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Sub-Saharan Africa Power Outlook

2014

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Infrastructure & Major Projects Group

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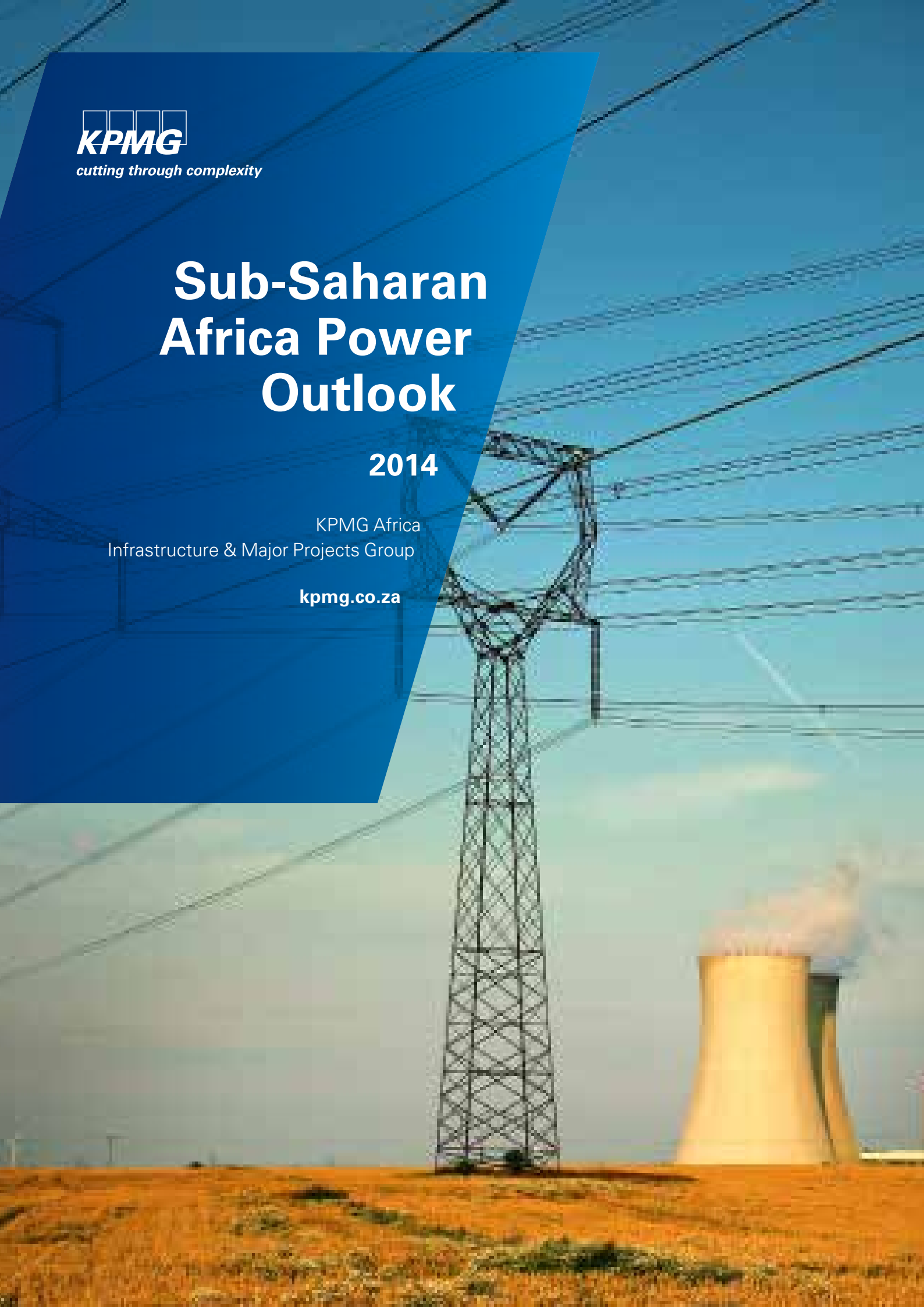

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We would also like to thank all those who have contributed and shared their valuable domain insights in helping us put this outlook together.

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01 Foreword

Dear reader,

It is my pleasure to introduce to you the 2nd edition of the Sub-Saharan Africa Power Outlook, which has been prepared by our Infrastructure & Major Projects Group. The high growth of Sub-Saharan countries and the current developments in the power sector provide a broad range of new topics since the first edition of this report was launched in 2011.

Sub-Saharan Africa is seen as a new frontier of growth and the economic growth rates have shown immense potential during the last decade. In the same time it increasingly became a common understanding that this growth is only possible when the power sector is in line with the national development plans. Wherever the power sector lagged or the plans were poorly executed, the economic growth slowed down. In that case, it is no wonder that the old clichés like 'the dark continent', 'low electrification rates', 'poor collection rates' or 'underinvestment in Africa', are used to describe the power sector.

But the widely recognised trends like urbanisation, growing population and increasing wealth, more discoveries amongst the wealth of natural resources or a deepening financial sector, leaves the power sector with no other chance but to respond. Simultaneously, the power sector experiences its own changes with, amongst others, impacts on increased proliferation of off-grid power solutions, a renewed focus on regional integration, further regulatory reforms and the clean energy drive. Therefore the current developments in the Sub-Saharan countries are dispensing with the clichés itself.

Nevertheless, Sub-Saharan Africa is also facing the trilemma of security of power supply that has a low carbon footprint (sustainability) and is affordable (energy costs). For the region, the trilemma is both a challenge and an opportunity. A challenge – especially coming from an old, unreliable and inefficiently maintained infrastructure with assets from the nineties and politically-driven regulations and tariffs. But because of the high demand of new assets and infrastructure, there is a necessity to develop directly with regards to the compatibility of all three goals set in the trilemma.

There are currently various country-specific initiatives underway to improve the power sectors' infrastructure and to increase the number of power generation plants as well as transmission and distribution lines. Often these plans are integrated in national development plans and linked to social, economic and climate goals. There are two main ways of realising the plans. The one direction lies in upgrading, refurbishing and process optimisation for existing generation assets, and the other direction goes to building new assets.

Both result in a higher, more effective and efficient as well as affordable capacity in the power market.

Due to the high power demand, the expanding plans are huge and require a lot of investments to be realised either from public or private side. Unfortunately, the plans have not materialised as far as they could. The current tariff structure is the biggest barrier for more investments and implementations in the power sector, as the tariffs often are politically driven, low and unpredictable, and therefore offer limited long-term and sustainable investment opportunities.

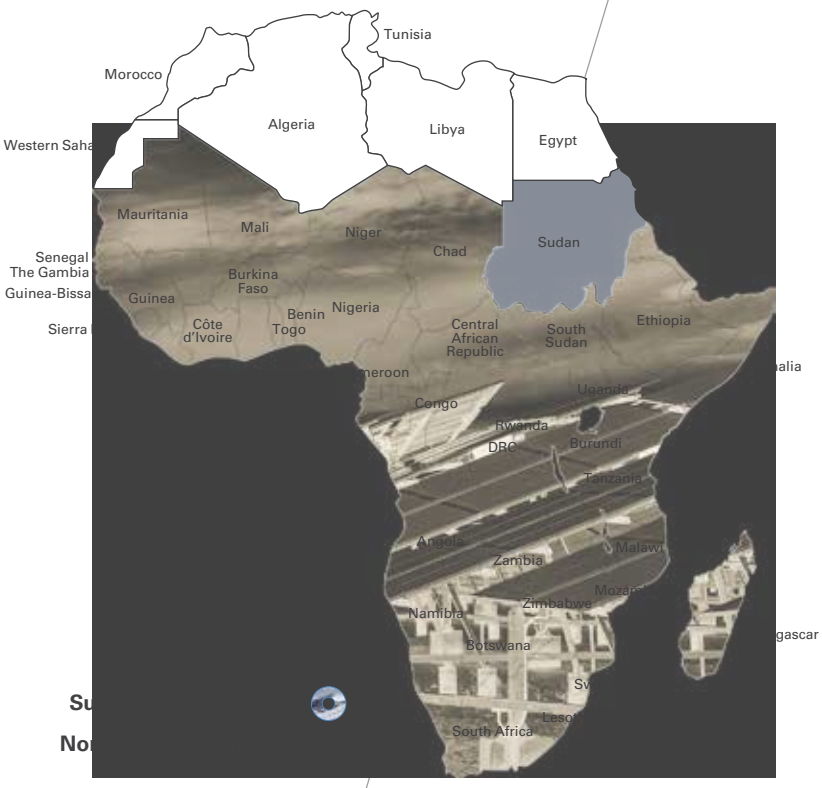
How the countries deal with these challenges can be seen on the two contrasting, but both successful developments in Nigeria and South Africa. Nigeria went through one of the boldest privatisation initiatives in the global power sector over the last decade which, amongst others, led to a higher tariff structure and includes several reforms over the last decade. A strong institutional mechanism was established and, during the privatisation process, the expectations of both the investors and the employees working in the power sector were adequately addressed. South Africa launched in accordance with the Integrated Resource Plan, a state-governed Independent Power Producer Procurement Programme. The success of the renewable energy programme resulted in the design of further, especially base load, programmes for coal, gas, co-generation and hydro, which will be launched soon. The interest of private investors for the renewable programme was significantly higher than the requested capacity and is a good sign for further developments. Both countries can be seen as role models for pushing forward the energy transformation albeit with vastly different and contrasting strategies.

The 49 Sub-Saharan Africa countries face a lot of similar challenges with regards to the power sector but, as different as the countries are, the priorities, the solutions and the developments are different. The selected country profiles highlight some of the specific developments and show examples of opportunities to realise the national or even cross boarder plans for an improved energy sector.

I hope you will enjoy reading this publication and I wish you all the best in discovering the Sub-Saharan Africa Power sector. Contact us should you want to discuss either your own Sub-Saharan Africa experience or a more detailed view on one of the associated countries and the current developments.

Moses Kgosana
Chief Executive KPMG South Africa and
Chairman KPMG Africa

02
Sub-Saharan Africa



African Statistics

- **Current:**
  - **US$1.6 trillion – Africa's collective GDP in 2008, roughly equal to Brazil's or Russia's;**
  - **US$860 billion – Africa's combined consumer spending in 2008;**
  - **60% – Africa's share of the World's total amount of uncultivated, arable land;**
  - **52 – The number of African cities with more than 1 million people;**
  - **20 – The number of African companies with revenues of at least US$3 billion.**
- **Future:**
  - **US$2.6 trillion – Africa's collective GDP in 2020;**
  - **US$1.4 trillion – Africa's consumer spending in 2020;**
  - **US$1.1 billion – The number of Africans of working age in 2040;**
  - **128 million – The number of African households with discretionary income in 2020.**

Introduction to Sub-Saharan Africa

Sub-Saharan Africa is, geographically, the area of the African continent that lie south of the Sahara Desert and consists of 49 countries. It contrast with North Africa, which is considered part of the Arab World. It has a combined population of up to one billion people due to having the highest population growth in the world, a number that is expected to more than double by 2050. More than 40% of the population in Sub-Saharan Africa are younger than 15 years old, with the exception of South Africa.

Sub-Saharan Africa is seen as the new frontier of growth. In 2013, economic growth in the region was at 4.9%, compared to 3% for the global economy, and is projected to about 5.5% in 2014. Supported by sound economic policies, debt relief, stronger institutions and high investments, many countries have now sustained a 5-6% growth rate for more than a decade. Economic activity and growth in the region continues to be underpinned by large investments in infrastructure and is supported by a continuation of strong domestic demand and higher production in the mineral resources, agriculture and service sectors. Growth in exports has been supported by strong demand from developing countries, in particular China, given its relatively high resource intensity in production and its fast growth rate.

