonline.com/2018/01/nigeria-africas-worst-electricity-supply-nation/>

i. Land access for grid

East Africa – Greed could stall projects

Example Uganda

Greed is stalling government- and private sector-led initiatives on the much-anticipated production of oil and gas, according to Hans Peter Christophersen, the Trade and Energy Counsellor at the Royal Norwegian Embassy in Kampala. Christophersen says that greedy individuals have inflated land costs and demanded huge compensation rates in the Albertine Graben, making it difficult for planned projects to take off. Norway, through the Uganda Electricity Company Limited, is funding the Nkenda-Kasese electricity transmission line from Hoima. The 225 km transmission line is one of the biggest energy projects to be funded by the Kingdom of Norway. The line is expected to play a big role in transmitting electricity within Uganda and as well as exporting it to the neighbouring Democratic Republic of Congo. However, Christophersen says one of the biggest nightmares for the project is how to deal with inflated land costs driven by greed. He says while it is right for people to be compensated for their property, there should be a system to control the greedy who want to get much higher payments. He says government projects may not move on as planned in future, if the land acquisition process continues to be dominated by the greedy few.³⁷

i. Role of IT in the sector

North Africa – Smart meter rollout to enable real-time monitoring, reduce tampering and reduction in power outages

Example Tunisia

The Tunisian Electricity and Gas Company selected Huawei and a local electrical equipment manufacturer for the development of an integrated smart metering solution. In a press statement, Huawei confirmed that it signed an agreement with the Industrial Company of Electrical Apparatus and Equipment (SIAME) to develop and supply smart meters for the Tunisian Electricity and Gas Company (STEG). The integrated metering solution will also include meter data management software and technology to enable connectivity between the smart meters and the utility firm. The developers of the integrated metering solution are confident that the technology would be adapted and help multiple utility firms in Africa and the Middle East to harvest the benefits of smart grid technology. The deployment of the advanced metering infrastructure (AMI) will be the first rollout of smart electric meters in Tunisia. The development will ensure STEG optimises its revenue collection process through accurate billing as well as reduce electricity theft that was a result of meter tampering. It is expected that the utility's customers will be able to use energy more efficiently with access to real-time data. The smart meters will also pave the way for STEG to develop and introduce new business models, including demand response and energy efficiency programmes. More importantly, the smart metering technology would help STEG to manage its grid network in real time and improve its customer services through a reduction in power outages.³⁸

³⁷ URN. (2018, April 6). Greed could stall Uganda's oil and gas projects – Expert. Retrieved from <http://dispatch.ug/2018/04/06/greed-stall-ugandas-oil-gas-projects-expert/>

³⁸ Nhede, N (2017, January 19). Tunisian utility selects Huawei for smart meter rollout. Retrieved from <https://www.metering.com/regional-news/africa-middle-east/africa-smart-meters/>

Southern Africa – Call for smart metering for low-end utility customers

Example South Africa

A well-known obstacle to the deployment of smart meters for low-end customers is inadequate cellular network coverage in areas, where these customers are located. However, alternative advanced metering infrastructure (AMI) backhaul connectivity options are being widely researched globally, and some are mature enough for large-scale deployment. These options include the use of TV white space and a variety of long-range lower power wide area networks (LPWAN), mainly at Internet of Things (IoT) applications. A key design criterion for TV white space and LPWAN technologies is cost-effectiveness and long-range communication capabilities. Thus, utilities are no longer tied to the single option of public cellular networks, but have viable alternative connectivity options for supporting smart meter deployments in low-end customer areas. The rollout of smart meters for low-end customers is justified, considering the benefits associated with the technology, standardisation efforts that are driving smart meter interoperability, the variety of available cost-effective connectivity options – and the growing interest from government, a potential funder, in the potential of technology to efficiently address the service delivery needs of these customers.³⁹

ii. Role of mobile phones in the sector

Southern Africa – Smartphone a requirement for employment

Example Zimbabwe

The Zimbabwe Electricity Transmission and Distribution Company (ZETDC), a subsidiary of Zesa Holdings, has come under fire from prospective employees for demanding the "expensive" Samsung J7 smartphone as one of the requirements. Recently, ZETDC flighted an advert seeking to recruit 20 data capture clerks on a fixed-term contract in Victoria Falls with a Samsung J7 smartphone as one of the requirements. "Applications are invited from suitably qualified candidates to fill vacancies below. Candidates should have five O Levels, be proficient in local languages, have good communication skills, be fit to travel at least four kilometres per day and possess a smartphone to be used for the job, preferably a J7 Samsung," read part of the advert dated January 11, 2018.⁴⁰

i. Procurement

Southern Africa – Errors, not following procedures and conflict of interest exposed in procurement process.

³⁹ Papi, S. (2018, January 2). Smart metering for low-end utility customers. Retrieved from <https://www.esi-africa.com/smart-metering-low-end-utility-customers/>

⁴⁰ Staff Reporter (2018, January 29). ZETDC under fire. Retrieved from <https://bulawayo24.com/index-id-news-sc-national-byo-126833.html>

i. Maintenance

West Africa – Lack of maintenance / way maintenance conducted causing fatalities. Finance for Maintenance, Training, PPE readily available and standardised across Discos?

Example Nigeria

EKO: As stated in the report, distribution defects in the systems of Benin, Eko, Enugu, Ibadan, Jos, Kaduna, Kano and Yola distribution companies (Discos) caused the death of six employees and 22 third parties in the three months under study.⁴¹

i. Ageing infrastructure

West Africa – ageing and obsolete infrastructure becomes contention point for decentralised approach

Example Nigeria

Brand and Communication Manager of Ibadan Electricity Distribution Company, IBEDC, Kikelomo Owoeye, expressed the belief that TCN could not meet the expectations of Nigerians, even if generation were to double. According to Owoeye, notwithstanding the challenges of energy theft and vandalism, most of the equipment to produce and distribute the required energy are obsolete. He stated: “On our transmission, even if the GENCOs generate enough megawatts or gigawatts as the case may be, the equipment at the Transmission Company of Nigeria (TCN) cannot wheel out all the required supply. There are challenges on the equipment; most of them are obsolete,” she said. But Bede Opara, General Manager in charge of Transmission at TCN, believes that GENCOs have not been able to pay their debts due to energy theft and other issues.⁴²

4 Distribution:

a. Centralised / Decentralised (Structure)

West Africa – From centralised to decentralised to centralised or independently regulated?

Example Nigeria

Electricity consumers have called for the revocation of the licenses of distribution companies (DISCOs) and sanctions against estimated billing otherwise, known as crazy bills. A customer who identified herself as Dr Ibukun Ogundipe, Chairman, Ekiti Landlords and Landladies’ Electricity Consumers Association, under the network of Benin Electricity Distribution Company, BEDC, said, “The distribution company is fraudulent and we are on the verge of charging them in court. We don’t get supply, but still receive enormous and unimaginable bills on a monthly basis. In Ado Ekiti, for example, there are no pre-paid meters.” Also, Bode Ojomu of Magodo Phase 1 in Lagos State called for the revocation of licenses of the DISCOs. “There is a need for a holistic appraisal of the DISCOs to check the irregularities in their operations. DISCOs have not added any value to Nigerians. Power supply has turned from

⁴¹ Sahara Reporters, New York. (2018, April 16). 22 Nigerians killed by defective electricity distribution network In 3 months- NEMSA. Retrieved from <http://saharareporters.com/2018/04/16/22-nigerians-killed-defective-electricity-distribution-network-3-months-nemsa>

⁴² Yusaf, A. (2018, March 13). As GENCOs,DISCOs lock horns with FG... Retrieved from <https://newtelegraphonline.com/2018/03/gencosdiscos-lock-horns-fg/>

bad to worse, as we are constantly forced to pay for darkness. We are calling on the government to place a sanction on estimated billing and possibly treat it as illegal.”⁴³

Southern Africa – Calls to nationalise coal mines (energy sources)

Example South Africa

An opposition party, the EFF, condemns the higher tariffs that Eskom seeks to put in place in order to recover the R66.6bn of costs incurred over the past three years, saying that “they sold less electricity than forecast because of an economic downturn. Eskom executives earn millions from taxpayers’ money, the tariff hikes are meant to recover the loss on account of state capture corruption and payment to Gupta-owned companies for services not rendered and yet, there are already communities in South Africa, where our people cannot even afford the electricity, but now they are expected to suffer from the corruption and mismanagement of funds by Eskom. The EFF calls for the nationalisation of mines for this very reason. Nationalisation of mines means that commodity prices will be determined by the government.”⁴⁴

- i. Power Plants
- ii. Power Stations
- iii. Urban versus Rural Power

North Africa – Drive to get businesses and individuals to generate renewable energy and sell to businesses

Example Egypt

The Renewable Energy Committee is conducting negotiations with a number of Egyptian banks to provide a LE 1 billion fund for several solar energy projects under 500 Kilowatt. Rooftop solar energy projects in particular have been focused on, and it is hoped they will encourage citizens to establish solar items on their rooftops to provide for their own electricity needs and sell the remaining electricity to companies. This all comes as part of a wider plan to establish Egypt as a major player in renewable energy.⁴⁵

- b. Governance Approach

West Africa – Increasingly difficult to play a governing role when decentralised companies fail to deliver

Example Nigeria

Latest on the long list of the bickering between the government and its investors is the case, which came up before Binta Nyako on March 1, 2018, in which the 13 generation companies (GENCOs) dragged the Federal Government before a Federal High Court sitting in Abuja,

⁴³ Obasi, S & Ejoh, E. (2018, April 19). Electricity: Consumers demand revocation of DISCOs licenses. Retrieved from: <https://www.vanguardngr.com/2018/04/electricity-consumers-demand-revocation-discos-licenses-calls-sanctions-estimated-billing/>

