



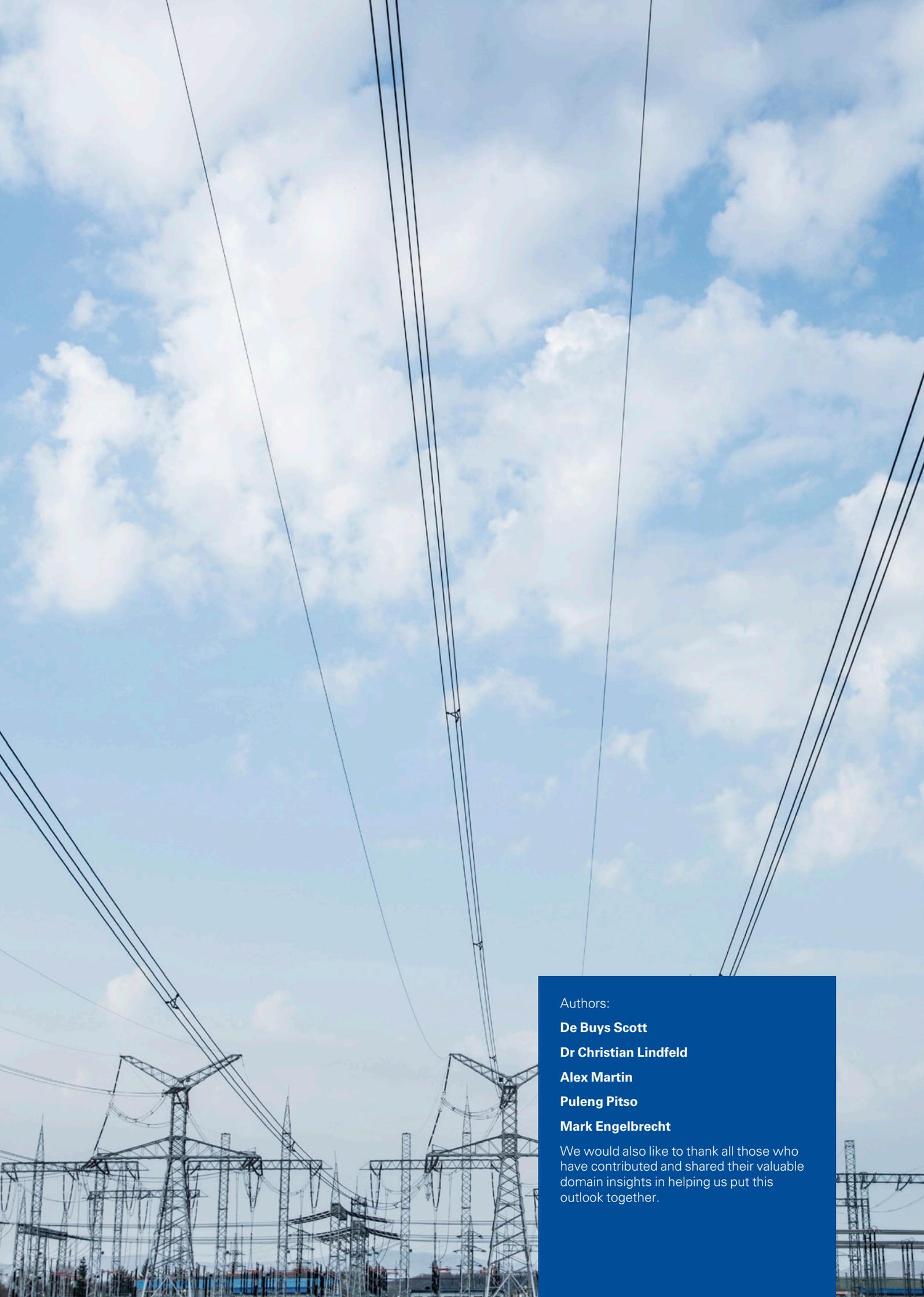
Sub-Saharan Africa Power Outlook

2016

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Infrastructure

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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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n1 Foreword

I take great pleasure in presenting the third KPMG Sub-Saharan Africa (SSA) Power Outlook document which has been prepared by the Infrastructure team with collaborative inputs from our Sub-Saharan Africa Power Sector heads. Power continues to be a focal point in SSA as demand for energy continues to grow and governments allocate material funds in order to drive Power Sector projects forward. As a result private sector interest tends to follow. The continuing focus and interest in the Power Sector leads to a need for thought leadership documents such as this, which allows decision makers, investors, existing and potential clients to gain insight into SSA's Power Sector.

Historically growth rates in SSA have been strong in comparison to developed markets albeit from low growth bases. This has led to a high demand for electricity, a positive investment environment and strong private sector appetite for participation in both SSA economies as well as their Power Sectors. In recent years, growth rates in SSA have begun to decline, in line with global trends, however the need for energy has remained positive and in certain instances is even higher than before. High levels of demand, along with Governments' intention to increase private sector involvement in the Power Sector has resulted in an environment that is conducive to private sector participation. The introduction of various IPP programmes has proved that substantial private developer interest exists on the continent which has led to the start of a new chapter in competitive electricity production.

The process of generating power through to the eventual consumption by the end user can be separated into various distinct elements. In this document we introduce the KPMG version of the Power Value Chain which forms the underlying theme of this Report. Each Value Chain element is experiencing its own developments and challenges and opportunity for private sector investment, in each of these Value Chain phases, either currently exists or will exist as the Power Sectors in SSA countries align with those of developed economies.

The Power Value Chain can be differentiated into distinct stages that follow the flow of energy, beginning from natural resources through to eventual consumption by households and industry. The first step, energy resources, looks at the existing and potential sources of generation in each country. Generation speaks to the manner in which the natural resources are converted into electricity. Once generated, the energy must be directed to the relevant user. In instances where a country or region is able to generate more electricity than it requires, trading with an external party or region becomes plausible. The generated energy must then be transported to the end user which requires a transmission network and eventual step down through a distribution network. The generation and associated steps require revenue to remain sustainable. The sales phase details the risks and opportunities that are associated with these elements.

Finally as SSA countries move towards a modernised Power Sector, smart grid and other smart technologies create the possibility for grid and usage optimisation programmes. This can be achieved through rewarding and/or punitive measures for consumers, such as lower off-peak tariffs and/or fines for using high power appliances at peak times. The use of smart appliances and an ability to measure electricity usage during designated times enables such an approach. Considering each step of the Power Value Chain allows us to evaluate not only each distinct step but also how the steps interrelate.

Recently, there have been a great deal of positive developments taking place in the SSA Power Sector. IPP involvement has started to grow both in renewables and now baseload programmes. Some transmission and distribution infrastructure is now controlled and held outside of government hands which represents the start of grid unbundling. An increasing amount of international donors and funders have sought to assist with addressing the historically low electrification rates.

Electricity tariffs have begun to move towards a situation where the full costs of production are recovered, in contrast to previous politically influenced tariffs. While a situation where the tariff is set by market forces would represent the best case scenario, the movement away from artificial tariffs is a positive one.

The involvement of private companies in the SSA Power Sector through the various IPP and privatisation programmes has provided encouraging results that support further private sector involvement. Specifically the fact that IPP renewable bid tariffs having dropped substantially to levels which compete with or better state utility tariffs, strongly supports the argument for further private sector involvement to leverage efficiencies to a larger extent in the primary infrastructure environment. These private developers have introduced substantial private capital into the power industry together with an ever more sustainable procurement process.

Generation has often been seen as the primary mechanism to address historically low electrification rates. The Power Value Chain suggests additional elements that are equally crucial to address Power Sector problems. The splitting up of the Power Sector into a value chain and the associated country analysis for each element assists in highlighting the various challenges and opportunities that exist in the Power Sector in each region and country.

A case in point is the fact that most SSA countries rely on a single energy resource for the majority of their generation. This coupled with the fact that most SSA countries do not possess the diversity of natural resources required to allow them to materially alter their generation mix, points to a need for greater regional integration. There can be little doubt that regionality in power generation thinking will improve SSA's ability to improve the overall electrification rate on the continent.

Assuming that such integration was to occur, additional benefits would be seen, such as power projects that did not prove feasible on a single country basis now becoming viable on a regional basis. Resource-constrained countries would then be able to rely on an additional energy supply source to counter the lack of internal diversity. In this situation the other aspects of the Value Chain, such as transmission, must be sufficiently reliable to enable this regional integration which again highlights the need to consider the Value Chain in total rather than singular aspects.

Sub-Saharan African countries all face similar problems, however their challenges and approaches to Power Sector issues are vastly different and therefore both detailed country and regional analyses have been included for easy reference.

I hope that you enjoy reading this publication and I wish you all of the best with your activities in the Sub-Saharan Africa Power Sector. Please contact us should you want to discuss either your own Sub-Saharan Africa experience or a more detailed view on one of the associated regions, countries or the Power Sector Value Chain itself.



De Buys Scott
Director
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High levels of demand, along with Governments' intention to increase private sector involvement in the Power Sector has resulted in an environment that is conducive to private sector participation.

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Introduction

Sub-Saharan Africa (SSA) consists of 49 countries with a combined population in the region of 900 million people. The area, which has historically been known for its high growth rates, suffered a bit of a setback in 2015, with overall GDP slowing to 3.5%, down from 5.1% in 2014. The slowdown was further highlighted by the fact that growth in the final quarter of 2015 was the slowest expansion since the final quarter of 2009.

This slowdown can be attributed to various factors including reduced growth in the region's biggest economies - Nigeria and South Africa -, slumping commodity prices, security threats, a slowdown in trade with SSA's main trading partners and adverse weather conditions.

All economies start with two primary infrastructure developments, namely Power and Transport. Without both of these industries being properly developed any further investment into secondary infrastructure (education, health, housing etc) will struggle to materialise.

Power is one of the main challenges facing the SSA region across all aspects of the Economic Value Chain. Although SSA has a current installed capacity of approximately 70GW, at least a quarter of this is unavailable due to poor infrastructure and maintenance.



It is estimated by the World Bank that the short-term need for power is in the region of a further 70GW and that investment of between USD120 billion and USD160 billion is required per annum in order to provide electricity access to the entire Sub-Saharan region by 2030. The lack of power infrastructure is proving a bottleneck to growth in the region and is an urgent problem which needs to be addressed. More than 30 African countries are now experiencing power shortages leading to either expensive short-term fixes or power blackouts. The economic cost of such power shortages can amount to more than two percent of GDP.

Due to the importance of power in SSA, this document provides an analysis of the Power Sector in the region utilising the Power Value Chain and highlights the key trends and issues that are happening across the different regions within SSA. The Power Value Chain sets forth all of the relevant steps in the energy supply industry from the inputs into the process through to energy generation and delivery to end users.



The Power Value Chain itself is highlighted in more detail in section three of this Report.

In setting forth the information in this document, we utilise a top-down approach by first considering Sub-Saharan Africa as a whole, before analysing its four main regions and then considering specific countries as case studies.

The Power Value Chain provides a holistic view of the Power Sector. By planning along the Value Chain, countries can realise efficiencies and better meet their overall power development objectives rather than using the traditional silo mentality which leads to developmental plans falling down at other steps in the Value Chain and slow Power Sector development.

SSA has previously suffered from focusing too heavily on the generation aspect of the Value Chain without taking into account how this integrates into other areas such as what energy sources are used in the generation process, how the electricity will be transmitted and distributed to end users, at what tariffs electricity should be sold to consumers and how current infrastructure can integrate with smart technologies. By highlighting the importance of the Power Value Chain and where specific countries fall short, the value of utilising a holistic energy planning process is underlined.

SSA is further subdivided into four main regions, namely East Africa, Southern Africa, West Africa and Central Africa. For each of these regions we provide an overview of the region as well as ongoing developments. SSA is plentiful in energy resources, however these are not allocated equally between countries. By analysing the regions overall we can get a better understanding of what resources are dominant in each of the areas and how resource sharing can benefit the area's Power Sectors.

Within each of these four regions, focus countries have been identified. 17 countries have been chosen for this analysis. These countries were chosen as they provide a good representation of what is happening on a country-level in the SSA region and provide specific case studies on the major new innovations and challenges being experienced. By delving deeper into these countries we can not only see how they have planned for energy in the past but what they are doing to combat the growing demand on the continent and how implementing a holistic energy planning approach could assist them in realising their goals.

These statistics highlight the fact that in at least the South African market, where great inroads have been made in the renewable energy space, the issue of sustainable technologies being unaffordable, which was historically the case, is becoming less and less of an issue

Recap of the past few years

Over the past few years there have been a few key trends and developments throughout the SSA region. These can be summarised as the following:

- › The Energy Trilemma
- › Upgrading, refurbishing and process optimisation for existing generation assets
- › Building new generation assets
- › South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)
- › Nigerian electricity industry privatisation

The Energy Trilemma is the recent acknowledgment that the global power market faces a 'trilemma' in securing a power supply (security of supply) that has a low carbon footprint (sustainability) and is affordable (in terms of energy costs). The issue is that no single form of energy satisfies all of these criteria fully and to a large extent, the issue of the Energy Trilemma still remains in SSA as a whole. This issue speaks to the energy resources which are used for generation in the Power Value Chain.

However, there are some developments in the market which indicates a gradual shift away from certain aspects of this problem. For example, tariffs under the South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) have dropped significantly since the first round, as bids have become more and more competitive. This is evidenced by the fact that the average tariff for Solar PV and Wind technology has fallen to USD72.9/MWh and USD57.4/MWh respectively in bid window 4, a drop of 72% and 46% in rand terms respectively from bid window 1.

These statistics highlight the fact that in at least the South African market, where great inroads have been made in the renewable energy space, the issue of sustainable technologies being unaffordable, which was historically the case, is becoming less and less of an issue and the REIPPPP bid window 4 average prices for these technologies are even bettering coal tariffs in certain instances.

In terms of security of supply, it is evident that new power infrastructure assets are required in order to meet future demand in SSA. The commitment of additional investment into power infrastructure on the continent will go a long way in assisting the development of such infrastructure.

Certain projects which are underway are also utilising regional economies of scale in order to benefit large areas of SSA. These come mainly in the form of large cross border transmission projects. The realisation of such projects will impact other projects and investments and increase the security of supply by creating a stable transmission network. In addition, by using cross border transmission and pooling electricity on a regional basis, the amount of installed generation capacity in the region can be optimised.

Furthermore, the use of decentralised off-grid and mini-grid solutions could aid in bolstering the security of supply in outlying rural area. The use of such decentralised solutions means that large investment to expand transmission infrastructure to remote locations can be avoided.

The above regional projects and decentralised solutions will go a long way to addressing issues in the generation and transmission steps of the Power Value Chain.

Another development in recent years has been the upgrading, refurbishing and process optimisation for existing generation assets as well as the building of new generation assets.

The focus on these developments as part of the Generation step of the Power Value Chain continues. Countries need to bear in mind, that generation is only one step of the Value Chain and need to ensure that the revival and installation of new power infrastructure is done across the Value Chain in its entirety. When evaluating their existing generation assets, countries are focusing on how best to optimise their current generation assets. Optimisation methods include adding additional generation capacity to existing units or enhancing the efficiency of the current infrastructure. Governments are even investigating the potential for asset sales to free up funds which can then be rolled into new power projects.

In terms of new generation capacity, the major new generation projects which have been cited in recent years in the region are still ongoing. The South African Medupi and Kusile coal-fired power plants, which will each add approximately 4.8GW of power to the South African grid, are still under construction following various delays. The first 794MW unit of Medupi is now online and completion for all units is expected by 2020 for Medupi and 2022 for Kusile. In the DRC the construction of the 4 800MW Inga 3 hydropower project is yet to commence. Inga 3 forms the first phase of the ambitious 40GW Grand Inga Project.

South Africa has also led the way in SSA, not only in the introduction of renewable energy, but also in the successful introduction of IPP players into the marketplace and the country's Renewable Energy Independent Power Producer Procurement Programme is still going strong. Bids have been submitted for the Expedited Bid Submission Phase, which aims to allocate 1 800MW of renewable generation capacity, following four previous bid windows under which more than 6GW has been allocated to Preferred Bidders. Following the announcement of Preferred Bidders under the Expedited Bid Submission Phase, the release of the Request for Proposal under bid window five is currently scheduled for the second quarter of 2016. This programme is playing a major role in changing the country's overall energy mix from its historical dependence on coal technology.

The South African Government has further sought to foster the development of a local electricity sector by the launching of their "Small Projects" IPP programme. This programme sets high local content and empowerment restrictions with a view to encourage the development of a number of local small scale developers as well as a pool of Power Sector manufacturers. This seeks to generate lasting positive impacts on the local economy and incubate the growth of new industry.

The above two programmes are playing a major role in changing the country's overall energy mix from its historical dependence on coal technology. Small renewable technology is also set to become a major player in the SSA market especially in remote rural areas.

The increase in generation under the REIPPPP should not be considered in isolation and issues in connecting the generation facilities under this programme to the South African transmission network have been noted. This underlines the importance of having a holistic view of the Power Sector.

Coal as an energy resource will still dominate South Africa's electricity production going forward, although its share in the generation mix will decrease over time. The country has recently introduced a Coal Baseload IPP Procurement Programme which seeks to procure 2 500MW of coal-based energy. Bids under the Coal Baseload programme have been submitted under the first bid window (which seeks to procure 1 000MW) and the second bid window is expected to close towards the end of 2016. In addition, the country has also introduced a CoGeneration IPP Procurement Programme which seeks to procure 800MW of energy and there are also future plans to introduce a Gas IPP window for 3GW of energy as well as the procurement of around 10GW of nuclear power.

The reform of electricity industries across SSA has also resulted in the unbundling of stakeholders in the Power Value Chain. Recently there has been a shift away from centralised monopolies to unbundled structures.

A case in point is Nigeria who has contributed in setting a different tone in Power Sector innovation in SSA following the recent privatisation of its electricity industry. The evolution of the industry included the unbundling of the Power Holding Company of Nigeria into six successor Generation Companies, the Transmission Company of Nigeria and 11 Distribution Companies through a transparent bidding process.

Following in the steps of Nigeria, Ghana plans to privatise its electricity supply industry in an attempt to create a stable supply of electricity and resolve its energy crisis. Whether this solution will be the right fit for Ghana's industry remains to be seen, should the approach be implemented. Additional sector reforms in Angola and Tanzania are also expected to attract further Power Sector investment in these markets. These electricity industry reforms consider multiple aspects of the Power Value Chain, which needs to be considered in a holistic approach in restructuring the industry.



Current challenges and new developments

Despite all of the positive developments in the market in the past few years, there are still many challenges which need to be addressed. These include the inability of Governments in certain countries to provide guaranteed offtake to IPPs. This creates substantial risk for IPP developers and will act as an extremely large barrier to the implementation of a successful IPP market. Without some mechanism in order to ensure that IPPs can secure revenue from their power generation the IPP market cannot develop and projects will be unable to secure financing as the risk of capital not being repaid will be too great, especially considering the large amounts and long time frames involved. The ability of many Governments to provide such a guarantee on a credible basis is another challenge for which enhancements need to be developed.

An additional problem in developing power infrastructure is the lack of primary infrastructure transactions which have occurred over the years. A track record of successful infrastructure projects together with stability in the political, financial and judicial environments is a major draw card to investors as it provides them with assurance that transactions have a solid base on which to be developed. Once transactions occur, the stability of systems implemented in the countries can be established and a track record can be built.

One of the developments which will aid in the establishment of a track record is the commitment of funds to developing power projects in the region.

In 2013, US President Obama launched 'Power Africa', an innovative partnership designed to add an additional 30GW of energy and 60 million new connections in SSA by 2030. In response, United States government agencies have mobilized funds and partnerships to strengthen the Power Sector. This initiative is a process of real significance and puts into practice a course of action to really dig deep and address the lack of bankability in African power projects which generally fall flat due to poorly prepared feasibility studies or a poor procurement planning and preparation process.

Power Africa has established partnerships with more than 120 entities and its initial commitment of USD7 billion has already leveraged commitments of more than USD43 billion from private and public sector partners, including the African Development Bank (AfDB), the World Bank Group (WBG), the Government of Sweden and the European Union (EU).

USAID is now in the process of awarding USD1 billion under a Multiple Award Indefinite Delivery, Indefinite Quantity contract for transaction advisory services in order to assist in achieving this ambitious goal.

This programme will look at projects across the Power Value Chain and together with a holistic planning approach implemented by Governments should significantly assist in increasing project bankability and the sustainability of projects over their lives.

A track record of successful infrastructure projects together with stability in the political, financial and judicial environments is a major draw card to investors as it provides them with assurance that transactions have a solid base on which to be developed.

In addition to the above, The New Development Bank, BRICS has also been set up to enhance cooperation among the five BRICS countries and to act as an alternative funding source to the traditional international lenders such as the World Bank and International Monetary Fund. The initial capital of the fund is set at USD50 billion and is set to increase further to USD100 billion. These funds will be utilised to support both public and private projects through loans, guarantees, the provision of equity finance and other financial instruments.

Two other game changers in the financing arena include the acceleration of Chinese investment in the region and the use of Export Credit Agencies as financiers as opposed to them merely acting as guarantors. This is highlighted by the fact that ECA lending in Africa has increased by more than USD15 billion in 2013. Furthermore, Chinese investment on the continent increased tenfold between 2005 and 2011 to USD15 billion, of which more than USD3.25 billion is invested in SSA's Power Sector.

Despite, an increase in available funding sources, further trends across the SSA Power Sector are also apparent. One of these is the ever-increasing focus on the involvement of Independent Power Producers within the Power Sector. South Africa, through its IPP programmes, has already introduced approximately 40 new IPP players into its Power Sector through more than 90 different projects. Furthermore, the REIPPPP has showcased that renewable energy can successfully be introduced into the SSA market. Other African countries, such as Nigeria, Ethiopia and Kenya, are following suit, especially given the limitations of Government entities who have come to realise that it is often impossible to solve their power crises alone.

There is also a focus on changing the energy mix in certain countries with a focus on the utilisation of different power sources, including renewable energy. Historically, many SSA countries have relied heavily on a single power source leading to dependency issues. For example coal and hydropower have historically been dominant sources of power generation throughout SSA. The dependence on environmentally unfriendly coal, linked to the coal price and the variability of water flow affecting hydropower have led to issues in the past. The recent trend to diversify the generation mix will ultimately see this issue becoming less relevant.

This change in the use of energy sources is also being pushed from the funders' side. The aforementioned USAID programme for example specifically highlights the importance of clean energy technologies and technologies with lower emissions. Utilities need to bear in mind how the change in generation mix affects other steps in the Power Value Chain including how stable the supply of electricity is which can be fed into the grid and whether this transmission infrastructure is able to cope with the additional capacity.

The introduction of cross border projects can provide great economies of scale to SSA. Collaboration and sharing of resources between neighbouring countries can greatly increase the effectiveness of their Power Sectors and go a long way to reducing costs overall which can be passed on to the end user in the form of lower tariffs in the sales step of the Power Value Chain.

Two great examples of cross border projects currently underway in the transmission step of the Power Value Chain are the Mozambique – Zimbabwe – South Africa (MoZiSa) and Zimbabwe – Zambia – Botswana – Namibia (ZiZaBoNa) transmission projects. Once realised these projects will significantly upgrade the regional transmission network between the respective countries and will assist the regions in optimising generation resources and realising more affordable tariffs.

