

# Electricity Market Reform in Sub-Saharan Africa and the Power Africa Initiative: The Nigerian Case

By Gbadebo A. Oladosu

## Introduction

Electricity is an important modern energy source for human development (Alstone, et al, 2015; Pasternak, 2000). Thus, socio-economic development in Sub-Saharan Africa faces a daunting barrier given that the region has the lowest electricity generation capacity in the world. Rosnes and Shkaratan (2011) estimated that infrastructure weaknesses in Sub-Saharan Africa, with electricity been the most critical, reduce per capita economic growth by an average of 2%. This paper focuses on the Nigerian electricity sector as an archetype of the Sub-Saharan Africa region. At a current population of about 180 million persons or 1 in 5 of Sub-Saharan Africa's population in 2014 the Nigerian electricity market is potentially large. The 2015 World Population Prospects (United Nations, 2015) suggests that half a billion persons will live in Nigeria by 2050. The economy is currently the largest in Africa and 22<sup>nd</sup> largest in the world with a nominal GDP of about \$570 billion in 2015. A 2011 Citigroup report identified Nigeria as one of the 11 top global growth generators (Weisenthal, 2011). Figure 1 shows data on population, gross domestic product and electricity generation capacity for Nigeria and ten comparable countries in the global GDP ranking (5 above and below), as well as for five other African countries. Apart from Kenya, Nigeria has the lowest generation capacity among all 16 countries, as well as generation capacity per capita and per dollar of the GDP. Total public electricity generation capacity is only 6 GW or less than one-third of the minimum requirement for a medium level of human development in a country with the same population. To make up for the shortfall in electricity supply, Nigerians spend nearly \$500 million annually to import electric generating sets, with half of these on 1.6 million small spark ignition engines (see Figure 2) in 2013 (COMTRADE, 2015). The total number of generators in Nigeria has been estimated at about 60 million (Adeyemo, 2012). The issues underlying the parlous state of the Sub-Saharan electricity sector have been highlighted by many studies (see Rosnes and Shkaratan, 2011; Iwayemi, 2008; Adenikinju, 2003; Makwe et. al., 2012). The rest of this paper describes the state of reform efforts in the Nigeria electricity sector, discusses the requirements for success, and highlights the crucial role of international initiatives such as the United States' Power Africa.

## The State of Electricity Sector Reforms in Nigeria

After his inauguration in 1999 the president of Nigeria's new democratic republic stated that "We cannot be talking about creating a conducive environment for foreign investments if the performance of our transport, telecommunications and energy sectors remains dismal and epileptic." (Ndukwe, 2005; italics mine). However, efforts to reform the electricity sector lagged until 2005 when the Electric Power Sector Reform Act (EPSRA) was enacted. The National Electric Power Authority (NEPA) was replaced by the Power Holding Company of Nigeria (PHCN) under the Bureau of Public Enterprises as an initial phase towards privatizing the sector. Manitoba Hydro International (MHI) was engaged as a management contractor for the public Transmission Company (TCN) of Nigeria in 2012, and 6 generation and 11 distribution companies were privatized in 2013. The interface between the generation and distribution companies is to be managed by the Nigerian Electricity Bulk Trader (NBET). Figure 3 shows the 11 private distribution companies and their coverage areas.

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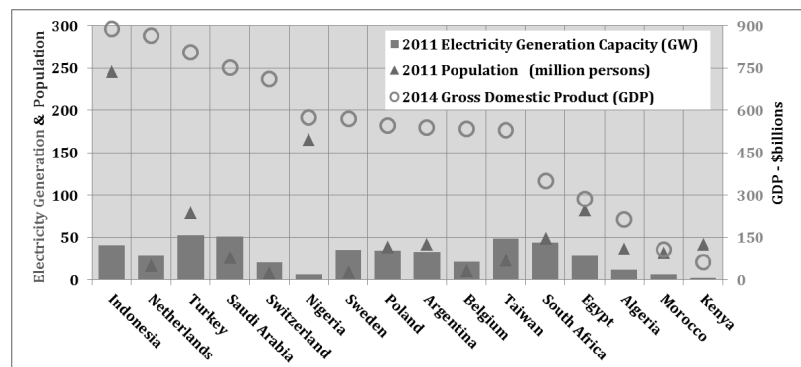


Figure 1. Electricity generation capacity, population and GDP in Nigeria and peer economies.



Figure 2. Generating sets in Lagos Nigeria (Source: Adeyemo, 2012).