⁴⁴ Economic Freedom Fighters (2018, April 17). Mine nationalisation answer to Eskom's funding woes – EFF. Retrieved from <http://www.politicsweb.co.za/politics/mine-nationalisation-answer-to-eskoms-funding-woes>

⁴⁵ Tawfeek, F (2018, January 2). Egypt to build the largest wind farm in the Middle East. Retrieved from <http://www.egyptindependent.com/egypt-to-build-the-largest-wind-farm-in-the-middle-east/>

over alleged preferential treatment for two of its competitors with intent to harm their business interests.⁴⁶

Southern Africa – New culture of accountability and calls for better regulation

Example South Africa

The Eskom board is serious about instilling a new culture of accountability and consequence management at the power utility, the portfolio committee of public enterprises heard. Members of Eskom's board, including Deputy Chair, Sindi Mabaso-Koyana, acting CEO, Phakamani Hadebe, and acting CFO, Calib Cassim, briefed the committee on the utility's annual performance and turnaround plan. Hadebe tackled concerns over non-compliance in procurement processes at Eskom. He referred specifically to reports on the suspension of an official implicated in granting of an extension of a contract with Gupta-owned Optimum coal mine. Hadebe said Eskom learnt of this on Friday and acted immediately to discuss the decision. On Monday, an investigation was launched. "By Monday, we had members of an independent company to start working on this. We want to highlight to management these things are not acceptable." He said that the board is implementing a new culture of accountability and consequence management at the utility. Once the report of the investigation is released, Eskom will take appropriate action, he assured.⁴⁷

Example South Africa

The Organisation Undoing Tax Abuse (OUTA) head of energy, Ronald Chauke, presented its recommendations, and emphasised that Eskom must be held accountable for the mismanagement of funds... "Let us hold Eskom accountable. People can't do what they wish with state-owned institutions. It is not their tuck shop to do with as they wish," he said. The organisation [OUTA] is also calling for increased oversight by the Regulator, with Eskom regularly reporting to Nersa on more than just an annual basis. Nersa's tests of prudence, for example, should also be more rigorous. "[Eskom] must be more closely managed, the Eskom guys are naughty," Chauke said.⁴⁸

Southern Africa – Dissolving company boards and replaced with on new governing board (and opposition to it)

Example Zimbabwe

Chinamasa also indicated that government is restructuring the national power utility, Zesa Holdings. "A single Zesa board will be established to take charge of the Zimbabwe Electricity Transmission and Distribution Company (ZETDC), Zimbabwe Power Company (ZPC) and Zesa Enterprises. The boards of ZETDC, ZPC and Zesa Enterprises are to be dissolved" he said. The board will be allowed to engage strategic partners under ZPC operations, where necessary. The strategic and Zesa-specific activities of Powertel will be incorporated under ZETDC, while

⁴⁶ Yusaf, A. (2018, March 13). As GENCOs, DISCOs lock horns with FG... Retrieved from <https://newtelegraphonline.com/2018/03/gencosdiscos-lock-horns-fg/>

⁴⁷ Omarjee, L (2018, April 18). Eskom acting CEO promises 'new culture of accountability'. Retrieved from <https://www.fin24.com/Economy/Eskom/eskom-acting-ceo-promises-new-culture-of-accountability-20180418>

⁴⁸ Omarjee, L. (2018, April 16). Public enterprises like Eskom can't be treated like tuck shops – OUTA. Retrieved from <https://www.fin24.com/Economy/Eskom/public-enterprises-like-eskom-cant-be-treated-like-tuck-shops-outa-20180416>

excess telecommunication capacity will be included in the merger between Zarnet and Africom,” he added.⁴⁹

Example Zimbabwe

The Zimbabwe Energy Council said Cabinet should focus on privatising entities, strengthening corporate governance structures and employing more competent people on the board instead of creating one board for Zesa Holdings... “ZPC is a company that can generate its own resources, but what it needs to do is have its own investors, so what we need to do with our power sector is sort of re-evaluate it, the whole power sector. We need ZPC to be a stand-alone company with private investors, so that it can go out and look for its own monies. It does not need government support and after all, the government does not even have support,” he said. “ZETDC should be a stand-alone institution (it does not even get funding from government) that should go out and get resources. Before this, (the establishment of a singular board), the government had thought of separating the entities, where ZETDC was going to become a stand-alone company and ZPC was going to be a stand-alone company that was the way to go.” Sithole said without good corporate governance, the same problems plaguing the boards of ZPC, ZETDC and Zesa Enterprises would continue. “So, my comment from ZEC is that these things should not be independent of each other, you cannot have a board without an improved code of conduct or the good governance act, which the government was speaking about.”⁵⁰

c. Metering (see also role of technology in utilities)

West Africa – Decentralised approach, challenge to invoice distribution correctly and collecting payment from partners.

Example Nigeria

EKO: The Eko Electricity Distribution Company has denied that it was one of the distribution companies that failed to remit payment in respect of the bulk energy invoice presented by the Nigerian Bulk Electricity Trading Plc (NBET) for the month of January, 2018.⁵¹

Sub-Saharan Africa – Nearly one-third of power produced in Africa is never properly billed to customers

Example: In related news, a report published by North East Group last year, states that utilities in Sub-Saharan Africa will invest \$8 billion in electricity metering through to 2026. The report titled 'Sub-Saharan Africa Electricity Metering: Market Forecast 2016-2026' discusses the region's current metering landscape, factors restraining the market as well as a forecast of the market. Ben Gardner, President of North East Group, commented: “Nearly one-third of the power produced in Africa is never properly billed to customers. This means utilities do not generate sufficient revenue to maintain their networks and fund necessary expansion.” As such, “Utilities in Sub-Saharan Africa must urgently upgrade their poor metering infrastructure.” The report highlighted that despite Africa being the world's fastest growing metering market and a leader in prepaid metering, the continent's prepaid metering market penetration is just above 40%. However, at a later stage, utilities mainly in

⁴⁹ Kachembere, J. (2018, April 16). Govt restores Zinara. Retrieved from <https://www.dailynews.co.zw/articles/2018/04/16/govt-restructures-zinara>

⁵⁰ Zwinoira, T. (2018, April 16). Energy council shoots down Zesa reforms. Retrieved from <https://www.newsday.co.zw/2018/04/energy-council-shoots-down-zesa-reforms/>

⁵¹ Alike, E. (2018, April 10). Eko Disco Denies Report of Non-remittance to NBET, Explains Power Outage in Ikoyi, Others. Retrieved from <https://www.thisdaylive.com/index.php/2018/04/10/cnpp-why-president-shouldnt-run-for-second-term/>

selected countries, including South Africa, Nigeria and Ghana will begin to increase the deployment of advanced metering infrastructure.⁵²

d. Blackouts

West Africa – Decentralised approach, connection between different parties a potential weakness and scapegoat? (Reputational risk)

Example Nigeria

Eko Electricity Distribution Company has given a reason behind the current power outage being experienced in some parts of Lagos Island, saying it was due to the breakdown of some facilities at the Alagbon Transmission injection sub-station, which is a major source of bulk power supply to the company from the Transmission Company of Nigeria (TCN).⁵³

West Africa – Social unrest due to lack of electricity

Example Nigeria

Hundreds of women from Alaba-Oro, Mosafejo and Amukoko area of Lagos on Thursday, April 5, stormed the Marina headquarters of Eko Electricity Distribution Company, protesting over six-year 'epileptic' power supply. The News Agency of Nigeria reported that the all-women protesters prevented workers and visitors from entering EKEDC premises and caused traffic gridlock on the ever-busy Lagos Marina. The placard-carrying women, who chanted solidarity songs, said their husbands have abandoned their respective homes due to the 'epileptic' power supply in the areas. Another protester, Mojisola Olaosebikan, said she had closed her frozen food shop at Mosafejo Market due to the 'epileptic' power supply.⁵⁴

Example Nigeria

Minna – Claims by the Federal Government that electricity supply in the country has improved tremendously might be false after all, as angry youths in Niger State continued to protest what they termed 'worst electricity supply situation ever in the history of the state'. Regional staff of the Abuja Electricity Distribution Company (AEDC) have gone into hiding, following fears of attacks by angry youths who have threatened to raze the company's office over alleged non-performance in the past two years. The youths in their hundreds staged protests, blocking the only road from Minna linking Shiroro at Mutum-Daya, Gwada and She` junctions over what they termed 'worst' situation in the history of Niger State.⁵⁵

⁵² Nhede, N (2017, January 2). Tunisian utility selects Huawei for smart meter rollout. Retrieved from <https://www.metering.com/regional-news/africa-middle-east/africa-smart-meters/>

⁵³ Izuora, C. (2018, April 11). Eko Disco Explains Power Outage In Ikoyi, Others. Retrieved from <https://leadership.ng/2018/04/11/eko-disco-explains-power-outage-in-ikoyi-others/>

⁵⁴ Oladele, D. (2018, April 7). Our husbands no longer stay at home due to power outages, protesting women allege. Retrieved from: <https://www.naija.ng/1161980-our-husbands-longer-stay-home-due-power-outages-protecting-women-allege.html#1161980>

⁵⁵ Nnadozie, C. (2018, March 29). AEDC Staff Go Into Hiding As Youths Protest Power Outage In Niger. Retrieved from <https://independent.ng/aedc-staff-go-into-hiding-as-youths-protest-power-outage-in-niger/>

Southern Africa – Load shedding expected due to inefficient coal stockpiles

Example South Africa

Eskom is scrambling to get supplies of coal to six power stations, where stockpiles are critically low, raising concern about the parastatal's ability to feed power into the national grid. Energy analyst Chris Yelland raised a red flag, when he revealed reports about "alarming coal supply problems at numerous Eskom coal-fired power stations in Mpumalanga. Eskom has been relying on emergency, diesel-driven, open-cycle gas turbines regularly to meet demand this year," he wrote on the website EE Publishers. "The latest coal supply reports suggest that Eskom's current coal supply problems are as serious as, if not worse than, those that existed in SA shortly before the load shedding of 2008."⁵⁶