As previously mentioned the use of mini-grid and off grid renewable energy solutions also has the potential to become a game-changer in providing power to outlying rural communities who are not served by traditional transmission infrastructure.

These trends are set to continue in SSA over the coming years and will start to shape the market towards more sustainable Power Sector solutions. Successes in the market such as the IPP Procurement Programmes in South Africa and the privatisation process in Nigeria demonstrate Power Sector solutions to other market players which they can then start to implement, building on the lessons which have been learnt in pioneering countries.

It should be noted that these trends cover mainly the energy resource, generation and transmission steps of the Power Value Chain. In order for the SSA Power Sector to experience significant development, there will have to be extensive consideration given to the other steps of the Value Chain, namely storage, distribution, sales and smart technologies. Although there are isolated instances of these steps being explored in the region eg the rolling out of prepaid electricity meters and the analysis of other smart technologies, they are attracting far less attention at the moment and there are no overall trends to be noted. In order to realise success it is critical that Governments keep the entire Power Value Chain in mind throughout the development of their Power Sectors.



03

The Power Value Chain



SSA has historically been known to suffer from ageing and insufficient power infrastructure which is poorly maintained. Unfortunately, this only represents one aspect of the challenges facing SSA's Power Sector. Stability of electricity supply is an issue in many countries which rely on a single source of energy in order to generate power.

In addition, significant energy losses continue to occur between sources of supply and points of distribution and due to the lack of adequate distribution infrastructure, the electric power actually delivered to end users is only a fraction of what was generated in the first place as a result of damaged power lines, transmission technical losses and illegal electricity connections.

The Power Value Chain sets forth all of the relevant steps in the energy supply industry from the inputs into the process through to energy generation and delivery to end users. This has become of ever-increasing importance as there is often a focus on solving Sub-Saharan Africa's power crisis by merely adding additional generation capacity without consideration as to whether and how effectively the additional electricity production can ultimately be distributed to end users.



Energy resources form the first step of the Value Chain and are a critical consideration in the energy planning process as a diversified energy resource base will increase the security of electricity supply. Unfortunately, one of the big issues in Sub-Saharan Africa is that many countries rely heavily on a single energy resource in order to generate their power. These resources tend to be whichever is most plentiful in the country is question. This includes gas in the Western regions, hydropower in the Eastern and Central areas and coal in the Southern region of SSA.

The reliance on a single energy source can be problematic. For example, dependence on coal makes electricity generation dependent on the fluctuating market price of an exhaustible resource while for hydropower the seasonality of water flow leads to generation shortfalls during times of drought. Quick fixes are generally used as stopgaps but prove prohibitively expensive. These include the use of diesel-based generation sources as well as leased generation plants.

Recently there has been a shift from certain SSA countries to broaden their generation mix with a specific focus on renewable technologies. This has been most notable in South Africa with the introduction of the Renewable Energy Independent Power Producer Procurement Programme and other countries on the continent are beginning to follow suit. The potential for renewable energy in Africa is huge and sources such as solar and wind power are plentiful in SSA but are generally not ideal for providing baseload power and cannot be used as a quick fix for a lack of generation capacity.

Generation is a crucial aspect of solving the power crisis in SSA as many countries just do not have sufficient installed capacity. This is currently the focus of most countries in SSA and major generation projects are under development all over the continent. These projects often suffer from a variety of challenges including offtake which cannot be guaranteed leading to financing difficulties, construction delays and political issues.

The importance of growth in electricity generation is twofold – firstly, it needs to grow sufficiently in order to fill the current shortfall between electricity supply and demand. Secondly, generation needs to expand further in order to cope with the high growth rates which SSA countries are experiencing. As such growth in generation needs to exceed economic growth rates.

Of the 17 SSA countries investigated in this Report, only five show a scenario where envisaged generation increases exceed the economic growth rate (GDP increases). This suggests that, at the current envisaged economic growth projections and envisaged generation increases, the majority of SSA countries will struggle to address the current gap between electricity supply and demand.

With regards to generation, the relationship between installed capacity and total generation is interesting as it shows to what extent increases in installed capacity are being converted into increases in actual electricity generation.

For 11 of the 17 countries selected, the addition of installed capacity results in a less than proportionate increase in electricity generated (ie if installed capacity is doubled, electricity generated increases by less than double). One possible explanation for this is that the increased installed capacity additions are making use of technologies that generate electricity at lower efficiency rates. This is not unexpected as renewable energy programmes have been followed in a number of countries such as South Africa and Kenya. The implication is that the addition of installed capacity must be planned to ensure that actual electricity generation meets energy demands.

However, in isolation generation cannot solve the power crisis without consideration of the other steps in the Power Value Chain. Unfortunately, this is the approach of many countries in SSA who aim to target what they often consider to be the root of the problem without adopting a holistic approach utilising the entire Power Value Chain. As such even once additional generation capacity has been added, the country in question may not be able to transmit and distribute the electricity effectively.

Following the generation of electricity, production shortfalls and surpluses should be considered in the storage and trading steps of the Power Value Chain. Countries who have generated more electricity than required should be able to store it for use at a later stage or should be able to sell it in a market to countries who generate insufficient electricity to meet their own requirements. Consideration of how best electricity can be stored as well as how it can be traded between users and different regions in order to maximise generation resources will further increase the efficiency of the process.

Electricity **storage** is currently not widely used in SSA. However, if the Power Sector in the region is to develop, this is an area which needs to be considered, especially considering the drive towards the use of renewable energy in certain countries. The incorporation of storage facilities into the Power Value Chain in SSA will promote the use of renewable technologies, lower electricity costs and allow electricity grids to operate more effectively.

The importance of growth in electricity generation is twofold – firstly, it needs to grow sufficiently in order to fill the current shortfall between electricity supply and demand. Secondly, generation needs to expand further in order to cope with the high growth rates which SSA countries are experiencing. As such growth in generation needs to exceed economic growth rates.

Given SSA's enormous hydropower resources, pumped storage facilities are one of the main power-storage solutions. Concentrating Solar Power (CSP) plants with thermal storage are also used in the renewable energy space. South Africa is leading the way in SSA utilising these types of storage and the country has numerous pumped storage facilities as well as having introduced CSP plants with thermal storage which have been commissioned under the country's REIPPPP.

Other smaller-scale storage solutions have also been used throughout the region, mostly in rural areas. These are predominantly based on solar-power which charge batteries in order to retain power for use at a later stage. Such solutions have been rolled out in Tanzania and Kenya and provide a good power option for remote areas which are not served by major transmission networks.

Power trading on the African continent would be greatly beneficial and would alter the way power generation is looked at. As already mentioned, one of the main problems with energy generation in SSA is that energy resources are not uniformly distributed in form or location. The introduction of a means to trade energy on an inter-regional basis would mean that resource-sharing could be implemented between countries ensuring that countries rich in resources could export power to other countries with limited resources. This would lead to a greater diversity in the generation mix and would reduce reserve requirements.

Countries which rely heavily on a single energy resource in order to generate their energy would also be able to decrease this reliance by utilising power imports without having to be concerned as to which source the power was generated from.

However, there are currently no energy exchanges on which to trade electricity such as those available in developed markets. For example, Europe who utilises platforms such as the European Energy Exchange (EEX) which creates spot and derivatives markets in power and power-related commodities.

The only currently available means of trading energy in SSA is through regional Power Pools utilising bilateral trade agreements between countries. There are currently four Power Pools, namely the Southern African Power Pool (SAPP), West African Power Pool (WAPP), Central African Power Pool (CAPP) and the Eastern Africa Power Pool (EAPP). These are all in various stages of development with the Southern African Power Pool being the most advanced. The main challenges in setting up the Power Pools to a level of efficient operation include conflicting national policies and a need for significant transmission infrastructure investment in order to exchange power over borders. Currently, only minimal trading is done through the Power Pools, with less than 1% power traded in CAPP and EAPP and approximately 7% traded in SAPP and WAPP.

The introduction of a means to trade energy on an inter-regional basis would mean that resource-sharing could be implemented between countries ensuring that countries rich in resources could export power to other countries with limited resources.

This lack of **transmission infrastructure** is not uncommon in SSA which suffers from ageing transmission and distribution networks which provide inadequate coverage of rural areas. Even if generation capacity is adequate, without a proper transmission network, electricity cannot effectively be delivered to different regions within a country or across borders to facilitate exports and imports of electricity through the Power Pools.

An ineffective **distribution network** will mean that the electricity will struggle to reach the end user. High transmission and distribution losses well in excess of the European and North American average of 8%, illegal connections, theft and vandalism are just some of the problems which are obstructing the proper development of Sub-Saharan Africa's power markets. Furthermore, the generation infrastructure is often not even considered together with the transmission infrastructure. This leads to pervasive problems when connecting new generation facilities to the electricity grids which cannot handle the additional capacity.

Electrification rates in SSA countries help to illustrate the extent to which power infrastructure needs to be upgraded. This process begins by looking at the adequacy of generation infrastructure after which countries need to ensure that the electricity generated reaches its population by way of adequate transmission and distribution infrastructure.

Out of the 17 countries presented as case studies in this Report, 13 have electrification rates below fifty percent with eight of these thirteen experiencing electrification rates below thirty percent. To put this statistic into perspective, average electrification rates for Developing Asian countries and Latin American countries are:

- › An average of the developing Asian market (excluding China and India) – 86%
- › Latin America – 95%

As it stands, the majority of our 17 SSA countries currently have a ratio of approximately 2km of transmission lines for every 1MW in installed capacity. When the same ratio is calculated for countries that have projections for 2020, this ratio drops to less than half of the 2km.

This could mean that either the current transmission networks have sufficient capacity to handle the increased generation or it suggests that the projected spending on transmission lines will be insufficient to meet the needs of the increased generation capacity which will have further knock on effects for the Power Sector in SSA.

A great case study highlighting some of the problems with a lack of transmission and distribution infrastructure is Nigeria. Nigeria's transmission system is potentially the weakest link in its entire Power Value Chain and inadequate transmission infrastructure has been consistently highlighted as being responsible for stranded capacity that is characteristic of the electricity grid. There is also the need for considerable expansion of the distribution network to accommodate the demand for power from consumers. The current Aggregate Technical, Commercial and Collection losses (ATC&C) are well above acceptable limits and adequate investment must be made to improve the level of efficiencies in the distribution system. Furthermore, issues such as supply of meters to consumers to enable proper metering and the billing system would need to be addressed in order to prevent revenue leakages for the distribution companies. As such Nigeria's key focus on the Power Value Chain should be the transmission and distribution steps as opposed to focusing on generation alone.

More positively, there have recently been a few developments in the Sub-Saharan Africa power markets which show thinking further along the Power Value Chain on a regional scale. This includes the Mozambique – Zimbabwe – South Africa (MoZiSa) transmission project as well as the Zimbabwe – Zambia – Botswana – Namibia (ZiZaBoNa) transmission project both of which seek to build extensive transmission infrastructure across these respective regions. Such regional solutions aid in optimising generation resources and can result in more affordable tariffs levied to the end user.

Hand in hand with power distribution comes the electricity sales process which is integral to the Power Value Chain. The tariff at which electricity is sold to users will determine how well the costs used to produce electricity and maintain the generation, transmission and distribution infrastructure are recovered and whether there is additional cash flow to expand such infrastructure in the future. Without a proper tariff structure, electricity will either be too expensive for the end user and result in cost push inflation or if tariffs are set too low they will not be able to recover costs meaning that there are not enough funds to maintain existing infrastructure which will lead to it becoming old, damaged and eventually obsolete. Insufficient funds from poor tariff structures will also lead to going concern issues with the power generation companies in question.

Smart technologies such as smart grids and smart meters installed at the end user can also add to the efficiency of the process by more accurately determining how much electricity is consumed by users for billing purposes and the best ways to utilise power generation sources.

Currently in Sub-Saharan Africa there are a variety of issues in this space including the use of non-cost reflective tariffs, billing errors and tampering of prepaid electricity meters.

In order to modernise the electricity sales sector, the environment must enable greater private sector participation. Two of the requirements for private sector involvement include an unbundled grid and a mechanism that allows the energy tariffs to be arrived at by market forces, specifically the movement away from a politically determined artificial tariff. Developments in the SSA market will be required in order to realise these factors.

From the above, it is evident that each step of the Power Value Chain has its own unique issues and a focus on generation alone will be insufficient to effectively combat the power crisis in SSA. Although there are instances of certain projects which highlight a shift in thinking along the Power Value Chain, this is still the exception rather than the rule. Governments need to adopt a holistic approach in their energy planning which considers all steps in the process in order to derive the greatest benefit for their power markets. This holistic approach should be adopted in all phases of power infrastructure development. For example during the feasibility study stage, specific focus should be given to how the Project in question will affect each step of the Power Value Chain.



Power is one
of the main
challenges
facing the SSA
region across
all aspects of
the economic
development

04

Regional and Country Analysis

The following sections in this Report set forth a regional overview of each of the four main areas in Sub-Saharan Africa, namely: Central Africa, East Africa, Southern Africa and West Africa.

For each of these regions we have selected countries as case studies. These countries have been chosen as they provide a good representation of the current status and upcoming developments in the SSA Power Sector. The snapshots of each of these 17 countries include:

- › A macroeconomic overview;
- › An overview of the relevant Power Sector regulatory environment; and
- › An analysis of each country's Power Sector in terms of the Power Value Chain.

Central Africa Overview



The Central Africa region is made up of eight countries namely: Cameroon, Central African Republic, Chad, Congo, the Democratic Republic of Congo, Equatorial Guinea, Gabon, and Sao Tome and Principe.

The region is dominated by French-speaking countries with the mining sector being one of the main engines driving growth. Despite conflict in certain countries, Central Africa has maintained decent growth in recent years. GDP growth for 2016 is expected to average 5%, although this may prove an ambitious target.

Hydropower accounts for approximately 70% of the installed capacity in Central Africa and it is envisaged that this will continue to be the case in 2030. One of the mega projects in this region, and on the continent, is the DRC's Grand Inga project which alone has the potential to generate 40GW of power. The heavy use of hydropower does however lead to reliance on an energy source which is heavily dependent on rainfall and the resultant water flow.

The Central Africa region is facing a huge setback in the development of infrastructure, and it is lagging behind the other sub regions. This results in many of the region's resources being left untapped and their power generation potential wasted. With an estimated total installed capacity of just 6GW, Central Africa is underperforming its SSA counterparts and insufficient power generation has been one of the major hurdles preventing significant economic growth.

The lack of infrastructure development throughout all aspects of the Power Value Chain has been as a result of a lack of adequate legislation to regulate the industry and a lack of investment from the government and the private sector. This region also struggles with a general low level of infrastructure roll-out and until fairly recently degrees of political instability. Future planning should be done while utilising a holistic planning approach which takes into account the entire Power Value Chain.

Much like most of the SSA region, Central Africa faces severe electrification challenges as demonstrated by its electrification rate of 20%, the lowest on the continent. The region is underperforming in comparison with other areas in SSA and insufficient power generation has been a major hurdle on the region's path towards economic growth.

Currently the countries of Central Africa engage in minimal power trading with the Central African Power Pool (CAPP) constituting the only available trading mechanism in the region. This Power Pool is one of the least developed and faces many challenges which need to be overcome before it can become a significant tool in regional power trading. These challenges include the lack of a legal framework for electricity trading, lack of regional regulations and appropriate mechanisms for dispute resolution and difficulties in mobilising investment for power projects.

In addition to the difficulties the region faces in its power trading mechanism the general transmission and distribution infrastructure is also severely lacking and inefficiently set up. For example in Cameroon, the three main transmission grids are completely isolated from one another and no exchange of available surpluses can be made between the grids. This highlights the need for holistic planning for the entire country along the Power Value Chain.

The use of smart technologies is also behind that of the other regions. Although smart meters are being installed currently only a small portion of the population are using them. The effects of this are being felt by distributors who are suffering from inaccurate billing which could be solved through the use of smart/prepaid meters.

Low collection rates are common and compounded by the high poverty rates in the region. In certain instances these high poverty rates also impact tariff pricing which is set too low and result in utilities being unable to recover the all-in delivered cost of electricity at the end user. The result is that insufficient funds are generated leading to insufficient maintenance and preventing future power infrastructure expansion. An example of this kind of tariff pricing is in the DRC where tariffs are approximately one tenth of those of other African countries.

The state of the Power Sector in Central Africa is a mixed bag and it is clear that certain countries are experiencing pervasive energy challenges. In order to resolve their issues governments need to consider a complete overhaul of their Power Sectors using a holistic planning approach addressing the entire Power Value Chain. Each step of the Value Chain will pose its own issues, but only if they are addressed together can these challenges be overcome.

Cameroon

Macro overview

	2015	2025
Nominal GDP US\$ billion	29.1	79.5
GDP per capita (US\$)	1 244	2 682
Real GDP annual growth (yoy%)	5.7	5.9
Population (millions)	23.3	29.5
Labour Force (millions)	9.5	12.9
Unemployment (% of labour force)	3.9	N/A
Ease of doing business index within Sub Saharan Africa <small>(1: Most friendly and 47: Least friendly)</small>	37	N/A

Situated in Central Africa, Cameroon is rich in natural resources, specifically in the agriculture, forestry and the mining sectors. Cameroon’s largest driver of GDP is its agricultural sector.

Growth is expected to remain strong in Cameroon, with an anticipated GDP growth rate of 5.3% predicted for 2016. However this remains below the 6% average growth target set in the 2010-20 Growth and Employment Strategy Paper (2010-20 GESP), which aims to incorporate Cameroon into the group of emerging countries by 2035.

A lack of infrastructure as well as the poor quality of Cameroon’s existing transport and energy infrastructure remains a major obstacle to economic growth and investment.

Power Sector regulatory environment

- Organisations responsible for energy policies**
 - › The Ministère de l’Energie et de l’Eau, (MINEE – Ministry of Energy and Water)
 - › The Rural Electrification Agency (AER)
 - › The Electricity Development Corporation (EDC)
- Energy Regulator**
 - › The Electricity Sector Regulatory Agency (ARSEL)
- Energy policy publications**
 - › Rural Electrification Master Plan (PDER)
 - › Energy Sector Development Plan (PDSE 2030)
 - › Cameroon Vision 2035
 - › National Energy Plan, 2005
 - › 98/022 of December 1998
 - › The Electricity Law
- Main entities in the electricity generation market**
 - › ENEO Cameroun S.A.
- Main entities in the electricity transmission market**
 - › ENEO Cameroun S.A.
- Main entities in the electricity distribution market**
 - › ENEO Cameroun S.A.



Market in Yaounde, Cameroon

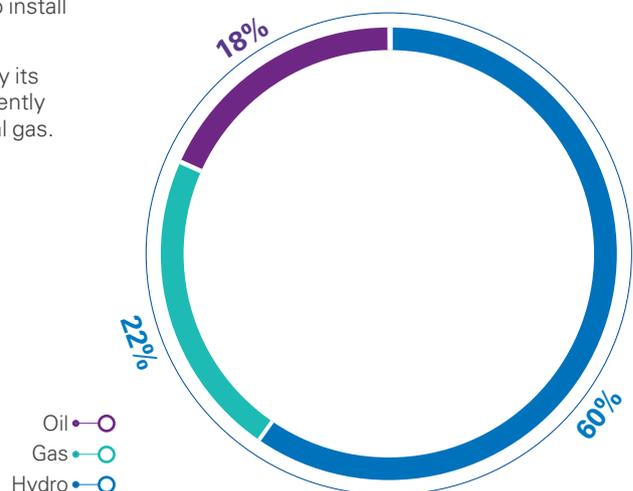
The adoption of an electricity law in 1998 followed by a complementary electricity decree in 2000 led to the liberalisation and privatisation of the state-owned power utility with a 20-year concession in 2001. The state-owned power utility SONEL was privatised and purchased by the American company AES Sirocco, becoming AES Sonel. A majority stake of 56% in this entity was acquired in 2014 by the British private equity firm Actis with the balance being held by the Cameroonian State. The company was then renamed ENEO Cameroun S.A. This entity was granted a monopoly over transmission and distribution throughout its concession area in Cameroon.

Power Sector Overview

The vast majority of Cameroon’s on-grid installed capacity is generated via hydropower. However the country is currently harnessing only 5% of its enormous hydropower resources.

The total hydro potential is estimated at 23GW with a production potential of 103TWh per year. It is estimated that hydropower will continue to remain the major resource of energy production in the country and there are plans to install an additional 720MW of hydropower capacity by 2020.

In addition to hydropower, Cameroon’s energy mix is dominated by its abundant oil and gas resources. In fact the country’s reserves currently stand at 200 million barrels of oil and 4.8 trillion cubic feet of natural gas.





The Central African nation’s infrastructure bottlenecks, in addition to the cumbersome business environment, remain the primary reasons why the country has failed to realise its GDP growth potential. In order to combat its infrastructure challenges the Government has embarked on a range of infrastructure policies and programmes, particularly in the energy sector, which should result in higher economic growth rates in the future. Such programmes include Cameroon’s Vision 2035 (Vision 2035), the Energy Sector Development Plan (PDSE 2030) and the Rural Electrification Master Plan (PDER).

Vision 2035 addresses the development of energy infrastructure in in Cameroon. The objectives addressed include:

- › Increasing electricity production by adding value to the country’s hydro-electric and gas potential;
- › Intensifying exploration and developing oil resources;
- › Developing alternative energies; and
- › Extending and modernising transport and distribution facilities and networks.

In order to achieve the objectives the Government has set for themselves in terms of these policies, they will have to improve on the current legislative and regulatory environment across the Power Value Chain.

In addition to developing policies, the Government of Cameroon has implemented various measures to promote increased energy generation. The Government specifically focuses on promoting and developing renewable energy as a generation and source and provides various tax, import and export benefits. Furthermore, all public service operators have an obligation to connect all renewable energy power producers to who request grid connection. In the case of rural electrification, priority is granted to decentralised solutions.

Highlighted Generation Projects in Cameroon

Project Name	Type of Transaction	(MW)	Current status
Nachtigal Hydro power plant	Hydro	420	› Production agreement signed Q3 2014 › Construction is yet to commence. Expected completion 2021
Kribi Power Plant (Expansion) – Kribi II	Gas	114	› Expansion announced Q1 2015

Transmission and distribution losses



Key constraints faced by Cameroon in terms of the transmission and distribution steps of the Power Value Chain relate to the country’s narrow geographic shape and relative obsolescence of its transmission and distribution networks. This situation is exacerbated by the fact that the country’s three main transmission grids; the Southern Interconnected Grid (SIG), the Northern Interconnected Grid (NIG) and the Eastern Interconnected Grid (EIG); are completely isolated from one another and no exchange of available surpluses can be made between the grids.

Electrification rate



In order to increase electricity access, Cameroon has established a long term power policy under the PDSE 2030, which aims at achieving an electrification rate of 75% by 2030. Although the current electrification rate of 55% may seem high in comparison to other SSA countries, this is due to high electricity access in urban areas, with rural areas only having an electrification rate of 17%. The PDER’s focus is the electrification of about 660 localities through the extension of the interconnected grids, the rehabilitation and construction of isolated diesel power plants and mini-hydro plants as well as the development of a regional grid. This regional grid will interconnect the standalone NIG, SIG and EIG grids. The country further plans to integrate its national grid with those of neighbouring countries.

