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Africa's Chronic Power Problems: West Africa Power Pool could be a Game-changer

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Introduction

The World Bank released its 2020 Doing Business report in October. Once more Sub-Saharan Africa (SSA), accompanied by South America, occupies the bottom rank. Despite steady progress and reform over the past decade, the gap between SSA countries and other regions remains vast. Reform of its electricity industry is one of the weakest links in the continent's infrastructure. SSA has the world's highest electricity cost per capita, while scoring lowest for supply reliability and tariff transparency.

For a continent in search of viable ways to achieve competitiveness in manufacturing, high costs and chronic power supply failures pose challenging obstacles. The cost of electricity is a binding constraint to private investment in a number of West African countries (Joint USG-GoG technical team, 2012; MCC, 2012, 2013a, 2013b; 2017; UCF, 2017). This constraint affects the financial performance of companies. A sample of African firms from the World Bank Enterprise Surveys reports that 23% of business owners in Africa perceive electricity (or its lack) as the single biggest obstacle to success, followed by access to finance (21%) and competition from the informal sector (9%). Often, burdensome connection processes form a barrier between newly incorporated startups and their new electricity connection (Geginat and Ramalho, 2015). Many business owners face frequent blackouts. These force them to halt production, unless they resort to generators at significant expense (Foster and Steinbuks, 2010). Lastly, high electricity tariffs, due to the expensive thermal generation sources in most land locked countries; hinder firms' productivity where energy prices are high relative to income levels (Abeberese, 2016).

Three interrelated root causes in SSA countries result in high electricity costs. The first is heavy reliance on thermal generation. Many countries depend on thermal plants that use heavy fuel oil (HFO). More expensive than most traditional energy sources (such as coal and hydro), this fuel is often imported. The dilapidated condition of system assets, is the second major cost driver. This is due to overuse and under resourced maintenance. The aging condition and overuse of thermal generation units (often due to the lack of backup generation capacity needed for routine maintenance) leads to poor efficiency and frequent breakdowns. These result in unfavorable values for System Average Interruption Frequency Index (SAIFI)[1] and System Average Interruption Duration Index (SAIDI)[2] (Arlet, 2017). The suboptimal coordination capability of its institutions is the third root cause of high electricity costs. Weak or strained institutional capacity is pervasive in West African utility industry. The companies often lack the human and systems resources needed to anticipate outages, and to respond to them in a timely and efficient manner. African regulators are often under-resourced and marginalized in terms of influence over the major functions for which they are legally responsible. These include tariff reviews and utility performance monitoring.

Several SSA countries sought to address this situation in recent years. Some countries, lacking natural endowment in hydroelectric or natural gas sources, imported electricity from better-endowed neighbors. Regional political bodies established wholesale markets to formalize these trades. Africa now has six power pools: member countries with surpluses or shortages trade electricity at market rates. Power pools address inefficient spatial distribution of electricity between low cost supplier and high demand countries. Results from these African power pools are mixed. This is due to limited resources for building the necessary infrastructure, rising demand for electricity as African economies develop, and the limited capacity of related institutions, such as regional regulators and dispatch entities.

The West African Power Pool (WAPP) is positioned to rewrite that story. WAPP enjoys strong support from donors willing to build interconnectors. Ghana, Cote d'Ivoire, and Senegal have newly discovered natural gas reserves. These supply factors, combined with increasing government willingness to initiate tough sector reforms (such as reducing the monopolistic power of national utilities), may be a blueprint to re-wire the continent's power pools to increase business competitiveness.

We identify and group the business beneficiaries of a fully operational WAPP ecosystem into two distinct groups. Producers are public and private generation, transmission and distribution companies involved in the power sector value chain (generation, transmission, and distribution, plus auxiliary activities such as electricity billing). Implementation of WAPP also provides opportunities for other stakeholders, such as independent power producers (IPP). An integrated regional power grid enables an IPP to reach a larger consumer base, and ensures uptake of their supply. For example, a solar energy IPP will be able to set up a PV farm in Niger, with peak sun of about 7 hours per day, and sell the electricity produced in Liberia, where peak sun is 4 hours.

Consumers are business stakeholders that use electricity in production functions, as inputs or intermediate goods, to produce non-electricity related value. Manufacturing firms use electricity as one of the inputs to produce autos, for example. WAPP promises to lower the cost of electricity while improving its reliability. This will enable "consumers" firms to reduce their operation costs.