4 End Users:

a. Product / Service structure (Offerings)

West Africa – Dissatisfaction with delivery from Disco's to end users and poor payment to suppliers could lead to product offerings from Generation Companies (Gencos) directly to consumer

Example Nigeria

Following the huge debt owed the Gencos by the Discos, the power generating companies had last year threatened to bypass the Discos and supply power directly to a certain class of customers.⁵⁷

Southern Africa – Rethink end user infrastructure and needs (Smart Cities)

Example South Africa

"The dominant theme for the BRICS Summit Africa this year is 'Driving sustainable growth through smart urbanisation'. In the wake of rising economic growth, Africa's rapid urbanisation topped the agenda at last year's summit. This year, we zone into how Africa can build smarter cities and more sustainable cities, to better deal with its high levels of urbanisation and global climate change," says Chetty. "With Africa's billion-strong population seeking economic opportunities and better lifestyles in its cities, the pressure is on urban planners to create smarter and more sustainable urban environments. Greater demands are placed on resources such as water and electricity, but also on infrastructure around which cities are built." The recent water crisis in Cape Town – in fact, water issues in general in other parts of South Africa and the continent as a whole – brought home the very real impacts of climate change. "Fellow coastal city, Durban, faced a different side of climate change, with beach erosion and the resultant destruction of coastal property becoming a concern. While South Africa has overcome the electricity crisis of a few years back, power generation issues remain an infrastructure challenge in many parts of the rest of Africa. Built environment professionals, including city planners, are at the heart of dealing with such

⁵⁶ Staff Writer (2018, April 17). Load shedding looms again as Eskom scrambles for coal supplies. Retrieved from <https://www.businesslive.co.za/bd/companies/energy/2018-04-17-load-shedding-looms-again-as-eskom-scrambles-for-coal-supplies/>

⁵⁷ Staff Writer (2018, April 9), Thumbs Down: Discos' Failure to Pay for Power Sold to Them. Retrieved from <https://www.thisdaylive.com/index.php/2018/04/09/thumbs-down-discos-failure-to-pay-for-power-sold-to-them/>

issues; whether it's through building water and other infrastructure or innovations in the green building and the renewable energy space," adds Chetty.⁵⁸

Example South Africa

Mayors of Tshwane, Johannesburg, Cape Town and Durban to introduce requirements, ensuring all new buildings are energy efficient, cutting electricity bills and greenhouse gas emissions. C40 Cities South Africa Buildings Programme, launched in Tshwane, aspires to make zero carbon buildings standard practice across South African cities...Tshwane, South Africa (16 April 2018) — Residents and businesses moving into new buildings in Johannesburg, Cape Town, Durban and Tshwane will soon enjoy lower energy bills, and will generate less greenhouse gas (GHG) emissions, reducing their climate change impact. High-efficiency energy performance requirements are being developed for all new buildings in these leading cities, thanks to their collaboration in the C40 Cities South Africa Buildings Programme. The ambition of the programme, launched at an event in Tshwane, is to make zero carbon buildings the standard practice across South African cities. The energy used to power, heat and operate buildings accounts for more than 25% of the GHG emissions produced by South African cities. Therefore, action to make buildings more energy efficient has huge potential to reduce GHG emissions. More than 70% of South Africans are expected to be living in cities by 2030. With growing urban populations comes increased demand for housing, commercial buildings, office space, schools, hospitals and other buildings. Ensuring these new buildings meet high-efficiency energy performance requirements will be crucial, if cities and South Africa as a whole will deliver on its commitments to the Paris Agreement on Climate Change.⁵⁹

- b. Commercial, government, household.

West Africa – Corporates affected by blackouts having to resort to expensive alternative power. Could this trigger installation of permanent alternative solutions? (Economic Risk & Reputational Risk)

Example Nigeria

EKO: Headquarters of banks and International Oil Companies (IOCs) located on the network of Eko Electricity Distribution Company (EKEDC) in Marina and Victoria Island, have suffered total power outages from the grid supply... "Many of them have switched to alternative power sources. Though they consider this expensive and investment unfriendly, they have no choice, but to ensure that businesses keep running," a source in one of the IOCs located on the Victoria Island told this newspaper.⁶⁰

Southern Africa – Corporates get own renewable power generation license for own consumption, but connected to national grid.

Example Zimbabwe

The Zimbabwe Regulatory Authority (Zera) has granted the country's largest telecoms company, Econet Wireless, a license to construct and operate a solar plant at its Wilovale

⁵⁸ Hinnah, S. (2018, April 13), Smart urbanism and sustainability take centre stage at BRICS Summit Africa. Retrieved from <https://www.modernghana.com/news/847331/smart-urbanism-and-sustainability-take-centre-stage-at-rics.html>

⁵⁹ Staff Writer. (2018, April 16). Four South African cities strive to make all new buildings zero carbon

⁶⁰ Yusaf, A. (2018, April 10). Banks, IOCs' headquarters suffer grid's total power outage. Retrieved from <https://newtelegraphonline.com/2018/04/banks-iocs-headquarters-suffer-grids-total-power-outage/>

site in Harare... for the purposes of generation and supply of electricity for own consumption, but connected to national grid.⁶¹

Southern Africa – End users “dropping off the grid”

Example: Lights, plug points and fresh water pumped to the pipes from a borehole – these could all change the lives of both pupils and teachers at rural schools, and they could all be powered by a relatively new source of renewable energy – hydrogen. The Department of Science and Technology in association with Hydrogen South Africa launched a hydrogen fuel cell system at the Poelano Secondary School in the North West Province. The renewable energy source converts chemical energy (hydrogen) to electricity through a process similar to that of a battery. News24 reported that the school has been facing problems with its electricity bill and that Eskom has cut the power to the school. This provided an opportunity for the department and Hydrogen South Africa to test the technology.⁶²

c. Vandalism, Theft

West Africa – Theft & tampering (vandalism) increase as grid expand?

Example Nigeria

EKO loses N1b due to theft and vandalism (tampering with pre-paid meters). “Tampering with Eko Disco meters, installations, distribution lines, equipment or assault on any field worker will attract a jail term. “The management of EKEDC will no longer handle these actions with kid gloves; this is no empty threat. If you disregard this warning, you do so at your own risk.”⁶³

According to the statement, another transmission line was recently vandalised along Alulu Nike, still in Enugu State, destroying four towers. These unpatriotic acts, it said, were threatening transmission expansion efforts in the state, as time and funds would now be put into replacing the vandalised lines and towers instead of completing and energising them. The company appealed to members of the public, particularly those residing in communities around its installations, to assist it in this fight against vandalism of the nation’s national asset. Destroying such assets is tantamount to sabotaging the development of the nation.⁶⁴

West Africa – Insecurity and vandalism in the Niger Delta

Example Nigeria

Shell Petroleum Development Company has disclosed that its operation is still threatened by insecurity in the Niger Delta. The company indicated in its latest report that crude oil theft, sabotage and related damage to oil and gas facilities continue to present significant security concerns in parts of the Niger Delta, as well as environmental damage, which is aggravated by the proliferation of illegal refineries in the area. It stated that illegal refining and third-party interference are the main sources of pollution in the Niger Delta today. According to the report, third-party interference is the cause of 90% of the number of spills of more than

⁶¹ Kathinimure, T. (2018, April 19). Econet gets power generation license. Retrieved from <http://www.chronicle.co.zw/econet-gets-power-generation-licence/>

⁶² Hussain, M (2018, April 13). Could hydrogen power be the answer for rural schools? Retrieved from <https://city-press.news24.com/News/could-hydrogen-power-be-the-answer-for-rural-schools-20180413>

⁶³ Izuora, C. (2018, April 14). Eko Disco Loses N1bn To Vandalisation. Retrieved from <https://leadership.ng/2018/04/14/eko-disco-loses-n1bn-to-vandalisation/>

⁶⁴ Staff Writer (2018, February 27). ‘How multi-million 132kV double circuit naira accessories disappeared’. Retrieved from <https://newtelegraphonline.com/2018/02/multi-million-132kv-double-circuit-naira-accessories-disappeared/>

100 kilograms from the Shell Petroleum Development Company of Nigeria Limited operated Joint Venture (SPDC JV) pipelines in 2016. It stated that security in parts of the Niger Delta remains a major concern with persisting incidents of crime, vandalism, threats from militant groups, host community agitations and offshore piracy. The report disclosed that there were renewed acts of sabotage by militant groups on oil and gas infrastructure in parts of the Niger Delta in 2016, which severely impacted oil and gas operations. For example, export operations at the SPDC-operated Forcados Oil Terminal (FOT) were disrupted after three sabotage incidents in 2016. It disclosed that this resulted in loss of revenue, particularly for domestic producers who rely on the FOT for export. The report stated that facilities operated by both indigenous and international oil and gas companies were vandalised by attacks and other illegal activities such as crude oil theft, which led to a sharp decline in oil and gas production and incidents of environmental contamination.⁶⁵

West Africa – Engagement with civil society to reduce vandalism

Example Nigeria

The management of Kano Electricity Distribution Company (KEDCO) has said that it loses N180m every month due to activities by vandals. The Managing Director of the company, Alhaji Jamilu Isyaku Gwamna, made the disclosure at an engagement meeting with traditional and religious leaders in Kano state. Gwamna explained that the company is spending N4bn monthly on purchase of energy, but only generating between N1.8bn and N1.9bn. "With these huge problems and less credible customer's paying their bills, it has become imperative to engage traditional and religious leaders to help us handle the situation," he said. Sanusi also advised the company to do more on public enlightenment in order to create synergy between the company and electricity consumers.⁶⁶