Per capita electricity consumption



Cameroon has a low rate of electricity consumption per capita, estimated at 317.3KWh/capita in 2015. This is set to increase to 422.6KWh/capita by 2025. However, this is still far off the average per capita consumption in more advanced SSA countries such as South Africa.

Democratic Republic of the Congo

Macro overview

	2015	2025
Nominal GDP US\$ billion	39.7	108.6
GDP per capita (US\$)	513	1 038
Real GDP annual growth (yoy%)	7.3	6.3
Population (millions)	77.3	104.5
Labour Force (millions)	28.4	38.3
Unemployment (% of labour force)	8.0	8.0
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	44	N/A

Situated in Central Africa, the Democratic Republic of the Congo (DRC) is a vast country with immense economic resources. With 80 million hectares of arable land and over 1 100 minerals and precious metals identified, the DRC has the potential to become one of the richest countries on the African continent and a major driver of the continent's growth.

The economy has performed fairly well over the past few years and is expected to continue to remain strong with real GDP growth in 2016 anticipated to be 6.6%. Growth is expected to decrease slightly, but still remain high with the country predicted to achieve a real GDP growth rate of 6.3% in 2025.

Power Sector regulatory environment

Organisations responsible for energy policies	<ul style="list-style-type: none"> › Ministry of Mines, Energy and Hydrocarbons › Electricity Regulation Authority (ARE) › National Renewable Energies Service (SENEN) › National Electrification Agency (AGENA)
Energy Regulator	<ul style="list-style-type: none"> › The National Energy Commission › The General Atomic Energy Commission (CGEA)
Energy policy publications	<ul style="list-style-type: none"> › Law No 14-2003 of April 10, 2003 on the Electricity Code › Law No 17-2003 of April 10, 2003 › Law No 16-2003 of April 10, 2003 › Law No 15-2003 of April 10, 2003 › Law No 10-2003 of February 6, 2003 › Law No 067-84 of September 11, 1984
Main entities in the electricity generation market	<ul style="list-style-type: none"> › Société nationale d'électricité (SNEL)
Main entities in the electricity transmission market	<ul style="list-style-type: none"> › Société nationale d'électricité (SNEL)
Main entities in the electricity distribution market	<ul style="list-style-type: none"> › Société nationale d'électricité (SNEL)



Kinshsha, Democratic Republic of Congo

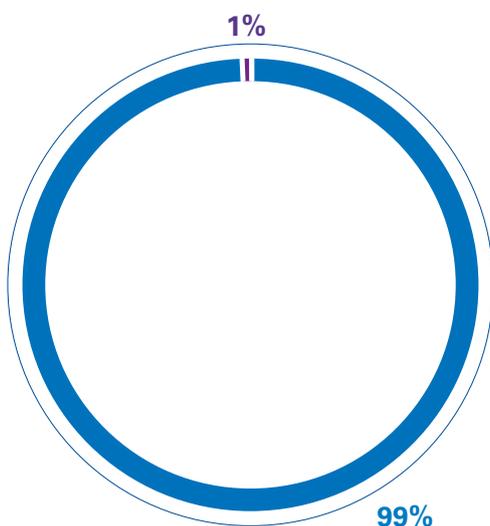
The Government passed new electricity reforms in 2009 to create various national agencies, namely the Electricity Regulation Authority, the National Electrification Fund (FONEL), and the National Electrification Agency (AGENA). The laws also restructured DRC's national electricity company, Société Nationale d'Électricité (SNEL).

Power Sector Overview

The DRC has the highest hydro potential in the SSA region which accounts for 35% of the potential in Africa and 8% in the world. Hydropower currently accounts for 99% of the country's total generation mix. Given the huge potential in the country there is a significant focus on developing hydroelectric power facilities going forward in order to make the country one of the major hydropower exporters in the SSA region.

The DRC currently utilizes about 2% of its significant hydroelectric resources from the Congo River; which is estimated to have the capacity to generate 100GW of electricity through hydropower installations. Approximately 44% of this hydroelectric potential is concentrated at the Inga Falls, located 150km from the mouth of the Congo River.

In addition to hydropower potential, the country has estimated oil reserves of 3 billion barrels, and 991.1 million cubic metres of proven natural gas reserves.



○ Oil
○ Hydro

Net Installed capacity



Total electricity generation



The DRC faces various challenges in the generation step of the Power Value Chain. These include a lack of power supply to meet current power demands and a lack of funding and financial support from the Government.

In order to combat these issues, SNEL has committed itself to work with various multilateral, bilateral, private and commercial partners on its power projects. These projects address issues faced in electricity generation, transmission and distribution. However there are concerns as to whether and how long it will take for these projects to reach completion.

Projects which are currently underway include the 150MW Central Zongo II Hydroelectric dam and the Grand Inga Project.

Inga Falls is currently the site of two large hydropower plants and is being considered for a much larger hydropower generating station known as Grand Inga. The Grand Inga project, if and when completed, will be the largest hydroelectric power generating facility in the world. The Grand Inga Dam has been estimated to cost USD80 billion and will deliver approximately 40GW of power.

Inga 3 forms the first phase of the Grand Inga Project. This phase will provide 4 800MW of power and construction is expected to commence in 2017.

Highlighted Generation Projects in Democratic Republic of Congo

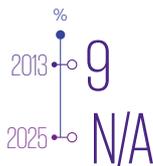
Project Name	Type of Transaction	(MW)	Current status
Inga 3 Hydro Station	Hydro	4 800	› World Bank approved Inga 3 preparatory grant › Development/planning phase
Central Zongo II Hydroelectric dam	Hydro	150	› Under construction since 2012

Transmission and distribution losses



Access to electricity in the DRC is extremely low at 9% per year. The DRC is home to one of the world’s longest electric power transmissions lines; the 1 700km Inga Kolwezi transmission line. The line transmits power from Inga Falls on the Congo River to the copper mining district of Katanga in the Democratic Republic of Congo (DRC). In 2014 there was a refurbishment of the transmission line to improve its operating capacity from its previous level of 25%.

Electrification rate



Per capita electricity consumption



Per capita consumption is extremely low at approximately 86kWh/year. This is a serious cause for concern as poor performance in the Power Sector has and will continue to impact economic growth.

The financial performance of the national utility is presenting a challenge, as billing collection rates have remained around the 40% mark in recent years and the hidden costs in power generation for the company stand at nearly 600%, due to gross financial inefficiencies. Restructuring of this portion of the Power Value Chain is essential in order to ensure that tariffs are cost reflective and to improve the rate of recovery of electricity invoices.

East Africa Overview

The East African region is made up of 13 countries, namely Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Seychelles, Somalia, South Sudan, Sudan, Tanzania and Uganda.

East Africa is acknowledged as one of the fastest growing regions in Africa, with expected GDP growth of 6.7% in 2016. These high levels of economic growth have fuelled the need for a more developed Power Sector along all aspects of the Power Value Chain. East Africa benefits from a diverse range of energy resources spread across the region. However hydropower makes up for the majority of power generation, accounting for more than 50% of the energy mix.

There are significant geothermal resources in the East African Rift system with more than 10GW of potential capacity which could be exploited. Ethiopia and Kenya are two of the countries in the region which showcase particular promise. The use of geothermal energy in East Africa ticks many boxes as it is renewable, cost effective, reliable and can be used for baseload power generation.

The region's other resources remain underdeveloped or untapped, including natural gas, coal, biomass, solar power and wind. Energy resource diversification is essential to reduce the current reliance on hydropower which is highly dependent on water flow, leading to power outages in times of drought.

One promising initiative in the region which looks at the various generation resources in the region is the East African Power Master Plan; developed by the East African Community (EAC). The Master Plan identifies a least cost generation and transmission plan to meet the region's growing power demand from 2013 to 2038 and addresses technical requirements, economic viability as well as the opportunities for power exchange between countries.

East Africa faces serious challenges in terms of electrification with four out of five East Africans currently without access to electricity. This is well below the SSA average of approximately 32%.

The low electrification rate is as a result of steps in the Power Value Chain being under-developed and there being a lack of investment in the Power Sector historically. There has been limited regulatory and institutional capacity as well as shortcomings in technical capacity and local resources. Furthermore, inadequate physical infrastructure has been and continues to be a major constraint in the growth of the Power Sector in this region. The lack of transmission and distribution infrastructure as well as their poor maintenance is of particular concern, resulting in frequent power outages.

In order to tackle these issues, East Africa is placing a large focus on power security and intra-regional energy trade which have been identified as areas of development for the region.

Power trading is currently performed through the Eastern African Power Pool (EAPP). This Power Pool still requires significant development with less than 1% of the region's power being traded through this mechanism.

East Africa is however, making strides towards improving access to power and trade with projects like the Eastern Africa Interconnector, dubbed the "Eastern Electricity Highway Project". The project will establish power trade between Ethiopia and Kenya and the wider East Africa region and ensure access to reliable and affordable energy to around 870 000 households.

The transmission line will stretch across 1 068km from Wolayita Sodo in Ethiopia to the Suswa substation in Kenya utilising 2 000MW bi-directional transfer capacity. Construction on the USD1.26 billion project began in 2013 and is expected to be complete by 2018.

Considering the low rate of electrification and outlying rural areas, a great alternative to extensive transmission networks are small off-grid and mini-grid renewable energy solutions. Ethiopia, Kenya and Tanzania are all pilot countries in utilizing this solution under the "Scaling-up Renewable Energy in Low Income Countries Program".

The use of prepaid electricity meters have already been implemented, to a greater or lesser extent in certain areas. This benefits distribution companies by allowing them to collect their revenue upfront as opposed to suffering collection losses from unpaid bills. Smart meters, such as the Automatic Meter Reader AMR System, have also been implemented in Tanzania in order to combat their poor rate of collections.

Given the high reliance on hydropower and diverse energy resources available in the region, East Africa's Power Value Chain focus should continue to be on diversifying the energy mix in the region. Increased power trading as well as a focus on how electricity is transmitted and distributed to the end user, whether via new transmission and distribution infrastructure or through the use of off-grid generation solutions will also play a key role in increasing electricity access going forward.

Ethiopia

Macro overview

	2015	2025
Nominal GDP US\$ billion	61.6	185.2
GDP per capita (US\$)	619	1 481
Real GDP annual growth (yoy%)	8.1	6.7
Population (millions)	99.4	125.0
Labour Force (millions)	47.0	60.0
Unemployment (% of labour force)	5.5	5.6
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	20	N/A

Ethiopia is a landlocked country in North East Africa. It is the oldest independent country on the continent and the second-most populous in SSA. Ethiopia has been one of the fastest growing countries boasting GDP growth rates between 8% and 10% over the past five years. Going forward the real GDP growth rate is expected to remain at high levels, with an anticipated 7.8% growth in GDP for 2016.

The public sector-led development strategy, with its focus on heavy investment in infrastructure, has underpinned the country's strong economic growth. This high rate of growth has been inclusive, spanning different economic sectors and benefiting both urban and rural communities.

Power Sector regulatory environment

Organisations responsible for energy policies	<ul style="list-style-type: none"> › The Ministry of Water, Irrigation and Electricity of Ethiopia (MoWIE) › Ethiopian Rural Energy Development and Promotion Center (EREDPC) › Ministry of Finance and Economic Development (MoFED) › Ministry of Mines
Energy Regulator	<ul style="list-style-type: none"> › Ethiopia Energy Authority (EEA)
Energy policy publications	<ul style="list-style-type: none"> › The Electricity Proclamation No. 810/2013 › Electricity Law (86/1997) › National Energy Policy, 1994 › Electricity Operations Regulations (49/1999) › Investment proclamation (280/2004) › National Energy Policy, 1994 › Electricity Operations Regulations (49/1999) › Investment proclamation (280/2004)
Main entities in the electricity generation market	<ul style="list-style-type: none"> › Ethiopian Electric Power Corporation (EEPCo)
Main entities in the electricity transmission market	<ul style="list-style-type: none"> › Ethiopian Electric Power Corporation (EEPCo)
Main entities in the electricity distribution market	<ul style="list-style-type: none"> › Ethiopian Electric Utility (EEU)



Addis Ababa, Ethiopia

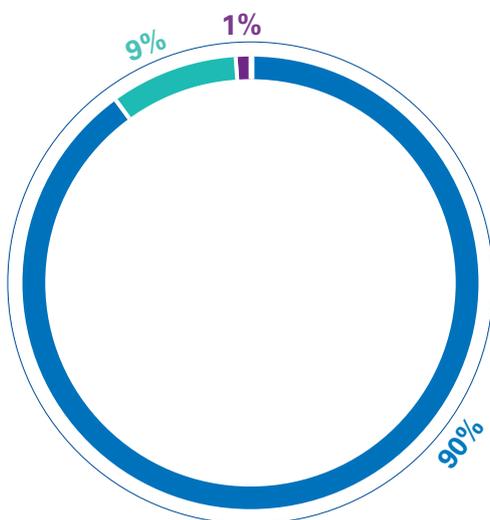
Ethiopia is looking to develop a geothermal energy sub-sector and in order to do so has undertaken a comprehensive review of the geothermal sector including the design of a strategy for development. In addition, preparation of new geothermal legal and regulatory frameworks are currently underway

Power Sector Overview

The Ethiopian Power Sector is heavily dependent on hydropower which accounts for 90% of its total power generation. Although hydropower has proved to be a cheap source of electricity its availability has been negatively affected in times of drought.

Ethiopia has significant untapped renewable energy resources including 45GW in additional hydropower, 10GW from untapped geothermal resources and significant solar and wind potential in the Rift Valley.

In addition to hydropower, geothermal technology could be a game changer in Ethiopia. The long term plan is to have 2.5GW of geothermal energy installed by 2030 which will be further expanded to 5GW by 2037. However there may be challenges in reaching these targets including large financial requirements, lack of institutional capacity, long gestation periods and a sub-optimal regulatory framework.



- Thermal
- Other Renewables
- Hydro

Net Installed capacity



Total electricity generation



Ethiopia plans a highly ambitious expansion of its Power Sector by doubling installed capacity and the resultant electricity generation between 2015 and 2025. These goals are driven by Government’s vision, set forth in its Growth and Transformation Plan (GTP), which seeks to transform Ethiopia into a middle-income country by 2025.

By 2037 the Government of Ethiopia (GoE) under the GTP, plans to increase generation capacity to 37GW. These growth targets in the Power Sector are based on meeting growing domestic demand in Ethiopia as well as in the East African region.

Furthermore, the country plans to increase private sector energy participation and is encouraging IPP’s to invest in the country in order to boost its generation capacity. The benefits for private parties entering the Power Sector are very attractive. According to Ethiopian Electric Power Corporation (EEPCCO), the opportunities in the Power Sector represent approximately USD3 to 4 billion per year. Of this, 65% is in generation, with the rest spread across transmission, universal access and engineering services.

Highlighted Generation Projects in Ethiopia

Project Name	Type of Transaction	(MW)	Current status
Corbetti Geothermal project	Geothermal	1 000	<ul style="list-style-type: none"> › Total project is estimated to be complete in 8-10 years › It will be developed in two stages of 500MW each › 500MW operational Q2 2023 › 500MW operational 2025
Gibe III Hydropower Project	Hydro	1 870	<ul style="list-style-type: none"> › Under construction since 2008 › 93% Complete

Transmission and distribution losses



The GoE is also committed to expanding transmission and distribution networks to deliver additional electricity to end users, reforming tariffs to allow for full-cost recovery, and reducing inefficiency in the sector.

Electrification rate



Per capita electricity consumption



Ethiopia is waking up to the need for smart grid technology through which it plans to reduce distribution losses. Hi-Tech Engineering Industry under the Metal & Engineering Corporation (MetEC) has started supplying the Ethiopian Electric Utility (EEU) with locally manufactured smart electric meters, called It-Plus. In addition, dVentus Technologies has been contracted by EEU to manufacture two million smart meters. In Q4 2014 prototypes were produced and tested; however by Q3 2015 there has been limited actual production of meters.

Kenya

Macro overview

	2015	2025
Nominal GDP US\$ billion	61.3	169.3
GDP per capita (US\$)	1 311	2 850
Real GDP annual growth (yoy%)	5.6	6.3
Population (millions)	46.1	58.6
Labour Force (millions)	18.6	27.6
Unemployment (% of labour force)	9.3	N/A
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	9	N/A

Kenya is the anchor in East African and has maintained economic dominance in the region in recent years. It is the 9th largest economy in Africa and is seen as one of the fastest growing economies in the region with a forecast growth in GDP of 6.0% in 2016.

The country is the most diversified economy in East Africa and boasts a market based economy which promotes economic efficiency, competition and encourages foreign investment.

Power Sector regulatory environment

- Organisations responsible for energy policies**
 - › Ministry of Energy and Petroleum
 - › Energy Tribunal
 - › Rural Electrification Authority (REA)
 - › The Geothermal Development Company
 - › Kenya Nuclear Electricity Board (KNEB)

- Energy Regulator**
 - › Energy Regulatory Commission (ERC)

- Energy policy publications**
 - › Energy Act, 2006 (section 108 & 66)
 - › State Corporations Act (Cap 446), November 2012
 - › Electric Power Act, 1997
 - › Feed in Tariffs (FiTs) policy of 2008 (revised 2012)
 - › Kenya’s Energy Policy, 2004
 - › Kenya Vision 2030
 - › National Climate Change Action Plan (NCCAP), March 2013
 - › Electricity Licensing Regulations
 - › Energy Management Regulations 2012

- Main entities in the electricity generation market**
 - › Kenya Electricity Generating Company (KenGen)

- Main entities in the electricity transmission market**
 - › Kenya Power
 - › Kenya Electricity Transmission Company Limited (KETRACO)

- Main entities in the electricity distribution market**
 - › Kenya Power



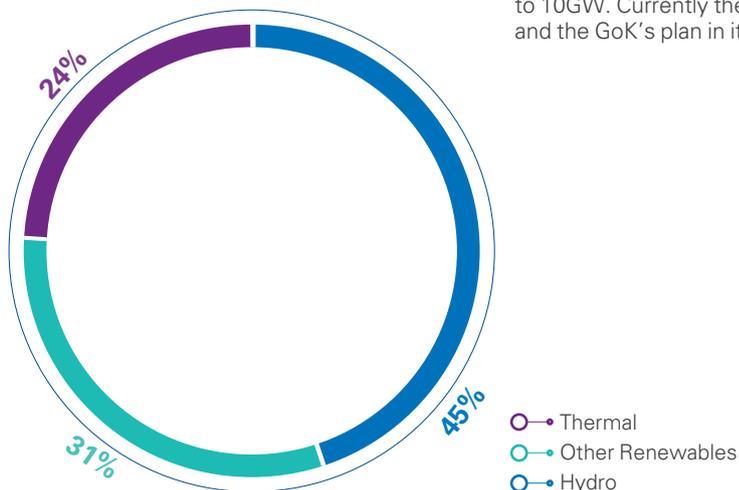
Nairobi, Kenya

Feed-in Tariffs (FITs) were introduced in 2008 and revised in 2010 and 2012 in order to provide investment security to renewable electricity generators, reduce administrative and transaction costs and encourage private investors. This regulation enables Independent Power Producers to sell electricity to Kenya Power at a fixed price for a fixed term of 20 years. The tariffs vary depending on the technology.

Power Sector Overview

Hydropower is the main source of power in Kenya's generation mix. Although hydropower has been a cheap source of electricity in the past there have been challenges such as droughts which have impacted the water flow used in the hydropower process. This has forced Kenya to reconsider its generation mix and there are plans to reduce hydro as a source of power to 24% by 2025 from its current level of 45%.

In addition to hydropower, geothermal energy has gained momentum in Kenya as a source of renewable energy with potential in the range of 7GW to 10GW. Currently the total effective installed capacity stands at 1.5GW and the GoK's plan in its Vision 2030 is to expand this to 5GW.



Net Installed capacity



Total electricity generation



In Kenya, energy is identified as one of the infrastructural enablers of the three pillars of Vision 2030, with an expected surge in energy use within the commercial sector on the road to 2030. The Government of Kenya (“GoK”) plans to increase its generation capacity to 5GW by 2016 and 23GW by 2030 in accordance with Kenya Vision 2030. This goal appears ambitious as current expectations place net installed capacity at only 3.8GW in 2025.

Highlighted Generation Projects in Kenya

Project Name	Type of Transaction	(MW)	Current status
Olkaria geothermal power project (expansion)	Geothermal	560 (4 phases of 140MW each)	› Project consists of 4 phases, the last phase was commissioned in 2014
Lake Turkana Wind Power	Wind and Transmission	300	› Reached Financial Close in December 2014 › Construction commenced in Q4 2014

Transmission and distribution losses



Currently only 20% of Kenya’s population has access to electricity. This is mainly as a result of steps in the Power Value Chain being underdeveloped. In the past there has been a general focus on the generation aspect of the Value Chain, which is now relatively liberalised, and this has resulted in a lack of development in transmission and distribution. This has resulted in challenges such as:

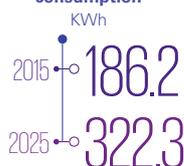
- › High costs of electricity connection, resulting in unaffordable household connections in rural areas;
- › Low per capita consumption; and
- › High transmission and distribution losses.

Electrification rate



In order to improve electrification there needs to be a commitment to increase transmission and distribution infrastructure to match power generation plans. The GoK is focused on sustaining a stable investment climate for private sector participation in energy, developing expanded transmission and distribution networks to deliver power to customers, maintaining a credit worthy off taker and providing end users with more affordable cost reflective tariffs.

Per capita electricity consumption



Kenya Power has set aside USD1.5 million to finance the two-year pilot project in which 5 000 customers, whose monthly power bills exceed KES100 000, will be furnished with smart meters. This will pave the way for the distribution of smart meters to 500 000 clients countrywide at a cost of USD150 million.

Rwanda

Macro overview

	2015	2025
Nominal GDP US\$ billion	8.4	25.2
GDP per capita (US\$)	720	1 752
Real GDP annual growth (yoy%)	6.9	7.5
Population (millions)	11.6	14.4
Labour Force (millions)	5.6	7.5
Unemployment (% of labour force)	1.0	1.0
Ease of doing business index within Sub Saharan Africa <small>(1: Most friendly and 47:Least friendly)</small>	2	N/A

Rwanda is one of SSA’s development success stories and is one of the fastest growing economies in SSA. Although the country still remains predominantly rural its development is underlined by high GDP growth, a low unemployment rate and a high ease of doing business index. GDP growth for 2015 amounted to 6.9% and is expected to remain high going forward.

The country is looking at continued expansion and its long-term developmental goals are put forward in its “Vision 2020” strategy. The objective of this strategy is to transform Rwanda from a low-income agriculture-based economy to a knowledge-based, service-oriented economy with middle income status by 2020.