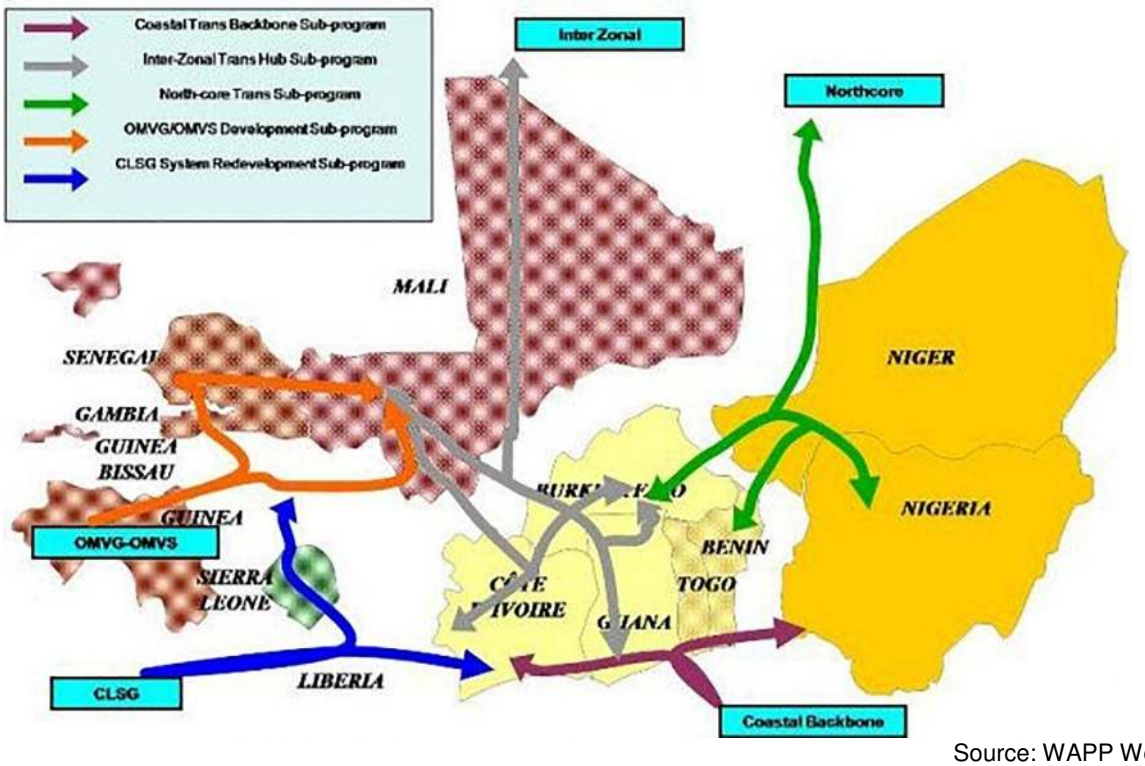
After describing WAPP, this article profiles four WAPP countries, discuss challenges facing the two types of stakeholders, and closes with recommendations. The discussion will apply the EM classification of the selected WAPP countries to highlight the opportunities and challenges to WAPP in their private sectors.

WAPP

The ECOWAS Heads of State created WAPP to curtail the power deficit prevalent in the region and create a competitive regional electricity market. They WAPP formed in 1999. However, activity began only in 2006, after the ECOWAS summit adopted articles regulating its functions. WAPP member countries now include Benin, Côte d'Ivoire, Burkina Faso, Ghana, Gambia, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

Headquartered in Benin, WAPP currently has 26 member utility companies. The pool includes public and private generation, transmission and distribution companies involved in the operation of electricity in West Africa. Below is an illustration of current and planned WAPP interconnections.