Southern Africa – Theft reason for blackouts

Example South Africa

Johannesburg - The City of Johannesburg says Randburg and surrounding suburbs will remain without power indefinitely due to the theft of cables and a battery at the Hawkens Switching Station. The areas have been without power since Saturday. Officials say a generator has been dispatched to the area to charge a newly bought battery, but it is not clear how long that will take. The city's Nico de Jager said, "I'm not sure how much longer it will be, there are technicians on site."⁶⁷

- d. Government's exclusive grip. (See also Centralised / Decentralised section)

West Africa Trend – Calls to strengthen legal and regulatory framework

Example Nigeria

Legal experts and others have met in Lagos to discuss how to make the power sector work by strengthening its legal and regulatory framework. To them, for Nigeria to meet its energy

65 Akpan, U (2017, August 1), Security still a challenge in Niger Delta – Shell. Retrieved from: <https://www.vanguardngr.com/2017/08/security-still-challenge-niger-delta-shell/>

66 Ibrahim, Y. (2018, April 18). KEDCO loses N180m monthly. Retrieved from <https://www.dailytrust.com.ng/kedco-loses-n180m-monthly.html>

67 EWN, (2018, April 2). City Power: Randburg remains without power indefinitely. Retrieved from <http://ewn.co.za/2018/04/02/city-power-randburg-remains-without-power-indefinitely>

needs, power must be on the concurrent legislative list to free it from the federal government's exclusive right.⁶⁸

- e. Privatisation (or different ownership models)

See Co-Op article from the UK.

Southern Africa – Possibilities of privatisation of state owned enterprises (SOE)

Example South Africa

A key figure in charge of South Africa's economy has hinted at his appetite for privatising the country's ailing state-owned enterprises (SOEs). "Why not?" responded National Treasury Director General, Dondo Mogajane, when asked by Reuters, if it was possible for segments of South Africa's publicly-owned firms to be sold. "There have to be new ways of looking at these things. Are we talking privatisation? Are we talking equity partnership? Let's give an opportunity for new ministers to unpack what it means," he added. New South African President Cyril Ramaphosa, as part of his drive to revive the economy and stymie corruption, has spoken of reforming the country's more than 700 state-owned enterprises. These include utility firm Eskom, which provides most of the country's electricity, and South African Airways, both of which are loss-making.⁶⁹

- f. International Competitors (read in conjunction with FDI and international partners in sector)

East Africa – Internationals competing for local concessions

Example Uganda

The names of the two Chinese companies looking to dislodge Umeme [provides electricity to the end user] from the power distribution function have been revealed. The companies are State Grid and Sinohydro. Sunday Monitor has learnt that they have been working behind the scenes to scoop the job, when Umeme's contract expires in 2025. According to the official, if the Chinese companies were to come on board, it would be to ease UEDCL's access to cheap loans from the Export Import Bank of China.⁷⁰

4 Financing and Revenue

- a. Loss-making versus Profitability

West Africa– Decentralised distribution companies failing to pay bulk supplier of electricity, on time or in full

Example Nigeria

It emerged last week that only four of the 11 electricity distribution companies (Discos) made part payments for electricity sold to them by the Nigerian Bulk Electricity Trading Plc (NBET) in January. The latest market report on the monthly remittances by the Discos

⁶⁸ Jibueze, J. (2018, March 27). Freeing power from Fed Govt's exclusive grip. Retrieved from <http://thenationonlineng.net/freeing-power-fed-govts-exclusive-grip/>

⁶⁹ Crabtree, J (2018, March 26). South Africa's economic chief hints at privatisation drive. Retrieved from <https://www.cnbc.com/2018/03/26/south-africa-economy-chief-hints-at-privatization-moodys-upgrades.html>

⁷⁰ Wesonga, N. (2018, April 8). Chinese competition to Umeme revealed. Retrieved from <http://www.monitor.co.ug/News/National/Chinese-competition-Umeme-revealed/688334-4376806-i81wi6/index.html>

showed that Kaduna; Ikeja; Kano; Port Harcourt; Benin; Eko and Ibadan Discos did not remit a dime to the NBET in January. Similarly, a report by the NBET in December showed that Ikeja; Kano and Kaduna also failed to remit any money to the NBET for the December cycle. According to the latest report, only Abuja; Enugu; Jos and Yola paid parts of their monthly bills to the NBET in January. The report noted that Enugu Disco remitted about 29.24% of its invoice; Abuja Disco did just 18.60%; while Jos Discos paid a paltry 9.09%. Yola Disco, which is currently managed by the federal government, paid 15.06% of its invoice.⁷¹

Example Nigeria

Like their counterparts in the power distribution, the investors in power generation said in the case, which has been adjourned till April 16, 2018 that the businesses of their members, who currently generate 80% of the power consumed in Nigeria, were on the verge of collapse over debts in excess of N1 trillion.⁷²

Southern Africa – Expect losses during turnaround period

Example: Eskom's results for the year to end March 2018 would be "below breakeven", meaning it would make a loss, the utility's acting Chief Financial Officer, Calib Cassim, disclosed. In the previous financial year, Eskom made a net profit of R1bn on revenue of R177bn. Its interim financial statement for the six months to end-September placed emphasis on matters relating to the utility's going-concern status. The 2017-18 results will be released in July. Cassim told members of Parliament's portfolio committee on public enterprises that Eskom would probably have the same emphasis on its going-concern status in its 2017-18 financial results and would continue to face the same challenge in the current year.⁷³

Example Botswana

The Botswana Power Corporation (BPC) said it had increased electricity tariffs by 10% as the loss-making utility tries to recover costs. BPC has made operating losses for years due to high import costs, non-performing assets and operational inefficiencies. That has made the company reliant on government subsidies to stay afloat, but it is now slashing costs as part of a turnaround plan... BPC said it received a subsidy of 800-million pula (\$83-million) for the 2018 financial year, down from about 3-billion pula in subsidies in the past two years. BPC slashed its operational losses by 83% in the year ended January 31, 2018, to 200-million pula, after cutting imports and overhead costs, and helped by another tariff adjustment in April 2017, BPC Chief Executive Officer, Stefan Schwarzfischer, said. The company aims to be able to operate without a government subsidy from 2020 and Schwarzfischer said its subsidy would be reduced to 400-million pula in 2019.⁷⁴

- b. Debt Management (leading on from Loss-making vs Profitability & Cost and Inceptive Structures)

⁷¹ Staff Writer (2018, April 9), Thumbs Down: Discos' failure to pay for power sold to them. Retrieved from <https://www.thisdaylive.com/index.php/2018/04/09/thumbs-down-discos-failure-to-pay-for-power-sold-to-them/>

⁷² Yusaf, A. (2018, March 13). As GENCOs, DISCOs lock horns with FG... Retrieved from <https://newtelegraphonline.com/2018/03/gencosdiscos-lock-horns-fg/>

⁷³ Ensor, L (2018, April 18). Eskom warns MPs of expected annual loss. Retrieved from <https://www.businesslive.co.za/bd/companies/energy/2018-04-18-eskoms-irregular-expenditure-to-spike-in-year-to-march-2018/>

⁷⁴ Reuters. (2018, April 5). Botswana's power utility lifts tariffs by 10%. Retrieved from http://www.engineeringnews.co.za/article/botswanas-power-utility-lifts-tariffs-by-10-2018-04-05/rep_id:4136

Southern Africa – Excessive Debt from Municipalities

Example South Africa

Defaulting municipalities also came under the spotlight, with Eskom saying it continued to battle to recover the R13.5 billion in debt owed to it by defaulting municipalities.⁷⁵

Southern Africa – Influence of Managing State-Owned Enterprises on National Debt Ratings

Example South Africa

Johannesburg - Eskom says it is continuously working on a number of concerns raised by rating agencies in the past few months, including comments by Moody's last week. Moody's retained South Africa's credit rating at BAA3, saying improvements to state-owned enterprises, among other things, will improve the country's rating in the future. Eskom's Khulu Phasiwe says they take these statements seriously. "We now have a regulator working on reinstating the RCA processes and also the fact that Eskom has a new board and very soon will have a new CEO and CFO. And people who have been impacted by wrongdoing have been either suspended or they have resigned, and others have been fired. Already we are beginning to see some green shoes of positivity around Eskom."⁷⁶

- a. Import and Export of Electricity

West Africa – Reserve power and symbiotic export / import arrangements.

Example Ghana

Former Chief Executive Officer of Ghana Grid Company Limited (GRIDCo), Ing William Amuna has revealed that Ghana has enough energy capacity to meet the demand of Ghana's power outages. This, he noted, has led to the supply of power to Ghana's neighbours Ivory Coast and Togo over the past few days; according to Ing Amuna, a total of 100 megawatts to 200 megawatts have been exported so far. "Ghana once used to be exporters of power to La Cote D'Ivoire, but when the power crisis happened, we became importers of electricity from La Cote D'Ivoire. Through our collective efforts, we have been able to install electricity supply to Ghana. Today, we have over 25% installed capacity on standby. We need not to import power. We export power. In fact, for the past three days, Ghana has been exporting 100 megawatts of power to La Cote D'Ivoire. Togo has similar problems and we export to Togo and Benin," Amuna said at a workshop organised by Siemens Ghana in Accra.⁷⁷

- a. FDI and international partners in the sector?