Power Sector regulatory environment

- Organisations responsible for energy policies › Ministry of Infrastructure (MINIFRA)
- Energy Regulator › Rwanda Utilities Regulatory Agency (RURA)
- Energy policy publications › Electricity Law, 2011
› National Energy Policy, 2008
› National Energy Strategy (2008-2020)
› Electricity Access Roll-out Program (EARP)
› Renewable Energy Feed-in Tariff 2012 (REFIT)
- Main entities in the electricity generation market › Rwanda Energy Group
- Main entities in the electricity transmission market › Rwanda Energy Group
- Main entities in the electricity distribution market › Rwanda Energy Group



Kigali, Rwanda

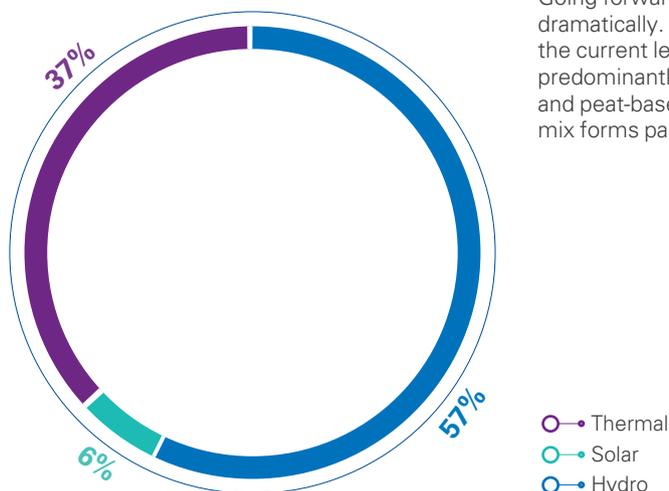
Rwanda Energy Group is a government owned company which controls the generation, transmission and distribution of electricity in the country. The Rwanda Energy Group Limited (REG Limited) and its two subsidiaries; The Energy Utility Corporation Limited (EUCL) and The Energy Development Corporation Limited (EDCL) are entrusted with energy development and utility service delivery in the country.

Although the electricity market is dominated by the Rwanda Energy Group, the industry is opening up to IPP players. Gigawatt Global currently operates an 8.5MW solar plant and additional private players are currently in the process of developing additional generation facilities.

Power Sector Overview

The bulk of Rwanda's electricity is currently produced from small capacity hydro-power plants. The balance of the country's energy mix is made up of thermal and solar technologies.

Going forward, the Rwandan generation mix is anticipated to change dramatically. By 2025, hydro generation is expected to drop to 25% from the current level of 57%. The decrease in hydro generation will be taken up predominantly by thermal technologies including, methane-based (22%) and peat-based (19%) generation technologies. This change in generation mix forms part of the expected capacity expansion to 1.54GW in 2025.



Net Installed capacity



Total electricity generation



Highlighted Generation Projects in Rwanda

Project Name	Type of Transaction	(MW)	Current statu
Nyabarongo II Power Station	Hydro	120	› Development/planning
Ruzizi III Power Station	Hydro	147	› Development/planning
Rusumo Power Station	Hydro	80	› Construction expected 2016
Gisagara Thermal Power Station	Thermal – peat	80	› Development/planning
KivuWatt Biogas/biomass Plant - Phase II	Biogas/biomass	75	› Project is in planning stage after construction of first phase

Transmission and distribution losses



The Electricity Development Strategy further aims to increase the country’s electrification rate from the current level of 21% to 50% by 2017 and emphasises energy efficiency measures including a reduction in technical and commercial losses on the national grid, distribution of energy efficient lamps and the establishment of a Solar Water Heater subsidy scheme.

Electrification rate



Rwanda is also focusing on the transmission and distribution step of the Power Value Chain and is in the process of expanding and upgrading this infrastructure. Rwanda intends to extend its grid by 700km of high-voltage (HV) lines and add 220kv interconnection lines in addition to the existing 110kv lines in order to handle future demand and the proposed new generation facilities. Feasibility studies are currently underway for a number of transmission interlinkages.

Although this overhaul is still in progress, the current improvements to substations, secondary distribution infrastructure and the rehabilitation of the national control centre have resulted in a decrease in the outage rate and a drop in transmission and distribution losses from 25% in 2005.

The above highlights the fact that Rwanda is addressing various aspects of the Power Value Chain and is looking to match its proposed increase in generation infrastructure with effective transmission and distribution systems.

Per capita electricity consumption



In Rwanda over 90% of the customers use a pre-paid metering system and Government has a few initiatives underway in order to upgrade this technology.

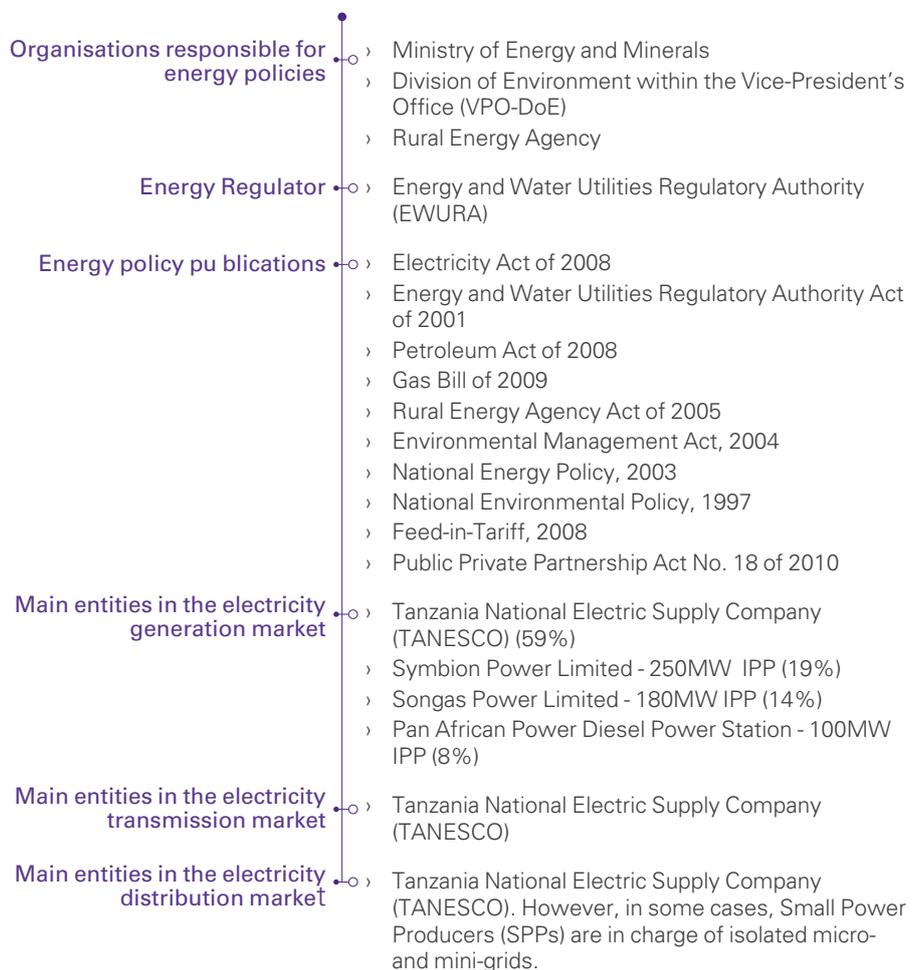
Tanzania

Macro overview

	2015	2025
Nominal GDP US\$ billion	43.3	93.7
GDP per capita (US\$)	827	1 351
Real GDP annual growth (yoy%)	6.0	6.8
Population (millions)	53.5	72.0
Labour Force (millions)	23.3	32.6
Unemployment (% of labour force)	4.8	4.6
Ease of doing business index within Sub Saharan Africa <small>(1: Most friendly and 47:Least friendly)</small>	15	N/A

Located on the eastern coast of Africa, Tanzania is amongst the fastest growing economies in Africa. Agriculture remains the backbone of the country, employing the majority of the workforce. Growth in Tanzania is driven by continued strong performance in most sectors and supported by public investment in infrastructure. Tanzania will continue to perform strongly following its real growth rate of 6.0% in 2015 with the anticipated rate of growth in 2025 amounting to 6.8%.

Power Sector regulatory environment





Dar es Salaam, Tanzania

In 2003, the Government of Tanzania (GoT), through its National Energy Policy, reiterated the objective of reducing dependence on fossil fuels for power supply, suggesting the development of renewable energy options.

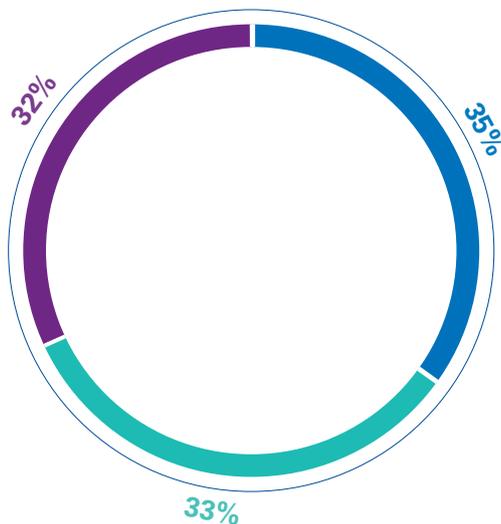
To create a legal and regulatory framework conducive to investment, GoT has instituted a range of energy-sector reforms, a major aim of which has been to attract private investment in order to boost electricity supply and thus meet demand.

Power Sector Overview

Historically, electricity production in Tanzania has been dominated by large hydropower facilities. However, their contribution to the total generation mix has fallen dramatically in recent years due to extensive droughts in the country. This has forced the country's electricity utility to undertake extensive load shedding, using thermal power plants for base load power and emergency power facilities at considerable cost.

Tanzania is blessed with abundant, high quality renewable resources which are largely untapped. This includes an estimated 650MW in geothermal potential in the East African Rift System. The country also benefits from high levels of solar energy boasting between 2 800 and 3 500 hours of sunshine a year.

Gas-fired power stations will be key to the country's diversification plans. Tanzania has abundant natural gas deposits and the Government plans to increase its gas-fired plant capacity from 33% to 50% of total generation capacity.



- Thermal
- Natural gas
- Hydro

Net Installed capacity



Total electricity generation



The Tanzanian Power Sector suffers from shortfalls in energy supply and is characterized by low rural electrification rates and high transmission and distribution losses. This is mainly due to:

- › Power demand exceeding the generation capacity;
- › A lack of adequate infrastructure; and
- › The vastness of the country coupled with low population density in most regions making grid extension an enormously challenging and expensive way to electrify rural areas.

The GoT intends to address many of the issues facing the Power Sector through initiatives like the Electricity Supply Industry Reform Strategy and the Power Supply Master Plan.

According to the country’s Power Supply Master Plan, which was updated in 2012, electricity demand will increase by at least 11.9% annually. The GoT aims to achieve an electrification rate of 100% by 2030, with the addition of 8 990MW of generating capacity by 2035.

This goal seems ambitious as it is expected that the installed capacity will increase by only 1 170MW, between 2015 and 2025.

Highlighted Generation Projects in Tanzania

Project Name	Type of Transaction	(MW)	Current status
Kinyerezi I power plant	Gas	150	› Constructed in 2014 › Operational in 2015
Symbion Mtwara Gas-fired Power Plant	Gas and Transmission	400	› Project announced Q4 2014 › Expected to be constructed by 2019

Transmission and distribution losses



In order to tackle the issues faced in the transmission and distribution steps of the Power Value Chain several projects are under development which aim to:

- › Extend and upgrade the transmission and distribution sectors to cope with expanding demand and supply;
- › Interconnect the isolated grid, to increase international electricity trade with neighbouring countries; and
- › Improve the general reliability of the system. One such example is the Tanzania Five Year Development Plan 2011-2016, which included ten network projects for a total investment of around USD2.4 million.

Electrification rate



Per capita electricity consumption



In terms of tariffs, Tanzania has made progress by entering into agreements with Independent Power Producers, who bring know-how and technology to the sector, and establishing Feed-in Tariffs that provide many of the commercial terms that would otherwise delay negotiations of Power Purchase Agreements (PPAs). The GoT is publicly committed to improving TANESCO’s viability through tariff reform allowing for full cost-recovery and operational improvements to the management of the utility.

Low social tariffs are available to customers using up to 75KWh a month. However, few of the people making up this demographic have been able to take advantage of the reduced rates owing to the high connection fees, which has prohibited them from gaining access.

Uganda

Macro overview

	2015	2025
Nominal GDP US\$ billion	21.9	55.9
GDP per capita (US\$)	619	1 144
Real GDP annual growth (yoy%)	5.4	8.3
Population (millions)	39.0	53.5
Labour Force (millions)	16.6	24.7
Unemployment (% of labour force)	4.1	N/A
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	12	N/A

Uganda is a landlocked country in East Africa, surrounded by the DRC, Kenya, Rwanda, Sudan and Tanzania. Its economy is dominated by the agriculture sector which employs 80% of the workforce. The economy in Uganda has strengthened in recent years as a result of prudent macroeconomic policies, coupled with declining energy prices, good weather conditions, and rising foreign investments in the energy sector.

Uganda's real GDP growth is forecast to be 5.0% in 2016 on the back of increased investment in infrastructure, a recovery of the private sector owing to increased lending activities, stimulus to boost the agricultural sector, and better public service delivery.

Power Sector regulatory environment

Organisations responsible for energy policies

- › Ministry for Energy, Minerals and Development (MEMD)
- › National Environment Management Authority (NEMA)
- › Rural Electrification Agency

Energy Regulator

- › The Electricity Regulatory Authority (ERA)

Energy policy publications

- › The Electricity Act 1999
- › Statutory Instrument 2001 no. 75
- › The National Energy Policy 2002
- › Renewable Energy Policy 2007
- › Biomass Energy Strategy, 2013
- › Renewable Energy Feed in Tariff, 2007
- › Scaling-up Renewable Energy Program (SREP)

Main entities in the electricity generation market

- › Uganda Electricity Generation Company Ltd (UEGCL) has privatized the O&M
- › Eskom Uganda Ltd (44%)
- › Bujagali Energy Limited (29%)
- › Electro-Maxx Limited (10%)

Main entities in the electricity transmission market

- › Uganda Electricity Transmission Company Limited (UETCL)

Main entities in the electricity distribution market

- › Uganda Electricity Distribution Company Ltd (UEDCL) - owns infrastructure (privatized the O&M). Umeme limited (largest electricity distribution company)



Kampala, Uganda

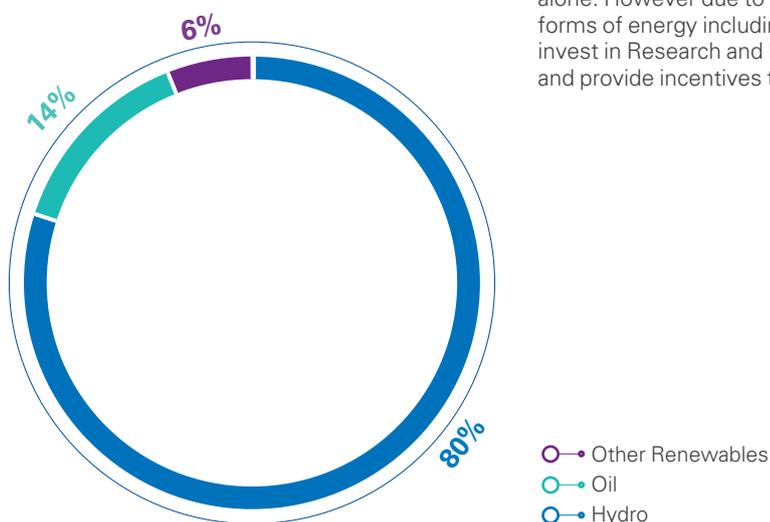
Uganda's Power Sector is liberalized and relatively advanced as a result of the state-owned Uganda Electricity Board unbundling in 2001 into the Uganda Electricity Generation Company Limited (UEGCL), the Uganda Electricity Transmission Company Limited (UETCL) and the Uganda Electricity Distribution Company Limited (UEDCL).

The Government of Uganda (GoU), through the formation of various agencies like the ERA, is promoting private sector investments via IPP participation in the country.

Power Sector Overview

Generation capacity is dominated by hydropower which accounts for 80% of electricity generation. Fuel oil and biomass cogeneration power plants make up the balance on the generation mix.

Hydropower is set to remain Uganda's main source of electricity generation in the near future, with 827MW of hydro capacity set to come online in 2018 alone. However due to climate change, emphasis will be on other renewable forms of energy including wind, solar and biogas. Going forward GoU will invest in Research and Development in other renewable forms of energy and provide incentives to encourage the use of renewable energy.



Net Installed capacity



Total electricity generation



The GoU has a highly ambitious strategy in terms of Vision 2040 which seeks to increase installed capacity to more than 41GW by 2040. Considering the fact that net installed capacity is only expected to increase to 2.3GW in 2025 it is doubtful whether this capacity expansion can be achieved.

In addition there have already been significant delays in the implementation of planned infrastructure projects. A case in point are the delays experienced on the construction of the 600MW Karuma Hydropower station due to a slow release of funds by the Government in order to fund the Project.

In order to achieve anything close to the goal envisioned in Vision 2040, Uganda will need to provide concessions to speed up procurement processes, increase private sector involvement and increase funding.

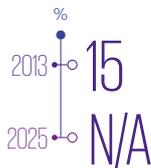
Highlighted Generation Projects in Uganda

Project Name	Type of Transaction	(MW)	Current status
Karuma hydro power project (PPP)	Hydro	600	<ul style="list-style-type: none"> › Construction began in Q4 2013 › Delays in Q3 2014 – Government delayed release of funds
Isimba hydro power project	Hydro	140	<ul style="list-style-type: none"> › Construction work commissioned in Q2 2013 › Currently in construction phase › Expected to come online by Q1 2017

Transmission and distribution losses



Electrification rate



Per capita electricity consumption



With electricity access levels sitting at 15% overall and only 7% in rural areas, Uganda has an electrification rate well below the regional average of 20%.

Uganda is making strides towards improving this step of the Power Value Chain by investing in the transmission and distribution network. Uganda has approximately 1400 -1500km of transmission lines (over 33kV), which the Government aims to double by 2020, as part of its USD2 billion Grid Expansion and Reinforcement Project (GERP).

In order to support this initiative the World Bank is considering a USD100 million loan. However, this will only fund a small portion of the Project and funding the balance will pose a major challenge.

Further plans in this step of the Power Value Chain include the upgrading of existing transmission lines and the development of a 220kV “ring” around Lake Victoria in conjunction with Kenya and Tanzania.

Uganda currently has one of the lowest per capita electricity consumption rates in the world at around 83.8kWh/year. This is far below neighbouring countries such as Kenya at 186kWh/year and Ghana at 300kWh/year, and is totally incomparable to industrialized economies such as South Africa at 4 694 kWh/year, or the Republic of Korea at 8 502 kWh/year.

Southern Africa Overview

Southern Africa is the southernmost region of the African continent. The region is comprised of Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe.

The region includes Africa's second largest economy, South Africa. Growth in GDP in the region is estimated to be 3.5% for 2016. Southern Africa's economy has an abundance of cheap coal, making it the region's primary energy source, accounting for over 50% of installed capacity in 2015. Despite the fact that carbon emissions from coal fired energy are quite high; coal has been and is expected to remain the major source of power in the region, with estimated reserves of over 281 billion tonnes.

In recent years there has been a growing potential for gas as an energy resource which provides an alternative flexible power option. Gas discoveries in the Southern Africa region, particularly in Mozambique and South Africa, present an opportunity to reduce the carbon intensity of the current power generation mix. Going forward it is likely that gas will contribute more to the generation mix in Southern African countries. If the logistical and additional infrastructure investment considerations (including gas pipelines) can be met, gas can be a game changer in the region going forward. Renewable technologies are also set to shape the region's generation mix in the future, especially through IPP development.

In terms of generation, the Southern Africa region has an estimated total installed capacity of approximately 59GW. However, approximately 49GW of this installed capacity belongs to South Africa alone (although not all of it is operational). Expansion of generation capacity has been a key focus of many countries in the region historically and there have been many successes, especially in South Africa who have launched various IPP procurement programmes in order to utilise the private sector in helping to solve the country's generation crisis.

Other projects in the region have not been as successful and have failed to get off the ground. This is often due to the lack of an enabling environment in order to encourage investment from the private sector. Particularly in the case of where offtake cannot be guaranteed, the risk level for private investors outweighs the benefit and as such projects struggle to move out of the development phase. Project delays and costs spiralling out of control have also been evidenced such as in the case of South Africa's Medupi and Kusile coal-fired power plants which are currently under construction.

Energy can be traded between countries in the region through the Southern Africa Power Pool (SAPP), the most developed Power Pool in SSA. SAPP is actively developing the transmission network between countries in order to ensure adequate power supply in all countries.

However, despite its relative advantage to other countries in SSA, the state of power infrastructure remains a cause for concern, and a high prevalence of power outages still exist. While there have been improvements in generation capacity, very little focus has been placed on improving other elements of the Value Chain like transmission and distribution infrastructure. With the exception of South Africa, most of the region's transmission and distribution infrastructure is in dire need of upgrade and requires heavy maintenance in order to take on the increased generation capacity.

An example which clearly highlights the state of the transmission infrastructure is that of Angola. In this country, there are three independent electric grids which have not been interconnected. The lack of a single transmission network prevents surplus power in the north being wheeled to the centre and south of the country. This system is clearly inefficient and has resulted in an unstable power supply. This issue then filters through to the generation step of the Power Value Chain as even if new generation capacity is installed it will be utilised in a very inefficient manner.

The structure of the transmission network also affects end users such as businesses. To highlight this point a 2010 study revealed that Angolan firms lost an average of 13% of annual turnover due to power downtime.

Recent developments showcase the fact that the region is moving forward in this area of the Power Value Chain and is even utilising regional efficiencies through cross border projects. A noteworthy example is the Mozambique-Zimbabwe-South Africa (MoZiSa) transmission system which will link the aforementioned countries and as a result improve connectivity and electricity trading in Southern Africa. The 400kV transmission link will cover a distance of over 935km. Although the project is in its initial phase, it is an example of progress that is being made towards improving the power situation in Southern Africa.

New funding sources such as the New Development Bank BRICS is also assisting in resolving the Power Crisis in the region throughout the Power Value Chain. This is evidenced by the fact that the institution has just provided their first round of loans including USD180 million to Eskom for power lines that can transmit 670MW and transform 500MW of renewable energy generation. The Southern African region is more developed than the rest of SSA in terms of smart technologies. The use of prepaid and smart electricity meters are currently being rolled out in various countries throughout the region, including South Africa, Botswana, Mozambique, Namibia, Zambia and Zimbabwe. If the use of these meters are properly combined with appropriately structured tariffs, these measures should go a long way in rectifying the accuracy and collection issues faced by distributors in the industry.

Utilities in the region are also looking at other mechanisms in order to solve their power problems. This includes techniques such as demand side management. By focusing on the demand for electricity as well as its supply, these countries are able to better manage their Power Sectors.

Southern Africa, and specifically South Africa, represents some of the most developed Power Sectors in SSA. Although there are challenges in the region, new developments indicate thinking along the Power Value Chain and on a regional basis. If the hurdles affecting major projects are dealt with, the region's Power Sector should develop significantly in the future and the power crisis in the region should be overcome.

Angola

Macro overview

	2015	2025
Nominal GDP US\$ billion	107.4	256.8
GDP per capita (US\$)	4 705	8 434
Real GDP annual growth (yoy%)	2.2	4.6
Population (millions)	25.0	34.0
Labour Force (millions)	8.5	12.0
Unemployment (% of labour force)	6.8	6.6
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	42	N/A

Bordered by Namibia and the Democratic Republic of Congo, Angola is the seventh largest country in Africa. The country has vast mineral and petroleum reserves and is the second largest oil producer in Africa.

