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14. ABSTRACT Nigeria has long recognized the need to support entrepreneurial business growth to reduce its severe levels of poverty and improve socioeconomic stability. Attempts to provide this support have been largely ineffective, due in large part to the poor state of Nigerian electrical power infrastructure. In 2010 Nigeria renewed emphasis on improving its power sector, including privatization of the formerly state-run system, but this current plan requires several adjustments to optimize its ability to increase socioeconomic security. Nigeria must increase its focus on improving electrical service in the North, the area of highest instability. With the predominance of the Northern population residing in rural areas, the privatization of the existing state-run electrical distribution companies into commercial activities will not deliver the expected results. Implementation of co-operative associations (co-ops), modeled after US Rural Electrical Associations, would be more effective at expanding electrical service into rural areas. Co-ops are grassroots, community-based organizations that would also fit well in the Nigerian socioeconomic context and possess several advantages over purely commercial distribution companies. The US government and US Africa Command can assist Nigeria to develop co-ops by leveraging expertise from the US National Rural Electrification Cooperative Association and brokering agreements with US electrical equipment manufacturers. Now is the time to enact these recommendations, as Nigeria currently is re-establishing its Rural Electrification Agency, has just broken ground on a new national power training institute, and is completing the transition of the existing distribution companies to private control in 2013.					
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**NAVAL WAR COLLEGE
Newport, R.I.**

**“POWER TO THE PEOPLE:
DEVELOPING ELECTRICAL CO-OPS TO IMPROVE STABILITY
IN NIGERIA”**

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

02 November 2012

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Abstract

Nigeria has long recognized the need to support entrepreneurial business growth to reduce its severe levels of poverty and improve socioeconomic stability. Attempts to provide this support have been largely ineffective, due in large part to the poor state of Nigerian electrical power infrastructure. In 2010 Nigeria renewed emphasis on improving its power sector, including privatization of the formerly state-run system, but this current plan requires several adjustments to optimize its ability to increase socioeconomic security. Nigeria must increase its focus on improving electrical service in the North, the area of highest instability. With the predominance of the Northern population residing in rural areas, the privatization of the existing state-run electrical distribution companies into commercial activities will not deliver the expected results. Implementation of co-operative associations (co-ops), modeled after US Rural Electrical Associations, would be more effective at expanding electrical service into rural areas. Co-ops are grassroots, community-based organizations that would also fit well in the Nigerian socioeconomic context and possess several advantages over purely commercial distribution companies. The US government and US Africa Command can assist Nigeria to develop co-ops by leveraging expertise from the US National Rural Electrification Cooperative Association and brokering agreements with US electrical equipment manufacturers. Now is the time to enact these recommendations, as Nigeria currently is re-establishing its Rural Electrification Agency, has just broken ground on a new national power training institute, and is completing the transition of the existing distribution companies to private control in 2013.

INTRODUCTION

Since Nigeria's independence in October 1960, it has suffered through a long period of instability. Political leadership has alternated multiple times between civilian and military rule, and through the constant power struggles corruption within government has become the norm.¹ Although the Government of Nigeria (GON) has been relatively stable under its current democratic constitution, Nigeria has continued to endure armed insurgencies in both the southern Niger River Delta and northeastern states. Religious and cultural divides between the predominantly Muslim north, Christian south, and over 250 interspersed ethnic groups add to the tension.² Nigeria is beset by problems of economic inequality, with over 60% of the population living in poverty.³ Despite an average economic growth rate of 8% between 1999-2009, the economic equality gap actually increased, further increasing the strains between the "haves" and "have nots."⁴

Nigeria recognized this enormous economic disparity as one of the main drivers of instability and in 2004 published its "NEEDS" strategy to address these concerns. The NEEDS strategy promoted development of small, entrepreneurial businesses to reduce the "have-to-have not" gap.⁵ The NEEDS plan attained only limited success; one of the most visible barriers has been the unreliability of the Nigerian electrical power supply.⁶ It is difficult to run an effective business if the owner cannot predict when he will have power to turn on the lights.⁷ Entrepreneurial businesses are inherently fragile and thus extremely susceptible to this volatility. The GON has embarked on an ambitious plan to address the deficiencies in the electrical system, but the roadmap is not optimized to promote economic stability. It does not focus enough on northern Nigeria, the area most devoid of power infrastructure, with the highest incidence of poverty and the largest remaining instability.⁸

Because of the predominantly rural population in the North, the GON must also adjust its distribution company (DISCO) privatization scheme. To promote small business growth and reduce socioeconomic instability, Nigeria must modify its current power sector development roadmap to refocus on the North and enable development of local energy distribution co-operatives (co-ops) modeled after US Rural Electrification Associations.