Sub-Saharan Africa – Power Africa Roadmap Investments

In June 2013, President Obama launched Power Africa with the ambitious goal of doubling access to electricity in Sub-Saharan Africa. Power Africa is a US Government-led initiative, coordinated by the US Agency for International Development (USAID), that comprises 12 US Government agencies, and a diverse coalition of more than 130 public and private sector

⁷⁵ Presence, C (2018, April 18). Eskom tackles rot, but limps towards financial sustainability. Retrieved from: <https://www.iol.co.za/business-report/energy/eskom-tackles-rot-but-limps-towards-financial-sustainability-14516449>

⁷⁶ Nicolaidis, G (2018, March 26). Eskom says working on concerns raised by ratings agencies. Retrieved from <http://ewn.co.za/2018/03/26/eskom-says-working-on-concerns-raised-by-ratings-agencies>

⁷⁷ Addo, K. (2018, April 18). Dumsor Over! Ghana has over 25% Installed power on standby – Former GRIDCo Boss. Retrieved from <http://www.peacefmonline.com/pages/local/news/201804/349838.php>

partners, including bilateral and multilateral partners, as well as international organisations, civil society organisations, and private sector companies. In its first three years, Power Africa has built the foundation of an innovative development model that focuses on supporting “first-of-their-kind” transactions that create pathways for future transactions to move forward. Power Africa also prioritises unlocking and accelerating transactions by removing barriers and building a more investment-friendly enabling environment. Through this model, Power Africa is leading a major international effort to develop new power generation capacity and connect millions of households and businesses to on-grid and off-grid power across Sub-Saharan Africa. The Power Africa Roadmap, released in January 2016, lays out our strategy for doubling access to power across Sub-Saharan Africa by adding 60 million new electricity connections, as well as increasing installed generation capacity by 30,000 MW by 2030. The Roadmap outlines Power Africa’s three strategic pillars: generation, connections, and unlocking energy sector potential. After three years of operation, Power Africa has helped facilitate the financial close of private sector power transactions that are expected to generate over 4,600 MW. Power Africa is currently tracking approximately 60,000 MW of generation projects across the continent, which we recognise is just a subset of all generation projects proposed or underway. Based on the realities of capital projects, our experience in Sub-Saharan Africa, and the best available information we have today, we expect that between 18,000 – 21,000 MW of the 60,000 MW we are tracking will reach financial close and are expected to be online by 2030. In the past year, Power Africa grew the number of its field-based transaction advisors in Sub-Saharan Africa to over 40 experts who are helping the private sector and governments prioritise, coordinate and expedite the steps necessary for the implementation of these power projects. Our transaction advisors are also working with our partners to help us identify new viable projects to fill the gap of 9,000 – 12,000 MW to reach our 30,000 MW goal.⁷⁸

West Africa – Perception is that investors are leaving, while more international investments are taking place?

Example Nigeria

Aubja Electricity Distribution Company: According to Aubja, “This morning somebody said all the investors are leaving Nigeria. But please play the speech of the Japanese Ambassador, Sadanobu Kusaoke, to this person that not only have they (JICA) completed these projects (*project for emergency improvement of electricity supply called the Power Capacitor Bank*), they are undertaking another one in Lagos and they are going to do more. If there was one sector in the Nigerian economy that investment appetite is high, it is the power sector and the potentials that it brings. I couldn’t say that more eloquently than the way Ambassador Kusaoke has put it.”⁷⁹ (Also relevant in 7. Partnerships.)

Example Ghana

In a workshop organised by Siemens Ghana in Accra themed: “Electricity as a catalyst for growth.” Noting that Ghana has enough installed capacity to meet its demand currently, he said there is more room for improvement in the sector since an increase in demand could deplete the reserves. He, therefore, called on investors to take advantage of the demand situation in Ghana and build more power plants, adding that the sector is a big market for investors. He stated that Ghana has 85% access to electricity in Africa, second only to South

⁷⁸ Power Africa Annual Report (2017, August). Page 4 - 5. Retrieved from

https://www.usaid.gov/sites/default/files/documents/1860/Power_Africa_AR2016-optimized.pdf

⁷⁹ Okafor, C. (2018, April 12), Fashola: Nigeria’s power sector still attractive to international investors. Retrieved from <https://www.thisdaylive.com/index.php/2018/04/12/fashola-nigerias-power-sector-still-attractive-to-international-investors/>

Africa... Welcoming participants, Edmund Acheampong, Country Manager of Siemens Ghana, said the stimulation in Ghana's economy was attributable to the steady supply of electricity over the last few months, adding that with 165 years of excellence in innovation and technology, Siemens is equipped with the requisite technology and expertise, which would help maximise Ghana's energy production and supply. Siemens, which has so far added 330 megawatts of installed capacity to the national grid, said it was working with Rotan Energy, an international energy consortium, to develop some 260 megawatts of thermal power⁸⁰

a. Cost and Inceptive Structures

West Africa – Decentralised companies struggling to survive under the debt burden. They had to raise foreign debt to buy assets from government, then sell energy back to government (Nigerian Bulk Electricity PLC – 100% Federal Government owned), but are not paid and therefore struggling to survive under the debt burden.

Example Nigeria

Specifically, the GENCOs stated that they had made huge sacrifices, bearing the excruciating burden of not being paid for electricity generated and sold to the Nigerian Bulk Electricity Trading, NBET Plc and are facing the threat of business failure as a result of their huge indebtedness to banks and financiers, which provided the foreign currency-denominated acquisition loans, which the power plants were acquired from the Federal Government.⁸¹

4 Tax, Legislation and Regulation

a. Tenders

East Africa – Lobbying for early renewal of concession

Example Uganda

Power distributor Umeme is lobbying the Ministry of Energy to have its concession agreement extended before it expires and as President Yoweri Museveni threatens to have the contract terminated. A source at the Ministry of Energy told this publication on condition of anonymity that Umeme officials have been using different lobbyists to convince President Museveni and Energy Minister, Engineer Irene Muloni, to commence early negotiations to have the current 20-year concession extended beyond 2025. Umeme has been using its latest achievements like increased roll-out of pre-payment metering, increase in revenue collection and distribution efficiency to lobby the government to extend its concession. The company says it has excelled in distribution efficiency at 83% compared to 50% at the start of the concession in 2005. It appears that sections within the Ministry of Energy have been convinced by Umeme's lobby, but the President, who has over the years been critical of power tariffs, was not convinced.⁸²

a. Turnarounds and Executive Revolving Doors

⁸⁰ Boadi, S. (2018, April 18). Power Sector Demands Proper Planning – Former Gridco CEO. Retrieved from <https://www.modernghana.com/news/848240/power-sector-demands-proper-planning-former-gridco-ceo.html>

⁸¹ Yusuf, A. (2018, March 13). As GENCOs, DISCOs lock horns with FG... Retrieved from <https://newtelegraphonline.com/2018/03/gencosdiscos-lock-horns-fg/>

⁸² URN. (2018, April 3). Why Umeme is lobbying for early renewal of concession. Retrieved from <http://dispatch.ug/2018/04/03/umeme-lobbying-early-renewal-concession/>

Southern Africa – Tariff increases and successful turnaround plan

Example Botswana

The Botswana Power Corporation (BPC) said it had increased electricity tariffs by 10% as the loss-making utility tries to recover costs. BPC has made operating losses for years due to high import costs, non-performing assets and operational inefficiencies. That has made the company reliant on government subsidies to stay afloat, but it is now slashing costs as part of a turnaround plan.... BPC said it received a subsidy of 800-million pula (\$83-million) for the 2018 financial year, down from about 3-billion pula in subsidies in the past two years. BPC slashed its operational losses by 83% in the year ended Jan. 31, 2018, to 200-million pula, after cutting imports and overhead costs, and helped by another tariff adjustment in April 2017, BPC Chief Executive Officer, Stefan Schwarzfischer, said. The company aims to be able to operate without a government subsidy from 2020 and Schwarzfischer said its subsidy would be reduced to 400-million pula in 2019.⁸³

Example South Africa

It says that subject to consultations with Public Enterprises Minister, Pravin Gordhan, it will be ready to appoint a permanent group chief executive officer by the end of the month. Eskom is briefing Parliament's Public Enterprises Committee on its latest financial results. The Eskom board says that it is moving quickly to improve the company's liquidity and restore investor confidence. Five executives embroiled in corruption being investigated by Parliament's Public Enterprises Committee, have left the company. Two of the four top executives on suspension will face a disciplinary panel this month and the other two in May. Executives and two tiers of managers are all undergoing lifestyle audits. Board member, Sindi Mabaso-Koyana, adds that action has already been taken against all but three of the 24 employees doing business with Eskom. "The organisation is determined to clear the company of corruption in all its forms, and is currently investigating 239 cases that have come through our whistleblowing channels." The board says it will have finalised its turnaround strategy by September.⁸⁴

Southern Africa – Executives behaviour increasingly scrutinised

Example South Africa

Mark Lamberti has resigned as a director from the Eskom board. His resignation was tendered, and accepted. Lamberti said he made the "difficult" decision because he wanted to put the interests of Eskom, the board and the country above all else... On March 23, the South Gauteng High Court found that Lamberti, who was in 2015 the chief executive of Imperial Holdings, impaired the dignity of former employee Adila Chowan by referring to her as "a female empowerment equity candidate".⁸⁵

Example South Africa

Johannesburg - Long-standing Eskom executive Mongezi Ntsokolo was, until November last year, a board member of independent power producer (IPP) Acwa SolAfrica Bokpoort

⁸³ Reuters. (2018, April 5). Botswana's power utility lifts tariffs by 10%. Retrieved from http://www.engineeringnews.co.za/article/botswanas-power-utility-lifts-tariffs-by-10-2018-04-05/rep_id:4136

⁸⁴ Dentlinger, L (2018, April 18). Eskom board on mission to root out corruption. Retrieved from <http://ewn.co.za/2018/04/18/eskom-board-on-mission-to-root-out-corruption>

⁸⁵ Staff Reporter (2018, April 7), Lamberti quits Eskom following ruling that he impaired employee's dignity. Retrieved from <https://city-press.news24.com/Business/lamberti-quits-eskom-following-ruling-that-he-impaired-employees-dignity-20180407>