The economy remains dependent on oil, which is estimated to account for 95% of exports, 70% of total government revenue and 46% of GDP. Angola is expected to experience slightly lower real GDP growth of 2.2% in 2015, as a result of lower oil prices which is expected to lead to sizeable cuts in public spending. However growth is increase to 2.7% in 2016 and reach 4.6% in 2025.

It is expected that investment in infrastructure will be the key strategic focus for the Government over the next ten years given the sector's vital importance to the country's economic competitiveness.

Power Sector regulatory environment

Organisations responsible for energy policies	<ul style="list-style-type: none"> › National Investment Promotion Agency (NIPA) › Ministry of Energy and Water › The Ministry of Finance › Ministry of Planning › Ministry of Urban Affairs and the Environment (MUAE) › Institute for Electricity Regulation (IRSC)
Energy Regulator	<ul style="list-style-type: none"> › Regulator Institute for Services of Electricity, Water Supply and Waste Water Sanitation (HIRSEA)
Energy policy publications	<ul style="list-style-type: none"> › General Law of Electricity, 1996 › Law on delimited Areas of Economic Activities, 2002 › Law on environmental protection, 2003 › Law on the environmental impact assessment of projects, 2004
Main entities in the electricity generation market	<ul style="list-style-type: none"> › Empresa Pública de Produção de Electricidade (PRODEL)
Main entities in the electricity transmission market	<ul style="list-style-type: none"> › Rede Nacional de Transporte de Electricidade (RNT)
Main entities in the electricity distribution market	<ul style="list-style-type: none"> › Empresa Nacional de Distribuição de Electricidade (ENDE)

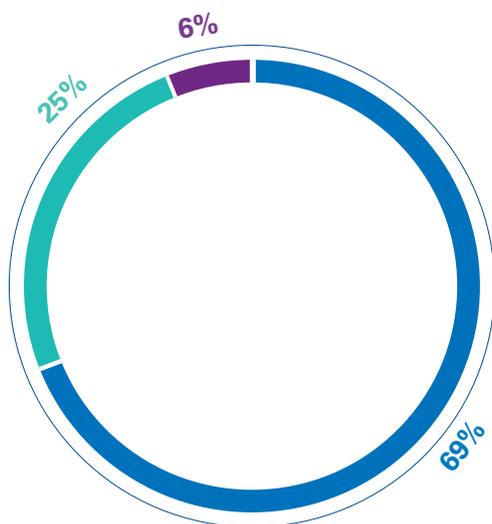


Luanda Bay, Angola

In January 2016 Cabinet Council put an end to the Electricity Sector Regulator Institute (IRSE) replacing it with the Regulator Institute for Services of Electricity, Water Supply and Waste Water Sanitation (HIRSEA), which is tasked with regulating the production, transportation, distribution, trade and use of electricity.

The Angolan Government has identified the need for reform, and is currently undergoing the process of restructuring the Power Sector. The process of privatization has been slow, but the Government has announced that, by 2025, it plans to have the Power Sector “partially liberalized”, which will help boost the country’s power output efficiency. This restructuring has focused on unbundling the generation, transmission and distribution systems, and in the process has established three new utility companies. These companies are as follows:

- › Empresa Pública de Produção de Electricidade (PRODEL), which will manage power production
- › Rede Nacional de Transporte de Electricidade (RNT) which will act as the national transmission company as well as the single buyer of electricity
- › Empresa Nacional de Distribuição de Electricidade (ENDE), which will be the national distribution company.



Power Sector Overview

Angola’s generation mix is dominated by two main energy resources, namely hydropower and oil. In terms of the generation mix, hydropower currently accounts for 69% of the total generation mix and will continue to grow in the future given its potential to generate 50GW of power.

In addition to its abundance, the biggest driver of investment in hydropower is the relatively low levelised cost of electricity generation. These low production costs ensure that Government-subsidized electricity tariffs remain low for the 30% of the Angolan population that has access to the grid.

- Natural gas
- Oil
- Hydro



In an effort to improve the country's low generation capacity, the Government of Angola (GoA) has approved the Strategic Energy Security Plan, which is complemented by a medium-term development plan, both falling under the Decade of Sustainable Energy for all 2014-2024, with the following primary objectives:

- › Increase the national electrification rate by around 60% by 2025; and
- › Increase installed production capacity by 9 900MW by 2025 using 66% water sources, 19% natural gas sources, 8% renewable energies, and 7% thermal energy.

In order to achieve the objectives set out in the Strategic Energy Security Plan, it is essential for Angola to attract private sector involvement together with foreign investment.

The GoA has in the last few years implemented a series of medium- and large-scale projects focusing on the rehabilitation of numerous social infrastructure sites and reconstruction of all hydroelectric dams in the country. This has resulted in installed capacity increasing from an estimated 900MW in 2005 to a predicted 1 880MW in 2015 and an increase in the total generation capacity from an estimated 2.73TWh in 2005 to an estimated 6.84TWh in 2015.

The country is only going from strength to strength and aims to have approximately 5GW of power online by 2017 after the completion of various power structuring projects including the Lauca, Capanda and Cambambe 2 hydroelectric facilities as well as the Soyo Combined Cycle Gas Turbine plant. The country is thus well on its way to achieving its installed capacity targets.

Highlighted Generation Projects in Angola

Project Name	Type of Transaction	(MW)	Current status
Laúca Hydroelectric Power Plant	Hydropower	2 067	› Construction started in 2014 › Expected completion Q2 2017
Cambambe 2 Hydroelectric Power Plant (Expansion)	Expansion of Hydropower project	700	› Currently in development phase

Transmission and distribution losses



Despite the expansion of power generation capacity, deficient transmission and distribution infrastructure has prevented electricity from flowing to end users, and the reliability of supply has remained very poor.

Only one out of three Angolans have access to electricity, which is lower than the Southern Africa region average of 48%. The low electrification rate is attributable to factors including insufficient power generation, limited revenue collection (more than 80% of users are not metered), high costs of power generation and distribution (diesel used for generation is completely subsidized by the Government), and the lack of highly skilled workers to manage the electricity sector. Clearly this aspect of the Power Value Chain requires specific attention in order to solve the power crisis in the country.

Electrification rate



However, the initiatives under development to reconstruct the country's hydropower facilities has allowed for the expansion of electricity transmission and distribution, and for the improvement of the standard of living of populations in both urban and rural areas.

Per capita electricity consumption



Electricity tariffs in Angola take into account the income level of electricity users. For example, the new tariff structure which has recently been introduced includes a 'low income' user category who pay a reduced tariff. This is mainly to cater for those who live in rural areas and do not own their own electric appliances. This is an example of how Angola has introduced its specific demographics into its tariff structure.

Botswana

Macro overview

	2015	2025
Nominal GDP US\$ billion	14.8	24.9
GDP per capita (US\$)	7 197	11 100
Real GDP annual growth (yoy%)	2.5	4.4
Population (millions)	2.3	2.6
Labour Force (millions)	0.9	1.0
Unemployment (% of labour force)	17.5	20.0
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	3	N/A

Situated North of South Africa, Botswana's economy is dominated by the mining sector which accounts for more than a third of its GDP. Within the mining sector itself, diamond mining is extremely prominent. Over the past few years Botswana has shown sound economic performance. It is likely that its growth prospects will remain consistent going forward, with GDP growth set to be 3.7% for 2016.

Power Sector regulatory environment

Organisations responsible for energy policies	<ul style="list-style-type: none"> › Ministry of Minerals, Energy and Water (MMEWR) › Ministry of the Environment, Wildlife and Tourism (MEWT)
Energy Regulator	<ul style="list-style-type: none"> › The Botswana Energy and Water Regulatory Agency (BEWRA)
Energy policy publications	<ul style="list-style-type: none"> › Electricity Supply Act, 1973 (amended 2007) › Botswana Power Corporation Act, 1970 › The national development Vision 2016 › National energy policy › Botswana Energy Master Plan (1996, reviewed 2003)
Main entities in the electricity generation market	<ul style="list-style-type: none"> › Botswana Power Corporation (BPC)
Main entities in the electricity transmission market	<ul style="list-style-type: none"> › Botswana Power Corporation (BPC)
Main entities in the electricity distribution market	<ul style="list-style-type: none"> › Botswana Power Corporation (BPC)



Gaborone, Botswana

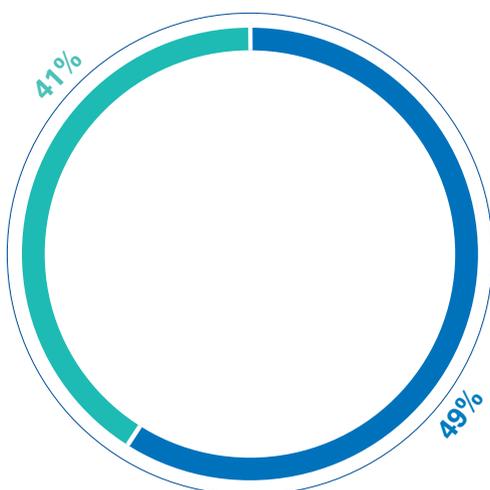
In order to attract investment to the Power Sector, Government is slowly liberalizing the sector and this has resulted in IPP's entering the market. In December 2007, the Government of Botswana amended the Electricity Supply Act to allow for Independent Power Producers.

Power Sector Overview

Coal dominates Botswana's energy mix, accounting for 59% of all power generation. With current coal reserves of over 212 billion tonnes, Botswana will continue to focus on increasing its generation capacity from coal. The new coal capacity coming online will result in a significant decrease in oil-fired power generation by 2025. Apart from coal, government has announced that they are interested in developing their solar power capabilities by adding an additional 100MW in generating capacity to the grid.

One of the main policies concerning the energy sector and ensuring energy security is Botswana's Vision 2016 which was developed in 1996. Botswana's Vision 2016 recognizes the potential role that solar energy can play in meeting the energy requirements of rural communities not served by the national grid. In addition the Government of Botswana implemented several strategies to advance the use of renewable energy in Botswana including the use of renewable energy Feed-in Tariffs (REFIT).

The Government of Botswana is in the process of setting up a task team that will develop the next national vision - Vision 2036, which will serve as the platform for national development post 2016. It would be highly beneficial for this updated strategy to tackle all relevant areas of the Power Value Chain in order to resolve Botswana's power crisis in the most optimal manner.



- Oil
- Coal

Net Installed capacity



Total electricity generation



The current estimated net installed capacity in Botswana is 730MW. However, due to electricity supply shortages and constant failures at the Morupule B power plant, Botswana has to import up to an additional 150MW from South Africa alone. Botswana also has other import agreements with power utilities in Mozambique, Zambia and Namibia.

Botswana’s reliance on power imports poses a threat to its energy security. South Africa is currently barely meeting its own growing demand and as a result electricity supplies to Botswana have had to be cut back in recent years. Therefore it is important for Botswana to make concerted efforts to improve the current energy security situation.

In order to ensure energy security going forward the country will need to focus on the generation, transmission and distribution steps of the Power Value Chain. Solutions include building new generation, transmission and distribution infrastructure, refurbishing existing infrastructure, procuring additional power through IPP’s and putting energy frameworks and policies in place to promote investment.

In the interim, the Government of Botswana has implemented short-term solutions in order to avoid power outages by installing two emergency diesel facilities, a 70MW facility at Matshelagabedi and the 90MW Orapa plant. Morupule A, a 132MW facility where capacity dropped to 30% in 2012, has been rehabilitated and upgraded to add capacity. In addition Morupule B will be starting expansion in the current year in order to add another 300MW by 2020.

Highlighted Generation Projects in Botswana

Project Name	Type of Transaction	(MW)	Current status
Morupule Coal-Fired Plant (Expansion)	Thermal/ Coal Fired	300	› Construction is expected to begin in Q4 2016 and is estimated to be completed by 2020
Sese Integrated power plant	Thermal/ Coal	300	› Approval for project obtained Q4 2014

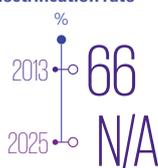
Transmission and distribution losses



Trading plays a large role in Botswana’s Power Sector with huge quantities of electricity being imported from neighbouring countries. Botswana’s net electricity imports for 2015 were estimated at 3.7TWh.

Due to the large quantities of electricity supplementing Botswana’s power generation, the country is able to achieve an electrification rate of 66%, which is high when compared to other countries in SSA. It is also one of only five countries in SSA who can boast electrification rates in excess of 50% in rural areas.

Electrification rate



Further transmission infrastructure is in the pipeline with SAPP planning to construct a transmission line between Botswana and South Africa (BoSA) in order to enhance connectivity and electricity trading between the two countries.

Per capita electricity consumption



Botswana’s electricity tariffs were increased by 7%-10% for households and 7%- 20% for business and government users in April 2015. The Government of Botswana continues to subsidize the unit cost of electricity by providing revenue support to the Botswana Power Corporation (BPC).

A consortium has recently been appointed to establish an independent Botswana Energy and Water Regulatory Agency (BEWRA). Its main purposes will include a turnaround of BPC and to ensure a more cost effective tariff structure, as well as to attract private sector investment into the country’s electricity sector.

Mozambique

Macro overview

	2015	2025
Nominal GDP US\$ billion	14.7	39.9
GDP per capita (US\$)	526	1 093
Real GDP annual growth (yoy%)	6.2	7.2
Population (millions)	28.0	36.5
Labour Force (millions)	12.4	13.7
Unemployment (% of labour force)	8.3	N/A
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	14	N/A

Mozambique is located on the southeast coast of Africa. The country has vast resources including natural gas, coal and titanium. The main sectors driving the economy are construction, services to enterprises, transport and communications, the financial sector and extractive industries. Growth is predominantly funded through public expenditure and Foreign Direct Investment (FDI). Real GDP growth was strong in 2015, at 6.2% and is expected to be 5.4% in 2016.

Power Sector regulatory environment

Organisations responsible for energy policies	<ul style="list-style-type: none"> › The Ministry of Energy and Mineral Resources › FUNAE › Instituto Nacional do Petroleo (INP) › Empresa Nacional de Hidrocarbonetos (ENH) › Ministry of Energy
Energy Regulator	<ul style="list-style-type: none"> › National Electricity Council (CNELEC)
Energy policy publications	<ul style="list-style-type: none"> › Electricity Act, 1997 › Energy policy, 1998 › Energy Sector Strategy, revised 2000 › 2009 Policy for renewables › 2011 strategy for renewable energy › Natural Gas Master Plan › Petroleum Law
Main entities in the electricity generation market	<ul style="list-style-type: none"> › Electricidade de Mocambique (EDM) › Hidroelectrica de Cahora Bassa (HCB)
Main entities in the electricity transmission market	<ul style="list-style-type: none"> › Electricidade de Mocambique (EDM)
Main entities in the electricity distribution market	<ul style="list-style-type: none"> › Electricidade de Mocambique (EDM)



Maputo harbour, Mozambique

Mozambique has been implementing energy-sector reforms for over two decades. These have included privatising the vertically-integrated national utility EDM and introducing the Electricity Act, which provided for elements of competition and opened the electricity sector to new entrants.

The country has also developed various policies in relation to its resources including the Natural Gas Master Plan (2014) and the new Petroleum Law (2014) which set forth the country's vision in the use of these resources domestically.

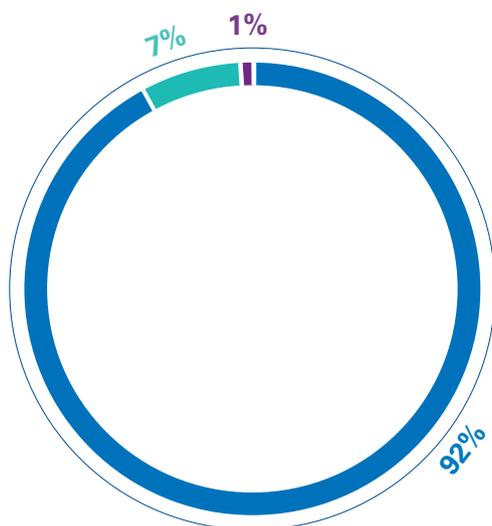
Power Sector Overview

Hydropower currently accounts for 92% of Mozambique's generation mix. The Power Sector has huge potential for energy development with an abundant supply of natural resources including natural gas, coal, water, oil, sun and wind.

Mozambique's future generation capacity is likely to incorporate more fossil fuels following the discovery of significant natural gas and coal reserves in the region. On-shore reserves in Pande and Temane have been discovered and off-shore areas in the Rovuma basin are now being researched which 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.

As Electricidade de Mozambique (EDM) is trying to maintain low electricity tariffs and minimize losses, gas is currently the most attractive fuel source for future development compared to relatively more expensive coal and renewable sources.

While these resources are being pursued, the Government of Mozambique (GoM) has also established a Renewable Energy Policy targeting solar, wind, mini-hydro and biomass technologies, although no fiscal incentives are currently in place.

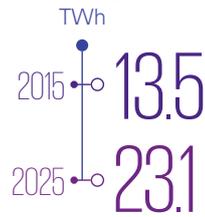


- Diesel
- Natural Gas
- Hydro

Net Installed capacity



Total electricity generation



With electricity demand said to be increasing by 8% annually, there is clearly a need to increase generation capacity. This can be achieved through investment in power generation and transmission infrastructure as well as improved legislation that attracts private sector investment.

In order to realise its key energy policy objectives the GoM has identified large-scale power generation projects to provide universal access to electricity through (1) the construction of new and rehabilitation of existing power generation and transmission infrastructure, (2) an improvement in the management of the Electricity Supply Industry, (3) an increase in exports and (4) an improvement in energy sector legislation to attract private sector investment.

Mozambique is investing heavily in increasing its overall generating capacity, with over USD14bn worth of projects under way. There are further plans to expand its transmission and distribution network. These plans are essential since the domestic electricity deficit continues to grow and reached 985MW in September 2015.

Highlighted Generation Projects in Mozambique

Project Name	Type of Transaction	(MW)	Current status
Moatize	Coal	600	› Q4 2014 – IPP signing delayed
Cohara Bassa North Bank Expansion Project	Hydro	1 245	› It is expected to come on line in 2020

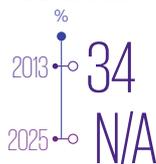
Transmission and distribution losses



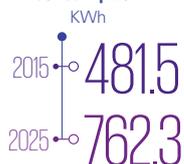
Given the abundant resources in Mozambique it is quite concerning that the electrification rate is only 34%. One of the key constraints facing the Power Sector is the country’s lack of transmission capacity. Due to poor connectivity within the country, much of Mozambique’s current power capacity is actually exported to South Africa and then re-imported back into the country at higher prices.

The grid needs to be extended with a focus on loss reduction and the avoidance of blackouts to avoid a negative impact on economic growth.

Electrification rate



Per capita electricity consumption



Mozambique needs to ensure that affordable electricity is available to meet the domestic demand.

The country’s first Feed-in Tariff scheme is under development. Covering wind, solar, biomass and hydropower generation, it will promote private investment in generating capacity and open up opportunities for accelerating the expansion of generating capacity and connectivity by attracting Independent Power Producers (IPPs).

Namibia

Macro overview

	2015	2025
Nominal GDP US\$ billion	11.8	25.7
GDP per capita (US\$)	4 950	9 095
Real GDP annual growth (yoy%)	3.9	4.9
Population (millions)	2.5	3.0
Labour Force (millions)	1.0	1.4
Unemployment (% of labour force)	19.3	19.0
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	7	N/A

Namibia, a country in southwest Africa, is distinguished by the Namib Desert along the Atlantic Ocean's coast. The country has enjoyed steady overall growth in recent years driven by robust infrastructure development and mining activities. The consistent real GDP growth is set to continue and is expected to be 4.9% in 2025.

Power Sector regulatory environment

Organisations responsible for energy policies	› Ministry of Mines and Energy (MME)
Energy Regulator	› The Electricity Control Board (ECB)
Energy policy publications	› White Paper on Energy Policy of 1998 (WPE) › Electricity Act, 2007 › Namibian Renewable Energy Program (NAMREP) › Renewable Energy and Energy Efficiency Capacity Building Program (REEECAP) › Namibia Energy Efficiency Programme in Buildings (NEEP) › National Integrated Resource Plan (NIRP) › National Connection Charge Policy › National Support Tariff Mechanism › Renewal Energy Feed-In Tariff (REFIT) plan
Main entities in the electricity generation market	› NamPower
Main entities in the electricity transmission market	› NamPower
Main entities in the electricity distribution market	› City of Windhoek (the country's largest distributor) remainder managed by Northern RED (NORED), Erongo RED (ERONGORED), Central RED (CENORED) and various municipalities



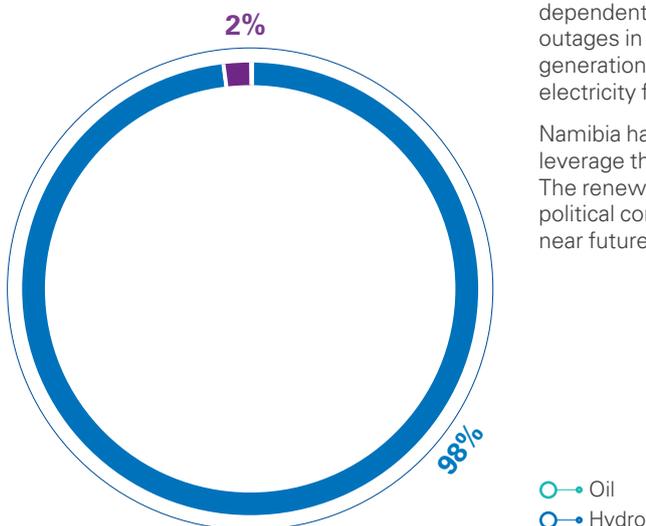
Windhoek, Namibia

The Power Sector in Namibia has undertaken a number of reforms aimed at attracting IPPs by providing a stable investment environment. Such reforms include the horizontal unbundling of regional distribution companies and the establishment of transparent tariff setting procedures, all overseen by the sector regulator, the Electricity Control Board (ECB).

Power Sector Overview

Hydropower dominates Namibia's generation mix. This is set to continue in the future with hydropower contributing at least 70% to the country's power generation mix in 2025. This power source is however highly dependent on water flow and thus the country is susceptible to power outages in times of drought. As such diversification of the country's generation mix is key in order to be able to deliver a stable supply of electricity from domestic sources.

Namibia has great potential for wind and solar energy and has plans to leverage these technologies as part of its energy supply going forward. The renewable sector is still at an early stage of development but given the political commitment and technical potential it should gain traction in the near future.



Net Installed capacity**Total electricity generation**

Namibia has an installed capacity of approximately 0.52GW with electricity generated of approximately 2.37TWh. Of the current power supply it is reported that a total of 58% was imported from the SAPP countries, highlighting the need to increase domestic generation capacity.

This is especially true given that many of the SAPP countries have electricity supply issues of their own and thus their willingness to export power is likely to decrease in the near term.