Figure 1: WAPP Major Interconnection Projects



Source: WAPP Website

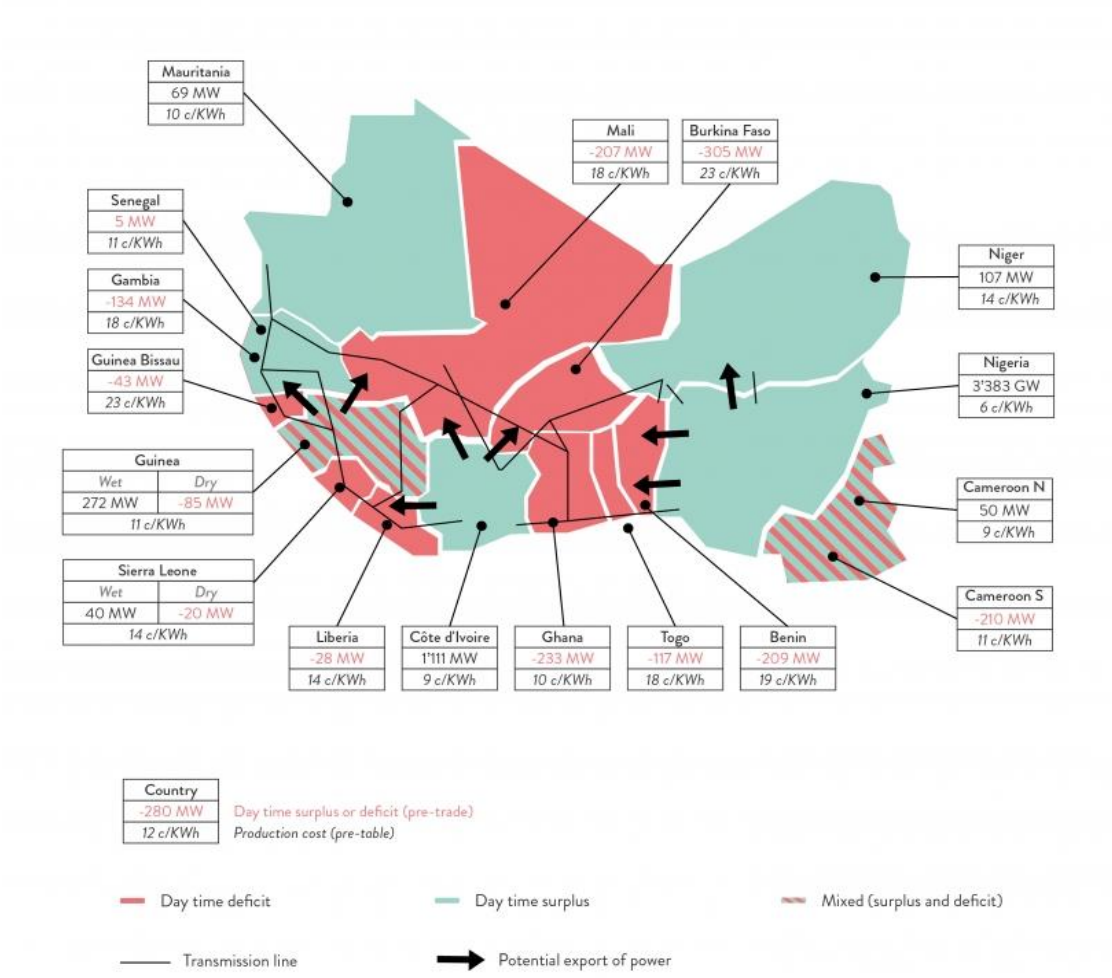
Electricity trade under WAPP will rely on five key interconnectors:

(a) Coastal Transmission Backbone Sub-program (Côte d'Ivoire, Ghana, Benin-Togo, Nigeria) to establish a robust interconnection between the ECOWAS Coastal Member States (Purple line).
(b) Inter-zonal Transmission Hub Sub-program (Burkina Faso and Mali through Ghana) to establish secure, reliable transmission corridors for transfer of low-cost energy to displace diesel-based sources especially in Burkina Faso, through Ghana (Gray line).
(c) OMVG9 and OMVS10 Power System Development Sub-program (The Gambia, Guinea, Guinea Bissau, Mali, Senegal) to interconnect national systems of The Gambia, Guinea, Guinea Bissau, Mali, and Senegal and secure access to sources of low-cost energy to be built on the Gambia, the Senegal, and the Konkoure River Basins (Orange line).
(d) North-Core Transmission Sub-program (Nigeria, Niger, Burkina Faso, Benin) to upgrade and extend existing capacity to transfer low-cost energy supply to Niger, Burkina Faso, and northern Benin and Togo (Green line).
(e) Côte d'Ivoire-Liberia-Sierra Leone-Guinea Power System Redevelopment Sub-program (Côte d'Ivoire, Liberia, Sierra Leone, Guinea [CLSG]) to interconnect these countries into the WAPP Energy System and to develop the hydropower resources in the sub-region (Blue line).

Anticipated gains from electricity trade to member countries

It is projected that full operationalization of the WAPP could produce substantial gains for member countries involved in the scheme. The figure below illustrates the anticipated gains from trade.

Figure 2: Anticipated flow of electricity and resulting gains from trade by 2025



Source: https://institute.global/insight/governance/how-can-trade-help-solve-west-african-power-issues

Figure 2 illustrates the countries that will save and earn revenue as a result of trade. These revenues and cost savings across WAPP member countries amounts total nearly $32 billion. If these gains from trade were fully passed on to consumers, electricity tariff rates would decrease by an average of 15%, ranging between 3% in Nigeria and 31% in Burkina Faso (TBI, 2019). This improved enabling environment should attract more producers and consumers business stakeholders to enter and expand in the West Africa market.