The world has started to look to Africa as a high-growth market due to opportunities opened up by strong growth in the region, improved regulation, a growing middle class with higher discretionary income, the fast pace of urbanisation, which makes it easier to reach consumers, and one of the highest rates of return globally.

Developments are also supported by the new political dynamic in many African countries, which is a good foundation for strong social, economic and ecological developments. Responsible governments are talking over and they are monitored by an active civil society. Additionally, enhanced regional cooperation enables Africa to speak with one voice and to emerge as an important player on the global political stage.

The Power Sector

The challenges bedevilling the Sub-Saharan Africa region are well-documented. The region is characterised by ageing power infrastructure that is unable to meet current power demands and therefore suppresses the power demand. The 49 countries of Sub-Saharan Africa with a combined population of up to 1 billion, generate approximately the same amount of power as Spain, which has a population of 45 million. Power consumption, at 124 kilowatt hours (kwh) per capita per year and falling, is only a tenth of that found elsewhere in the developing world, which is barely enough to power one 100-watt light bulb per person for three hours a day. The previously mentioned African statistics presents an excellent investment opportunity.

The region is characterised by ageing power infrastructure that is unable to meet current power demands

The other challenges facing the power sector are as follows:

- Under-utilisation of generation capacity due to low maintenance of assets;
- High primary energy costs and securing resources at reasonable prices to fuel current and new build assets;
- Loss-making power utilities due to low collection rates and high operational inefficiencies;
- Ineffective transmission infrastructure and high transmission losses of up to 25%;
- Ineffective and missing distribution infrastructure;
- In some countries low, sub-economical regulated or political influenced tariffs;
- Policies and regulations that are not always conducive to private sector investment into the power industry;
- Changes to environmental emission legislation and standards, requires additional capital to make assets compliant;
- Lack of funds to cover development costs of potential projects, thereby compromising bankability; and
- Inadequate skills to develop and implement projects.

Compared to the Western Power Market, where each step of the energy value chain is fully developed, Sub-Saharan Africa has different development stages in each step. Generation and Transmission are the most developed within the region, followed by distribution and retail, which are mainly coupled, and the development of an energy trading sector, has just started.

Generation

The currently installed generation capacity of Sub-Saharan Africa is approximately 70 000MW but, due to technical restrictions, not all available. 44 000MW of these are installed in South Africa alone. The majority of the existing power stations in Africa were commissioned way before the 90s. There has been underinvestment over the past two decades. The current generation assets are aging further, which leads to decreasing efficiency, increasing maintenance cost and unexpected outages. The short-term need for power, according to the World Bank Africa Infrastructure report, is in the range of another 70 000MW.

The generation mix varies between the countries. For example, South Africa's generation mix constitutes about 85% coal-fired power plants with high carbon emissions and an increasing competition for coal resources, which is resulting in higher costs. The majority of power generation in the other countries comes from hydro power stations, coal and gas power plants as well as diesel-fired turbines which are currently mainly used for base load generation due to the immanent under-capacity.

But hydro power is, in some of these countries, highly seasonal and droughts have affected countries over-reliant on hydro power in the recent past.

Nevertheless, the hydro potential on the continent is enormous and will certainly remain one of the main sources of power. Currently the continent's only nuclear power plant is in South Africa with 1 800MW installed capacity.

The frequent power outages have resulted in the growing use of emergency power, using liquid fuels, which are expensive. Using a single source of power has proven to be unsustainable and, given the increasingly stringent climate change regulations, this approach will likely result in additional costs, especially for coal and liquid fuel generated power.

Transmission

As well as the generation assets, the existing transmission infrastructure is old and mainly insufficiently maintained and not able to deal with the growth of generation, especially not with the planned new builds in most of the countries and not with the need for transmission through the introduction of renewable energy. Also, significant energy losses continue to occur between sources of supply and points of distribution in Sub-Saharan Africa. According to some estimates, utilities can lose up to 25% of power to be consumed, compared to the global average of 10%.

This not only means that there is considerable room to improve transmission and distribution networks, but also that there is actually a larger disparity between energy production and effective energy use in many African countries than elsewhere.

The comparatively low transmission fees (not reflecting the market) and the high amount of maintenance costs (to at least secure the existing capacity) are not supporting new investments in the infrastructure for transmission lines. Another problem for new investments, especially in South Africa, are the recent court cases about securing servitudes for areas on which new infrastructure can be built.

Nevertheless, the development of new transmission lines is crucial to the whole sector. The new transmission lines are not only needed within each country they should also connect the regions across borders to secure energy supply and to realise economies of scale. Some positive examples are already under development or even under construction. For example, the transmission line project between Zimbabwe, Zambia, Botswana and Namibia (ZIZABONA), which connects four countries or the regional transmission backbone project in Mozambique, planned to connect the central-north and southern power systems in Mozambique to meet the rapidly growing domestic, industrial energy needs and exports to South Africa.

Additionally there are a lot of country-specific plans to increase the capacity of the transmission lines, mostly coupled with the development plans of the whole energy sector.

This could be improved even more by the regulator if there would be more recognition and (financial) support for new builds.

Electrification and Distribution

The countries in Sub-Saharan Africa have varying levels of electrification, which is the percentage of the population having access to electricity. Most countries have an electrification level below 30%. The main reason for low rural electrification levels is the weak, damaged or underdeveloped electricity distribution infrastructure. The majority of the distribution system operators are in the hands of local municipalities. There are often a lot of separate system operators in most countries, which results in loss of economies of scale. Small municipalities also often struggle to maintain the distribution networks and most are in need for additional investment.

Another huge challenge for the transmission infrastructure, and consequently also for the distribution grid, is that all the renewable energy projects are being developed in areas favouring the source of renewable energy, such as sunny and windy areas. These areas are not always necessarily the closest to the existing infrastructure. A contribution from the renewable projects to the grid development or coupled projects could also improve the situation.

Grid extensions may still be required in the long term to cater for future economic growth plans of all areas.

Energy Trading and Retail

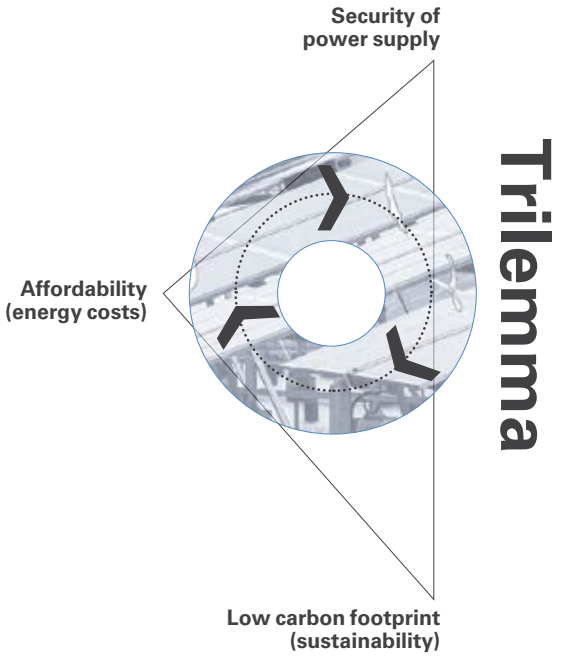
Especially compared to the Western Energy Market, "energy trading" is more or less non-existent throughout the Sub-Saharan Africa region. The obvious reasons are the state-owned utilities companies which are mainly the only player in the countries energy market and the fact that, in most of the countries, overcapacity for trading is non-existent. Energy trading is not even between countries established, where it at least could improve the regional energy markets.

Some of the current developments include initial ideas of establishing a form of trading, but it's not prior to other issues. The chance in efficient energy trading lies in the more market-related prices, as well as in the transparency of price building. Another advantage can be seen in the possibility to secure energy supply through future contracts and to deal with peaks and off-peak periods in a day-ahead or intraday market.

In most of the Sub-Saharan countries, the energy retail business is coupled with the distribution companies and driven by the same provider. Tariffs and prices are mainly regulated by the Regulator and Governances, competition between municipalities is very low or even non-existed. The regulated tariffs mainly do not reflect the cost, i.e. being able to cover the operational costs and achieve a suitable return on investment or to repay debt from financiers.

Solar and wind power are much cleaner, but still operate intermittently and continue to be more expensive than conventional energy

The Energy Trilemma



Globally, the power industry faces the "trilemma" of security of power supply that has a low carbon footprint (sustainability) and is affordable (energy costs). To solve the trilemma or at least coming closer to a compatibility of the three goals, ongoing effort is required from all sector players and in each step of the value chain. Dealing with the trilemma and the development of relevant improvements will also have a huge impact on other sectors and transformations, e.g. climate change, economic growth and social development.

One underlying reason why policymakers struggle to form policies that will improve performance across all three of these dimensions is that (ceteris paribus) no single form of energy satisfies all three criteria completely. Fossil fuels continue to beat renewable forms of energy in terms of both affordability and reliability. Solar and wind power are much cleaner, but still operate intermittently and continue to be more expensive than conventional energy.

For Sub-Saharan Africa, the trilemma is both a challenge and an opportunity. A challenge, like for any other region in the world, especially coming from an old, unreliable and inefficiently maintained infrastructure, with assets from the 90s and politically-driven regulations and tariffs. But, because of the high demand of new assets and infrastructure, there is a huge opportunity to develop directly with regards to the compatibility of all three goals set in the trilemma. The investments have to be done in any case.

Security of supply

It is obvious that, in the Sub-Saharan Africa region, new assets are required and that existing assets need to be improved and upgraded to meet the demand of the next two decades as well as to secure the energy supply. That applies for generation assets, transmission assets and, most importantly, for distribution assets. With regards to the distribution challenge, the rural electrification programme which is already in place can help to fasten this development.

Security of supply is also about adequate planning and projecting the energy requirements of the future. The current situation in Sub-Saharan Africa is unfortunately a result of poor planning and projecting in the past. And, even if there have been plans, the execution and implementation was poor. But governments are already in the process of correcting this.

Unlikely a lot of countries try to become independent from the neighbouring countries and so economies of scale are not considered for the investment cost of new developed assets and in regards to the potential reduction in power costs. But as soon as some of the regional projects are realised, that will impact other projects and investments and security of supply will increase.

Further challenges to secure energy supply:

- Ability of utilities to manage planned and unplanned outages and maintenance;
- Ability of Sub-Saharan Africa countries to deliver new build projects on time and within budget;
- Securing funding for new generation projects in Africa;
- Securing resources to fuel current and new build projects to sustain demand; and
- Quality of resources to fuel power generation, especially coal.

Affordability (energy costs)

The economy will only grow with affordable energy prices and society can and will develop accordingly. For that reason, it is seen that prices are kept low through political influence, which directly avoids or slows investments in new assets and furthermore reduces the amount spent on maintenance and improvements.

A more regulated market with policies for investment security could help to deal with that challenge. But often the policies in place are not considered or implemented in a sufficient manner. So affordability is not only about efficient assets which can provide affordable energy but also about effective policies.

Another weak point is that often new builds are delayed and the required demand can only be met with expensive generation assets. Directly related to that point is securing resources at reasonable prices, especially oil and gas. In an open market where commodities are priced based on demand, it becomes difficult for utilities to manage its energy costs if there is big demand internationally from countries like China. Both increases generating cost and impacts affordability of electricity.

From an economic perspective it can also be beneficial to allow higher tariffs. With predictable and market related tariffs the investments in generation and transmission assets would increase and improve the power infrastructure. This would also result in more people having access to electricity and due to the related economic growth they are able to pay the higher tariffs. Compared to bearing he economic costs for a society not having access to electricity this is a considerable opportunity.

Low carbon footprint (sustainability)

Coming from a largely coal-based power sector, the preconditions to become a sustainable, low carbon sector are extremely good in the Sub-Saharan Africa region. Hydro power has the highest potential and is already part of the roadmap (even without Grand Inga a huge potential). Also, wind and solar energy exists in some parts of the region to capture mainly the mid merit and peak load. But both technologies need an efficient infrastructure and connection to the distribution and transmission grid as they are predominantly decentralised.