In an effort to make good on the shortfall in generation capacity, NamPower has been developing various generation projects. This includes the 800MW gas-fired Kudu Power Project, the 250MW LNG to power project in Walvisbay and the 600MW Baynes hydropower project. However, the development of these projects have all halted at various stages for the meantime. If Namibia is to be self-sufficient in its energy production it will need to make a concerted effort to drive these projects to completion. Currently the most promising of the three is the 250MW LNG to power project which is in the financial due diligence stage.

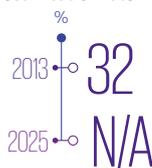
Highlighted Generation Projects in Namibia

Project Name	Type of Transaction	(MW)	Current status
Walvisbay LNG to power project	LNG	250	› Financial due diligence stage

Transmission and distribution losses

Other than the lack of generation capacity, which forces Namibia to be a net importer of power, the electricity grid remains one of the main limiting factors in Namibia's Power Value Chain due to its age and a lack of maintenance. Currently the grid does not permit the balancing of power and is thus restricting the development of the renewable energy sub-sector. This is underlined by the substantial energy losses in the transmission and distribution grids, of 22.9%.

In an effort to address the challenges faced in this step of the Power Value Chain NamPower has developed a Transmission Master Plan. The plan is updated on an annual basis to ensure that the company maintains pace with the evolving electricity needs of the country and that network expansions are executed accordingly.

Electrification rate**Highlighted Transmission Projects in Namibia**

Project Name	Type of Transaction	(MW)	Current status
Kuiseb Walvis Bay line 132kV	Transmission	N/A	› Construction commenced Q2 2013

Per capita electricity consumption

Namibia's approved electricity tariff as of 1 July 2015 sat at USD0.11/KWh. Although NamPower had requested a 13.2% bulk electricity tariff increase, the Electricity Control Board only granted 9.53%. The shortage of electricity in the country, as well as in the region, has put pressure on its tariffs and without a significant improvement in the country's Power Sector, large tariff increases will continue to be a reality going forward.

South Africa

Macro overview

	2015	2025
Nominal GDP US\$ billion	313	420
GDP per capita (US\$)	5 844	7 406
Real GDP annual growth (yoy%)	1.3	2.7
Population (millions)	54.5	58.4
Labour Force (millions)	19.6	21.4
Unemployment (% of labour force)	24.4	22.3
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	4	N/A

South Africa is the second largest economy in Africa ranked by GDP after Nigeria. Growth has slowed to 1.3% in 2015 but is expected to increase to a moderate level of 2.7% by 2025. In the short-term however, growth is expected to remain low and real GDP growth for 2016 is estimated at a mere 0.7%. This is primarily due to the fall in commodity prices and slowdown in the Chinese economy. This weak growth has aggravated already high unemployment, inequality and macro vulnerabilities.

Power Sector regulatory environment

Organisations responsible for energy policies	› Department of Energy
Energy Regulator	› National Energy Regulator of South Africa › National Nuclear Regulator
Energy policy publications	› Electricity Regulation Second Amendment Bill › National Energy Regulator Amendment Bill › Electricity Regulation Act, 2006 (Act No 4 of 2006) › Electricity Regulation Amendment Act › National Energy Regulator Act › Electricity Regulations on new generation capacity › Integrated Energy Plan › Integrated Resource Plan › Liquid Fuels Road Map › Gas Utilisation Master Plan › National Energy Efficiency Strategy › National Transportation Roadmap › Universal Access to Energy Roadmap › White Paper on Renewable Energy › Electricity Pricing Policy
Main entities in the electricity generation market	› Eskom, with IPPs becoming ever more prominent
Main entities in the electricity transmission market	› Eskom
Main entities in the electricity distribution market	› Eskom › Local Municipalities



Johannesburg, South Africa

The Department of Energy is the primary energy institution in South Africa which is regulated by the National Energy Regulator of South Africa. The current structure of the market is dominated by Eskom, who is currently generating up to 93% of the country's energy. This is set to decrease in the future with the introduction of the country's various IPP programmes. Eskom also controls electricity transmission as well as sharing in its distribution together with local municipalities.

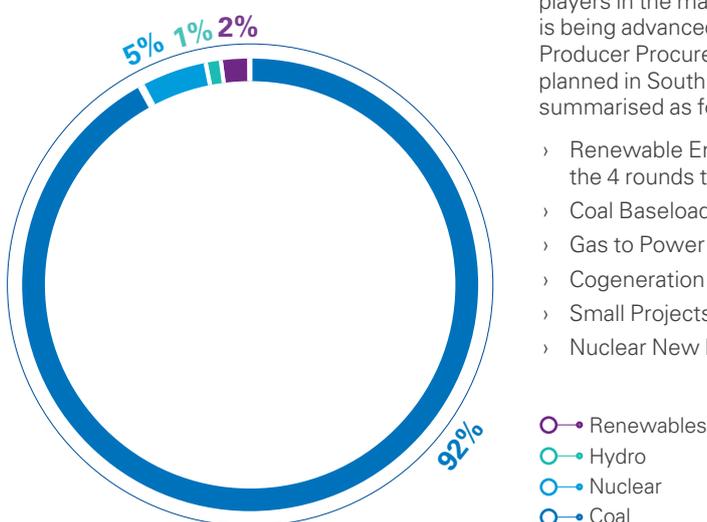
Power Sector Overview

South Africa's energy planning has been set forth in its Integrated Resource Plan (IRP). This document identifies the increase in generation capacity which South Africa aims to achieve by 2030 as well as which technologies are to be used in order to fulfil this goal.

The anticipated installed capacity mix will experience a shift away from coal-based power which is expected to drop to 62% in 2025 from its current actual installed capacity level of 81% in 2015. From the above it can be seen that at current levels, the percentage coal-powered generation exceeds its proportion of installed capacity.

The change in generation mix will be largely driven by an increase in IPP players in the market, including an increase in renewable energy which is being advanced through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The IPP programmes planned in South Africa in terms of the Integrated Resource Plan can be summarised as follows:

- › Renewable Energy IPP Procurement Programme (6 352MW procured in the 4 rounds to date)
- › Coal Baseload IPP Procurement Programme (2 500MW to be procured)
- › Gas to Power Programme (3 126MW to be procured)
- › Cogeneration IPP Procurement Programme (800MW to be procured)
- › Small Projects Renewable Energy IPP Procurement Programme
- › Nuclear New Build Programme (9 600MW to be procured)



Net Installed capacity**Total electricity generation**

South Africa's net installed capacity of 48.8GW makes up approximately 70% of SSA's total installed capacity. The Integrate Resource Plan 2010 Base Case targets an increase in capacity to 81GW by 2030. This will be done through a combination of Eskom projects as well through the aforementioned IPP programmes.

Highlighted Generation Projects in South Africa

Project Name	Type of Transaction	(MW)	Current status
Medupi power plant	Coal-fired generation	4 764	<ul style="list-style-type: none"> › Under construction › 794MW Unit 1 is online › Expected completion of all units by 2020
Kusile power plant	Coal-fired generation	4 800	<ul style="list-style-type: none"> › Under construction › All units expected to be online by 2022
Ingula pumped storage facility	Pumped storage facility	1 332	<ul style="list-style-type: none"> › Under construction › First two 333MW units have been synchronised to the national grid › Completion expected by July 2017

Transmission and distribution losses**Electrification rate**

Currently, South Africa has an overall electrification rate of 85%. Electricity access is however, far lower in rural areas. The country has also recently experienced a spate of load-shedding due to its ageing infrastructure which has led to maintenance and breakdowns. These issues have now been largely resolved and developments in the Power Sector are looking positive with major Projects such as Medupi, Kusile and the Ingula Pumped Storage facility beginning to come online over the next few years.

The country is also looking at other aspects of the Power Value Chain in order to complement its generation capacity expansion programmes and has a major inter-regional transmission project underway in the form of the Mozambique-Zimbabwe-South Africa (MOZISA) transmission project.

In order to further address the transmission element of the Power Value Chain Eskom has received a USD180 million loan from the recently established New Development Bank BRICS in order to fund power lines that can transmit 670MW and transform 500MW of renewable energy generation.

Highlighted Transmission Projects in South Africa

Project Name	Type of Transaction	(MW)	Current status
Mozambique-Zimbabwe-South Africa (MoZiSa) transmission project	Transmission	N/A	› Under development

Per capita electricity consumption

South African municipalities are in the process of rolling out smart meters in certain areas. This includes City Power who have recently installed 34 000 smart meters in Johannesburg and the City of Tshwane who have installed in excess of 12 000 smart prepaid meters.

The country is also looking into the development of smart grids and several municipalities have already set up pilot projects in this regard. Furthermore, the South African National Energy Development Institute (SANEDI) has established the South African Smart Grid Initiative (SASGI) in order to develop a smart grid vision and related policies for South Africa.

Zambia

Macro overview

	2015	2025
Nominal GDP US\$ billion	16.2	34.2
GDP per capita (US\$)	1 044	1 600
Real GDP annual growth (yoy%)	3.1	6.4
Population (millions)	16.2	21.9
Labour Force (millions)	6.4	8.9
Unemployment (% of labour force)	13.3	13.4
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	6	N/A

Zambia boasts a strong economy and ranks as the 18th largest in Africa by GDP. Following stable growth of 3.1% in 2015, the country is expected to produce GDP growth in excess of 6% per annum by 2025. Governance and democratic processes remain strong although poverty rates are still high.

Power Sector regulatory environment

Organisations responsible for energy policies	› Ministry of Energy and Water Development
Energy Regulator	› Energy Regulatory Board of Zambia (ERB)
Energy policy publications	› Energy Regulation Act of 1995 (amended 2003) › Rural Electrification Act 2003 › Draft Zambian Grid Code 2006 › The National Energy Policy (NEP) of 1994 was revised in 2008 › Sixth National Development Plan (2011-2015) › Rural Electrification Master Plan (REMP) › National Energy Strategy (NES) (2009- 2030)
Main entities in the electricity generation market	› ZESCO Limited
Main entities in the electricity transmission market	› ZESCO Limited › Copperbelt Energy Corporation (CEC).
Main entities in the electricity distribution market	› ZESCO Limited › Copperbelt Energy Corporation (CEC).



Lusaka, Zambia

ZESCO Limited is a vertically integrated electricity utility, which generates, transmits, distributes and supplies 93.6% of Zambia’s electricity. It is a public utility, with the Government of the Republic of Zambia being the sole shareholder.

Transmission and distribution is catered for by ZESCO and Copperbelt Energy Corporation, the latter who operates in the Copperbelt region.

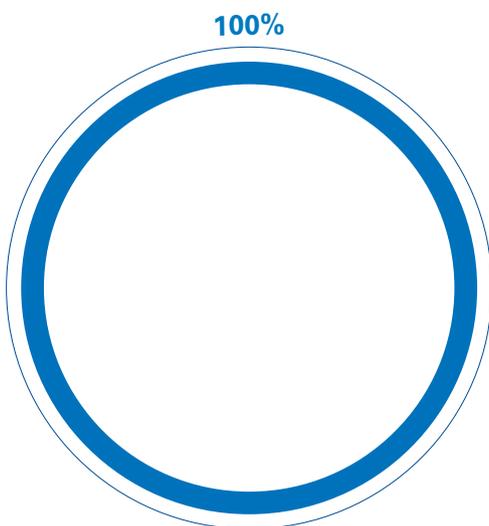
Power Sector Overview

Zambia is currently almost exclusively dependent on hydropower, with 99.7% of all electricity generation coming from this source. Problems with ageing infrastructure and water flow issues have hampered the provision of electricity and have led to load shedding.

The reliance on hydropower causes problems during times of drought and volatile water flow. Backup generation is usually from fuel-based sources which can prove prohibitively expensive.

Going forward, the generation mix is expected to change with hydropower dropping to 82.4% of the total generation mix with coal becoming the major secondary technology utilised.

Zambia also has potential to harness solar power generation as well as geothermal technology. The country has good solar insolation rates and approximately 3 000 sunshine hours annually. In terms of geothermal potential, Zambia has more than 80 hot springs, of which 35 have been highly rated in terms of surface temperature, flow rate, proximity to power lines, as well as ease of access and relative energy potential.



○— Hydro

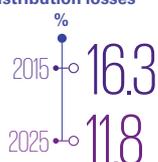
Net Installed capacity**Total electricity generation**

Zambia's Power Sector continues to struggle due to problems associated with aged infrastructure which is hampering the generation performance of currently installed capacity.

In order to improve the status of current infrastructure along the Power Value Chain, Zambia has launched the Power Rehabilitation Programme (PRP). This Project includes the rehabilitation of power plants at Kafue and Kariba North Bank as well as increasing generation capacity at Kafue Gorge, Kariba North Bank and Victoria Falls. The Programme also implemented an Enterprise Resource Planning system, introduced capacity building and assisted displaced communities around the Kariba Dam by rehabilitating social infrastructure.

Highlighted Generation Projects in Zambia

Project Name	Type of Transaction	(MW)	Current status
Kafue Gorge Lower Hydropower Project	Hydro	750	› Under construction › Completion expected 2019
Maamba Thermal Project	Thermal	300 (phase 1)	› Under construction

Transmission and distribution losses

The country suffers from a low electrification rate of 26% and underinvestment in generation and transmission infrastructure has led to deterioration in the power network. In fact between 1980 and 2000 no major developments in transmission infrastructure took place at all.

Transmission and distribution infrastructure upgrades should be a key focus for Zambia as it will allow them to increase the region's access to hydropower and reduce the country's dependency on expensive oil and coal generated power sources.

There are a few positive developments in this area of the Value Chain with Zambia getting involved in two regional transmission projects as highlighted below.

Electrification rate**Highlighted Transmission Projects in Zambia**

Project Name	Type of Transaction	(MW)	Current status
ZiZaBoNa electricity transmission interconnector project	Transmission	N/A	› Development/planning
The Zambia – Tanzania – Kenya (ZTK) interconnector project	Transmission	N/A	› Development/planning › Kenya, Tanzania and Zambia have signed a Memorandum of Understanding (MoU)

Per capita electricity consumption

Tariffs in Zambia are currently below USD0.06 per kWh, well below the SSA average. This tariff structure is definitely not cost reflective and covers less than half of the average cost of generation.

Without considering how poorly structure tariffs affect the rest of the Power Value Chain, Zambia will experience continued underinvestment and deterioration of its Power Sector.

Zimbabwe

Macro overview

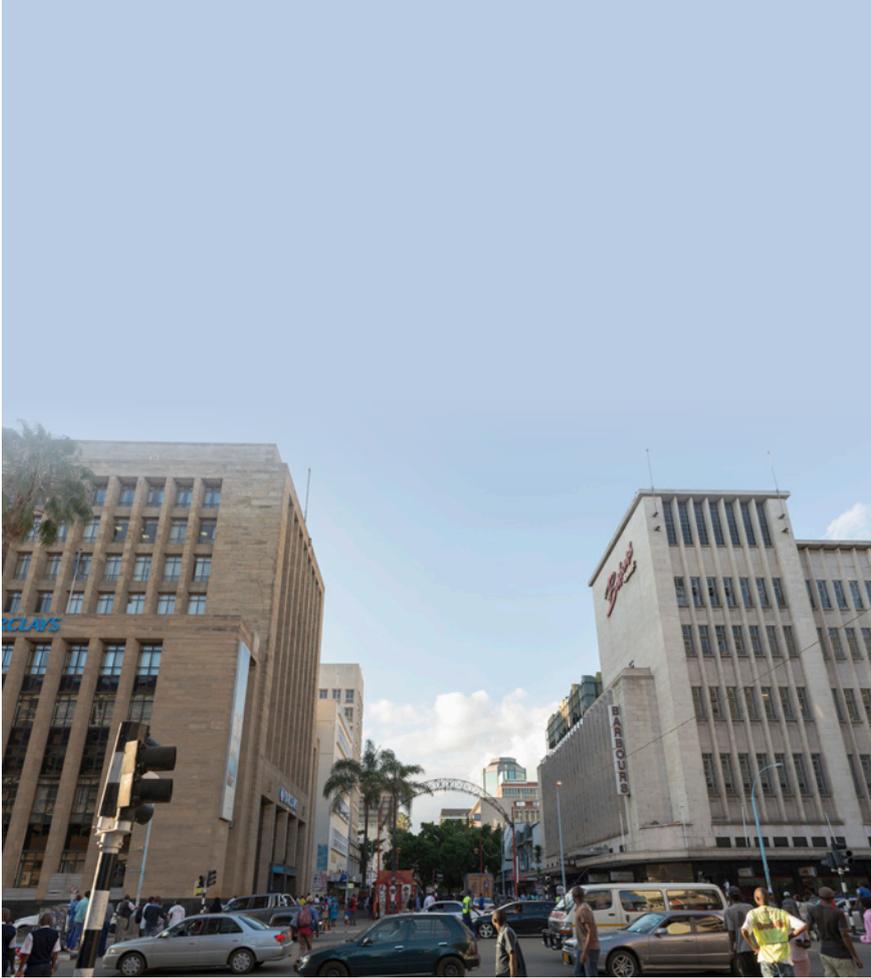
	2015	2025
Nominal GDP US\$ billion	13.6	28.9
GDP per capita (US\$)	903	1 543
Real GDP annual growth (yoy%)	-1.4	5.7
Population (millions)	15.6	19.4
Labour Force (millions)	6.3	8.2
Unemployment (% of labour force)	5.5	5.5
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	27	N/A

Zimbabwe has been a country in turmoil in recent years after suffering economic collapse, however the economy is now far more stable. The use of the Zimbabwean dollar was suspended due to hyperinflation and the US dollar and Chinese Yuan have been adopted along with a spate of unofficial currencies. Growth in recent years has come largely from the mining and agricultural sectors.

However, the country is still plagued by problems and remains in debt distress. In 2014 the external debt stock was 53% of GDP, of which 42% was in arrears. Major multinationals have also relocated to neighbouring countries. Zimbabwe needs to continue the implementation of structural reforms to improve the business environment, achieve a sustainable current account balance, reform public enterprises and make growth more inclusive.

Power Sector regulatory environment

Organisations responsible for energy policies	<ul style="list-style-type: none"> › Ministry of Energy and Power Development › The Zimbabwe Electricity Regulatory Authority (ZERA)
Energy Regulator	<ul style="list-style-type: none"> › The Zimbabwe Electricity Regulatory Authority (ZERA)
Energy policy publications	<ul style="list-style-type: none"> › The Electricity Act, 2002 › National Energy Policy 2012 › The Rural Electrification Act, 2002 › Energy Regulatory Act, 2011 › Draft Renewable Energy Policy
Main entities in the electricity generation market	<ul style="list-style-type: none"> › Zimbabwe Power Company
Main entities in the electricity transmission market	<ul style="list-style-type: none"> › Zimbabwe Electricity Transmission Company
Main entities in the electricity distribution market	<ul style="list-style-type: none"> › Zimbabwe Electricity Distribution Company



Harare, Zimbabwe

The Zimbabwean electricity industry was restructured in 2002 through the introduction of the Electricity Act and the Rural Electrification Fund Act.

In terms of the Electricity Act, all power generation assets and operations fall under the ambit of the Zimbabwe Power Company (ZPC), the general subsidiary of ZESA Holdings. Transmission is the responsibility of the Zimbabwe Electricity Transmission Company while Distribution assets and supply functions are looked after by the Zimbabwe Electricity Distribution Company.

A separate Rural Electrification Fund was also set up under the Rural Electrification Fund Act in order to provide funding for rural electrification projects.

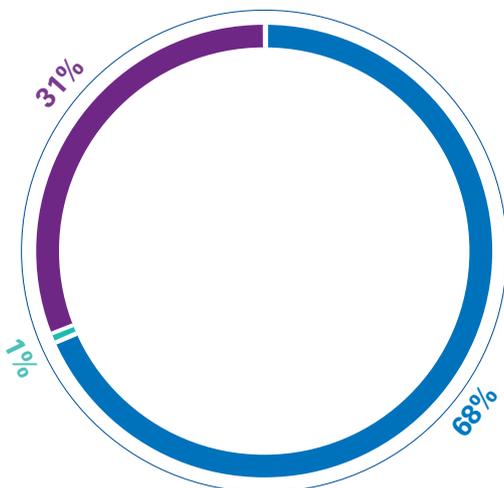
IPPs currently form a very small part of the Power Sector, with total generating capacity of 83MW. In order to encourage additional private-sector participation ZERA has completed developing an Independent Power Producer (IPP) framework and plans to produce an additional IPP Policy document, as Government increases efforts to stimulate more private sector participation in the Power Sector. Furthermore, ZERA is in the process of developing a Renewable Energy Policy.

Power Sector Overview

Zimbabwe derives its electricity mainly from hydropower sources which account for 68% of its total generation capacity. Currently the Power Sector faces various challenges including ageing infrastructure, a low quality grid, high transmission and distribution losses as well as theft and vandalism.

The use of hydropower has also proved a major issue at the Kariba dam which has experienced extremely low water levels (12% in February 2016). All of the above factors coupled with a shortage in capacity have led to severe load shedding of up to 18 hours a day.

With this in mind the country is aiming to increase the share of thermal power generation in its energy mix up to 70% by 2025, with hydropower falling to 30%.



- Coal
- Oil
- Hydro

Net Installed capacity



Total electricity generation



Ageing and insufficient generation infrastructure is proving a hurdle for Zimbabwe’s Power Sector. In order to deal with power shortages the country utilises large power imports from neighbouring countries including 300MW from South Africa and 500MW from Mozambique.

This is only a short-term solution and the country is in the process of bolstering its generation infrastructure. Generation projects include the 600MW USD1.1 billion Hwange Coal-fired power plant expansion which is expected to reach Financial Close in the second half of 2016. The 300MW Kariba South Expansion Project is also on the go and according to ZPC is 39% complete.

Extensive power infrastructure rehabilitation is also being undertaken in order to revive the current ageing generation infrastructure.

Highlighted Generation Projects in Zimbabwe

Project Name	Type of Transaction	(MW)	Current status
Hwange Coal Fired Power Plant Expansion Project	Coal	600	› Engagement with EPC contractor in progress prior to Financial Close
Kariba South Hydro Power Expansion Project	Hydro	300	› Pre-construction activities underway › Financial Close reached › Completion expected 2018

Transmission and distribution losses

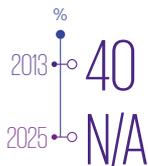


Zimbabwe’s transmission and distribution infrastructure is ageing and of a poor quality with transmission and distribution losses of 20%. Theft and vandalism is also a major issue and is leaving end users all over the country without electricity.

Gaining access to the grid for new generation projects can also be extremely challenging and can take up to 106 days, highlighting another hurdle in the Power Value Chain.

Zimbabwe is currently targeting an electrification rate of 85% by 2020 and in order to achieve this goal will need to focus diligently on developing its transmission and distribution infrastructure.

Electrification rate



Currently, the country is involved in two regional projects (highlighted below) which, if realised, will go a long way towards increasing electricity access in the region.

Highlighted Transmission Projects in Zimbabwe

Project Name	Type of Transaction	(MW)	Current status
Zimbabwe – Zambia – Botswana – Namibia (ZiZaBoNa) Transmission Project	Transmission	N/A	› Development/planning
Mozambique – Zimbabwe – South Africa (MoZiSa) Transmission Project	Transmission	N/A	› Development/planning

Per capita electricity consumption



In order to combat load shedding, ZESA has proposed to increase tariffs by 49%, increasing the price from USD0.0986/KWh to USD0.1464/KWh. These would be far in excess of the tariffs in neighbouring countries which average just above USD0.08/KWh.