STATUS OF NIGERIAN ELECTRICAL INFRASTRUCTURE

Nigeria's electrical infrastructure is dilapidated at best. All three major elements – generation, transmission and distribution – have severe shortcomings. The GON currently owns and operates the power sector; over time this has fostered inefficiencies and corruption. The GON spends about \$2 billion annually on electricity, yet the infrastructure is falling apart.⁹ Only 35-50% of Nigerians have access to electricity.¹⁰ Those that do are beset by frequent power outages, with manufacturing firms losing up to two-thirds of available work hours due to power interruptions.¹¹ As a result, locals refer to the government-run Power Holding Company of Nigeria (PHCN) as “Please Have Candle Nearby.”¹²

Despite a seven-year focus on the energy sector under the NEEDS program, Nigeria's power generation has not significantly improved.¹³ Total power generation is about 4400 megawatts (MW) against a requirement of 80,000 - 150,000 MW (Figure 1).¹⁴ The majority of existing and proposed power plants are gas-fired and are located in the southern half of the country near the fuel sources to minimize the length of gas pipelines (see Figure 2). But the gas-powered plants have been beset by chronic fuel shortages and therefore operate at only a fraction of designed capacity.¹⁵

Because most of Nigeria's power generation occurs in the South, the transmission infrastructure becomes vital for transporting energy to the rest of the country; unfortunately,

it too is in a state of disrepair. The system is outdated and suffers about 10% power loss.¹⁶ The lines are frequently sabotaged; both insurgents and “alternative power” (backup diesel generators and the associated fuels) interests have been accused of this “vandalism.”¹⁷ The transmission system tends to be more dense in southern Nigeria (see Figure 3), with many areas in the North only connected through a single point of failure, if at all.¹⁸

In those areas connected by the transmission system, the distribution systems are obsolete, with up to 33% energy losses.¹⁹ Seventy-five percent of Nigeria’s population lives in rural areas, yet only ten percent of rural households have power available.²⁰ Where electricity is accessible, the metering systems are inadequate. Because the DISCOs cannot tell where power drains originate, Nigerians are able to tap into the power lines and steal electricity.²¹ Even those connected legally can receive free electricity, because the PHCN collects only 66% of its bills.²² As a result, over time Nigerians have developed a culture where electricity is considered a “right” and therefore paying the electric bill is optional.²³

The GON has long recognized the issues plaguing its electrical power sector, but to date the steps it has taken have been unsuccessful at correcting the problems. In 2005 the Nigerian legislature passed the Electric Power Sector Reform (EPSR) Act, directing the GON to privatize the energy infrastructure by 2007 – but the privatization process is still ongoing.²⁴ The delay was largely due to lack of a business-friendly market resulting from severe government regulation and physical insecurity caused by insurgents.²⁵ Other resistance stemmed from labor unions and the robust “alternative power” market; disputes over ancestral land rights; and the poor status of paved roads (required to transport heavy electrical substation equipment).²⁶ The EPSR also created the Nigerian Rural Electrification Agency (REA) to focus on rural energy development. The REA faced its own challenges, as

President Umaru Musa Yar'Adua disbanded it in 2009 as a result of a ₦5.2 billion scandal.²⁷ Attempting to remedy this lack of progress and rejuvenate momentum, the GON published a new “Roadmap For Power Sector Reform” in 2010 and re-established the REA in 2012.

The government’s reform plans are extremely ambitious. The roadmap privatizes power generation and calls for increased capacity up to 40,000 MW by 2020. Nigeria has achieved only 33% power generation growth over the past seven years, so demanding an increase of 1000% in the next eight is highly optimistic.²⁸ That being said, the GON has recently negotiated commitments to build over 24,000 MW in new power plants (these are in addition to the developmental plants identified in Figure 2).²⁹ To disseminate all this new energy, the GON has proposed creation of a “super grid” to improve transmission.³⁰ Two years into this plan, roadmap execution is already severely behind schedule, so it remains to be seen how many of these projects will materialize into concrete results.³¹ Even more concerning is that even if the plan achieves its desired goals, it completely misses the opportunity to address several key areas important for long-term economic stability.

POWERING STABILITY

As mentioned at the outset, electricity availability is vital to enable development of small entrepreneurial businesses; these small businesses are, in turn, key to improving stability by reducing economic disparity. Although the GON has recognized this linkage, the Nigerian Roadmap For Power Sector Reform misses the opportunity to optimize its efforts towards achieving this desired effect.³² The plan fails to focus on improving conditions in northern Nigeria, and its solution for the distribution dilemma is to privatize the function solely to commercial interests. As a result, the plan will not meet the needs of Nigeria’s rural populace in a timely manner.