With regards to the required base load, electricity gas power plants and nuclear power plants are on the agenda of many countries. But, compared to the other technologies, they need more research and development. For gas, the upstream and midstream is also to be considered and is a field of development, probably in combination with the unexploited potentials of shale gas.

The appropriate financial and jurisdictional policies have to be in place for nuclear which seems to not be the case currently.

The right balance from an economic perspective must be found between meeting the countries' power and energy generation needs and meeting green goals, as a vast amount of power is crucial for growth in the region. But coal will still remain an important generation technology for now.

In a world seeking to reduce the emissions of fossil-carbon into the atmosphere, Sub-Saharan Africa should be awarded credit for having the least per-capital emissions of any strongly populated region worldwide.

Although lagging behind the world in terms of the development of power infrastructure, the importance of the power sector for the future growth and development of Sub-Saharan Africa is self-evident. The development of the mining industry has historically driven much of the infrastructure development, but now the demand for both industrial and residential electricity consumption shows unprecedented growth.

The potential to meet these unique needs is enormous and Africa is well placed for innovative and new renewable generation and off-grid technology solutions that fit their requirements and available resources.

Also, with regards to the energy trilemma, the region shows a lot of developments that can significantly improve the current situation. Relevant trends are already recognised and, idealistically, the power sector has to be one step ahead of the other changes and developments. But each country also faces its own unique challenges, given its unique resource mix, trading partners, geopolitical position, and budgetary environment – so there is no single preferred method for achieving a balance across all three dimensions.

03

Emerging trends changing the face of Sub-Saharan Africa

There have been various changes over the last decade in the Sub-Saharan Africa region, which have influenced, and will continue to do so over the medium to long-term, the perceptions and behaviours of regulators, power utilities, existing market players and potential investors. These trends include:

- A growing population and increasing wealth;
- Increasing urbanisation rates;
- More discoveries amongst the wealth of natural resources; and
- A deepening financial sector.

These emerging trends have had an immense impact on the power sector, which is seen as a significant sector that spurs economic growth and alleviates poverty across the continent.

These trends will continue to have an impact on the power sector, resulting in the following changes as likely outcomes for the medium to long term, depending on the jurisdiction:

- Increased proliferation of off-grid power solutions;
- Renewed focus on regional integration;
- Regulatory reforms; and
- Clean energy drive.

General trends

Growing population and increasing wealth

It is a well-known fact that Africa's population growth is higher than the average growth rate of other parts of the world. Sub-Saharan Africa, where fertility rates are among the highest in the world, will account for a significant portion of world population growth in the long-term. According to the World Bank's development indicators, women in Sub-Saharan Africa average 5.2 children during their lifetime, compared to 1.6 in Europe or 1.9 in North America. The population of Africa is estimated to be over 1 billion and is expected to grow to 1.5 and 2 billion by 2030 and 2050 respectively.

By 2050, over 1 billion Africans will be of working age and one in four workers in the world will be Africans.

This will also form a young, energetic and increasingly educated workforce, powering the continents service and manufacturing sector. Parallel, the consumer basis with a higher available income will continually grow and provide markets for local firms, economic opportunities and foreign investments. Strong economic growth in the past two decades has helped reduce poverty and has increased the size of the middle class.

This development is naturally one of the key drivers of electricity consumption and electricity demand is inevitably expected to rise exponentially during this period. The complexity in this trend is reinvesting in existing infrastructure to stabilise power supply while concurrently developing new power infrastructure to cater for the future demand that is increasing rapidly. This ultimately necessitates massive investments in the region's power infrastructure.

Increasing urbanisation rates

Sub-Saharan Africa experiences are among the largest rates of urbanisation in the world, although it still has the largest share of rural population in the world. With electrification rates being particularly low in rural areas, many people move to the cities in search of work and a better quality of life. Immigration to areas with access to electricity (often cities) and simultaneous emigration from areas without access to electricity (often rural areas) is expected to be notable over the long-term until the electrification rates increase substantially. This has a severe impact on the cost of infrastructure projects aimed at achieving universal electricity access. Cities across the continent present opportunities to increase power generation and distribution capacities. Widespread demand side management programmes (e.g. prepaid meters, use of energy efficient light bulbs), upgrading of power grids to smart-grids, increase in energy efficient buildings, are some of the trends that could be used by national and local authorities to meet the increase in power demand.

More discoveries amongst the wealth of natural resources

Africa is continually discovering and exploring natural resources and, with improved technologies, the potential is probably higher than it has ever been. To highlight some examples regarding natural resources, Africa has:

- 95% of the world's platinum group metals reserves;
- 90% of chromite ore reserves;
- 85% of phosphate rock reserves; and
- more than half of the world's cobalt.

The exploration potential of natural resources is shown by the doubled crude oil reserves since 1990 and the 70% increase of natural gas reserves within the same period. The directly related production is also expanding rapidly. For instance, between 2006 and 2010, copper production in Africa increased by 75%. Because of the high amount of natural resources, mining companies plan a lot of new mining operations in Sub-Saharan Africa. In most of the African countries, the mining sector is the biggest power user group, so new mining assets will increase demand significantly and most of these power grids are severely constrained and would need more generating capacity to power new mining assets.

An even more fundamental driver of growth is that Africa contains over 60% of the world's available and unexploited cropland. As the world's population heads towards a likely peak of around nine billion in 2050, it is very likely that Africa will become a major food exporter. Already, Africa's production of wheat is expected to increase by 30%, rice by 75%, and milk and sugar by 35% over the next ten years. Developing cropland and producing food for export will also significantly increase electricity demand and electricity has to be secure especially in harvesting times.

A deepening financial sector

Africa's financial system is growing rapidly and becoming stronger and more inclusive. The growth has been most spectacular in retail banking, which is being transformed from a branch-based preserve of the upper-middle classes into a truly popular convenience. It is likely that over 300 million Africans will be using mobile phones to access bank accounts and make payments by 2015. There has also been considerable deepening of Africa's capital markets.

Private equity investments in Africa grew rapidly in the last 10 years. Africa's debt markets have also been maturing rapidly, as seen, and is continuing to issue international dollar-denominated bonds.

Despite this progress, however, the African financial sector remains very underdeveloped by global standards. International Monetary Fund research shows that bank credit to the private sector in Africa represents, on average, 15% of GDP, compared to over 100% in many developing economies. Only 3.3% of Africans have any form of insurance, while fewer than one in five African adults has an account at a formal or semi-formal financial institution. In other words, there is still a great deal of growth potential for Africa's financial service providers.

Economic growth and efficiency in developing countries are both strongly stimulated by increases in the depth and inclusivity of a country's financial markets. As highly important as the financial sector, the energy sector has to work closely with financial institutions to secure growth, especially with regards to the high amount of investments which will be needed for new power infrastructure.

Power sector-specific changes

Regulatory reforms

Many Sub-Saharan Africa countries have, in the last 20 years, albeit accelerating in the last decade, been migrating to market-based and liberalised power sectors. This has been characterised by the unbundling of power utilities to cater for the different sub-sectors (power generation, transmission and distribution), partial or full privatisation of utilities, instituting independent regulators and in recent times, moving towards open trading platforms/ markets where buyers (end-users) and generators trade electrical power.

Most countries in Sub-Saharan Africa have established nominally independent regulatory agencies for their power sector. Regulation is intended to ensure financial viability, attract new investment, and encourage efficient, low-cost, and reliable service provision. Independent regulation is envisaged to insulate tariff-setting from political influence and improve the climate for private investment through more transparent and predictable decision making.

An analysis of data collected on 24 Sub-Saharan countries by the Africa Infrastructure Country Diagnostic indicated that the power sector performs better in countries with regulators than those without.

However, in most Sub-Saharan Africa countries, the national state-owned utility still retains its dominant market position. It is inevitable that various governments are in varying degrees of implementing regulatory reforms to improve efficiencies in their power sectors as well as attract investment due to increased transparency in procurement processes, dispute resolution and tariff determination.

Increased proliferation of off-grid systems

Countries in Sub-Saharan Africa have varyingly low levels of electrification. Approximately 42% of the population of Sub-Saharan Africa has access to electricity, compared with approximately 65% in South Asia and more than 90% in East Asia. The main reasons for low rural electrification levels is the low in-country generation capacities coupled with weak, damaged or underdeveloped electricity transmission and distribution infrastructure.

With such low electrification rates compared to elsewhere globally, rural electrification is high on the agenda in most Sub-Saharan Africa countries, as the energy situation has a far reaching impact on key social issues such as primary healthcare and education. Rural electrification is likely to be implemented through numerous small-scale projects due to the geographical spread of rural settlements and to speed up the electrification process.

But the problem with these projects is that often the grid extension adds a significant cost to the overall project and prohibits the extension. Therefore, in an increasing part of the rural areas, "of grid" solutions are preferred, which allows access to electricity but don't need grid connection. The off-grid power solutions are ideal because these could place small generators (for example, solar panels, mini hydro plants) more closely to the end-user and thereby mitigate transmission challenges. Furthermore, smaller rural electrification projects could be implemented more quickly due to their shorter licensing processes and construction times.

Renewed focus on regional integration

Regional integration is a crucial step in the power sector reform that would substantially reduce costs, mainly because of economies of scale and increased share of power in total power generation. Enlarging the market for electric power beyond national borders would stimulate investment, while pooling energy resources through regional power trade could significantly reduce power costs.

These envisaged benefits led to the formation of regional power pools in East, South, Central and West Africa. The power pools serve to smooth out temporary irregularities in supply and demand within national markets and increase cooperation on regionally beneficial projects. Should the ambitions of these power pools be fully realised, regional trade could reduce the annual costs of power system operation and development.

For example, the additional hydro power could displace natural gas generation in East Africa and coal generation in Southern Africa. A related consequence would be to increase the share of power coming from key export countries such as Ethiopia in East Africa and the Democratic Republic of Congo in Central Africa.

Some of the positive impacts, which are expected to result from the development of the Regional Power Pools, include the resulting economies of scale, the increased system reliability and security of supply, and diversification of power generation mix. The Power Pool participants have developed Electricity Master Plans which collect local national plans at a regional level.

In the short to medium term, some of the regional projects will be realised, creating an impetus for cooperation on other regionally significant power projects.

Additional greater investments in cross-border transmission links will be needed to accommodate the higher volume of trade, but those investments would be quickly repaid as countries gain access to cheaper power, notably in Eastern and Southern Africa. While the overall savings in the annualised cost of the power sector under trade are relatively small, at less than 10%, the gains for individual countries may be substantial. The latest successfully completed or near to complete financial close for power generation projects is the 300MW extension of Hydro power plant at Kariba in Zimbabwe and the Itezi-Tezhi Hydro Power project in Zambia.

The role of Development Finance Institutions (DFI) has never been more important for recent power projects on the continent. DFI involvement in such regional projects accelerates investments in cross-border transmission links and large hydroelectric projects, which the private sector may find too risky to invest due to high capital costs, long payback periods, and multiple country risks related to the enforceability of power-purchase agreements.