Western Africa Overview

The West African region is made up of 16 countries, more specifically: Benin, Burkina Faso, the island of Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo. West Africa is the second most dynamic sub-region after East Africa, is dominated by French speaking countries and is home to Nigeria, the largest economy in Africa.

Despite the recent outbreak of the Ebola virus, the macroeconomic outlook at the regional level is encouraging and GDP growth is expected to be 6% in 2016.

West Africa is rich in energy resources with great hydropower potential, strong winds, high solar radiation, as well as half of Africa's oil and gas reserves.

Natural gas has emerged as a game-changer in West Africa. In addition to being one of the cleanest, safest and most affordable forms of energy it complements intermittent renewable power, as natural gas plants can be ramped up and down on short notice.

Significant natural gas deposits are located in the Gulf of Guinea which borders Nigeria, Ghana and Cote d'Ivoire and additional potential has recently been discovered in Senegal. In order to maximise the use of this abundant source of energy, the West African Gas Pipeline project, once completed, will link a major pipeline in Nigeria with several other West African countries along the coastline with the potential to supply landlocked countries in future.

Current installed capacity in the region amounts to approximately 20GW around half of which is generated using gas, with oil and hydropower each accounting for a quarter.

Despite the ample resources for power generation in West Africa, the generation step of the Power Value Chain is constrained by ageing and insufficient infrastructure, vandalism and poor maintenance of transmission and distribution networks.

The public sector is the dominate player in the Power Sector in the region but recent trends indicate increasing private sector participation. In particular Nigeria has been a pioneer in the privatization of its Power Sector by fully privatizing the generation and distribution Companies held by the Government and various countries are in the process of enacting legislation to support planned PPP initiatives.

As in all SSA countries, electricity access is a concern and it is estimated that 57% of the population has no access to electricity in the region. It should be noted though that this is far better than the average SSA electrification rate of 32%.

In terms of power trading, West Africa has taken the first steps in establishing cross border trade through the West African Power Pool (WAPP). Currently WAPP is developing appropriate policies and financing mechanisms for cross-border projects. However WAPP is faced with challenges, including member country pullback regarding multilateral agreements and a lack of private sector investment. Currently about 7% of regional power is traded through WAPP which is far more than the levels traded through the Power Pools in East and Central Africa

In order to develop further, WAPP is working with the World Bank and other financiers to develop workable models for cross border project finance and regulation on priority projects, along with ways to increase institutional capacity.

Unfortunately although Nigeria's privatisation is a great case study demonstrating innovation in the SSA Power Sector, it has added some additional challenges to the country's transmission and distribution portions of the Power Value Chain due to funding limitations. As a result there has been little progress in the development of transmission and distribution of power in the country. This element of the Value Chain in Nigeria is significantly underdeveloped and should arguably be the key focus in their Power Sector.

The use of smart meters in the region is currently still a work-in-progress. If the countries in the region all commit to a rollout of this technology it will assist in improving the cash flow accuracy and collection rates in the region.

There have also been developments in tariff structuring in the region. For example, Nigeria has introduced The Multi Year Tariff Order (MYTO) which is a tariff vehicle designed to provide a unified way to determine the total industry revenue requirement, and provide a 15 year tariff look ahead.

Another interesting development is Ghana's decision in December 2015 to hike power tariffs by 59.2% in an attempt to lure private investors. The increase in tariffs has resulted in a significant decrease in electricity consumption since.

West Africa boasts a vast array of abundant resources with which to generate energy. Assuming these sources can be adequately harnessed the region will then be free to focus on the other steps of the Power Value Chain, especially transmission and distribution which poses a major problem in countries such as Nigeria.

Ghana

Macro overview

	2015	2025
Nominal GDP US\$ billion	36.2	141.1
GDP per capita (US\$)	1 343	4 341
Real GDP annual growth (yoy%)	3.4	6.3
Population (millions)	27.4	33.7
Labour Force (millions)	11.6	14.7
Unemployment (% of labour force)	4.3	4.3
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	11	N/A

Located in West Africa, Ghana has been globally recognised as a stable African economy with an entrenched political environment and democratic institutions. The Ghanaian economy also has a diverse and rich resource base resulting in robust economic growth over recent years. This trend is expected to continue with an expected real GDP growth rate of 4.5% for 2016, reaching 6.3% in 2025.

Power Sector regulatory environment

- Organisations responsible for energy policies**
 - › The Ministry of Energy (MoE)
 - › Ministry of Power (MoP)
 - › Environmental Protection Agency (EPA)
 - › Ghana Energy Foundation
 - › Ghana Investment Promotion Centre (GIPC)
 - › National Petroleum Authority (NPA)
- Energy Regulator**
 - › Energy Commission
 - › The Public Utilities Regulatory Commission
- Energy policy publications**
 - › The Renewable Energy Act 2011
 - › Ghana National Energy Policy 2010
 - › National Electrification Scheme (NES), 1990-2020
 - › Ghana Energy Development and Access Project (GEDAP) 2007
 - › Strategic National Energy Plan (SNEP), 2006-2020
- Main entities in the electricity generation market**
 - › The Volta River Authority (VRA)
 - › BUI Power Authority (BPA)
- Main entities in the electricity transmission market**
 - › Ghana Grid Company Limited (GridCo)
- Main entities in the electricity distribution market**
 - › The Electricity Company of Ghana (ECG)
 - › The Northern Electrification Department (NED)



Kumasi, Ghana

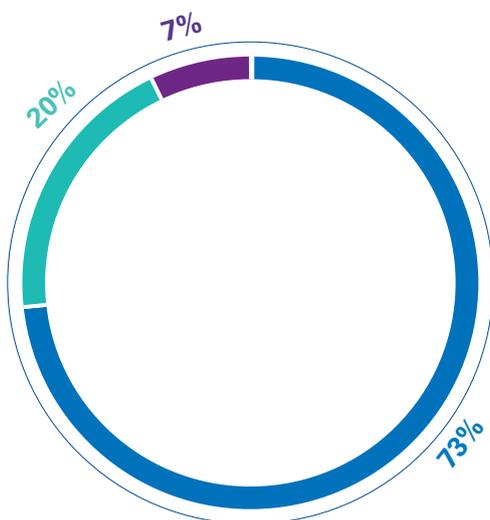
Several policies and acts related to the development of the electricity sector have been implemented over the past decade with the main goal to achieve macro-economic stability as well as becoming a middle income country by 2020.

Power Sector Overview

Hydropower dominates the Ghanaian generation mix, making up 73% of the country's generation mix. However the increasing unpredictability of weather conditions has forced the Government of Ghana to actively invest in diversifying its energy supply.

The Strategic National Energy Plan (SNEP) 2006-2020 is set to contribute to the development of the energy market by providing viable and efficient energy services to the extent required for economic development. In addition, the plan targets a 10% share of the energy mix for renewables (excluding hydropower) by 2020, utilising solar, wind, mini-hydro and modern biomass resources.

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 and improving the current gas infrastructure will require major investment. However the prevailing economic conditions limit the funding available to the Government for such projects. This provides an opportunity for private sector participation.



- Gas
- Oil
- Hydro

Net Installed capacity



Total electricity generation



As of 2015, the biggest issue for economic growth has been the lack of consistent electricity delivery. The power supply has been unstable owing to the heavy reliance on hydropower for electricity generation, which is highly susceptible to weather conditions which impact water flow.

To address this challenge, there are various initiatives currently underway to improve both power generation and the distribution network. Included in the initiatives is the Government’s plan to tap into the vast gas reserves of Ghana with the intention of developing more gas power plants.

Reforms across the Power Sector will be necessary for Ghana to scale-up private-sector investment. As part of the electricity sector strategy, the Government is working on attracting more private sector participation. The market has been dominated by the public sector, but an increasing number of Independent Power Producers (IPPs) have begun to enter the market.

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. Two further projects are highlighted below.

Highlighted Generation Projects in Ghana

Project Name	Type of Transaction	(MW)	Current status
Takoradi 2 power plant's expansion	Gas	110	› Construction completed › Operations yet to commence
CenPower Kpone (IPP)	CCGT	348	› Reached Financial Close Q4 2014 › Under construction

Transmission and distribution losses



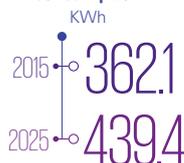
Access to electricity is one of the highest in SSA, at 76%. This is despite the high transmission and distribution losses of 27.6%. Going forward these losses are expected to diminish, dropping to 18.1% in 2025. Although this is a substantial decrease, the rate of loss is still high.

The high losses are due to the aged status of the current transmission infrastructure which has been operating since the 1960s.

Electrification rate



Per capita electricity consumption



Ghana started the roll out of prepaid electricity meters in 2014. If this programme proves successful, it will assist ECG in improving their collections rate and reduce non-technical losses suffered due to post-paid meter tampering.

Nigeria

Macro overview

	2015	2025
Nominal GDP US\$ billion	476.0	1 027.4
GDP per capita (US\$)	2 616	4 398
Real GDP annual growth (yoy%)	2.8	5.0
Population (millions)	182.2	233.6
Labour Force (millions)	57.5	77.9
Unemployment (% of labour force)	8.4	8.9
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	36	N/A

Nigeria is located in West Africa along the Gulf of Guinea. As the largest economy in Sub-Saharan Africa, Nigeria is characterized by abundant natural resources, a large population that is relatively young and a large workforce.

The Nigerian economy has been projected to become one of the twenty largest economies in the world by 2020 on the back of its strong fundamentals and expected economic reforms.

The country is looking to expand its economy based on non-oil related sectors. In order to do so Nigeria has put forward plans to fast-track the development of these other sectors by utilising significant Federal Government investment and creating a more attractive environment for private sector investment.

Power Sector regulatory environment

Organisations responsible for energy policies

- › Federal Ministry of Power
- › Rural Electrification Agency
- › Energy Commission of Nigeria
- › Nigeria Electricity Liability Management Company Limited

Energy Regulator

- › Nigerian Electricity Regulatory Commission (NERC)

Energy policy publications

- › Electric Power Sector Reform Act (EPSRA) of 2005
- › Multi Year Tariff Order (MYTO)
- › Grid Code
- › Energy Commission of Nigeria, by Act No. 62 of 1979, as amended by Act No. 32 of 1988 and Act No. 19 of 1989
- › The Nigerian Investment Promotion Commission (NIPC) Act, 1995

Main entities in the electricity generation market

- › The National Integrated Power Project ('NIPP')

Main entities in the electricity transmission market

- › Transmission Company of Nigeria (TCN) National Integrated Power Projects

Main entities in the electricity distribution market

- › Nigerian Bulk Trading Agency (NBET)



Lagos, Nigeria

The Nigerian Government has embarked on a privatisation policy and reform process which resulted in the unbundling of the Power Holding Company of Nigeria into six successor Generation Companies, the Transmission Company of Nigeria and 11 Distribution Companies through a transparent bidding process.

The Government has retained ownership of transmission assets through the Transmission Company of Nigeria (TCN) which is operating under a management contract with Manitoba Hydro International. Recently there have been reports stating that the Government is considering privatising its transmission asset ownership.

A key objective of the privatisation of the sector's assets was to attract funding. However capital investment by stakeholders in the sector has been limited by:

- › The size of the local banks which are the dominant lenders to the sector;
- › The low tariff approved by the regulators resulting in lower than expect projected cash flows for the assets' new owners;
- › The lack of liquidity due to high receivables by the distribution companies; and
- › The crash in crude oil revenue to the government which acts as the lender of last resort.

In order to drive the implementation of this reform in the Power Sector, The Presidential Task Force on Power was established in 2010. The role of the PTFP is to co-ordinate the activities of the various agencies involved in the sector.

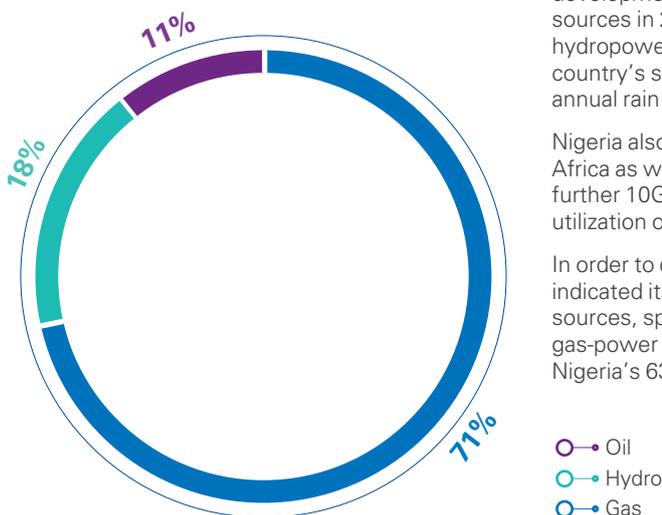
Power Sector Overview

With the largest natural gas reserves on the continent, gas power plants dominate the Nigerian generation mix. However, inadequate gas pipeline infrastructure coupled with frequent vandalism of operational pipelines has resulted in insufficient supply of gas to generation plants resulted in rolling blackouts.

Hydropower offers huge potential for the country's energy supply. Over 5GW of hydro power projects are currently in various stages of pre-development and development. The country generated 6TWh from hydro sources in 2015, representing 18% of total generation. The importance of hydropower to the country's energy mix is evidenced by the fact that the country's supply of electricity has historically been most stable during the annual rain season.

Nigeria also has some of the greatest potential for solar power in West Africa as well as potential for middle quality wind. The country boasts a further 10GW of Bagasse-based power generation potential. However, the utilization of renewable energy resources (other than hydro) remains low.

In order to diversify its generation mix further, the Government has indicated its intention to make a significant investment in non-gas energy sources, specifically towards mitigating the identified challenges with the gas-power plants and the gas pipelines. This includes a view to utilising Nigeria's 639 million metric tonnes of proven coal reserves.



- Oil
- Hydro
- Gas

Net Installed capacity



Total electricity generation



Nigeria has an estimated installed capacity of 10GW, which is lower than the required electricity demand. Currently, the installed capacity is only generating just over 5GW. It is clear that there are significant gaps in the Power Sector due to various challenges faced by the industry and the country as a whole.

One of these issues is the ageing infrastructure which is plaguing the entire Power Value Chain. Uncertainty about the details and the implementation of the Petroleum Industry Bill by the Government has also resulted in declined investment in the energy sector, especially the oil and gas sector.

In terms of generation, the Federal Government plans to add an additional 10GW of energy in 3.5 years, the detailed policies supporting the ambitious target are yet to be provided. There are also plans to add 4.8GW of Nuclear power to the energy mix by 2035.

There has also been renewed interest in developing coal mines and the Nigerian Bulk Electricity Trading Agency (NBET) recently signed a 300MW 20-year Power Purchase Agreement (PPA) with Zuma Power.

Highlighted Generation Projects in Nigeria

Project Name	Type of Transaction	(MW)	Current status
Azura-Edo Gas-Fired Power Plant Phase 1	Gas	450	<ul style="list-style-type: none"> Project consists of 2 phases with a total capacity of 1000MW Financial close achieved Q1 2016
Zungeru plant,	Hydro	700	<ul style="list-style-type: none"> Construction commenced in Q3 2013 Operational in phases starting Q4 2017

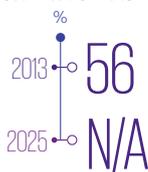
Transmission and distribution losses



Intermittent transmission network system failure is a major challenge in Nigeria and it can be argued that the transmission and distribution step of the Power Value Chain poses the biggest problem for the country. Other than current network infrastructure failure inadequate development of the network is also a major issue and examples of stranded capacity have been highlighted on several occasions.

In order to rectify these issues the Government is putting specific focus on investing in its transmission infrastructure. Monthly forums have been organised by the Ministry of Power for stakeholders to meet and evaluate the sector performance and discuss solutions to challenges.

Electrification rate



Per capita electricity consumption



The Multi Year Tariff Order (MYTO) is the tariff vehicle designed for the Nigeria Electricity Market to provide a unified way to determine the total industry revenue requirement and provide a 15 year look ahead for tariffs in the sector. MYTO is used to set both wholesale and retail prices in the Nigerian Electricity Market.

The Nigeria Electricity Market Stabilisation Facility (NEMSF) was established by the central bank together with deposit money banks to address shortfalls in Power Sector revenues due to lower tariffs. The facility has helped to settle basic gas debt that accrued during the Interim Rules Period (IRP) and in the process reset the economics of the Power Sector.

Senegal

Macro overview

	2015	2025
Nominal GDP US\$ billion	11.4	32.7
GDP per capita (US\$)	756	1 631
Real GDP annual growth (yoy%)	5.4	7.0
Population (millions)	15.1	20.0
Labour Force (millions)	6.5	8.9
Unemployment (% of labour force)	10.3	N/A
Ease of doing business index within Sub Saharan Africa (1: Most friendly and 47:Least friendly)	25	N/A

Located on Africa's west coast, Senegal is a country known for its tradition of stable governments and civilian rule. Senegal's economy is driven by mining, construction, tourism, fisheries and agriculture. With a relatively stable economy, real GDP growth is expected to increase to 5.9% in 2016 and reach 7% in 2025.

Power Sector regulatory environment

Organisations responsible for energy policies

- › Council of Ministers
- › Inter-Ministerial Committee on Renewable Energy
- › Ministry of Energy (MoE)
- › Ministry of Renewable Energy (MER)
- › Senegalese Agency for Rural Electrification (ASER)
- › National Agency for Solar Energy (ANDES)

Energy Regulator

- › Commission of Energy Sector Regulation (CRSE)

Energy policy publications

- › Electricity Act 1998
- › Renewable Energy Act 2010
- › Letter of Development Policy for the Energy Sector (LPDSE)
- › Poverty Reduction Strategy and Energy Policy (PRSP)

Main entities in the electricity generation market

- › Société Nationale d'Electricité du Sénégal (SENELEC) (50%)
- › Independent Power Producers (IPPs) (50%)

Main entities in the electricity transmission market

- › Société Nationale d'Electricité du Sénégal (SENELEC)

Main entities in the electricity distribution market

- › Société Nationale d'Electricité du Sénégal (SENELEC)



Dakar, Senegal

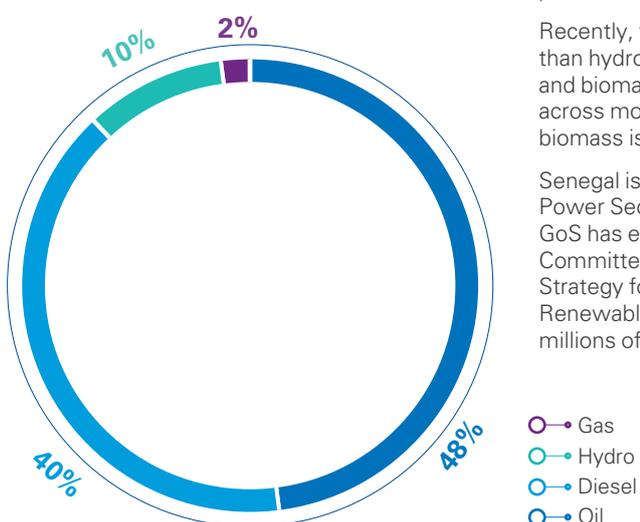
In October 2012, the Government of Senegal (GoS) adopted a Letter of Development Policy for the Energy Sector. The Letter of Development Policy outlines the sector policy objectives of the newly elected Government to improve the sector's performance in the medium term.

Power Sector Overview

Senegal's primary source of electricity generation is oil and diesel. It also has strong potential for renewable energy generation, most of it untapped. So far, hydropower has been partly exploited and contributes 54 MW to the power mix.

Recently, there has been a drive to use more renewable energy (other than hydro power) in the generation mix. The country has significant solar and biomass energy resources. The solar irradiation level is above average across most of the country, while the estimated generating potential from biomass is 2 900 GWh.

Senegal is slowly making the positive changes to improve the current Power Sector situation, especially in the renewable energy space. The GoS has established an official solar Power Sector and the Inter-ministerial Committee on Renewable Energy, and through the adoption of a National Strategy for Renewable Energy is targeting a 10% renewable mix by 2020. Renewable energy and the solar Power Sector in Senegal is now attracting millions of dollars in investment.



Net Installed capacity



Total electricity generation



Power demand has been growing throughout the last decade, and in tandem with upbeat economic forecasts it is expected to increase further over the next few years. However the development of Senegal’s power generation infrastructure is unable to keep up with rising demand.

Following the lifting of a law that banned solar power in Senegalese cities, the grassroots sector has partnered with the GoS to implement the renewable-energy source nationwide, starting first with areas not already connected to the national electric grid. The government is working on a project to turn 14 000 traditional rural villages into eco villages. So far, the GoS has built only 100 of them, but it plans to build 500 more by the end of 2018.

Highlighted Generation Projects in Senegal

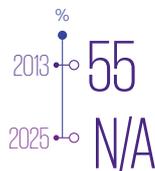
Project Name	Type of Transaction	(MW)	Current status
Tobene Power	Thermal (oil fired)	96	› Reached financial close in Q4 2014
Cap des Biches Oil Fired Powr Plant	Thermal	135	› Reached financial close Q4 2015

Transmission and distribution losses

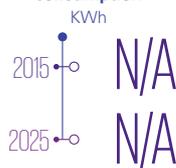


Poor infrastructure, in the form of a dilapidated and insufficient transmission network and a power supply that is incapable of adequately serving the growing economy, is a drag on economic growth, and can deter investment into new industries. It is clear that actions need to be taken to improve the current Power Sector situation.

Electrification rate



Per capita electricity consumption



Senegal is largely dependent on heavy fuel oil and diesel for power generation, both of which need to be imported. As a result, electricity tariffs are high, and in fact Senegal has one of the most expensive electricity tariffs in the SSA region.

Not only does the import of power generation result in high tariff costs but it also impacts electricity security. Electricity security and indirectly domestic power supply is a key challenge facing Senegal.

05 KPMG Service Offering

Overview of KPMG

Development of the Power Sector is one of the greatest global challenges of the 21st century.

Our Power & Utilities practice has advised on many ground-breaking energy projects, assets and businesses around the world.