Company. Ntsokolo's membership of Acwa's board raises conflict of interest questions, because Eskom is a designated buyer of renewable energy power. Acwa is one of the IPPs participating in the ongoing Renewable Energy Independent Power Producer Procurement (Reippp) Programme... Former Eskom interim Chief Executive, Matshela Koko, took to Twitter to criticise his former colleague's role as an Acwa board member. Koko said Eskom's policy prohibited employees from having a personal or other interest in an Eskom contract. This included third party-related transactions with indirect links to an Eskom contract. Koko questioned Eskom's choice of Ntsokolo to sign power purchase agreements with 27 IPPs. "In line with Eskom's good corporate government practices, Mongezi Ntsokolo, who is a director in Acwa Power IPP, was authorised by the new Eskom board to sign the unlawful (contract) with 27 renewable IPPs. Welcome to the New Dawn," he tweeted.⁸⁶

Southern Africa – On a mission to root out corruption

Example South Africa

Eskom's new board is on a mission to root out all forms of corruption at the power utility. Less than three months since their appointment, they have already finalised a third of over 200 reported cases of suspected corruption.⁸⁷

Example South Africa

The High Court in Pretoria says former Eskom boss, Brian Molefe, has no prospect of success in his bid to appeal the ruling that his return to the power utility was invalid and that he must pay back an estimated R11-million of his R30-million pension payout.⁸⁸

West Africa – Supply of electricity or lack thereof used or seen as means of extortion? (Reputational Risk regardless)

Example Nigeria

Bwari area council of the Federal Capital Territory (FCT)...The general secretary Rockville Residents Association, Mr Ekhaegbah Orbih said that the community had approached the area office of AEDC in 2014, but has not been connected. Orbih noted that the community, which has over 60 residential houses, has been in the dark, while the company officials make fortune out of their predicament, even though electricity is critical to any community. The secretary further stated that the community had paid more than half a million naira to Bwari area office of the AEDC as part of the conditions to be connected to the electricity greed since 2015. He added that the community met some of these conditions, but later jettisoned it when they realised that the AEDC Bwari office was defrauding them of their hard earned money.⁸⁹

4 Labour Relations

⁸⁶ Njobeni, S. (2018, April 9). Eskom's Ntsoloko was on Acwa board. <https://www.iol.co.za/business-report/energy/eskoms-ntsoloko-was-on-acwa-board-14326786>

⁸⁷ Dentlinger, L (2018, April 18). Eskom board on mission to root out corruption. Retrieved from <http://ewn.co.za/2018/04/18/eskom-board-on-mission-to-root-out-corruption>

⁸⁸ Preston, R. (2018, April 17). Former Eskom boss, Brian Molefe, loses bid to get his old job back. Retrieved from <https://www.timeslive.co.za/news/south-africa/2018-04-17-former-eskom-boss-brian-molefe-loses-bid-to-get-his-old-job-back/>

⁸⁹ Tarkaa, D. (2018, April 10). Looking at the plight of Bwari residents in access to power supply. Retrieved from <https://leadership.ng/2018/04/10/looking-at-the-plight-of-bwari-residents-in-access-to-power-supply/>

- 8 Major labour movement backlash as renewable energy and alternatives, both in terms of production as well as management and distribution, to state-ownership, undermine job security in the mining sector in particular.

Southern Africa – Balancing act of state-owned enterprises on profitability and being a job provider

Example Botswana

Unemployment is another burning issue and a ticking time bomb about to explode, and according to the Botswana Multi Topic Household Survey (BMTHS) report, unemployment declined from 20% in 2013 to 17.7% in 2016. "We believe that the research is fake, hence deserves to be condemned with outmost contempt. The BDP-led government still fails to provide employment solutions for its own people. Many workers experienced job losses in state-owned enterprises on account of retrenchments. Botswana Water Utilities Corporation (WUC), Botswana Meat Commission (BMC), Botswana Power Corporation (BPC), and Air Botswana have retrenched hundreds of their employees," he said. Kelebens said the private sector is bleeding, shedding jobs at a rate never experienced before.⁹⁰

Example South Africa

Eskom's latest statistics show power capacity of 0.72 megavolt amps per employee — against 30.98 at Power Grid Corporation of India. After a decade of unprecedented growth in staff numbers, cash-strapped power utility Eskom is finally tackling the controversial issue of its head count. State-owned Eskom, seen by Goldman Sachs as the biggest single risk to the South African economy, employed about 47,600 people as of March last year, compared with 32,600 a decade ago. A bloated workforce means high costs for a company struggling with cash flow. But it is stuck in a three-way tug of war between labour, which rejects job cuts, the ANC, which wants to boost the economy, and funders, who are leery of financing Eskom because of the way it has been managed. "We are currently rolling out a plan to manage our employee numbers to optimal levels," Eskom said in an e-mailed response to questions, without detailing what that level might be. A World Bank study in 2016 found that South African utilities pay workers more than double the norm in 35 other countries on the continent, with staff costs coming in at an average \$61,000 per employee per year. Eskom was potentially overstaffed by 66%, the report said. "We have noted the World Bank study," Eskom said. "The issue of Eskom staffing requirements versus the status quo has solicited views from a number of stakeholders. Staff costs also increased faster than consumer price inflation, which rose 84% over the 10-year period, while Eskom's power capacity was 0.72 megavolt amps per employee, according to data in its latest annual report. That compared with 30.98 MVA for every staff member at Power Grid Corporation of India, that country's largest transmission utility...Management will have to scrap between 13,000 and 15,000 jobs, says Wayne Duvenage, CEO of the non-profit Organisation Undoing Tax Abuse (Outa), which has studied Eskom's staffing, costs and asset valuations. "If Eskom gets its head count right and removes the unnecessary higher-paid positions, it should be able to cut its annual salary bill by R10bn," Duvenage says.⁹¹

⁹⁰ Basimanebotlhe, T. (2018, April 17). Young progressives applaud Kenewendo's appointment. Retrieved from <http://www.mmegi.bw/index.php?aid=75320&dir=2018/april/17>

⁹¹ Bonochis, R, Burkhardt, P & Prinsloo, L (2018, April 3). Eskom makes a start on bloated head count. Retrieved from <https://www.businesslive.co.za/bd/companies/energy/2018-04-03-eskom-makes-a-start-on-bloated-head-count/>

Southern Africa – Executives leading the way in taking accountability for underperformance

Example South Africa

Johannesburg - The City Power board of directors says all members of the utility's executive management committee and general managers will not receive bonuses for the last financial year. The board says the executive management committee has not achieved its goals and targets for the year. Johannesburg MMC for Environment and Infrastructure, Nico de Jager, said: "We believe that they still have a long way to go in improving service delivery in City Power and, therefore, they will not be taking or paying any bonuses." Other employees from the level of manager and below are still in line for bonuses, but only if they performed well.⁹²

Southern Africa – Renewable energy have to prove it is better for the environment and employment

Example South Africa

Greenpeace was compelled to respond to the news that Transform RSA and Numsa were taking the Minister of Energy to court at the 11th hour to prevent the signing of R56-billion worth of renewable-energy independent power producer (IPP) projects. We called the steps being taken "sabotage" of renewable energy in SA, in an effort to protect the dying coal sector. In an economy gasping for growth, it seems impossible to understand, why an important union like Numsa would block investment in SA and work to protect coal jobs. The devil is in the details here, though – because Numsa is protesting against private renewable energy, while pushing for socially owned renewable energy instead. "The key here is 'decent work', and instead of blocking renewable energy, labour organisations should be focusing on directing a plan for the just transition away from coal and towards renewable energy."⁹³

Southern Africa – Labour relations affecting raising international investments

Example Zimbabwe

President Emmerson Mnangagwa's government faces a major setback in its efforts to lure investment after the Zimbabwe Congress of Trade Unions wrote to the International Labour Organisation (ILO), accusing the government of anti-trade union discrimination. This follows the reluctance by the Zimbabwe Electricity Transmission and Distribution Company (ZETDC), a subsidiary of ZESA to comply with the 2012 Collective Bargaining Agreement that had the effect of increasing the minimum basic salary of its employees to 275 dollars... The complaint by the labour body will likely see Zimbabwe on the agenda of the International Labour Conference, which is held annually in June.⁹⁴

⁹² EWN (2018, March 12). City Power Board members won't get bonuses for last financial year. Retrieved from <http://ewn.co.za/2018/03/12/city-power-board-members-not-to-receive-bonuses-for-last-financial-year>

⁹³ Khambule, H. (2018, March 29). Renewable Energy: Better Than Coal For Environment AND Employment... Retrieved from https://www.huffingtonpost.co.za/happy-khambule/renewable-energy-better-than-coal-for-environment-and-employment_a_23398268/

⁹⁴ Staff Reporter (2018, March 31). Mnangagwa reported to ILO. Retrieved from <https://bulawayo24.com/index-id-news-sc-national-byo-131857.html>

4 Context: Macro Environment⁹⁵

a. Governance, Political and Geopolitical

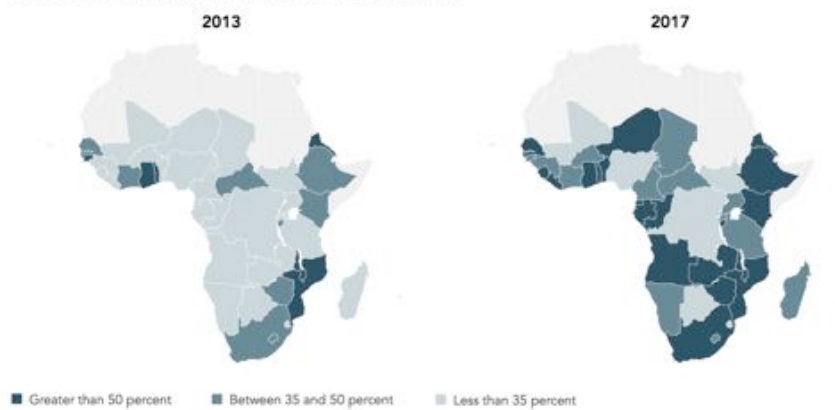
Shift from dictatorship and pseudo-democratic one-party states to technocratic authoritarianism.