Access to reliable low-cost electricity will benefit business consumers. Electricity drove the second industrial revolution in the developed world (Gordon, 2017). It plays a crucial role for economic development in SSA today. More reliable electricity will alter the composition of businesses that can operate efficiently in a specific economy. Low-cost electricity will increase the competitiveness of the manufacturing sector, relative to primary sectors such as agriculture.

West African countries view the unprecedented investment in electrification as a vehicle for economic development. Governments hope it will stimulate structural transformation, pushing business to invest in modern, higher valued-added sectors as was the case in developed countries many decades ago.

Full WAPP implementation will have two impacts. It will reduce a company's expenditures for electricity especially for alternative sources of electricity. It will also reduce production losses due to power outages. These outcomes will increase firm productivity and profits, and allow businesses to focus on segments of the value chain that offer higher margins.

Power sector profile of some WAPP countries

To identify the challenges and draw lessons for the path forward, we examine four WAPP countries with different characteristics. Each country has a distinct electricity trade profile (Net-importer/net-exporter), colonial heritage (Francophone/Anglophone), and endowment of natural gas reserves. We review their market structures for generation, transmission, and distribution; then discuss the institutional structure of the sector, including the roles and capabilities of the regulator, Ministry responsible for energy sector, and private sector involvement in the energy value chain.

For "producer" business stakeholders

Net producer countries are countries where we believe businesses operating in the electricity value chain stand to benefit the most from WAPP. We identify both Senegal and Nigeria for three reasons. First, their surplus generation associated with their natural gas endowment will allow private sector to increase their participation; especially that reforms have already been made to facilitate private sector investment. Second, their net exporter position will provide attractive opportunities for private sector to participate in the transmission segment of the value chain, especially in Nigeria. Last, the rural space has become ripped for private sector investment as higher standard of living increased rural households' willingness to pay for electricity.

Senegal (Francophone)

Both state-owned Senelec and Independent Power Producers (IPPs) carry out power generation in Senegal. Senelec is the country's largest electricity generation company, with total installed capacity of 632.9 MW as at end 2017. This makes up 73 percent of the national total. The IPPs contribute 231 MW of installed capacity to the generation mix.

The National Interconnected Transmission System (NITS) is owned and operated by Senelec, and performs transmission of electricity from generation to distribution. Distribution to end consumers in urban areas is carried out by Senelec. Both Senelec and concessionaries serve consumers in rural areas.

The Ministry of Petroleum and Energies (MPE) is responsible for policy and oversight of the electricity, hydrocarbon and renewable energies sectors in Senegal. Several institutions fall under the MPE. On the regulatory side, the *Commission de Régulation du Secteur de l'Electricité* (CRSE) is responsible for licensing and public regulation of all electricity production, transmission, distribution, and sales activities in the country. CRSE supervises all electricity distribution companies operating in Senegal. These include Senelec, the Agence Senegalese d 'Electrification Rural (ASER), and smaller concessions that

operate mostly in rural areas. The President, renewable for one additional term, names its three commissioners to five-year terms.

CRSE reviews demand forecasts, utility and concession actual performance relative to contract terms, planned and actual investments, and operating costs. CRSE is responsible for overseeing the procurement process for concession awards, and licensing concessionaires and local rural electrification initiatives, and may recommend legal and regulatory reforms. While in principle CRSE may sanction Senelec or concessions if they do not meet their performance contract targets, in reality this power is rarely exercised.[3]

CRSE analysis determines the Maximum Authorized Revenue. This is the basis for establishing ceiling rates, for both Senelec and the concessions.[4] Senelec's rates may be adjusted quarterly, depending on inflation in the price of fuels, while concession rates may be adjusted twice per year. CRSE's recommended ceiling rates are first announced as provisional. Before tariff finalization, two rounds of public consultations are held, as announced in the press and on the radio, at which the well-established stakeholder groups (such as the *Patronat* representing the business community and the Association of Senegalese Consumers[5]) can share views.[6] Information presented in these public consultations is available on CRSE's webpage, although these documents do not summarize the comments received from stakeholders. Senegal's Law requires consultations with private firms, concessionaires, and consumers, and specifies outreach modalities, for tariff revisions.

Nigeria (Anglophone)

The 2005 Electric Power Sector Reform (EPSR) Act enabled private companies to participate in electricity generation, transmission, and distribution. Today, the power sector in Nigeria is largely privatized. All six of its power generation companies are private, as are most of its eleven power distribution companies. However, power transmission remains under government ownership.[7]

A few Independent Power Producers (IPPs) that were managed by the private sector before the 2005 privatization process continue to operate in Nigeria. These are presented in table 1.