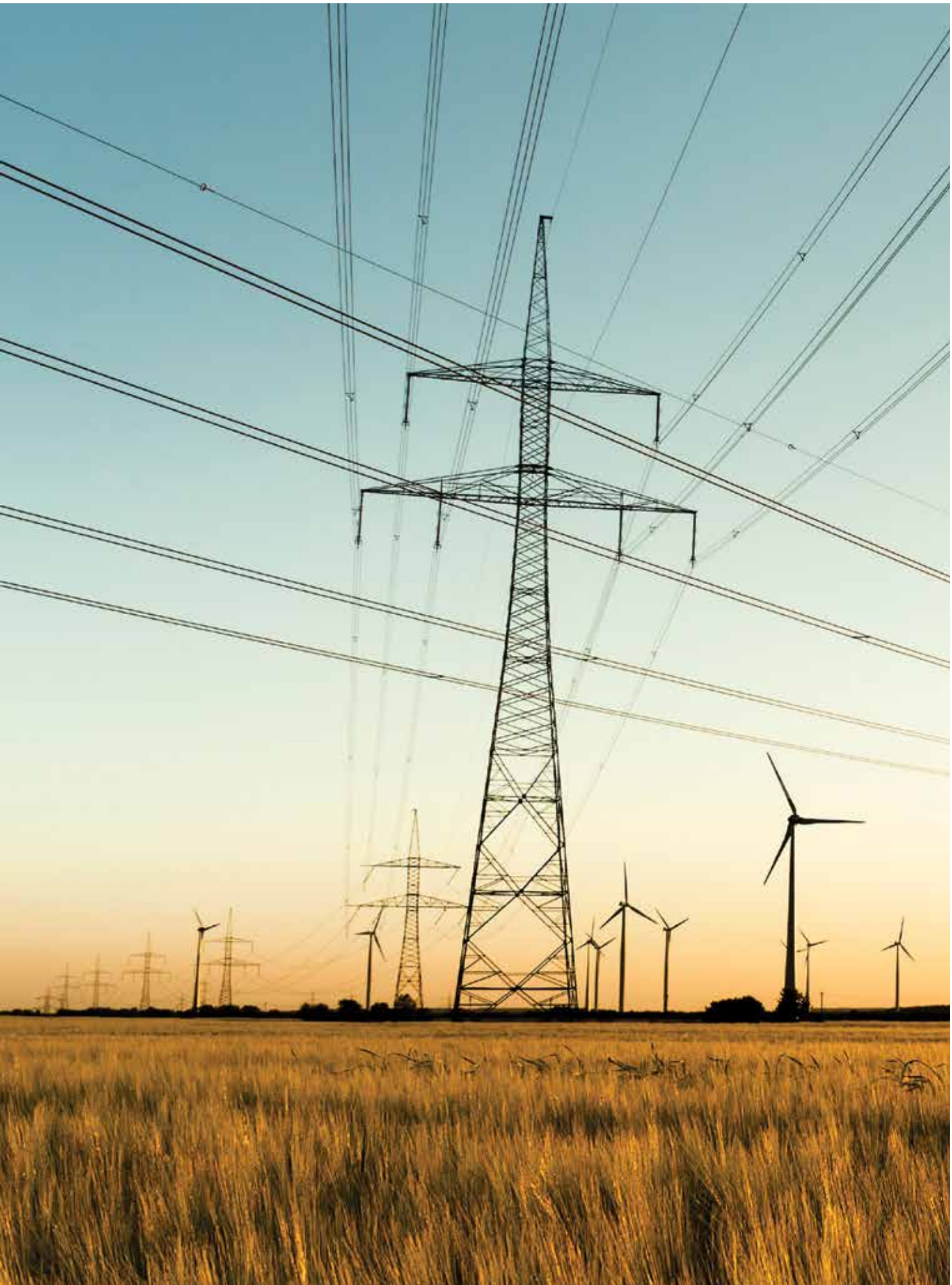
Clean energy drive

Another common trend in the region is the increasing use of low carbon emission generation sources. Climate change, and its repercussions on agriculture and tourism sectors, which are the mainstay or backbones of most African countries, has made many governments to look closely at sustainable power solutions that are environmentally friendly. There has been a slow, albeit gaining momentum, migration from traditional energy resources to renewable energy sources, with some governments initiating ministries or dedicated government departments that look closely at managing and mitigating climate change effects in the economy (South Africa and Kenya).

This trend has been coupled with policy and regulatory incentives to encourage investment in renewable energy. South Africa is currently leading in this trend with its REIPPPP that is sponsored by the Department of Energy. As renewable energy gains momentum, the short to medium term is likely to see more structure, in terms of policy and regulatory changes in the power sector being drafted and enforced to ensure that power projects have low carbon emissions as far as possible.

Africa has vast renewable energy potential in the form of hydro, solar and wind resources. These solutions can offer a long-term sustainable electricity power solution as well as provide affordable electricity in the long term. As indicated, most governments are actively promoting renewable and other low-carbon energy resources, which are more environmentally-friendly than conventional coal or oil, and are more bankable in terms of attracting investment.

The renewable energy and/or low-carbon energy plans vary from country to country. However, these plans generally include exploiting natural resources such as solar, wind, hydro, geothermal (particularly in East Africa), natural gas and nuclear. Currently, the continent's only nuclear power plant is in South Africa. However, there are other jurisdictions that are considering nuclear power in their long-term plans, such as Nigeria, Ghana, Senegal, Kenya, Uganda and Namibia. Oil-rich countries such as Nigeria, Ghana, Angola, Tanzania, Sudan and South Sudan also plan to increase the use of natural gas for both their current and future power plants.



04 Key developments for the Sub-Saharan power sector

Showing the challenges and the current trends in Sub-Saharan Africa Power Sector, the perspectives chapter offers insight on ongoing positive developments in general:

- Upgrading, refurbishing and process optimisation for existing generation assets;
- Building new generation assets

and highlights two successful programmes:

- the base load Independent Power Producer Procurement Programme;
- the Nigerian Privatisation Process of the Power Sector.

Furthermore, these examples illustrate how the Sub-Saharan countries dispense with the clichés regarding the energy sector and what a huge transformation process is constantly in progress.

Existing generation assets and processes

Much of the attention over the last twenty years has been focused on Greenfield projects – building new assets.

As project owners struggle to get new projects off the ground and the number of operational assets increases exponentially, more focus is probably going to be given to existing assets. The trend will also influence the power sector agenda in the coming decade and that upgrade and refurbishment can include: prudent asset management, improved performance, improved reliability, life extension and increase in power output.

This has led asset owners and infrastructure planners to reconsider how they are managing their existing assets. In some cases, project owners are looking to extend the lifespan of their assets to the limits, well beyond their original design lives. Sweating existing assets to yield better efficiencies has led asset owners and operators to put a renewed focus on operational management to ensure that maintenance and investments are being properly deployed to keep the asset in good condition. The counter argument as for the ability is that prolonged "sweating" of existing assets delays new investments and old technologies will eventually counter the entitled benefit.

A clear balancing act is required for sustainability. Programmes on commercialisation of state utilities, balance sheet optimisation projects, rolling out of prepaid meters to improve revenue collections and raising capital through listings and bond issues have not been uncommon in recent times across the Sub-Saharan Africa region.

In other cases, asset owners are exploring ways to 'bolt on' new technologies and innovations that either enhance the asset's long-term value, expand capacity or make it more resilient for the future. Others are investing in technologies to enhance the overall efficiency of their assets, meaning fewer new assets need to be developed in the future.

Governments are also looking at how they can make the most of their existing financial assets by conducting asset sales – particularly for assets that tie up fiscal capacity – in order to recoup their investment which, in turn, can be 'recycled' into new expansion generation, transmission and distribution projects.

The desire for greater operational efficiency is also catalysing a shift in infrastructure models. Recognising that some aspects of operations and management are more efficiently and effectively managed by private enterprise or sub-contractors, many public sector asset owners are increasingly focused on embedding commercial models and approaches into their infrastructure asset lifecycle plans.

Unfortunately, until now, the regulator and, respectively, the governance did not support investments in efficiency and improvements or put policy pressures on that matter. Reducing costs of operation is currently not part of the incentive scheme in most countries.

New generation assets

Over the past decade, six of the world's ten fastest-growing countries were African, largely due to the resource commodities boom. Consequently, the demand for power has grown significantly. The large scale of the power requirements in most Sub-Saharan Africa countries requires a number of new power projects. Many countries are now carefully considering how they can match these requirements and how they can attract investors to finance the needed capacity of energy generation. This also requires asset owners, investors, operators and planners to consider how value can be driven across the full asset life-cycle, from planning to end-of-life, and how the asset should be optimally structured at each stage. As electricity sectors in many countries deregulate and look to private capital for investment requirements, IPPs will play an increasing role in providing the necessary new generation capacity.

There are a number of large Greenfield projects. Most notable projects are the new coal fired power plants in South Africa: Medupi and Kusile, which will add about 4 800MW each to the national grid. These are among the largest power plants in the world and are planned to be commissioned in phases between 2015 and 2020. Other Greenfield projects, to which are worth noting is the Inga III development in the Democratic Republic of Congo adding 4 300MW – 5 000MW planned for 2017-18. The Grand Inga project has the greatest opportunity in Africa, with an estimated generation capacity over 40 000MW.

Pre-feasibility study preparations are re-evaluating potential development of this project. But there are also significant hydro projects around the Zambezi River, the Kafue River and the Congo River.

Natural gas fired power plants, which represent another form of power generation suitable to fill the gap, especially Nigeria, Mozambique, Angola and Tanzania, are planning to install significant capacity. Gas will be a major contributor to South Africa's base load programme for the next number of decades.

Currently, the continent's only nuclear power plant is in South Africa. However, there are other jurisdictions that are considering nuclear power in their long-term plans, such as Nigeria, Ghana, Senegal, Kenya, Uganda and Namibia. But before such plans are put in place, the financial and jurisdictional policies have to be developed or, where already existing, at least renewed. But first, there will be other much easier to achieve opportunities before investing in nuclear.

Africa lags the rest of the world with respect to new builds for wind energy, solar energy and other renewables. Kenya, Senegal and South Africa have stood out with programmes that support the use of renewable energy. Kenya is operating geothermal power plants and will see significant development in the wind and solar industry, especially in the region of Lake Turkana. In Senegal, the Eolien Taiba N'diaye Wind project is also advanced and will have a capacity of 125MW.

The IPP programme South Africa

The IPP Programme South Africa is part of the Integrated Resource Plan (IRP) 2010-2030. The IRP was promulgated by the Department of Energy (DoE) in March 2011 as a "living plan" which is revised on a regular basis (expected every two years). The plan sets a lot of development goals, especially in regards to the energy sector, to support South Africa's economic growth through sufficient energy resources. This includes, in particular, the amount of new generation capacity (the target is to double power generation capacity from approximately 44 000MW up to 80 000MW by 2030) and the therefor planned technology.

Core elements of the IRP include the following:

- Eskom capacity expansion programme with focus on key projects – Medupi (coal thermal- 4 800MW), Kusile (coal thermal – 4 800MW) and Ingula Pumped Storage (hydro – 1 332MW) and Sere Wind Farm (100MW); and life extension of existing old coal plants;
- Additional coal for base load power – 6 250MW;
- Imported hydro-power from regional producers – (2 609MW);
- Combined-cycle gas turbine using imported liquefied natural gas and gas-fired IPP programme – 2 370MW;
- Nuclear capacity to increase to 9 600MW between 2025 and 2030;
- Energy Efficient Demand System Management Programmes; and
- Transmission network expansion.

To meet the expectations, the authorities opened the power sector for Independent Power Producers (IPP). Aligned with that, South Africa wants to get a pivotal position in the global debate regarding the most effective policy instruments to accelerate and sustain private investments.

The first resulting programme was the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Since the commencement of the REIPPPP in August 2011, a total of 64 projects have been awarded to the private sector. Private sector investment totalling US$14 billion has been committed, and these projects are expected to generate 3 916MW of renewable power. Thereof, wind power accounts for 1 984MW and solar accounts for 1 884MW and others for 48MW. Of these projects, 2 460MW of renewable capacity has been contracted, with a further 1 456MW of capacity due to be contracted until end of 2014.

The REIPPPP was designed to contribute towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa. These objectives have, by and large, resulted in notable achievements in the economic development commitments, particularly in the rural communities.

The success of the REIPPPP in South Africa is evident. It showcases the private sector's willingness to invest in the power sector where there is a transparent and well-designed procurement process, transactions provide reasonable levels of returns and key project risks are mitigated by government.