Expenditures by the government in the electricity sector since 1999 have been estimated at \$16-\$32 billion (Eboh, 2013). Although the total installed capacity has changed little, the operating capacity now peaks at more than 4.5 GW compared with less than 2 GW in 1999. Thus, most of the expenditures since 1999 were on repairing and replacing obsolete generation, transmission and distribution system components dating back to the 1970s. The operable capacity and transmission system continue to be subject to inefficiencies and outright system collapse, but there are signs of improvements. According to a recent statement the TCN, in partnership with its management contractor, has “achieved a wheeling capacity of 5,300 MW and reduced system losses from over 12 percent to approximately eight percent. In addition, system collapses have reduced significantly, from 22 in 2013 to 9 in 2014, while the duration of collapses has reduced from more than 2.5 hours to approximately 30 minutes” (Alike, 2015).

A major aspect of the electricity reform effort is the Multi-Year Tariff Order (MYTO), designed to raise tariffs gradually over four years starting in July 2009 with the aim of reaching cost-reflective tariffs in 2011 (Ajayi, et al., 2013; Tallapragada, 2009). However, this was based on a number of assumptions, including raising the generation capacity to 10 GW (by 2010) and reducing technical, non-technical and revenue collection losses from 45% to 30%. The MYTO also includes a 15-year forward view of tariffs to provide stability for investors in the electricity sector. Although progress has been made in system efficiency, the inability to raise generation capacity to 10 GW, five years past the due date, means that the objectives of the MYTO could not be met. Moreover, revenue collection remains highly inefficient. Under the reforms, the government is providing subsidies, managed by the NBET, to cover the difference between costs and revenues until the full cost of electricity supply can be passed on to consumers.

### The Power Africa Initiative

The above makes clear that electricity sector reforms in Nigeria since 1999 have been slow, and has met with limited success. In this context, the “Power Africa” initiative of the United States government appears to be a much needed intervention. The Power Africa program was launched by President Obama in 2013, and has the goals of adding more than 30 GW of cleaner, more efficient electricity generation capacity, and 60 million new home and business connections across sub-Saharan Africa (The White House, 2015). The program involves 12 agencies of the United States government, the World Bank, African Development Bank (ADB), African governments, the government of Sweden and private sector partners. The United States government has committed \$7 billion to provide financial and technical support, and loan guarantees under the Power Africa initiative. The Power Africa initiative has helped to support transactions and commitments for nearly 7.5 GW of generation capacity in its six focus countries of Ethiopia, Ghana, Kenya,

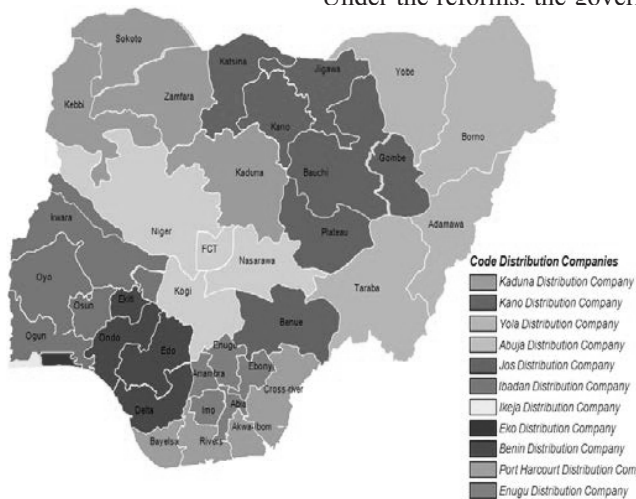


Figure 3. Privatized distribution utilities in Nigeria and coverage areas (Source: Ajayi, et al., 2013).

Liberia, Nigeria and Tanzania, involving nearly \$20 billion from the private sector. Some of Power Africa’s activities in Nigeria include financial and technical support for the privatization of the generation and distribution components of the electricity system, including the provision of \$1 billion in long term capital expenditure support for 10 distribution companies. Other contributions include technical support on the power purchase agreement for a new 450 MW power plant (USAID, 2015). On the eve of President Obama’s recent visit to Africa a number of commentators appraised the two years of the Power Africa initiative. In a New York Times article Ron Nixon (2015) stated that “Two years later...the reality of Power Africa’s promise bears little resemblance to the president’s soaring words. It has yet to deliver any electricity.” While conceding that many of the deals under the Power Africa initiative were achieved because they were already in the works, officials in charge of the initiative have appropriately noted that “the program was intended to provide incentives and support to help foster private investment, rather than to function simply as an aid program”. The questions then are: Are the objectives of Power Africa in line with the requirements for a successful reform of the Nigerian and Sub-Saharan electricity sector? If so, how can the Power Africa initiative help to accelerate these reforms?