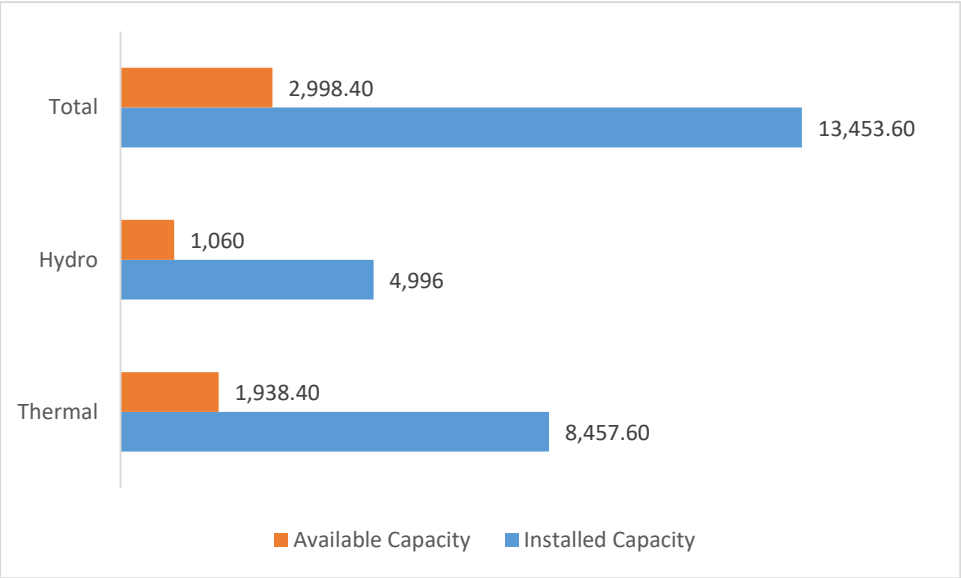
Table 1: Capacity of IPP in Nigeria

Independent Power Producers	**Capacity (MW)**
Afam VI	642
Okapi	480
Ibom Power, NESCO, and AES Barges	270

Source: https://www.nercng.org/index.php/home/nesi/403-generation

The generation sub-sector in Nigeria currently includes 23 grid-connected generating plants. The details of both the installed capacity and available capacity across both hydro and thermal sources are presented in Figure 3.

Figure 3: Generation profile



Source: https://www.nercng.org/index.php/home/nesi/403-generation

The Transmission Company of Nigeria (TCN) manages the electricity transmission network in Nigeria. Fully owned and operated by the government, TCN is responsible for electricity transmission, system operation, and electricity trading. The TCN transmission network consists of high voltage substations with a total theoretical transmission export capacity of 7,500 MW and over 20,000 km of transmission lines. Actual transmission wheeling capacity totals 5,300 MW, higher than the 3,879 MW of average operational generation capacity but far below the 12,522 of total installed generation capacity. Transmission losses average 7.4 percent across the network, high compared to the 2-6 percent benchmark for emerging countries.[8]

Prior to 2005, a state-owned monopoly known as the National Electric Power Authority (NEPA) controlled generation, transmission, and distribution of electric power in Nigeria. Following the 2005 power sector reform process, NEPA was unbundled and renamed the Power Holding Company of Nigeria (PHCN). In 2010, the Nigerian Bulk Electricity Trading Plc (NBET) was established to off-take electric power from generation companies.[9] The 2005 power reform act also established the Nigerian Electricity Regulatory Commission (NERC) as an independent regulator for the energy sector.[10]

Tariffs include the Transmission Use of System (TUOS) charge to be paid to the Transmission Company of Nigeria (TCN) by electricity distribution and retailing companies for the transportation of electricity from generators to the local bulk supply point. The TUOS is charged per unit of energy delivered and is determined through a calculation involving existing and forecast capital costs, efficient operating costs, and allowances for return on capital and depreciation (link to tariff schedule [11]).

For "consumer" business stakeholders

Participation in WAPP promises to dramatically reduce the cost of electricity. Projected to reduce electricity cost by 26% and 33% in Mali and Gambia, respectively. WAPP can thus be a game changer. Reduced cost of electricity promises to impact firm productivity and kick-start manufacturing. Hopefully, these promised outcomes lead to the types of structural transformation that prompted industrial growth in the USA after expansion of its national grid[12].

Mali (Francophone)

Energie du Mali S.A. (EDM), the only state-owned electric utility in Mali, carries out power generation and distribution. With on grid installed generation capacity of only about 310 MW serving a population of almost 18 million people, access to electricity remains a challenge for Mali.[13] The World Bank reported the access rate for electricity as about 30 percent nationally: about 55 percent in urban areas

and 18 percent in rural areas.[14] The majority of Mali's population (about 73 percent) resides in rural areas, where kerosene and dry-cell batteries currently satisfy most energy needs.[15]

Sources of power generation in Mali are currently limited to diesel and hydropower, although the country is endowed with plentiful solar and hydro potential.[16] Thermal generation, fueled by petroleum products, represents an increasingly significant portion of the power generation mix. Petroleum products are imported, which is especially costly as Mali is a landlocked country with poor transportation infrastructure.[17] However, solar potential will grow, as the Malian government recently accepted more solar power plant tenders.