As part of the REIPPPP, the DoE also released a request for information regarding a Small Projects IPP Procurement Programme. This was done to test the market appetite for small projects and assess the readiness of (onshore wind, solar PV, biomass, biogas, or landfill gas) projects with a generation capacity of not less than 1MW and not more than 5MW. The Programme is still running.

Based on the success of the REIPPPP and as a logical next step, the DoE has launched the base load programme as envisaged in the IRP. It is expected that the following base load programmes will be launched in the near future:

- Coal Base load Programme (6 250MW);
- Gas Base Load Programme (2 370MW);
- Co-Generation Base Load Programme (800MW); and
- Hydro Power Base Load Programme (2 609MW).

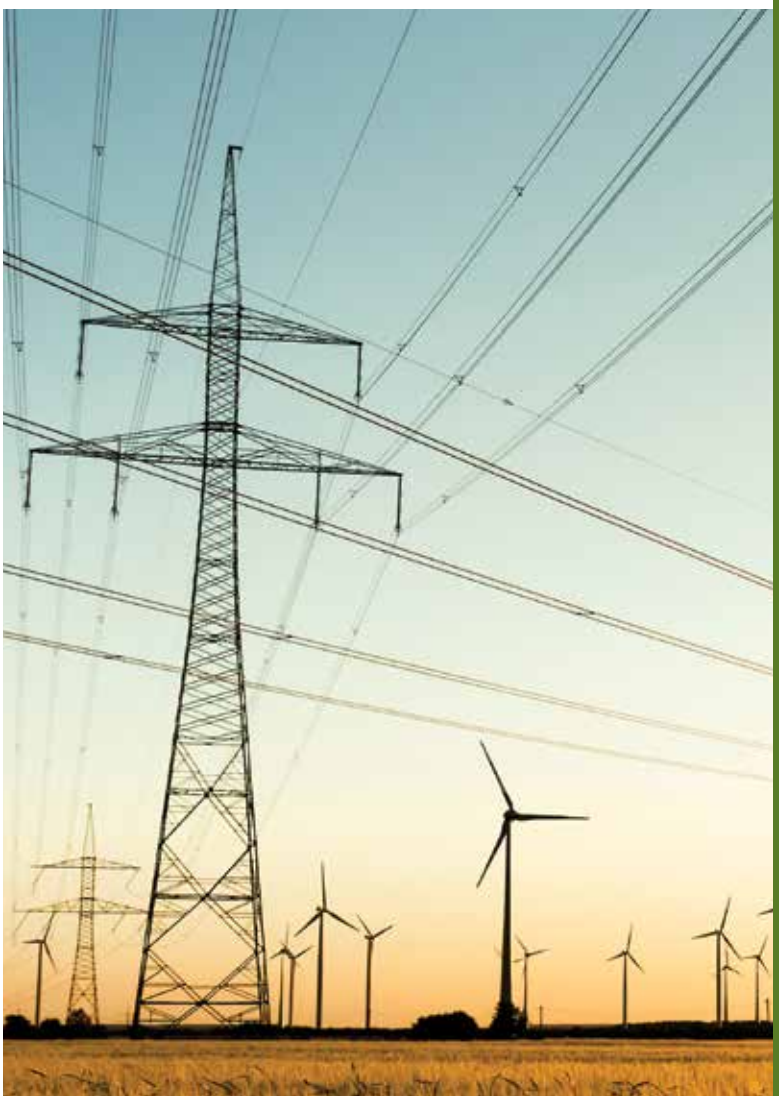
In regards to the coal base load programme, the DoE invited potential coal IPPs to register their prospective projects and overall interest by 25 July 2014. It is understood that the Request for Registration was undertaken to primarily improve the identification of possible connection constraints, as bottlenecks have emerged with increasing numbers of renewables projects being connected. Following an analysis of the register, the DoE intends to issue a formal Request for Proposals under what is being dubbed the "Coal Baseload Independent Power Producer Procurement Programme".

It is generally expected that the IPP capacity of 2 500MW in total would need to be introduced into the South African electricity system by 2024, in line with the IRP 2010. The coal base load IPP programme will be most likely governed along similar lines with the REIPPPP.

The coal programme could be divided into separate bid windows in which bidders, would be expected to specify a tariff and outline economic development commitments. This promotes competition in each window i.e. by capping the allocated MW, bidders will need to compete for smaller capacity allocation and through fully funded bids.

South Africa also launched the Gas Utilisation Master Plan and some already call it the "game changer for South Africa". The plan is part of South Africa's integrated electricity plan and will allow to include more renewable energy resources in the generation mix as, due to the flexibility of a gas power plant, it can be turned on and off as necessary to stabilise the grid. The development of the gas sector is not only relevant for the power sector but also for transport, domestic, commercial and the industry sector. The required infrastructure will also consider shale gas and offshore gas resources. However, in the short term, South Africa might need to use imported liquefied natural gas, but in the long term it could build pipelines and develop its own natural resources.

For the electricity sector, the plan also offers the opportunity of converting the diesel-fuelled open-cycle gas turbines that are either operational or under development. The Gas Utilisation Master Plan will additionally offer a signal of how government views the gas market evolving and offer a framework to facilitate future investments as well as help guide any programme for the procurement of base load or mid-merit natural gas capacity from independent power producers.



Privatisation in Nigeria

Despite the various effort of the State Owned utility, (which operated as a monopoly) to manage the Nigerian power sector in electricity provision, it became clear by the late 1990s that the Nigerian electricity system was failing to meet Nigeria's power needs. Hence, the National Electric Power Policy of 2001 kicked off the power sector reform in Nigeria, leading to several reforms over the last decade (e.g. Fuel-to-power, Infrastructure window in the Nigeria Sovereign Investment Authority, etc.) including one of the boldest privatisation initiatives in the global power sector over the last decade. The privatisation stemmed from a broader plan to accelerate the pace of reform which seeks to transform Nigeria from a country generating barely around 3 000MW in 2009 to a target of 40 000MW by 2020.

The evolution of the Nigerian Power Sector is depicted below.

The Power Holding Company of Nigeria was unbundled into successor Generation Companies, Transmission Company of Nigeria and Distribution Companies that led to the privatisation of the sector through a transparent bidding process.

Reform of the sector commencemenced a decade ago, and there has been gradual progress in the sector to date

Recent development have however placed Nigeria on the map as the next destination of Power Sector investments and financing

2013

Fully privatised power sector (excluding the transmission company of Nigeria)

2010 - 2012

Presidential Action Committee on Power (PACP) and the Presidential Task Force on Power (PTFP) instituted by the Jonathan Administration

Roadmap for Power Sector Reform released

Establishment of the Bulk Traderas the credible off-taker of power to guarentee liquidity in the market

BPE management of the Privatisation Process

2008 - 2009

The introduction of the Multi-Year Tariff Order for the determination of electricity prices

Power Sector Reform Committee inaugerated to identify urgent and workable solutions to the nation's power supply peoblems

Transitional board established to oversee PHCN and the 'unbundled' entities

2005 - 2006

Enactment of the Electric Power Section (EPSR) Act 2005

Establishment of regulator (NERC)

Formation of the Power Holding Company of Nigeria (PHCN) to assume the assets, liabilities and employees of NEPA

Implementation of 8 National Integrated Power Projects (NIPP)

Establishment of the Market Operations Department of TNC to manage the wholesale electricity market

2000 - 2005

Power was a monopoly

Sector liberisation commenced

Adoption of National Electric Power Policy

The Federal Government retains the ownership of the transmission assets (management under concession), while the six generation and ten distribution companies were fully privatised on 1 November 2013. The privatised entities as a whole have made substantial investment commitments in the sector. In addition, the private entities have joined forces with leading utilities from across the world as technical partners. Thus, the power sector in Nigeria now has access to world class technical expertise as well.

A number of targets were agreed by the relevant stakeholders, where after privatisation become realisable. Apart from the privatised entities targets were also set for other market participants, with the ultimate aim of ensuring stable and reliable power availability to Nigerians and a viable power sector for investors. These targets have been divided into short-, medium- and long-term targets. Most of the short-term targets have been achieved, leading to privatisation, and great efforts are currently underway to ensure the achievement of the medium- and long-term targets.

Notwithstanding the several achievements, the sector faces certain challenges, like inadequate supply of gas, transmission constraints and inadequate cash flow in the sector. The stakeholders in Nigeria are aware of these challenges and are taking several measures to mitigate them. Some of them are as follows:

- **Fuel supply:** The recent increase in the domestic gas price from US$1.50/Mcf to US$2.50/Mcf, and an increase in transportation cost from US$0.30/Mcf to US$0.80/Mcf is expected to trigger further investment in the gas sector;
- **Tariff:** Nigeria Electricity Regulatory Commission is reviewing the baseline losses and is expected to issue a new tariff order thereafter;
- **Transmission:** National Council on Power has recommended that a minimum of US$1 billion be made available to the Transmission Company of Nigeria, out of which about 75% should be expended on meeting the capital expenditure of TCN in ramping up its electricity wheeling capacity in Nigeria's Electricity Supply Industry.

The power sector in Nigeria has seen successful establishment of a strong institutional mechanism. During the privatisation process the expectations of both the investors as well as the employees working in the power sector were adequately addressed. The success achieved so far in spite of several formidable challenges is commendable and may act as key learnings for other countries planning to follow the path of reforms.

05 Selected country profiles

The 49 Sub-Saharan Africa countries face a lot of similar challenges with regards to the power sector, but as different as the countries are, the priorities, the solutions and the developments are too. The selected countries show a broad range of developments within the Sub-Saharan Africa Power Market and connect to the existing clichés as well as to the emerging trends and the power trilemma.

The country profiles represent a snapshot of the general developments and expanding plans, generation and transmission situation and projects. Further details and perspectives as well as facts and figures about missing countries can be discussed with our KPMG experts (see contact page).

Cameroon

Key facts

Indicator	2014	2023
GDP (US$ billion)	**32.8**	**62.0**
GDP per capita (US$)	**1,437**	**2,190**
GDP annual growth rate (%)	**5.6**	**5.4**
Population (million)	**22.8**	**28.3**
Installed capacity (MW)	**1,115**	**n/a**
Power produced (TWh)	**n/a**	**n/a**
Access to electricity (%)	**n/a**	**n/a**
Annual KWh per capita	**n/a**	**n/a**

Cameroon has experienced strong economic growth for the last decade which, like many of its neighbours in the West African region, has resulted in electricity supply shortages. Cameroon is a member of the West African Power Pool and currently has an installed electric generation capacity of approximately 817MW and an electrification rate of approximately 48%, which is relatively high by African standards, although this does drop to 14% for rural areas.

It is estimated that 88% of the electricity generated in Cameroon is hydroelectric and the remainder is thermal. While independent power producers are welcomed in Cameroon, the majority of the electricity generation and distribution is managed by AES National Electricity Corporation (AES-Sonel), which was created when the national power utility was privatised in 2001.

Cameroon has significant hydropower potential. Recent feasibility studies indicate that Cameroon's economically exploitable hydropower potential is approximately 20 000MW. Most of the potential is situated in the Sanaga River Basin. Successful development of these resources could make Cameroon a net electricity exporter in the future.

While Cameroon's heavy reliance on hydropower does, however, leave the county's electricity sector vulnerable to droughts, the government plans to add 5 000MW of generation capacity and increase connections by roughly 50% within the next 6 years. Much of this will be sourced from hydro developments, including a plant at the Lom-Pangar dam which has a potential long-term capacity of as much as 10 000MW, although it will be developed in smaller stages, and two smaller hydros with a capacity of 930MW and 200MW by Rio Tinto and Sinohydro respectively. In addition to this, a number of small gas turbine power plants of around 200MW each are being developed. In addition to hydro and gas turbine power stations, Cameroon currently relies on a number of small, aging HFO power stations as back-up facilities.