Major political shift from longstanding autocrats and dictators, such as; Mbasogo, Mugabe, Biya, Museveni, etc. and the rise of technocrats such as Kagame, including the revolutionary change that occurred in North Africa as a result of the so-called Arab Spring.

Rising public debt, as per the below, will constrain government infrastructure spending and raise the attractiveness and profile of PPPs.

FIGURE 2.3. TOTAL PUBLIC DEBT AS A PERCENTAGE OF GDP IN SUB-SAHARAN AFRICAN COUNTRIES

Public debt levels rose rapidly between 2013 and 2017 across the continent.



Source: International Monetary Fund, World Economic Outlook database, October 2017.

b. Economic: Global, Regional and National

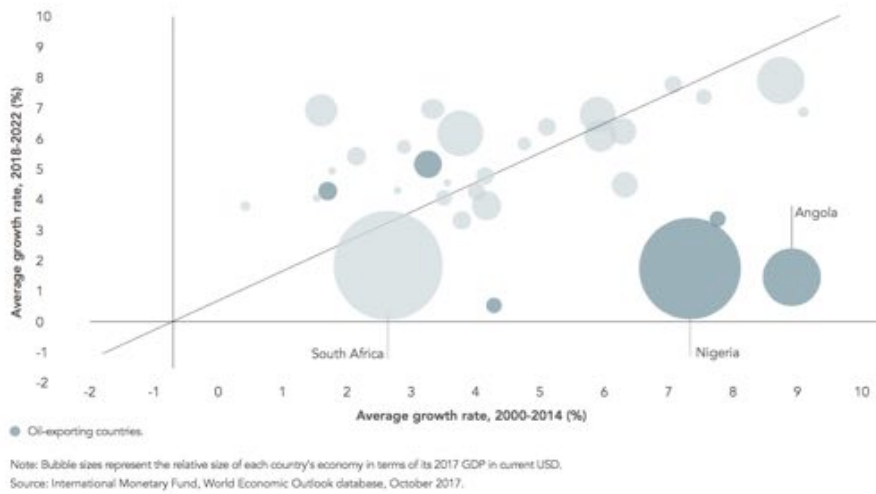
Economic growth and inequality diverging, with urban elites rapidly accruing the benefits of post-industrial development, while the peri-urban and rural poor languish with little opportunity. This is compounded by economic governance challenges, including corruption, state incapacity and populism.⁹⁶

⁹⁵ European Union Institute for Security Studies. African Futures, Horizon 2025. Retrieved at: <https://www.iss.europa.eu/content/african-futures-horizon-2025>

⁹⁶ Brookings, Africa Growth Initiative. Foresight Africa 2018. Retrieved at: https://www.brookings.edu/wp-content/uploads/2018/01/foresight-2018_full_web_final2.pdf

FIGURE 2.2. REAL GDP GROWTH ACROSS SUB-SAHARAN AFRICAN COUNTRIES

The region's three largest economies, South Africa, Nigeria, and Angola, are expected to grow at a slower pace during 2018-2022 than between 2000-2014.

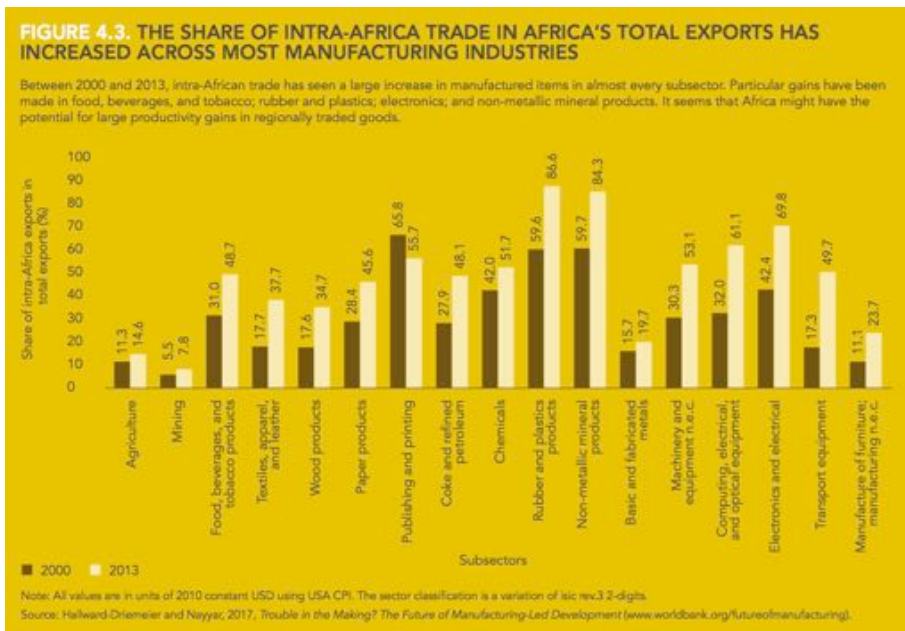


Major fluctuations and volatility in oil price undermine petro-economies and result in turbulence in the regulatory and planning environment as it relates to energy management.

Oil expert and oil markets will affect 2/3 of Africa's economies, Nigeria and Angola, dramatically in the coming decade. Growth will be high in regional pockets, centred on South Africa, Nigeria, Kenya and Morocco regionally.

Industrial export growth has increased in most sectors, especially plastics and non-metallic minerals.

Pocketed manufacturing growth, especially in coastal nodes, incentivises the prioritisation of energy reliability.



c. Social, Cultural and Societal

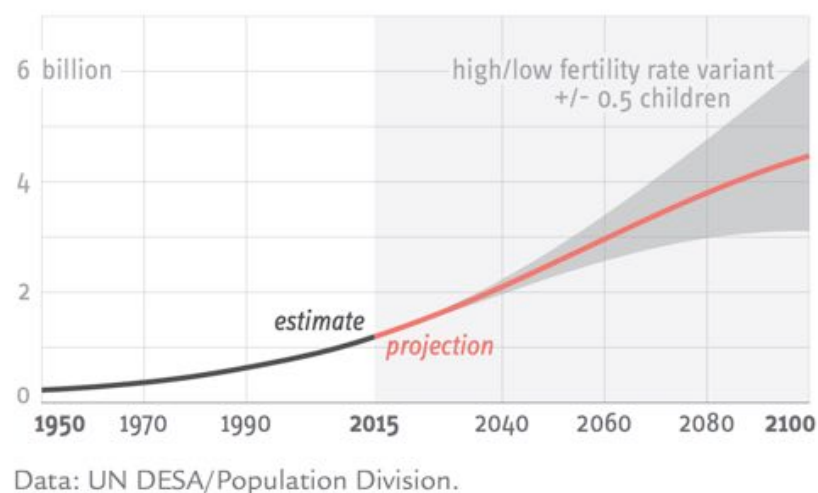
Rising social expectations, particularly among the youth, bring energy provision increasingly to the top of the political agenda.

The rapidly expanding youth bulge is either a demographic time-bomb or a demographic dividend – if the young African workforce can be productively engaged in the economy.

Ongoing and entrenched insecurity, particularly along the Sahel region as a result of religious extremism and tribal tensions continue to undermine human development, economic stability and investment.

Rapid urbanisation and densification across societies in Africa, enabling efficiencies in connectivity and access.

Figure 7: Total African population
Past estimate and future projections



Human capital constraints and brain drain are challenges, unless policy and an enabling environment are created to retain and/share talent with transnational corporations, specifically in high-tech segments and roles.

d. Technological: Industry 4.0 and 5.0 (Enabling Systems and Services)

Africa has seen a 344% growth in mobile phone use in the decade 2007 to 2017.⁹⁷ This rise in connectivity will impact; customer relationships, data and analytics, social engagement, mobilisation and collaboration, as well as dramatically altering the patterns of innovation and the proliferation of new micro-enterprise business models.

Key technological advances;

- Big Data and the resultant AIR capabilities for smart and responsible management and policy.
- Blockchain and decentralised-ledger and token-based transacting through FinTech platforms.

⁹⁷ PwC. 2016. Disrupting Africa. Riding the wave of the digital revolution. Retrieved at: <https://www.pwc.com/gx/en/issues/high-growth-markets/assets/disrupting-africa-riding-the-wave-of-the-digital-revolution.pdf>

- Drone technology, robotics and 3D printing disrupting the logistics constraints relating to transportation, maintenance, monitoring and distribution. This will enable early warning and the partial decentralisation of maintenance capacity through hub-and-spoke organisation.
- Sensors and the Internet of Things creating real-time data analytics capability embedded in hardware and machinery.
- Synthetics materials, intelligent polymers, nano-materials, nano-tubes, nano-sensors and graphene will alter the relationship between scale, strength, cost-of-production and functionality in fundamental ways.⁹⁸
- Virtual reality, ultra-thin functional coatings or bioactive surfaces or materials, fuel cells and bio-fuels, RFID-based logistics chains.
- Sharing economy emerging in real economic terms, through high-trust networks that augment relationships, especially in urban centres.