### Requirements for Success in Reforming the Nigerian Electricity Sector

Of the three critical sectors identified for reform by the Nigerian president in 1999, only the telecommunications sector can be judged to have been successful. The National Telecom Policy of 2000 sought to increase telephone lines from less than 600,000 in 1999 to 9 million by 2005. Although there are

many remaining issues in the industry, total connections exceeded the target by more than 2 million lines by 2005, and currently stand at more than 110 million lines (Mawoli, 2009). Cumulative private investment in the Nigerian telecommunications industry since 2001 has been estimated at \$32 billion (Adepetun, 2014). The success of telecommunications reform in Nigeria offers lessons for the electricity sector. On the positive side, similarities between the pre-reform conditions of the two sectors imply that electricity sector reforms can be successful. Similarly, the continued flow of investments into the Nigerian telecommunications sector means that private investments will also flow into the electricity sector, if requisite conditions can be met. Lastly, as with telecommunications, a successful reform of the electricity sector will likely exceed projections. On the negative side, the slow pace of reforms in the electricity sector reflects a far more complex supply chain relative to the telecommunications sector, and the extent of the required reform. In addition, the disposition of the government to public ownership of critical sectors of the economy has changed little despite the long-standing history of technical inefficiency, weak management, and corruption. Rosnes and Shkaratan (2011) identified success factors for independent power plants, which provide an outline of requirements for successful electricity sector reform in Sub-Saharan Africa, including policy reforms, a competent and experienced regulator, timely and competitive bidding and procurement process, good transaction advice, a financially viable off-taker, a solid power-purchase agreement, appropriate credit and security arrangements, availability of low-cost and competitively priced fuel, and development-minded project sponsors. In the Nigerian case these factors recommend the following areas for immediate action:

- **Firm Commitment to a Private Sector-led Electricity Sector:** The government of Nigeria would need to re-commit to private sector led growth, not only in the electricity sector, but throughout the economy. Nigeria's potentially large electricity market meets a primary condition for creating a successful private electricity market. The privatization of generation and distribution companies is laudable. However, the new president has already been urged to reverse the privatization process or at least take 59% ownership, instead of 49%, in these companies in order to "have control in the running of such power assets across the country" (Okpara, 2015). Also, the management contractor for the TCN recently threatened to pull out of its contract over disputes about revenue management procedures and non-payment of its fees (Abdulhamid, et al, 2015). These indicators raise the danger that the newly privatized system may fall victim to political meddling and corruption. Needless to say, any fraud in the privatization process should be corrected, but this should be done with a view to minimizing uncertainties that would result from a wholesale reversal or re-acquisition of privatized assets. This could be debilitating to the entire sector in the short- and long-term. Collier and Cust (2015) have outlined in some detail options for increasing private financing for infrastructure in Africa. The government's role and funding would be to help de-risk the market and support private investment, rather than as direct investors in the market. Used this way the government's expenditure of \$16-\$32 billion in the electricity sector since 1999 could have geared up private investments many times greater and increased electricity generation significantly. This approach is also appropriate given that the economy is potentially facing a long period of low oil prices and needs to prevent the dependence on sovereign debts that were responsible for the devastating debt overhang of the 1980s and 1990s.
- **Technically Sound Regulatory Agency with Political Authority:** As a natural monopoly the electricity sector is vulnerable to rent-seeking behavior. Thus, the role of a market regulator is indispensable in the formation and day-to-day running of a private electricity market. The regulator serves the triple role of implementing the government's market de-risking programs, monitoring performance, and protecting consumers against exploitation. Although the brief of the Nigerian regulatory agency, NERC, includes promoting competition and private sector participation, its main effort so far has been to administer the MYTO, which consumers have described as producing "crazy bills". The fixed electricity charge in the MYTO is particularly vexing to consumers because it must be paid even when consumers do not receive any electricity. Thus, the charge is essentially a perpetual "electricity connection tax" that consumers not only see as unfair, but has the real consequences of increasing payment defaults, electricity stealing, and discouraging connections. No doubt there is a critical need to reform the distribution, revenue collection and end-use parts of the system, including a re-design of the MYTO that balances the interests of electricity suppliers and buyers. For this purpose, the technical capabilities of the Nigerian electricity regulator would need to be greatly enhanced, hand in hand with its authority, to oversee the industry. The regulator would need to develop analytical capabilities, including identification

of risks to investment, implementation of de-risking programs, and monitoring of developments in the sector through the development of databases on technologies, resources and system performance. The regulator would also play a crucial role in identifying the manpower requirements of the electricity sector, and designing training programs and certifications. With the regulator adequately equipped and empowered the need for the government to re-insert itself into the electricity market as a direct investor would be eliminated.