Ethiopia

Key facts

Indicator	2014	2023
GDP (US$ billion)	**43.6**	**97.5**
GDP per capita (US$)	**451**	**817**
GDP annual growth rate (%)	**6.5**	**6.3**
Population (million)	**96.5**	**119.3**
Installed capacity (MW)	**2,177**	**n/a**
Power produced (TWh)	**n/a**	**n/a**
Access to electricity (%)	**n/a**	**n/a**
Annual KWh per capita	**n/a**	**n/a**

Ethiopia is the second-most populous country in Sub-Saharan Africa with a population of approximately 95 million. Although it is one of the world's oldest civilisations, Ethiopia is also one of the world's poorest countries.

However, the economy has experienced strong and broad-based growth over the past decade, averaging 10.6% per year between 2004 and 2012, compared to the regional average of 4.9%.

The government aspires to reach middle income status by 2023 through its Growth and Transformation Plan. The Growth and Transformation Plan is a development plan of the government of Ethiopia. Its objective is to bring transformative social and economic changes in Ethiopia that will enable it to become a middle income country by 2023.

As part of the Growth and Transformation Plan, the Ethiopian government recently announced plans to increase generation capacity from the current 2 177MW to 37 000MW by 2037, in a seemingly aggressive expansion programme. These exponential growth projections are based on meeting the growing domestic demand and supply in the East African region. To support this growth in generation capacity, Ethiopia recently liberalised the energy sector after ratifying a new Energy Proclamation that allows private investors to generate, transmit, distribute, sell, import or export electricity. This new proclamation allows private power companies to operate in the country, and thereby attract more investment in the energy sector.

Ethiopia has significant untapped renewable energy resources, including an estimated 45 000MW in additional hydropower potential, 10 000MW from untapped geothermal resources and significant wind and solar generation opportunities throughout the Rift Valley. Ethiopia will continue to develop its hydropower resources to serve as the backbone of the power system, with many more projects in the planning and preparatory stages. The development of wind energy also plays a critical part, with 8% of production coming from wind farms already built. This capacity will continue to expand, eventually reaching 20%. Development of the geothermal resources is also gathering steam, with construction going on for the expansion of a pilot plant and other new projects that will make Ethiopia one of the major producers of geothermal energy in the world.

To this end Ethiopia, working closely with other countries and regional organisations, takes into consideration regional power demand in the planning and implementation of the power generation and regional transmission interconnection projects. The expansion of the transmission and distribution networks is also ongoing, targeting universal electricity access nationally and strong regional power system integration. This has led to the construction of thousands of kilometres of transmission and distribution lines, the introduction of higher voltage levels for the transmission of ever larger quantities of energy, the construction and expansion of control centres and other associated infrastructure. To date, it is interconnected with Djibouti and Sudan as well as to the border town of Moyale in Kenya.

Overall, there is political will in expanding the generation and transmission capacities in the country, which have resulted in most of the planned projects being realised in short spaces of time. Additionally Ethiopia formally decided in late 2013 to open up the electricity generation and distribution sector to private players for the first time in its history. The government-owned Ethiopia Electric Power Corporation has, until now, been solely in charge of power generation, transmission, distribution, and sale of electricity throughout the country. New laws allow private power companies to compete directly with Ethiopia Electric Power Corporation.

Ghana

Key facts

Indicator	2014	2023
GDP (US$ billion)	**34**	**90**
GDP per capita (US$)	**1,284**	**2,865**
GDP annual growth rate (%)	**4.7**	**6.3**
Population (million)	**26.4**	**31.4**
Installed capacity (MW)	**2,546**	**n/a**
Power produced (TWh)	**n/a**	**n/a**
Access to electricity (%)	**n/a**	**n/a**
Annual KWh per capita	**n/a**	**n/a**

Ghana's economic growth has been fairly robust in recent years and Ghana now has a medium-sized economy by African standards, which is underpinned by a growing population and high rates of urbanisation.

Ghana is also well positioned geographically, being close to Nigeria, a significant trading partner. Demand for electricity has been growing by 10-15% annually for the last decade, which has resulted in severe power shortfalls that have led to persistent electricity outages and load shedding. Ghana's installed capacity is presently 2 546MW, the majority of which is generated from hydro, thermal and solar and wind technologies. Ghana primarily generates energy from hydro (68%), thermal and solar and wind technologies. Most of the rural district capitals and a lot of villages in Ghana have access to the national electricity grid.

While the Volta River Authority is primarily responsible for the majority of the country's power generation and transmission, private investment into the power sector is encouraged and relatively well-structured. The private sector supplies approximately 53% of total electricity produced in Ghana and the current legislation supports the existence of both IPPs and public-private partnerships (PPPs).

There are various initiatives currently underway to improve both the power generation and the distribution network. Ghana has, to a large degree, pinned its future energy generation strategy on natural gas. While there are significant gas reserves in the region, gas supply is currently constrained due to poor infrastructure. The ongoing development of the West African Gas Pipeline as well as the development of a processing plant in Atuabo, an offshore pipeline from the Jubilee field to Atuabo, and an onshore pipeline to transport processed gas from Atuabo to Aboadze, which is collectively known as the Western Corridor Gas Infrastructure Development Project, does however bode well for future gas supply security. Ghana plans to add 2 500MW of generation capacity within the next decade and is currently looking to develop a number of power generation, transmission and distribution projects to achieve this.

The most significant projects currently under development are the Takoradi 4 gas turbine, combined cycle power plant and the Ghana 1000 gas-to-power project, which aims to deliver more than 1 000MW to the grid. The West-African Gas Pipeline from Nigeria through Benin and Togo to Ghana will likely facilitate the construction of more gas-fired power plants in the future. Other projects include the Pwalugu Multipurpose Dam which is expected to be completed in 2017 and will generate between 50MW and 60MW. The nuclear power market is under development in Ghana; although there are no nuclear power plants, there are several nuclear research reactors as well as plans to build a power plant by 2018.

The draft National Renewable Energy Strategy, together with the draft Strategic National Energy Plan 2006–2020, set the target to achieve 10% of renewable energy (not including large hydro power) in the energy mix by 2020, including wind, mini-hydro, modern biomass resources and solar-PV. Ghana is home to the largest photovoltaic and solar energy plant in Africa, the Nzema project, which has a capacity of 155MW. The African Development Bank has also recently committed to funding a US$75 million procurement for the reinforcement and expansion of the electricity distribution and transmission system. Trade in power is also an economic engine for Ghana. Ghana has become an electricity exporter and currently exports power to neighbouring Togo and has an agreement to export or import power to Ivory Coast as the situation demands. Private investment into the power sector is relatively well-structured. Legislation supports the existence of both IPPs and public-private partnerships (PPPs). PPPs are typically structured with private institutions undertaking 60% of overall investment.

Kenya

Key facts

Indicator	2014	2023
GDP (US$ billion)	**47.8**	**133.5**
GDP per capita (US$)	**1,050**	**2,353**
GDP annual growth rate (%)	**5.6**	**6.3**
Population (million)	**45.5**	**56.7**
Installed capacity (MW)	**2,326.7**	**4,960.1**
Power produced (TWh)	**9.302**	**19.988**
Access to electricity (%)	**7.9**	**n/a**
Annual KWh per capita	**178.2**	**303.1**

Kenya is the largest economy in East Africa. It is an agro-based economy that has traditionally exported tea, coffee and fresh flowers to predominately the European markets.

The service industry, which includes financial services, telecommunications, and tourism, is also a major economic driver. The Kenyan electricity market is structured as a single buyer market with Kenya Power Limited Company, the transmission and distribution utility, buying electricity from all generators on the basis of negotiated power purchase agreements for onward transmission, distribution and retail to consumers. Kenya's energy generation market is rather liberalised, with seven IPPs contributing to the national grid, a collective installed capacity of 494.7MW and Kenya Generation Company Limited as the dominant market player with an installed capacity of approximately 1 200MW.

The Ministry of Energy and Petroleum is focused on deregulating both the supply and demand sides in the power value chain to create a more competitive market in the future. The Government of the Republic of Kenya ('GoK') has set forth its "Vision 2030," a programme to transform Kenya into an industrialised middle-income country. However, Kenya has less than 2 000MW of generation capacity to serve its population of over 43 million. Kenya aims to increase generation capacity to 15 000MW by 2030 and by 5 000MW by 2017. While these are aggressive targets, the GoK is focused on achieving this through:

- sustaining a stable investment climate for private sector participation in the sector;
- developing expanded transmission and distribution networks to deliver power to customers;
- maintaining a creditworthy off-taker in the country's transmission and distribution utility – Kenya Power Limited Company; and
- continuing to enforce cost-reflective tariffs
- reducing inefficiency in the sector to support more affordable end-user tariffs.

With the planned capacity expansion drive, it is most likely that this will be largely met through the exploitation of clean energy resources such as geothermal, wind and biomass in the medium to long-term. The East African country possesses over 10 000MW of undeveloped geothermal energy resources found in fields situated in the country's Great Rift Valley. Kenya Generation Company Limited intends to exploit these untapped resources for base load power generation. If the GoK's targets are realised, Kenya's power sector is set to undergo a dramatic change in the energy mix by 2030, with non-hydro renewables set to overtake hydro power as the dominant source of electricity. Overdependence on hydro power generation has resulted in supply disruptions during periods of drought, with costly oil-fired sources being used to boost output. As a result, the GoK aims to introduce coal, as well as gas-fired capacity, into the power generation mix The GoK's Vision 2030 strategy also stipulates the development of nuclear energy as a viable means of providing the much-needed reliable and affordable electricity. To date, over 4 000MW of projects are in progress, with most of these to be completed by 2016.

In light of the power generation plans of increasing power generation by up to approximately ten times in approximately 14-15 years, there needs to be a corresponding increase in transmission and distribution infrastructure to ensure GoK's objectives of increasing electrification rates at affordable prices are to be realised. In line with its mandate, Kenyan Electricity Transmission Co. Ltd. has identified for implementation on a priority basis, a total of 18 projects of 1471km of 132KV lines, 645km of 220KV lines, 608km of 400KV lines and 686km of 500KV HVDC lines to be implemented over the next 3-4 years. The GoK will also undertake the implementation of the 330KV transmission line between Arusha (Tanzania) and Nairobi, which is being undertaken jointly by the Kenyan and Tanzanian governments, with the funding already secured.

Mozambique

Key facts

Indicator	2014	2023
GDP (US$ billion)	**17.4**	**58.8**
GDP per capita (US$)	**590**	**1,791**
GDP annual growth rate (%)	**7.0**	**7.0**
Population (million)	**25.8**	**32.8**
Installed capacity (MW)	**4,110**	**6,410.1**
Power produced (TWh)	**23.715**	**35.748**
Access to electricity (%)	**34**	**n/a**
Annual KWh per capita	**527.7**	**948.9**

Mozambique is a southern African country and one of the largest countries in Sub-Saharan Africa, covering an area of approximately 800 000 km2, and also one of the most sparsely populated.

Since the restoration of peace after a long civil war, agricultural, commercial and industrial activities are showing strong growth throughout the country.

Mozambique has abundant and yet largely unexplored natural resources. With one of the largest hydropower installations in Africa, the Hydro Cahora Bassa dam, with 2 075MW of capacity, Mozambique could build another 5 000MW of hydropower. The country has large sedimentary basins of natural gas. On-shore reserves (in Pande and Temane) have been discovered and off-shore areas in the Rovuma basin are now researched and could contain more than 100 trillion cubic feet of gas. Massive deposits of coal in the northern Tete Province were recently discovered, with an estimated size of about 23 billion tons. Its sustainable biomass and biofuels potential is untapped, with estimates of at least 30 million hectares of arable land currently unused.