In addition to the above technology trends, a series of nested contextual trends will impact technology advancement in Africa, as per the table below:⁹⁹

⁹⁸ Pouris, A. 2012. DTI. Technology Trends. A review of technologies and policies. Retrieved at: http://www.dti.gov.za/industrial_development/docs/Final_Technology_Trends.pdf

⁹⁹ Swart, D. 2011. Africa's Technology Futures: Three scenarios. Boston University. Retrieved at: <http://www.bu.edu/pardee/files/2011/08/PardeePaper-14-Africa-Tech-Futures.pdf>

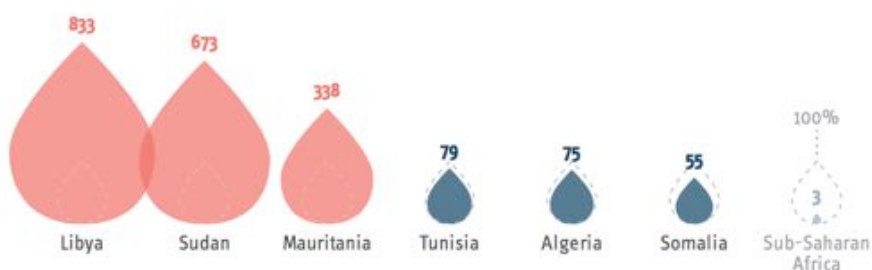
Table 1: Key Drivers of Technological Change in Africa

| Driver | Relevance |
|--|---|
| Demographics | Large populations, particularly if they are concentrated in urban areas, mean large potential markets. They also mean increased stresses on limited resources and introduce stresses from the social change associated with urbanization. |
| Governance | Governments have a key role to play in nurturing and protecting technology and technological capability. This includes conflict. |
| Safety and security | Lack of security changes the way people think about the future and reduces the value they give to long-term planning. |
| Entrepreneurship and the technology multiplier | Opportunity entrepreneurship is an interactive, social activity that requires the right conditions to be successful. |
| Globalization and external intervention | In addition to trade, globalization affects a country's capability to resist external political and economic intervention, increases technological collaboration, and enables niche players. |
| Internal continental relations | Good relations with neighbors create convenient trade opportunities, enhance skill and knowledge exchange, encourage a pluralistic approach to security, create economies of scale in knowledge creation, and create growth potential. |
| Economic and human development | Technological sophistication multiplies economic and human development opportunities, which in turn create opportunities for technological development. Economic and human development move together and are considered together. |

e. Climate, Ecology and Extreme Weather

Major resource depletion and land pressures will put pressure on food security and social stability as tensions rise over water scarcity and management.

Figure 10: Total annual freshwater withdrawals
 % of internal resources



Data: World Development Indicators (World Bank)

6. RESEARCH DESIGN

Scoping:

In terms of key stakeholders, we explored the current value chain and business models of a number of companies in order to come to terms with the scope of existing operations.

- Nigeria, EKO - Electricity Distribution Company
- Nigeria, Abuja Electricity Distribution Company
- South Africa and Uganda, Eskom Enterprises
- Ghana, GridCo
- Uganda Electricity Transmission Company Limited
- Botswana Power Corporation
- Burkina Faso, Société Nationale d'Electricité du Burkina Faso (SONABEL)
- Namibia, ErongoRed
- Malawi Electricity Generation Company
- Zimbabwe Electricity Transmission and Distribution Company
- South Sudan Electricity Corporation

Trend Scanning:

We used two frameworks, the first relates to urban governance and the latter to the environment of business. (See Appendices)

SCENARIO RESEARCH STEPS:

Phase A: Scoping the domain of African utilities.

1. Gathered an overview of companies represented.
2. Analysed in terms of country GDP to provide a qualitative measure of scale of the companies, or where you would expect them to be, and the magnitude of challenges they face.
3. Assessed whether they are state-owned companies (SOC) or Private Ltd companies, and assessed their latest Annual Report (AR) or profile document.
4. Assessed the companies in terms of size, as it relates to; Revenue, Area of services, Mega Watt capacity, where available, or number of users it provides service to.
5. Gathered popular press articles outlining the utility companies in the country, in addition to articles about the company's performance or developments, as well as historic articles.
6. Developed master list of trend categories and related research questions to guide the scanning process.

Phase B: Analysing the data in the domain.

1. Regional analysis of Africa, using activities of dominant players as a lens for developments in southern, eastern, western and northern Africa.
2. Generalising the trends for universal insights across the continent.
3. Develop a system analysis of the interactions between the trends to find emergent shifts in the domain.
4. Look for cross impacts due to convergence in Industry 4.0 on the value chain of the domain.
5. Analyse impact and uncertainty in relation to future outcomes.

6. Develop the scenario narratives for the future of African utilities.

Phase C: Analysing the data in the domain.

1. Surveying industry experts and stakeholders about the uncertainties and trends as identified in the research.
2. Facilitating stakeholder dialogue in open plenary, with panel of three utility CEOs, to present and review scenarios.
3. Facilitating a CEO Forum with 17 utility CEOs from across Africa to explore the strategic implications for utilities in light of the scenarios.

7. DELPHI SURVEY QUESTIONS

True or False:

1. As renewable energy enables widespread access to services, governance of the sector will improve.
2. The adoption of renewable energy by business and private citizens will lead to the decentralisation of production.
3. Governments will continue to tolerate illegal connections to the grid and non-payment of bills due to political expediency.
4. Social tensions will rise dramatically due to intermittent power supply.

Select an appropriate option:

Non-payment by government users such as municipalities and state-owned companies will lead to;

- a. Bankruptcy of utilities companies.
- b. Government bail-outs of utilities companies.
- c. Partial-privatisation of utilities.

As African states take advantage of their natural endowments in wind, solar, gas, geothermal and hydro energy, renewable energy in particular will be top of the agenda of utility companies in the next;

- a. 5 years
- b. 10 years
- c. 20 years
- d. Not at all

There is a market increase in public-private-partnerships as international investors look to harness opportunities for growth in Africa.

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree
- f. Don't know

Which will most **negatively** affect the development in the provision of utilities in the next decade:

- a. Weak states and disruption by terrorism
- b. Climate change and extreme weather
- c. Land-tenure related tensions
- d. Poor governance and conflicts of interest
- e. Ageing and poorly maintained infrastructure

Which will most **positively** affect the development in the provision of utilities in the next decade:

- a. New actors in the sector who are small, agile and privately owned.
- b. A growing pipeline of technical skills.
- c. Smart meters and mobile phone apps for monitoring, billing and energy efficiency.
- d. Urbanisation and the identification of cities.

The relationship between utilities companies and urban planners and city bureaucrats can be described as:

- a. No relationship.
- b. Occasional communication.
- c. Poorly coordinated, but aligned.
- d. Not coordinated or aligned.
- e. In conflict.

The possibility of the private sector opting to "drop the grid" for alternatives sources is:

- a. Unlikely, and welcomed.
- b. Likely, and welcomed.
- c. Unlikely, and not welcomed.
- d. Unlikely, and not welcomed.

Theft, tampering and vandalism of infrastructure are being criminalised on the premise of protecting the "national economic interest".

- a. Agree
- b. Partially agree.
- c. Don't agree.

Regional integration will accelerate as improved capacity leads to greater power-sharing and cooperation in Africa.

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree

- f. Don't know

A major labour movement backlash will occur as renewable energy and alternatives threaten job security in the mining sector.

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree
- f. Don't know

Governments in Africa are becoming more effective and this has positive outcomes for utilities:

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree
- f. Don't know

The greatest technological impact on utilities will come from:

- a. Advances in Big Data analytics and the resultant artificial intelligence capabilities.
- b. Blockchain and decentralised-ledger and token based transacting technologies.
- c. Drone technology, robotics and 3D printing that disrupt the logistics constraints relating to transportation, maintenance, monitoring and distribution.
- d. Advances in sensors and the Internet of Things.
- e. Advances in synthetics materials, intelligent polymers, nano-materials, and graphene.
- f. Not sure.

Due to the range of choices among energy resources, high levels of competition exist and lower margins, which will alter the trend from full-cost to low and "value added" services.

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree
- f. Don't know

What is the most important key driving factor of leapfrogging conventional energy to renewable energy in sub-Saharan Africa

- a. The global goals of a sustainable energy future and universal electricity access
- b. The abundance of renewable energy resources, especially in sub-Saharan Africa
- c. The financial commitment to invest in renewable energy
- d. The growing renewable energy technology and the declining cost of renewables
- e. The rapid urbanisation and population growth of the 'unmet electricity market'.

The readiness of my country's government, in terms of policies that enable the transition to and market preparedness for renewable energy, can be rated as;

- a. Fully prepared.
- b. Partially prepared.
- c. Slowly preparing.
- d. Entirely unprepared.

A barrier faced by organisations investing in new large-scale generation and transmission projects appears to be the inability to recover the cost of new generation via current electricity tariffs. Would moving to cost-reflective tariffs have a high impact by increasing electrification and improving reliability?

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree
- f. Don't know

Which of the following technology developments do you expect to have the biggest impact on your market?

- a. Expansion in Hydro
- b. Large gas-fired plants
- c. Thermal Power supply
- d. Fracking and Gas power
- e. Solar Plants
- f. Wind Energy
- g. Waste to Energy

h. Nuclear

The role of Foreign Direct Investment in your company can be described as

- a. Available, and being employed as a major enabler for expansion.
- b. Available, but not being employed sufficiently.
- c. Hard to obtain, but employed at a small scale.
- d. Difficult or impossible to obtain.

What is mostly preventing your company from servicing more users?

- a. Lack of reliable supply chain
- b. Heavy debt burden, lack of funding or unprofitable markets
- c. Political unrest, theft or vandalism
- d. Failing systems, old technology or maintenance requirements
- e. Political influence, laws or legislation

In the planning for the next 20 years, the composition of your energy portfolio, ranked from high to low, will consist of:

- a. Thermal, Nuclear, Renewable
- b. Thermal, Renewable, Nuclear
- c. Nuclear, Thermal, Renewable
- d. Nuclear, Renewable, Thermal
- e. Renewable, Thermal, Nuclear
- f. Renewable, Nuclear, Thermal

8. APPENDICES

Two scanning frameworks developed at the Gordon Institute of Business Science (GIBS) were used to scope the research and trend analysis.