Until 2006, availability of low-cost hydropower from the Manantali hydropower plan enabled the expansion of grid electricity. The government is exploring possible avenues to lower generation costs, such as building infrastructure to connect with Cote d'Ivoire, and further development of Mali's hydropower potential through the Félou regional hydropower project. This project, financed by the World Bank and completed in 2014, is capable of generating a maximum of 62.3 MW.[18]

Regulation of the energy sector is carried out by the Commission de Régulation de l'Electricité et de l'Eau (CREE) and the Direction Nationale de l'Energie (National Directorate of Energy, DNE), which falls under the Ministry of Energy (MoE). The Agence Malienne pour le Développement de l'Energie Domestique et l'Electrification Rurale (AMADER) has led impressive progress on increasing rural access to electricity from about 1 – 2 percent to 18 percent in less than a decade.[19]

As of February 2018, Mali's average energy tariff stood at USD 0.16 per kWh. Despite the fact that this does not cover costs, the tariff is still high for average Malian households and businesses, undermining competitiveness. There have been no substantial tariff adjustments since 2004, with very limited increases in 2009 and 2014.[20] EDM has also suffered, as tariffs have not kept up with rising operating costs. To maintain electricity supply, the Government of Mali has significantly subsidized EDM operating costs since 2010.[21]

Gambia (Anglophone)

The Gambia's power network is principally owned and operated by the National Water and Electricity Company (NAWEC). NAWEC generates, transmits, and distributes electricity to users. Global Electric Group, currently the only IPP operating in the country, supplies about ten percent of the power generated.[22] The country is entirely dependent on fossil fuel for electricity generation. With no known oil deposits, it relies on fuel imports.[23] Gambia's total installed capacity was 125 MW as of 2017, with access to electricity estimated to be 36% nationally and only 2% in rural areas.[24] The main power station in Kotu runs on heavy fuel oils. NAWEC also operates six small-scale power systems served by stand-alone electricity generation subsystems in provincial centers.[25]

The Ministry of Energy formulates and implements policy governing electricity supply and distribution, water management, petroleum products, and renewable energy. In 2001, the Gambia Public Utilities Regulatory Authority Act created the Public the Utilities Regulatory Authority (PURA). The PURA structure emerged from the Private Sector Participation and Regulatory Framework for The Gambia study, funded by the Public Private Infrastructure Advisory Facility (PPIAF).[26] PURA is responsible for guidelines on rates and fees, promoting fair competition, and monitoring and enforcing performance standards, among other regulatory activities.[27] PURA advises the Ministry of Finance, which evaluates the financial implications of policy proposals and provides recommendations to the President.[28]

In 2006, the Government passed an Electricity Law to promote cost-effective generation, transmission, and distribution of electricity, set standards for electrical services, determine appropriate tariffs, and enable the planned transition to a private investor controlled and operated electricity sector.[29]

At USD 0.212/KWH, power tariffs in The Gambia are relatively high compared to its neighbors. This represents an obstacle to power access for households and restricts economic growth. Tariffs are low relative to NAWEC's variable costs, contributing to the financial distress suffered by the power producer in recent years.[30]

Challenges

For "consumer" business stakeholders

While WAPP promises to reduce the cost of electricity, it is not evident that the reduced cost of electricity will be fully passed on to firms. Power sectors in countries such as Mali and Gambia face a number of inefficiencies, including;

Monopolistic market structure of power sector utilities

National power providers have notable dominance in national politics. As noted in the case studies above, except for Nigeria, most utilities are monopolies, viewed as the backbone of the economy. As a result, adhering to WAPP rules and regulations is less attractive on the ground of national security and sovereignty. This is a poor basis for competitive investments in regional energy trade. Energie du Mali, for example, is continuously on the brink of bankruptcy, while national elites and government officials continue to treat the national energy sector as a self-service buffet for cheap electricity and/or lucrative but uncompetitive business opportunities (Medinilla et al., 2019). As a result, countries continue to seek bilateral agreements for access to power, which increase the risk of undermining the WAPP movement.