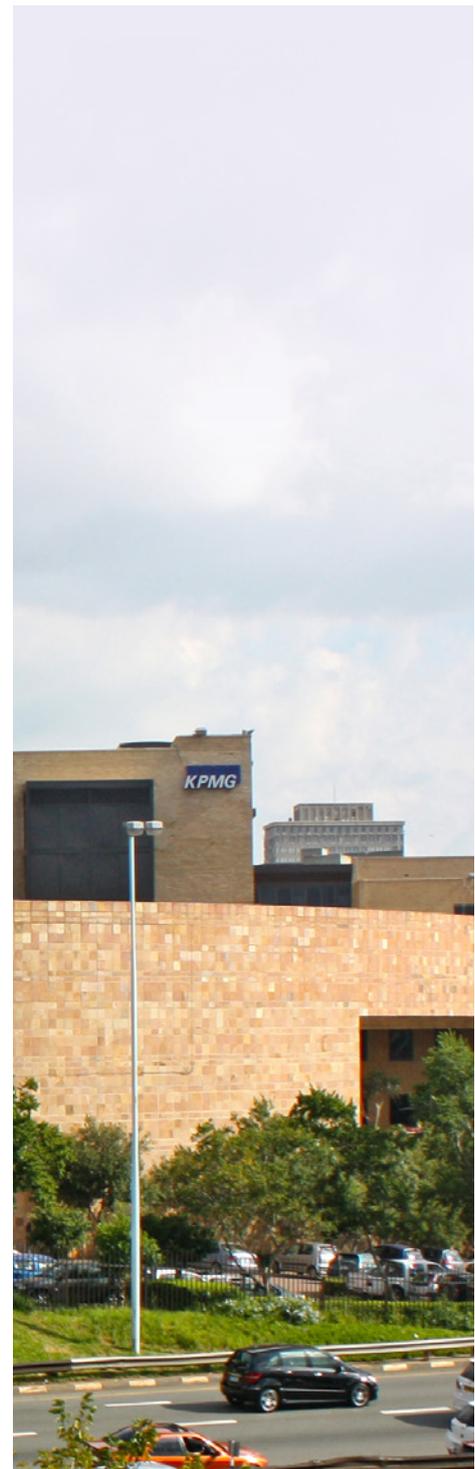
In Africa we have over 70 dedicated infrastructure advisors and by far the biggest power & utilities team on the continent. Our pool of knowledge provides ready access to industry best practice and insights.

KPMG firms are world-renowned as leading providers of audit, tax and advisory services. We operate in 155 countries and have over 174 000 people in all member firms around the world. We aim to respond to the complex business challenges facing our clients by adopting a global approach spanning professional disciplines, industry sectors and national borders.

Our Advisory Practice

KPMG's strategy is to be a globally consistent organization 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 to our clients. As a values-based organization, our values are central to everything that 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.

- › Local knowledge, skills and experience – supported by our global network.
- › Unrivalled technical knowledge; confidently expressed and fully supported.
- › Understanding the African market and its risks.

Our 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 groundbreaking infrastructure projects, assets and businesses around the world”

KPMG’s Global Infrastructure practitioners provide 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 teams help clients ask the right questions and find strategies tailored to meet their specific business objectives, 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:

Energy & Natural Resources	<ul style="list-style-type: none">› Mining› Nuclear› Oil & Gas	<ul style="list-style-type: none">› Power & Utilities› Renewables & Clean Utilities› Water, Waste & Recyclables
Social Infrastructure	<ul style="list-style-type: none">› Building & Construction› Cities› Defence› Education	<ul style="list-style-type: none">› Healthcare› Housing› Sport & Global Events› Technology (Broadband)
Transport	<ul style="list-style-type: none">› Airports› Port Facilities & Logistics	<ul style="list-style-type: none">› Rail› Road

What sets KPMG apart:
Our business model enables deep industry experts to work side by side with business leaders to develop and deliver solutions using highly specialised teams tailored to the specific business needs of clients.

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.

KPMG’s global presence enables our team to provide resources on the ground to support you, wherever you require. This global reach provides you with direct access to national and international “best practices” in all areas of infrastructure projects.

One of our key objectives is to ensure we will share and transfer our insights to your own team, enabling you to leverage this knowledge.



Our service offering

KPMG Global Infrastructure team is well-balanced with financial and transaction advisory experts that have backgrounds in project development, feasibility studies, procurement, capital raising and project management of major infrastructure projects, particularly in the Power Sector.

Some of the services our experts offer along the Infrastructure Lifecycle include:

- › Strategic planning
- › Feasibility analysis
- › Market analysis
- › Project risk analysis
- › Project scope analysis
- › Procurement options analysis
- › Project management
- › Communication strategy
- › Financial/Commercial analysis
- › Risk identification and mitigation
- › Contract management
- › Contract compliance
- › Asset operations reviews
- › Procurement process management
- › Assistance in developing the most optimal project structure
- › Assistance in preparation of RFIs, RFQs, and RFPs and evaluation of the results of thereof
- › Negotiation and commercial support
- › Financial modelling
- › Regulatory reviews
- › Capital raising to support projects in reaching financial close; and
- › Coordination of funding competitions



KPMG's Power & Utilities Practice

The KPMG Energy and Natural Resources ('ENR') Practice - in which Power & Utilities plays a leading part - has been recognised as being the leading service provider within the Energy and Natural Resources sector. This practice 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 its objective.

The Power Sector has become one of KPMG's main areas of focus and the firm prides itself on having Global Power & Utilities team, which cooperates with KPMG offices worldwide to ensure the right knowledge is available at the right location. Practitioners are on-site in 155 countries advising global Power & Utilities businesses, state-owned providers, national businesses and service companies worldwide.

The services provided by KPMG in the Power & Utilities space span the entire Power Value Chain. Whether KPMG assists you with a single element or a holistic plan along the entire process, our advice will take into account the knock-on effects on the other steps of the Value Chain.



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.

KPMG's Global Energy Centres ('GEC's')

KPMG member firms offer global connectivity. We have 19 dedicated Global Energy Centres in key locations around the world, working as part of our global network. They are a direct response to the rapidly evolving Power and Utilities Sector and the specific challenges that this is placing on industry players.



KPMG Global Energy Institute

The Global Energy Institute provides critical insights and analysis into the Energy Sector, helping energy regulators, policy makers, finance, tax and risk executives meet new energy challenges and successfully increasing 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.

Launched in 2007, the KPMG Global Energy Institute is a worldwide knowledge-sharing platform detailing insights into current issues and emerging trends within the Power & Utilities and Oil & Gas industries. Where individuals have access to valuable thought leadership, studies, events, and webcasts on key industry topics. The institute's regional focus provides decision-makers with tailored insight into the Americas, LATAM, ASPAC, and EMEA regions. Today, the Global Energy Institute exists in Houston, Rio Janeiro, Singapore and Berlin.

KPMG Global Energy Conference

The annual Global Energy Conference (GEC) 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. There are over 700 global professionals and energy executive attendees.

The event focuses on financial, risk, and tax issues for financial executives. It includes general sessions covering the new energy revolution and energy innovations as well as concurrent sessions on cost optimization, tax risk and technology and current accounting issues.

The 13th annual KPMG Global Energy Conference was held in May of 2015 in Houston, Texas with the fourteenth annual conference being held in May 25-26, 2016 in Houston.

KPMG Global Power & Utilities Conference

Launched in 2011 in Paris and successfully repeated in 2012 in Vienna, in 2013 in Berlin, in 2014 in London and in 2015 in Madrid the KPMG Global Power and Utilities Conference is a premier business-to-business industry event for the Power and Utilities Sector.



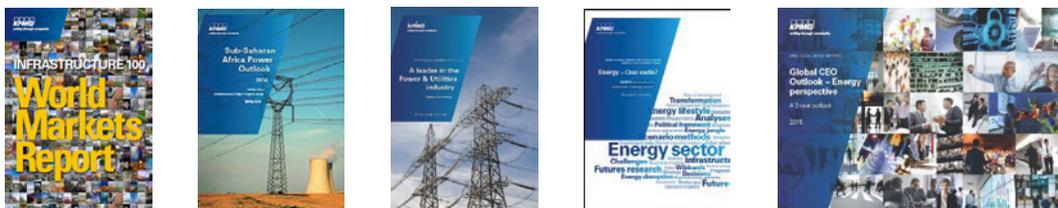
With more than 250 delegates from 40 countries in attendance, it brings together executives from across a broad spectrum of the industry worldwide, including power producers, developers, investors, regulators and other key industry stakeholders

The conferences agenda focuses on strategic, financial, environmental and risk related issues that are top of mind for power and utilities executives. The intensive two day programme consists of keynote presentations by distinguished leaders, issue-focused plenary roundtable discussions and interactive breakout sessions. The goal of the conference is to provide participants with new insights, tools and strategies to help manage industry-related issues and challenges. Attendees also have the opportunity to join their peers from leading power and utilities companies to share effective practices and participate in networking activities.

The fifth annual KPMG Global Power & Utilities Conference was held in October 2015 in Madrid, Spain with the sixth annual Conference taking place in Brussels, Belgium on November 7-8, 2016.

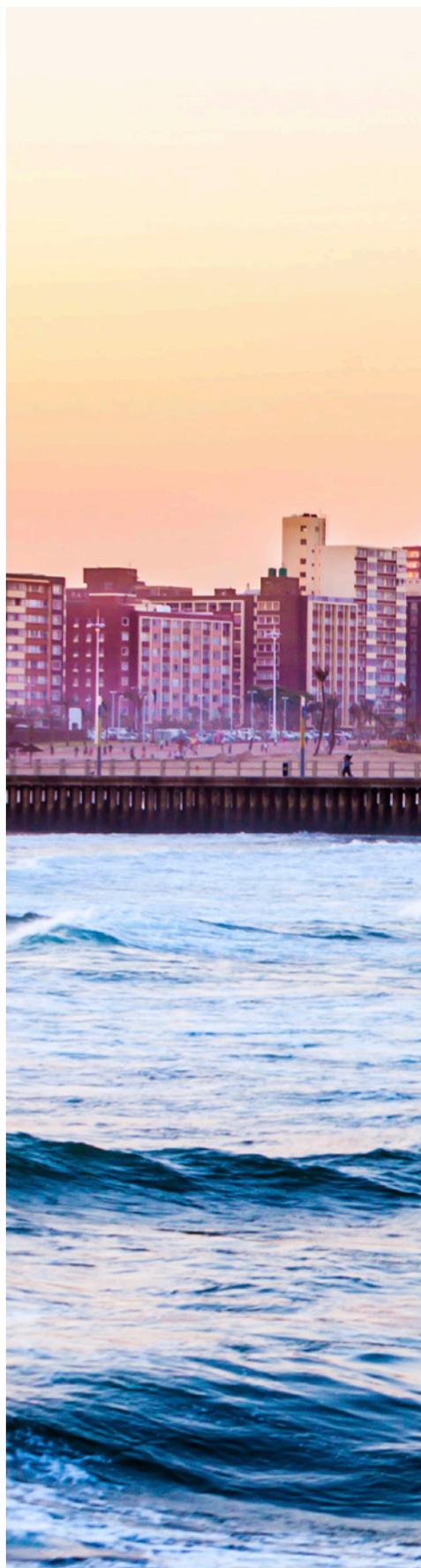
Leadership and Industry Insights

Some of the more recent thought leadership contributions in the Power and Utilities industry are show-cased below. The detailed fact sheets are available on request.





Acronyms



AER	Rural Electrification Agency (Cameroon)
AfDB	African Development Bank
AGENA	National Electrification Agency (DRC)
ANDES	National Agency for Solar Energy (Senegal)
ARE	Ministry of Mines, Energy and Hydrocarbons Electricity Regulation Authority (DRC)
ARSEL	Electricity Sector Regulatory Agency (Cameroon)
ASER	Senegalese Agency for Rural Electrification (Senegal)
ATC&C	Aggregate Technical, Commercial and Collection losses
BEWRA	The Botswana Energy and Water Regulatory Agency (Botswana)
BPA	BUI Power Authority (Ghana)
BPC	Botswana Power Corporation
CAPP	Central African Power Pool
CEC	Copperbelt Energy Corporation (Zambia)
CENORED	Central Regional Electricity Distributor (Namibia)
CGEA	The General Atomic Energy Commission (DRC)
CNELEC	National Electricity Council (Mozambique)
CRSE	Commission of Energy Sector Regulation (Senegal)
CSP	Concentrating Solar Power
DRC	Democratic Republic of the Congo
EAC	East African Community
EAPP	Eastern African Power Pool
EARP	Electricity Access Roll-out Program (Rwanda)
ECB	Electricity Control Board (Namibia)
ECG	Electricity Company of Ghana (Ghana)
EDC	Electricity Development Corporation (Cameroon)
EDCL	Energy Development Corporation Limited (Rwanda)
EDM	Electricidade de Mocambique (Mozambique)
EEA	Ethiopia Energy Authority
EEPCO	Ethiopian Electric Power Corporation
EEU	Ethiopian Electric Utility
EEX	European Energy Exchange
EIG	Eastern Interconnected Grid (Cameroon)
ENDE	Empresa Nacional de Distribuição de Electricidade (Angola)
ENH	Empresa Nacional de Hidrocarbonetos (Mozambique)

EPA	Environmental Protection Agency (Ghana)	KWh	Kilowatt hours
EPSRA	Electric Power Sector Reform Act (Nigeria)	LPDSE	Letter of Development Policy for the Energy Sector (Senegal)
ERA	The Electricity Regulatory Authority (Uganda)	MEMD	Ministry for Energy, Minerals and Development (Uganda)
ERB	Energy Regulatory Board of Zambia (Zambia)	MER	Ministry of Renewable Energy (Senegal)
ERC	Energy Regulatory Commission (Kenya)	MEWT	Ministry of the Environment, Wildlife and Tourism (Botswana)
EREDPC	Ethiopian Rural Energy Development and Promotion Center (Ethiopia)	MINEE	Ministry of Energy and Water (Cameroon)
ERONGORED	Erongo Regional Electricity Distributor (Namibia)	MINIFRA	Ministry of Infrastructure (Rwanda)
EU	European Union	MME	Ministry of Mines and Energy (Namibia)
EUCL	Energy Utility Corporation Limited (Rwanda)	MMEWR	Ministry of Minerals, Energy and Water (Botswana)
EWURA	Energy and Water Utilities Regulatory Authority (Tanzania)	MoE	Ministry of Energy (Ghana)
FDI	Foreign Direct Investment	MoE	Ministry of Energy (Senegal)
FiTs	Feed-in Tariffs	MoFED	Ministry of Finance and Economic Development (Ethiopia)
FONEL	National Electrification Fund (DRC)	MoP	Ministry of Power (Ghana)
GDP	Gross Domestic Product	MoU	Memorandum of Understanding
GEDAP	Ghana Energy Development and Access Project (Ghana)	MoWIE	The Ministry of Water, Irrigation and Electricity of Ethiopia (Ethiopia)
GERP	Grid Expansion and Reinforcement Project (Uganda)	MoZiSa	Mozambique – Zimbabwe – South Africa (transmission project)
GIPC	Ghana Investment Promotion Centre (Ghana)	MUAE	Ministry of Urban Affairs and the Environment (Angola)
GoA	Government of Angola	MW	Megawatt
GoE	Government of Ethiopia	MYTO	Multi Year Tariff Order (Nigeria)
GoK	Government of Kenya	NAMREP	Namibian Renewable Energy Program (Namibia)
GoS	Government of Senegal	NBET	Nigerian Bulk Trading Agency (Nigeria)
GoT	Government of Tanzania	NCCAP	National Climate Change Action Plan (Kenya)
GoU	Government of Uganda	NED	Northern Electrification Department (Ghana)
GridCo	Ghana Grid Company Limited (Ghana)	NEEP	Namibia Energy Efficiency Programme in Buildings (Namibia)
GTP	Growth and Transformation Plan (Ethiopia)	NEMA	National Environment Management Authority (Uganda)
GW	Gigawatt	NEMSF	Nigeria Electricity Market Stabilisation Facility (Nigeria)
HCB	Hidroelectrica de Cahora Bassa (Mozambique)	NEP	The National Energy Policy (Zambia)
HIRSEA	Regulator Institute for Services of Electricity, Water Supply and Waste Water Sanitation (Angola)	NERC	Nigerian Electricity Regulatory Commission (Nigeria)
HV	High voltage	NES	National Energy Strategy (Zambia)
INP	Instituto Nacional do Petroleo (Mozambique)	NES	National Electrification Scheme (Ghana)
IPP	Independent Power Producer	NIG	Northern Interconnected Grid (Cameroon)
IRP	Integrated Resource Plan (South Africa)	NIPA	National Investment Promotion Agency (Angola)
IRP	Interim Rules Period (Nigeria)	NIPC	Nigerian Investment Promotion Commission (Nigeria)
IRSE	Institute for Electricity Regulation (Angola)	NIPP	National Integrated Power Project (Nigeria)
KenGen	Kenya Electricity Generating Company (Kenya)		
KETRACO	Kenya Electricity Transmission Company Limited (Kenya)		
KNEB	Kenya Nuclear Electricity Board (Kenya)		
Kv	kilovolt		

NIRP	National Integrated Resource Plan (Namibia)	SIG	Southern Interconnected Grid (Cameroon)
NORED	Northern Regional Electricity Distributor (Namibia)	SPP	Small Power Producers
NPA	National Petroleum Authority (Ghana)	SNEL	Société nationale d'électricité (DRC)
PDER	Rural Electrification Master Plan (Cameroon)	SNEP	Strategic National Energy Plan (Ghana)
PDSE	Energy Sector Development Plan (Cameroon)	SREP	Scaling-up Renewable energy program (Uganda)
PPA	Power Purchase Agreement	SSA	Sub-Saharan Africa
PPP	Public Private Partnership	TANESCO	Tanzania National Electric Supply Company (Tanzania)
PRODEL	Empresa Pública de Produção de Electricidade (Angola)	TCN	Transmission Company of Nigeria (Nigeria)
PRP	Power Rehabilitation Programme (Zambia)	TWh	Terwatt hours
PRSP	Poverty Reduction Strategy and Energy Policy (Senegal)	UEDCL	Uganda Electricity Distribution Company Ltd (Uganda)
REA	Rural Electrification Authority (Kenya)	UEGCL	Uganda Electricity Generation Company Ltd (Uganda)
REEECAP	Renewable Energy and Energy Efficiency Capacity Building Program (Namibia)	UETCL	Uganda Electricity Transmission Company Limited (Uganda)
REFIT	Renewable Energy Feed-in Tariff	USAID	United States Agency for International Development
REG Limited	Rwanda Energy Group Limited (Rwanda)	VPO-DoE	Division of Environment within the Vice-President's Office (Tanzania)
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme (South Africa)	VRA	Volta River Authority (Ghana)
REMP	The National Energy Policy (Zambia)	WAPP	Western African Power Pool
RNT	Rede Nacional de Transporte de Electricidade (Angola)	WPE	White Paper on Energy Policy of 1998 (Namibia)
RURA	Rwanda Utilities Regulatory Agency (Rwanda)	yoy	Year on year
SANEDI	South African National Energy Development Institute (South Africa)	ZERA	Zimbabwe Electricity Regulatory Authority (Zimbabwe)
SAPP	Southern African Power Pool	ZiZaBoNa	Zimbabwe – Zambia – Botswana – Namibia (transmission project)
SASGI	South African Smart Grid Initiative (South Africa)	ZPC	Zimbabwe Power Company (Zimbabwe)
SENELEC	Société Nationale d'Electricité du Sénégal (Senegal)		
SENER	National Renewable Energies Service (DRC)		





ABB	KPMG
Adam Smith International	Mail & Guardian
Addis Fortune	Ministerial Dialogue on Global Energy, Angola
AFK Insider	Ministry for Energy, Minerals and Development (Uganda)
Africa Progress Panel	Mmegi online
Africa Ranking	NamPower
African Development Bank	National Planning Authority (Uganda)
African Economic Outlook	New Business Ethiopia
African-EU Renewable Energy Cooperation Programme	News24
Agência Angola Press	Nigerian Electricity Regulatory Commission
AidData	Norton Rose Fulbright
American Enterprise Institute	Pan Africa Power
Bloomberg	Powering East Africa
Botswana Daily News	Reegle
Business Daily	Renewable Energy in Africa
Business Day Live	Renewable Energy & Energy Efficiency Partnership
Business Monitor International	Rwanda Development Board
BusinessTech	Sourcewatch
Cape Business News	Southern African Power Pool
Climatescope	Southern African Research and Documentation Centre
Construction Review Online	Symbion Power LLC
East African Community	The Alliance for Rural Electrification
Electricidade de Moçambique	The Energy Collective
Energy Commission of Nigeria	The Infrastructure Consortium for Africa
Engineering News	The International Renewable Energy Agency
ESI Africa	The New Times
Focus Economics	Think GeoEnergy
General Electric	Trading Economics
Geothermal Development Company	Transmission & Distribution World
Germany Trade & Invest	UK-Ethiopia Trade & Investment Forum
GreenCape	United States Agency for International Development
Hivos International	United States Energy Association
index mundi	US Energy Information Administration
Infrastructure Journal Global	World Bank
Inter-American Development Bank	World Economic Forum
International Business Times	World Energy Outlook
International Energy Agency	Zambia Electricity Supply Corporation Limited
International Monetary Fund	Zimbabwe Electricity Supply Authority
International Rivers	Zimbabwe Power Company
International Water Power & Dam Construction	Zimbabwe Situation
Kenya Investment Authority	
Kenya Vision 2030	



African Footprint

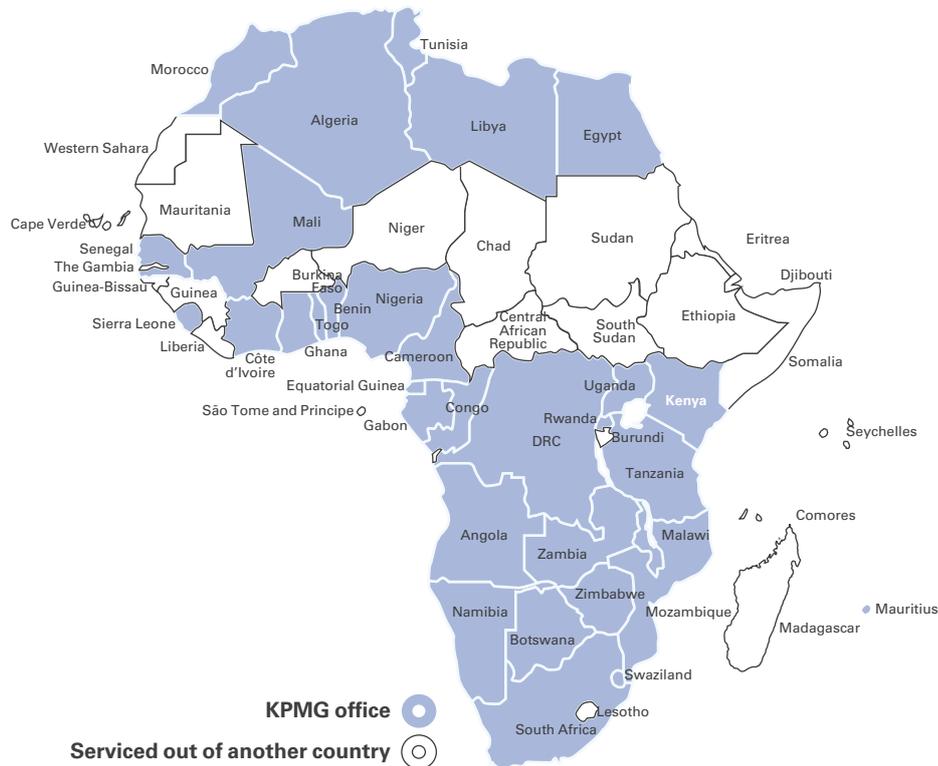
Our African Footprint

KPMG is well represented across the African continent. Our objectives are to provide consistent, high-quality services to multi-national, regional and local clients and to enhance the product offering in certain previously under-served markets.

The rest of Africa is covered by KPMG through firms in adjacent countries. By undertaking assignments in neighboring countries, KPMG can ensure that the needs of our firms' clients are met wherever they are in Africa. Our African footprint enables our offices to work effectively, efficiently and cohesively across the continent.

KPMG's representation in Africa stretches across the following countries

33 Practices servicing 54 countries



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