- **Recognition of the Crucial Role of Technologies:** The role of technology in reforming the Nigerian electricity supply chain will be crucial. Perhaps, the single most important reason for the success of telecommunications reforms in Nigeria was the maturity of the GSM 2G protocol (Global System for Mobile Communications) which enabled operators to by-pass the moribund publicly controlled land-lines and inefficient mobile systems. As a result, while the telecommunications policy envisaged 5 million fixed and 4 million mobile lines, the outcome of the reforms produced only 1 million fixed lines and 11 million mobile lines by 2005. Although electricity systems that can by-pass the current land-tied transmission and distribution used today are many decades away, the immature state of the current Nigerian electricity system offers opportunities to integrate more efficient technologies as it develops. Distributed generation technologies in particular have the advantage of less capital intensity and faster deployment that could help accelerate the increase in generation capacity (Alstone et al., 2015). Given the lack of the required domestic technical capacities, much of these technologies would need to be obtained through private investments and other international arrangements. However, minimum domestic competencies would be needed to operate the technologies and adapt them to the unique geographical and cultural environment for electricity supply and demand in Nigeria.
- **Innovative Approach to Infrastructure Security:** Stakeholders in the Nigerian electricity industry agree that the disruption of fuel supply, particularly natural gas, to power plants is a critical impediment to successful reforms (Bala-Gbogbo, 2015; USDOS, 2013). A recent compilation of stories related to the vandalism of energy infrastructure in Nigeria shows that it bears a significant responsibility for the wide fluctuation in available generation capacity (The Nation Newspaper, 2015). The issue of infrastructure vandalism is tied with broader conflicts in the management of natural resources in Nigeria. As such, efforts to reduce tensions in the affected regions will contribute to the assurance of energy supplies. In addition, the government and regulators would need to enforce infrastructure security procedures, and industry stakeholders would need to employ innovative technologies for protecting the electricity infrastructure. Diversification options can help minimize fuel supply disruption risks and should be a basic design criterion in electricity supply plans in Nigeria, making the case for distributed generation even stronger.

#### **What Role for the Power Africa Initiative in Sub-Saharan Electricity Sector Reforms?**

The objectives and the modalities of the Power Africa initiative appear to fit well with the requirements for successful electricity reforms in Nigeria as outlined above. The Power Africa program is aimed at providing risk-insurance, credit enhancements, grants, technical assistance and investment promotion, which are needed, but are areas of critical weakness, in Sub-Saharan Africa's quest for private investments in electricity supply. In addition, the Power Africa program seeks to promote electricity access through small-scale energy solutions (USDOE, 2015), which also falls in line with the significant role that distributed generation technologies could play to increase electricity supply. Comments on the lack of visible impacts two years into the program reflect the enormous challenges of electricity sector reforms, as well as the fact that electricity infrastructure is capital intensive and evolves slowly. The catalyst role of the initiative has increased the chance that existing plans will succeed. Thus, the Power Africa program, building on these short-term achievements, would help to accelerate the increase in electricity supply in the region. The Power Africa, and similar initiatives, could also help advance electricity sector reforms by providing support for the technical capabilities of the regulatory agency and the domestic manpower needed for industry operations.

#### **Conclusions**

With the lowest regional generation capacity in the world improvements in electricity supply is critical to socio-economic development in Sub-Saharan Africa. On the one hand, Nigeria, with its potentially large electricity market, provides an archetype of the parlous state of the sector in Sub-Saharan Africa. On the other hand, successful electricity reform in Nigeria can be the nucleus for powering surrounding

nations with smaller markets. The electricity sector in Nigeria had been dominated by technically inefficient and weakly administered public utilities, but the government has taken a number of laudable, if belated, steps to build a private-led electricity supply system. These reform efforts would need to be sustained and enhanced, including the empowerment of a technically sound regulatory agency. The support of international initiatives, typified by the United States' Power Africa would be crucial to gearing up private investment and developing the required technical capabilities for industry operation. With these components the prospects for successful electricity reforms in Nigerian and Sub-Saharan Africa are good, and can be the crucial linchpin to putting the region on the path of sustainable development. Private investors and Nigerian citizens stand to benefit from the resulting competitive returns to investments and improvements in socio-economic activities.

*Contact author for references.*

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