Poor national infrastructure

WAPP progress in infrastructure development has been limited. Only six out of the 25 planned priority projects have been completed, with three more under construction for the 2007-2017 period16 (Ki, 2017). The current installed capacity amounts to 14,091 MW of which only around 60% (ca. 8,458 MW) is fully functional in a context where the demand is estimated to be around about 22,000 MW (ICA, 2011). This gap between the demand and the offer is exacerbated by high commercial and technical losses estimated at 21.5% in West Africa in 2010 (ECREEE, 2014). In addition, the poor state of national grids and markets, both in net producing and net consuming countries remains a major obstacle for further integration (Karaki, 2017), and explains the gap between installed generation capacity and operating capacity. In fact, high transmission and distribution losses of 25% in places such as Cote D'Ivoire mean actual supply will have a difficult time meeting demand. Dwindling gas supplies may force gas-fired power plants to use distillate diesel oil as backup fuel, significantly raising production costs.

High inefficiencies, hidden costs, and subsidies

Utilities are saddled with high inefficiency levels as captured by the Quasi Fiscal Deficit (QFD). Huenteler et al. (2017) defines QFD as a measure of the contingent liabilities incurred from underpricing of electricity; i.e., the difference between actual revenue (charged and collected) and the revenue required to cover full costs of service provision and depreciation. The QFD takes the reduced form: QDF = Cost of underpricing of electricity + Cost of nonpayment of bills + cost of excessive line losses + Utility overstaffing. Across the continent, the QFD was equivalent to US$21 billion in constant 2014 U.S. dollars, or 1.5 percent of current GDP (Trimble et al, 2016). On a per kWh basis, the median QFD is $0.10 per kWh sold (roughly 50% of tariff rates), suggesting that with no change in operational performance or underlying cost structures, tariffs would need to increase by this amount in order to achieve financial viability. Without financial viability, it will be challenging for countries to trade electricity as importing countries will not meet their financial obligations and exporting ones may ask domestic consumers to pay for part of the export cost in the form of higher tariffs. The monopolistic nature of national utilities, subsidies to utilities, and limited private sector involvement are some of the root causes of high QFD.

For "producer" business stakeholders

We note three challenges that may undermine power sector investment by power sector businesses.

The critical components to complements electricity infrastructure to ensure returns to investment is lacking

Electricity generation provides the highest returns to private sector investment in the power sector. However, this electricity must be transmitted and distributed to consumers. Within the WAPP context, limited transmission lines across countries and high levels of distribution losses due to the dilapidated distribution lines threaten the profit margin of electricity generation firms. Observers estimate that distribution losses are about 25% in West Africa.

Limited capabilities, especially for local firms

Firms need strong managerial capabilities to invest successfully in West Africa's power sector. However, many private West African firms lack the managerial capabilities needed to manage large projects. The weak rule of law observed in West Africa triggers mistrust, and discourages family-owned firms from use of professional managers.

Limited capabilities to implement key power sector policies

The EM index for West African countries reflects their weak government capabilities. Most West African countries fall under the early or dormant EM index classifications. West Africa performs least well in the three EM index dimensions of infrastructure and connectivity, financial sector development, and institutional quality[31].

Where do we go from here?

Most WAPP countries now fall in either the early or dormant EM classification. Improved reliability and cost of electricity has the potential to drive their economic transformation. Wages in Africa are competitive. Electricity is comparatively expensive. Access to high-quality electricity will increase the competitiveness of light manufacturing in West Africa. Investors should view this as a potential business opportunity. Cheaper and more reliable power will allow labor-intensive light manufacturing in West Africa to compete with Asia. Producers can exploit West Africa's cultural and geographic proximity to key markets including the EU and North America. Once WAPP is fully operational, investors can consider investing in areas with strong industrial policies, such as Ghana's one district one factory model. Business stakeholders can use such perks to fine-tune their investment strategies.

For business in the power sector value chain, the WAPP website lists a number of projects requiring finance. Some of these projects have already conducted detailed feasibility studies that highlight their potential rates of return[32]. Investors should consider investing in some of these projects, as demand for electricity in West Africa will continue to rise, due to the growing middle class and the region's initiatives to promote economic transformation. African governments increasingly accept design, construct, and maintain contracts to support local investors. These trends should provide lucrative opportunities to interested producer stakeholders[33]. To overcome the challenges listed earlier, investors can work with key donors such as the World Bank or the African Development Bank who have experience setting up Public Private Partnership (PPP) to facilitate private sector participating in the power sector.