Paradoxically, despite Mozambique's production of electricity, approximately 34% of households have access to electricity. As in other African countries, Mozambique is heavily reliant on non-commercial energy, or traditional forms of energy (biomass such as wood and charcoal). In its national strategy to combat poverty, the Government of Mozambique ('GoM') has identified the energy sector as one of the main areas for investment. The country is on the brink of its industrial revolution, and it cannot develop without strengthening its energy sector. Access to modern energy forms can be a major motor to lift the population out of poverty. Energy is therefore destined to play an increasingly important role in the economic development of Mozambique over the next few decades.

To this end, the GoM has identified large-scale power generation projects to realise its energy policy key objectives of universal access to electricity through the construction of new and the rehabilitation of power generation and transmission infrastructure, improve the management of the ESI, increase exports and improve the energy sector legislation to attract private sector investment. The projects include: two large hydropower projects in the lower Zambezi, being the Mphanda Nkuwa, with a planned installed capacity of 1 500MW, and the Cahora Bassa North Bank, with an envisaged installed capacity of 1 245MW. Other projects are the coal thermal plants at the two coal fields close to Tete, that is, Moatize with proposed installed capacity of 600MW in Stage 1 and Benga with 500–600 MW envisaged in Stage 1. Possible thermal power plants in southern Mozambique fuelled by natural gas include Kuvaninga 40MW, Ressano Garcia 140MW and Gigawatt 100MW.

A key constraint facing most major potential generation projects is the lack of transmission infrastructure. Due to poor connectivity within the country, much of Mozambique's current power capacity is actually exported to South Africa and then re-imported back into the country at higher prices. Most of the large-scale generation projects are located in the Tete Province of Mozambique and, consequently, far away from the main load centres both in Mozambique and neighbouring countries. Evacuation of power produced at these generation projects is, by nature, a necessary requirement for realising these projects. The GoM has therefore taken the initiative to develop and construct an Extra High Voltage transmission system north-south in Mozambique for the evacuation of relatively low cost power to neighbouring countries, as well as for meeting Mozambique's own rapidly growing domestic and industrial needs. The north-south transmission system, planned to connect the central-north and southern power systems in Mozambique, is known as the Mozambique Regional Transmission Backbone Project.

Nigeria

Key facts

Indicator	2014	2023
GDP (US$ billion)	**550.1**	**1,386**
GDP per capita (US$)	**1,654**	**4,141**
GDP annual growth rate (%)	**7.0**	**7.1**
Population (million)	**178.5**	**227.6**
Installed capacity (MW)	**11,542.2**	**26,465**
Power produced (TWh)	**31.723**	**71.001**
Access to electricity (%)	**50.6**	**n/a**
Annual KWh per capita	**162.3**	**294.3**

With an abundance of natural resources such as coal, oil and natural gas; a large population and a rapidly expanding economy, which is now the largest in Africa, Nigeria is indeed a powerhouse on the continent.

In recent years, the country has emerged as one of the most attractive developing markets in the world, attracting significant foreign direct investment in various industries, including power.

The West African country's power sector has had insufficient capacity to keep up with the rising demand, with recurring blackouts and power shortages being commonplace. This has had a constraining impact on general industry and has created the world's highest concentration of small-scale power supply, with many Nigerians making use of their own generators to produce the required electricity.

To achieve the significant increase in generation capacity, Nigeria wants to:

- boost private sector involvement in the industry by moving towards cost-reflective tariffs, thereby providing sustainable returns for market participants;
- address existing generation, transmission and distribution challenges by investing in maintenance and expansion projects;
- stabilise the supply of electricity, by incentivising local fuel producers to allocate more gas resources to local power generation instead of exports; and
- establish fair regulation and management of resources across the power value chain through the adoption of policies such as the Petroleum Industry Bill (PIB) that are based upon good governance principles.

Following the unbundling of the state-owned utility Power Holding Company of Nigeria in November 2013, the Nigerian power sector has become one of the most liberalised in Africa.

Fifteen of the eighteen companies that made up Power Holding Company of Nigeria were sold to private companies and over 70 IPP licenses were issued, thus creating a diverse spread of market players in generation and distribution. Transmission is still controlled by the Transmission Company of Nigeria, which is owned by government but managed by a private firm. The Federal Ministry of Power and the Nigerian Electricity Regulatory Commission maintain regulatory oversight over the sector, with the latter also being responsible for the issuance of licences to market participants and compliance with operating guidelines and market rules.

Nigeria is currently in the process of establishing a Transitional Electricity Market that is meant to ensure an orderly transition from a monopolistic state-managed power market to a private-sector driven market. The implementation of the Transitional Electricity Market includes the establishment of the 2013 Gas Supply Agreement that seeks to guarantee that both suppliers to power-generating companies, as well as the electricity generation companies, are faced with sanctions should they not adhere to their respective supply commitments as per their power purchase agreements with the Nigerian Bulk Trading Agency.

Endowed with large gas reserves estimated at 5.15 trillion cubic metres, hydro, coal, solar and wind energy sources, it appears that Nigeria has abundant energy sources to meet the country's needs within the short to medium term. The future energy mix is set to comprise mainly of gas, which is abundantly available, followed by hydro and other renewables.

South Africa

Key facts

Indicator	2014	2023
GDP (US$ billion)	**340.9**	**900.1**
GDP per capita (US$)	**6,416**	**16,054**
GDP annual growth rate (%)	**1.9**	**3.1**
Population (million)	**53.1**	**56.1**
Installed capacity (MW)	**49,578.9**	**61,793.7**
Power produced (TWh)	**251.328**	**317.501**
Access to electricity (%)	**85**	**n/a**
Annual KWh per capita	**4,241.3**	**5,093.5**

South Africa is Africa's second largest economy. Its key economic sectors are mining, transport, energy, manufacturing (including vehicle assembly and manufacturing and food processing), tourism, telecommunications, financial services, agriculture and fisheries.

Underpinned by the diversity of its economy, the country is expected to record long-term annual growth rate of 3.5%.

South Africa has the most advanced power market in Africa and is sometimes coined "the powerhouse of Africa". Its state power utility, Eskom Holdings Limited, has a net generating capacity of 41 995MW and 359 337km power lines and 232 179MVA sub-station. The company supplies 95% of South Africa's electricity, constituting approximately 45% of Africa's electricity supply. Currently, Eskom is not only playing the role of a vertically integrated power utility, but is the single buyer from IPPs.

South Africa's generation capacity is expected to increase from approximately 44 00MW to 80 000MW between 2012 and 2030 to meet the projected demand growth. Projected electricity consumption rate is estimated to increase by an average of 2.7% per annum over the next nine years. Consequently, the Government of South Africa has defined strategies to increase power generation capacity through the Integrated Resource Plan in 2010 and updated the plan in 2013. The plan also includes to change the country's electricity generation mix from high coal dominance (85%) to a moderate one (48%). That will include a high level of renewable energy and also nuclear power plants.

There are various power generation projects that are being implemented in order to meet this growing power demand. South Africa's high level of renewable energy potential has led the country to pursue renewable energy as a means of electricity generation. The REIPPPP has been designed to contribute towards South Africa's security of supply of electricity, to contribute towards socio-economic and environmentally sustainable growth and to stimulate the renewable industry in the country.

South Africa's national transmission grid consists of 27 000km. Distribution lines in South Africa comprise of approximately 46 712km. However, the electricity transmission and distribution industry in South Africa is facing the following challenges:

- Capacity shortages and backlog of investments;
- Networks are inadequately maintained, resulting in maintenance and refurbishment backlogs giving rise to high cost of interruptions;
- Inequitable treatment of consumers, resulting in a wide range of tariffs for the same or similar groups of consumers and also unfair discrepancies between Eskom and municipalities; and
- The electrification performance for various areas varies partly unacceptably.

Although among the best electrification rates in Sub-Saharan Africa, the South African electrification rate of 85% still leaves parts of the population without electricity. Eskom's Transmission Ten-Year Development Plan 2013-2022 states that the major focus of the new developments in the transmission network are to ensure that the new power stations developed by Eskom and IPPs are integrated into the network and new loads are connected to the network.

In response to the energy trilemma, South Africa has launched "The Green Agenda". The Green Agenda lays a strong foundation for the wider greening of South Africa and is a showcase of government advocating for a sustainable future. This agenda will drive energy efficiency and the use of renewable and clean sources thus reducing the carbon footprint of government. The Green Agenda will initially comprise three programmes, roof-top solar panel roll out, water and energy retrofit and the transition to natural gas in healthcare facilities.

Tanzania

Key facts

Indicator	2014	2023
GDP (US$ billion)	**38.6**	**94.3**
GDP per capita (US$)	**759**	**1,437**
GDP annual growth rate (%)	**7.2**	**9.7**
Population (million)	**50.8**	**65.6**
Installed capacity (MW)	**1,589**	**3,543**
Power produced (TWh)	**5.196**	**11.573**
Access to electricity (%)	**18**	**n/a**
Annual KWh per capita	**79.8**	**154**

Tanzania's current GDP growth rate is estimated to be 6.9%. The country has experienced strong economic growth performance in recent years.

The strong economic performance has largely been driven on the back of the discovery of large offshore natural gas deposits. The country's recent track record of bonds issuance, both from Government and Corporates, as well as the expansion in the gas sector bodes well for infrastructure development.

The Tanzania Electricity Supply Company is primarily responsible for power generation and supply. Power demand in general exceeds generation capacity and power demand is estimated to be rising at a rate of approximately 10-15% p.a. Tanzania has sufficient resources to provide the country with sufficient electricity supply. There are however a number of challenges, which create hurdles to the desired progress in the development of the power industry. Transmission and distribution systems remain under-developed and regional interconnection along with rural electrification are key obstacles to overcome. Electrification levels are low at around 18% and approximately 85-90% of the population are not connected to the electricity grid.

Hydropower is currently Tanzania's main source of power but it is often unreliable due to the effects of drought. Dependency on hydropower is, however, reducing and the country aims to improve diversify its energy mix. Gas-fired power stations will be key to the diversification plans. Tanzania has abundant natural gas deposits. The government plans to increase the capacity of gas-fired plants from 37% to 50% of total capacity. To this end, a total of seven gas-fired power plants have been constructed in Tanzania in the last 10 years.

In addition to ongoing gas infrastructure development, Tanzania is also focussed on increasing the renewable energy mix. Geothermal Power Tanzania has announced that the company intends to invest up to US$350 million in developing Tanzania's first geothermal plant.

The investment will adopt a phased approach, beginning with 2MW by mid-2014 and expanding to 140MW by 2018. Tanzania has abundant solar resources throughout the year. This makes Tanzania well suited for the application of solar energy as a viable alternative source for modern energy services supply for rural electrification and in general. The Tanzania Renewable Energy Association is currently promoting solar generation as an off-grid for the country's energy requirements. Moreover, there are a number of wind projects underway.

In addition to the renewable energy projects, Odebrecht International, backed by the Brazilian government, is close to completing feasibility studies for a massive 2 100MW hydro-power plant in Stiegler's Gorge. The electricity generated from this project will be shared equally by Tanzania, Rwanda and Burundi and will enable these countries to reduce upwards pressure on electricity tariffs, as well as meet peak power demand.

In order to improve electrification rates, the government instituted the Rapid Electrification Programme in early 2013 with the aim of increasing electrification rates between 30% - 75% in rural and urban areas. By 2015, the target is to connect 30% of the population to the national grid, by increasing connections by 250 000 per year.

A backbone transmission investment project is also underway that will construct a 665km 400kV from Iringa to Shinyanga. This project is expected to enhance security of power supply in the northern regions of the country.

IPPs are encouraged in Tanzania. The energy policy allows independent power producers to generate electricity from different sources, particularly for the rural population of Tanzania. The electricity generation system contains two private independent power projects, which are connected to the grid: Independent Power Tanzania Ltd and Songo Gas.