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Editor: Dr. A. Lee Gilbert

Editor-in-chief: Prof. Sam Park

References

[1] The average number of outage for each customer served
[2] The average outage duration for each customer served
[3] Until 2011 CRSE enforced a 2% penalty against Senelec for failure to deliver the volume of gigawatt hours promised. In 2011, the penalty was suspended, pending Senelec's return to financial solvency. Today, according to CRSE, interruptions of service due to lack of fuels are far less frequent than they once were.
[4] CRSE was also authorized to set rates for *gestionnaires délégués transitoires* (GDTs) in Decision No. 2005-01. GDTs are temporary actors responsible for oversight of public works and customers in concession areas not yet awarded to a rural electrification concessionaire.
[5] During a particularly difficult period of electricity interruptions in June 2015, the Association formally visited the Minister of Energy to register their members' concerns about power reliability. http://www.ascosen.org/milnews.php?subaction=showfull&id=1434224833&archive=&start_from=&ucat=1&.
[6] For example, see CRSE's press release regarding a public consultation on proposed revision of Senelec's tariffs for 2014-2016, http://www.crse.sn/1ere-consultation-publique-sur-la-revision-des-conditions-tarifaires-de-senelec-2014-2016, date is unknown. A small number of women appear to have attended and contributed to the presentations.
[7] https://www.nercng.org/index.php/home/nesi/401-history
[8] https://www.nercng.org/index.php/home/nesi/404-transmission
[9] https://www.nercng.org/index.php/home/nesi/401-history
[10] Ibid.
[11] https://nerc.gov.ng/index.php/home/myto/407-transmission-tariff
[12] https://www.nber.org/papers/w26477?utm_campaign=ntwh&utm_medium=email&utm_source=ntwg27
[13] https://www.usaid.gov/powerafrica/mali
[14] http://documents.worldbank.org/curated/en/777531468000904441/pdf/AB7707-PID-P148355-Concept-Stage-Box394827B-PUBLIC.pdf
[15] http://documents.worldbank.org/curated/en/777531468000904441/pdf/AB7707-PID-P148355-Concept-Stage-Box394827B-PUBLIC.pdf
[16] https://www.usaid.gov/powerafrica/mali
[17] http://documents.worldbank.org/curated/en/777531468000904441/pdf/AB7707-PID-P148355-Concept-Stage-Box394827B-PUBLIC.pdf
[18] http://documents.worldbank.org/curated/en/777531468000904441/pdf/AB7707-PID-P148355-Concept-Stage-Box394827B-PUBLIC.pdf
[19] http://documents.worldbank.org/curated/en/777531468000904441/pdf/AB7707-PID-P148355-Concept-Stage-Box394827B-PUBLIC.pdf
[20] http://documents.worldbank.org/curated/en/864571522875815839/text/Concept-Project-Information-Document-Integrated-Safeguards-Data-Sheet-Mali-Electricity-Sector-Improvement-Project-MESIP-P166796.txt
[21] http://documents.worldbank.org/curated/en/777531468000904441/pdf/AB7707-PID-P148355-Concept-Stage-Box394827B-PUBLIC.pdf
[22] https://www.seforall.org/sites/default/files/Gambia_RAGA_EN_Released.pdf
[23] https://wedocs.unep.org/bitstream/handle/20.500.11822/20510/Energy_profile_Gambia.pdf?sequence=1&isAllowed=y
[24] https://www.export.gov/article?id=Gambia-Energy
[25] https://2012-2017.usaid.gov/powerafrica/gambia
[26] http://www.accessgambia.com/information/pura.html
[27] http://www.accessgambia.com/information/pura.html
[28] http://documents.worldbank.org/curated/en/218681468036331274/pdf/PID-Print-P152659-02-09-2015-1423498631171.pdf
[29] http://documents.worldbank.org/curated/en/218681468036331274/pdf/PID-Print-P152659-02-09-2015-1423498631171.pdf
[30] http://documents.worldbank.org/curated/en/218681468036331274/pdf/PID-Print-P152659-02-09-2015-1423498631171.pdf
[31] https://nbs.ntu.edu.sg/Research/ResearchCentres/CEM/Research/Pages/Annual-Emerging-Market-Rankings.aspx
[32] http://www.ecowapp.org/en/documentation
[33]https://www.uneca.org/sites/default/files/PublicationFiles/enhancing_domestic_private_sector_development_in_africa_eng_rev1.pdf

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Nanyang Centre for Emerging Markets

The Nanyang Centre for Emerging Markets (CEM) is a new initiative by Nanyang Business School to establish global thought leadership on business-related issues in emerging markets. It conducts research on pressing and timely business issues in emerging markets through a global research platform of leading scholars and institutional partners. It closely interacts with corporate partners to identify research topics and manage the research process. Its research outputs include valuable and relevant implications for sustained profitable growth for local and multinational companies in emerging markets. It delivers a variety of research reports and organizes forums, seminars, CEO roundtables, conferences, and executive training programmes for broad dissemination of its research outputs.
http://www.nbs.ntu.edu.sg/Research/ResearchCentres/CEM

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