Zambia

Key facts

Indicator	2014	2023
GDP (US$ billion)	**24.7**	**68.3**
GDP per capita (US$)	**1,642**	**3,399**
GDP annual growth rate (%)	**6.7**	**6.8**
Population (million)	**15.0**	**20.1**
Installed capacity (MW)	**2,130**	**2,837**
Power produced (TWh)	**12.742**	**20.246**
Access to electricity (%)	**12**	**n/a**
Annual KWh per capita	**708.8**	**842.6**

The Zambian economy has been growing steadily at an average annual rate of 5% over the last ten years, a diversifying economy, coupled with good economic governance, limited foreign exchange controls and ranks highly in the ease of doing business indicators.

This has translated into a rising demand for electricity, which has been increasing by 4% annually since 2005 and is set to increase by over 28% within the next five years on the back of strong projected growth. Zambia, like many countries in the region, faces power challenges that result from decades of underinvestment in generation and transmission capacity, this has resulted in electricity supply constraints. At peak, there is approximately a 175MW power deficit. Currently, it is estimated that only 30% of the Zambian population has access to electricity and rural areas are virtually disconnected from the national electrical grid.

ZESCO is primarily responsible for the generation and transmission of electricity in Zambia. In terms of regulation in the energy market, the Ministry of Energy and Water Development is responsible for policy development, while the Energy Regulation Board is the independent regulator. Zambia plans to invest heavily in electricity generation in the next decade in order to sustain its current high GDP growth rate. The rising demand for electricity has led to the declaration of power generation in Zambia as a priority sector. Incentives have been introduced in the form of tax concessions for various sources of energy including hydro, thermal and solar energy. The liberalisation of the power market has however resulted in new market entrants, most of whom are concentrated around supplying electricity to the mines and related development in the copper belt.

Approximately 95% of Zambia's 1 800MW electricity capacity is generated through hydro. Zambia has close to 6 000MW of hydro potential, of which only 32% is installed. It is expected that the share of hydropower in the overall energy mix in Zambia will continue to rise in the next decade. Several hydropower projects are in the pipeline. The Itezhi-Tezhi Power Corporation, in which ZESCO and Tata have a 50% share, is currently developing a 120MW hydroelectric power plant at the existing Itezhi-Tezhi dam, together with a Transmission line to Lusaka that will connect the power station to the national grid. There are currently also two 180MW units under development at the Kariba North Bank Extension Hydropower Project, of which one is in the pre-commission stage, while proposals for the 750MW Kafue Gorge Lower Hydropower Project are currently being assessed and the project is expected to be completed by 2018. In addition, Zambia has a number of potential sites on smaller rivers suitable for local small-scale power generation, especially in the Northern and the North-Western parts of the country because of their topography, the geology of the ground, and the highest rainfall in the country.

In order to raise electrification rates, which are currently only 18.5%, Eltel Networks was awarded a US$150 million contract to construct new power sub-transmission lines in the country. This work is currently underway and is planned for completion in 2015. Furthermore, a number of coal-fired initiatives are in the pipeline to support the fast expansion of generating capacity. This includes, for example, the Maamba coal-fired power plant, which is expected to contribute 300MW to the Zambian power grid.

Coal could become a major source of power generation to meet the regional deficit, especially if newer, cleaner, and more efficient technologies are chosen. A number of coal-fired initiatives are in the pipeline to support the fast expansion of generating capacity. The Zambian government recognises the need for promoting renewable energy and clearly stated its intentions in the National Energy Policy of 2008. A strategy is currently being devised to assist in increasing the deployment of renewable energy. The country has an abundance of sunshine at between 2 000 - 3 000 hours per year on average, but solar penetration has been relatively low to date because of high setup costs. Zambia has also developed a licensing regime for solar power operators, allowing the licensee to engage in the manufacture, supply, installation and maintenance of solar systems.

06 What KPMG offers

Overview of KPMG

KPMG firms are some of the world's leading providers of audit, tax and advisory services. We operate in 156 countries and have over 152 000 people in all member firms around the world. We aim to respond to the complex business challenges facing our clients. We adopt a global approach spanning professional disciplines, industry sectors and national borders. We are organised around our Audit, Tax and Advisory practices.

Overview of our Advisory Practice

KPMG's strategy is to be a globally consistent organisation with excellent people who have deep industry knowledge and understanding of the risks facing our clients, allowing us to provide multi-disciplinary solutions.

At the base of the KPMG brand, are our professionals, working together to deliver value for our clients. As a values-based organisation, our values are central to everything we do. We aim to build relationships with our clients, on the premise of trust, integrity and commitment, whilst remaining fully independent. The benefit of this to our clients is self-evident:

- Our local knowledge, skills and experience – supported by our global network.
- Unrivalled technical knowledge; confidently expressed and fully supported.
- Understanding your business and its risks.

KPMG's Global Power & Utilities Practice

The KPMG Energy and Natural Resources Practice – in which Power & Utilities plays a leading part – is dedicated to being a leader in the field of electricity and has the commitment, global presence, range of services and track record to support this objective. The power sector has become one of KPMG's main areas of focus and the firm prides itself in having a Global Power & Utilities team, which cooperates with KPMG offices worldwide to ensure the right knowledge is available at the right location.

Throughout the world, KPMG has advised on a wide range of electricity and energy related transactions, including industry restructuring, market reform, mergers and acquisitions, valuations and capital raising,. The firm has worked for clients in the public and private sector of the electricity industry in over 50 countries.

In Africa, our dedicated teams have over 20 live engagements with utilities and IPPs developing power projects in different energy sources (coal, hydro, wind, solar, gas and geothermal).

KPMG's Global Infrastructure Practice

Our Global Infrastructure practice has more than 3 000 dedicated professionals active in 146 countries. They have advised on many of the ground breaking infrastructure projects, assets and businesses around the world.

Our Global Infrastructure practitioners provide our clients with specialist advisory, tax, audit, accounting and compliance related assistance throughout the life of their infrastructure projects and programmes, or as part of their business. Our pool of knowledge provides ready access to industry best practices and insights.

Our international team of professional advisors help our clients to ask the right questions and find strategies tailored to meet their specific business objectives, and based on objective advice which is not biased toward any particular project outcome or financial solution.

Their varied backgrounds in government, industry, engineering, banking and finance and their diverse experience provide us with the bigger picture and a better understanding of any project. Their depth of industry experience enables them to provide our clients with the insights to help stay abreast of market developments and issues.

Our structured approach enables us to deliver major projects and programmes across the following industry sectors:

Transport	› Rail	› Airports
	› Road	› Port Facilities & Logistics
Social Infrastructure	› Building & Construction	› Healthcare
	› Cities	› Housing
	› Defence	› Sport & Global Events
	› Education	› Technology (Broadband)
Energy & Natural Resources	› Mining	› Power & Utilities
	› Nuclear	› Renewables & Clean Utilities
	› Oil & Gas	› Water, Waste & Recyclables

Our professionals provide strategic insights and relevant guidance wherever our clients operate. They bring extensive local and global experience advising government organisations, infrastructure contractors, operators and investors. This worldwide network of contacts offers experienced local resources and essential local knowledge within a global framework. We work closely with our clients, helping them to mitigate risks and realise opportunities. They look to KPMG for a consistent standard of service based on professional expertise, informed industry insight and specialist local knowledge. Active industry participation helps keep our professionals fully attuned to the needs of our Global Infrastructure clients.

Our Global Infrastructure business is involved in many exciting changes that are happening in every corner of the world. KPMG's Global Infrastructure team has consistently won more awards in the Global arena for its excellence and performance in infrastructure, project finance and financial advisory services, than any of its competitors. The Global Infrastructure practice is an international network of professional advisors from various KPMG member firms. We provide strategic, financial and commercial advice to public and private sector clients on infrastructure transactions across the globe.

Our product offering covers the creation of new infrastructure, as well as assistance in maximising the value of existing infrastructure assets through refinancing's and mergers & acquisitions.

We take into account the typical lifecycle stages of an infrastructure asset.

How KPMG can assist clients throughout the asset lifecycle

Sale/Liquidate

Owner disposes of asset - begin asset lifecycle again

- Advise owner on disposal of concession - begin asset lifecycle again

Restructure

Assets may experience difficulties or require replacement

- Contract reviews - dispute resolution - investigations
- Executive placement
- Turnarounds
- Replacement strategies

Operate & Enhance

Projects become stand-alone companies - manage full suite of professional services

- Contract management, compliance
- Performance improvement
- Risk, controls

Implement/Build

Investors/contractors build asset and monitor program delivery, risks and control

- Review program risks and control
- Governance and contract management
- Financing strategy/implementation

Strategy

Government/owner identify infrastructure needs and strategic options (costs, benefits). Potential investors identify opportunities, acquisition strategy, lobby government.

- Strategic planning & feasibility/ risk analysis
- Policy & legislation advice (for government
- Financing models, business case preparation
- Defining governance positions, screening criteria

Procurement & Transaction

Government/investor develop strategies and business case Investors proceed procurement process

- Procurement strategies, pre-qualification
- Financial modelling & Market testing of build solution
- Tax efficient structures
- Bidding and tender process, asset negotiation

Centres of Excellence

In line with our commitment to the power sector, KPMG member firms offer global connectivity. We have 12 dedicated Power & Utilities Centres of Excellence in key locations around the world, working as one global network. In each of these Centres, we have dedicated teams that have in-depth power expertise.

KPMG Global Energy Institute

The Global Energy Institute provides critical insights and analyses into the energy sector, helping energy regulators, policy makers, finance, tax and risk executives meet new energy challenges and successfully increase the share of renewable energy in the country's supply mix. We do this by creating an open forum where peers can exchange insights, share leading practices and access the latest KPMG thought leadership. These publications provide interpretations, insight and practical guidance, and range from white papers, podcasts and surveys to opinion pieces and regulatory analyses that affect the energy sector.

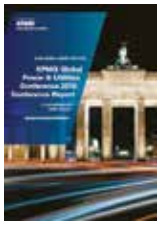
The Global Energy Institute interacts with members through a variety of channels, including webcasts, podcasts, conferences, forums and a Web-based portal.

KPMG Global Energy Conference

The annual Global Energy Conference is the premier event presented by the KPMG Global Energy Institute, and is held annually in Houston Texas. The conference brings together energy financial experts from around the world in a series of interactive discussions with industry luminaries. The event focuses on financial, risk, and tax issues that are top of mind for financial executives. It includes general sessions covering the new energy revolution and energy innovations as well as concurrent sessions on cost optimisation, tax risk and technology, and current accounting issues.

KPMG Global Power & Utilities Conferences

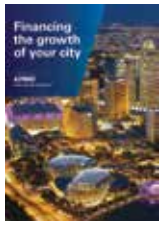
Annually, KPMG hosts a premier Power & Utilities Conference to allow industry captains, investors, regulators in the sector from all over the world to have roundtable discussions, breakout sessions and network socially.


Thought Leadership

Globally, KPMG is at the forefront in the Energy Thought Leadership. KPMG provides professional services to approximately 63% of the top Power & Utilities sector players in the world. Some of our recent publications include:



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- United Nations Conference on Trade and Development
- United Nations Development Programme
- UN Data
- U.S. Energy Information Administration
- United States Energy Association
- World Bank
- World Bank Data
- World Economic Forum
- World Nuclear Association

08 Acronyms

DoE	Department of Energy (South Africa)
DFI	Development Finance Institution
e.g.	example given
GDP	Gross Domestic Product
GoK	Government of the Republic of Kenya
GoM	Government of the Republic of Mozambique
IPP	Independent Power Producer
i.e.	in essence
IRP	Integrated Resource Plan
km	kilometre
kv	kilovolt
kwh	kilowatt hour
Mcf	million cubic feet
MVA	mega volt ampere
MW	megawatt
n/a	not available
PPP	Public Private Partnership
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
TWh	terawatt hour
US$	United States Dollar

09 African footprint and contacts

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