Northern Exposure

With the recent success of the amnesty agreement between the GON and the Niger Delta insurgents, the largest area of remaining instability is in northern Nigeria.³³ The most obvious is the Boko Haram insurgency in the northeast, but tensions exist throughout the North. The predominance of the Islamic religion and the establishment of Shari'a law in twelve northern states (Figure 4) creates religious friction. The recent election of "southern" President Goodluck Jonathan, despite an informal power-sharing arrangement that dictated it was the "North's turn" to win the presidency, has created political friction.³⁴ Economic friction stems from the fact the North is very agricultural and many northerners believe GON policies favor large industries (in particular the petroleum industry, predominantly located in the South), leading to "economic marginalization."³⁵ As pointed out by John Campbell, a former US Ambassador to Nigeria, these sources of tension converge to make northerners feel the GON demonstrates a "lack of sensitivity to northern concerns."³⁶

Reformation of the Nigerian power sector provides a tremendous opportunity to alleviate some of these tensions, yet the Roadmap for Power Sector Reform nearly completely misses the mark; it is very "southern focused." Almost all the new power plants are being built in southern Nigeria (see Figure 2), meaning the new jobs will go south, too. Examination of the preliminary plans for the new "Super Grid" transmission system (Figure 5) shows that the Super Grid will really just increase the capacity and improve redundancy of the existing electrical grid – it does not increase the number or location of substations (i.e., density of potential connection points) in northern Nigeria. The apparent exclusion of the North from these perceived benefits may actually increase the North/South divide. Thus, to reduce the existing geographic tensions, the GON must revise aspects of the energy sector roadmap to improve benefits for the northern states.

However, as Nigeria revises its plans to focus on the North, it must be careful not to overreact, particularly in the area of power generation. From a purely engineering standpoint, as well as the job creation argument made above, it is better to distribute power generation across the country.³⁷ As a result, much has already been written regarding the potential development of renewable power plants – primarily wind power – in the North.³⁸ However, from a perspective focusing purely on improving Nigerian socioeconomic stability, maintaining the predominance of power generation in the South is prudent. Preserving the North’s dependence on the South for electric power generation can quell potential secessionist tendencies, actually increasing the overall national stability. Obviously, there are both positives and negatives to expanding power generation in the North; this is a delicate balance the GON must maintain.

The Distribution Dilemma

Independent of where Nigeria decides to place its power generation facilities, improving the electrical distribution system is vital to promote small, entrepreneurial businesses. Even if Nigeria reaches its goal of generating 40,000 MW by 2020, that power is useless unless the power companies can distribute it to their customers. Sidestepping the distribution shortages by advocating installation of small, “off-grid” systems such as wind turbines, solar panel systems, etc., might work for individual household needs, but it will not promote small business development. Entrepreneurs accept a huge amount of risk launching a new venture; one cannot expect each business also to invest in its own private power generation capability – such an expense should be unnecessary, and it steals precious capital from other areas the owner must address. A reliable and accessible distribution system that allows business owners to connect to “the grid” easily is therefore a prerequisite to boost

small business growth. It follows that improving Nigeria's power distribution system should be a top priority to improve Nigeria's socioeconomic stability.

The Nigerian Roadmap for Power Sector Reform's plan to "fix" the distribution problem was simply to privatize it, expecting that market forces would be sufficient to drive improvements throughout the country. There are several significant problems with this assumption that will hinder expansion of power distribution into northern Nigeria.

Once the privatization process is complete, the new companies' first step will be to assess the current state of affairs and begin to repair, replace or retire the existing infrastructure. This means it will take time to expand services to new areas – particularly the rural areas in the North. Figure 6 shows the planned (initial) distribution points, and confirms this concern. While the north-central states admittedly do have a fair amount of planned distribution points, the regions of highest poverty – the northwest and northeast – do not.³⁹ The northeast is of particular concern, since it is also the most unstable region (the home of the Boko Haram insurgent group). The Roadmap for Power Sector Reform admits it will take up to four years for the DISCOs to become commercially viable.⁴⁰ During that period, the companies will likely avoid unnecessary risks (such as expanding services into rural areas). This interval required for the privatized companies to stabilize the existing distribution infrastructure will provide additional time for the current insurgency to fester.

In addition, there is no guarantee the private companies will ever improve the distribution system in the rural areas. Rural developments provide DISCOs with a much lower return on investment (ROI) than urban areas due to decreased "customer density."⁴¹ In a rural setting, the company has to provide and maintain much more wiring per customer, reducing the overall profit margin.⁴² For instance, in the US rural areas collect only about

\$15,000 per year per mile of wire, while urban areas average \$113,000.⁴³ As a result, although rural electrification projects can be profitable, a private company will tend to favor urban projects where it will realize a higher ROI.⁴⁴

The privatization scheme employed in Nigeria will further amplify this aversion to risk. During the transfer from government control, the private companies will receive only a 51-60% share in the distribution companies; the GON will retain the rest.⁴⁵ Yet despite this arrangement, the GON plans to phase out all government funding for distribution companies by 2020.⁴⁶ Thus, all risk will be placed on the private companies, while their potential profit margin will be cut nearly in half. The result will be a further decrease in ROI, eliminating nearly all incentives to expand distribution to sparsely-populated areas.

To be fair, the GON has implicitly acknowledged the propensity of commercial distribution companies to focus on high customer density areas, and has thus been advocating development of industrial parks that provide centralized locations for energy delivery.⁴⁷ While the idea is sound for general economic growth, industrial parks tend to favor large, established businesses, whereas the reduction of poverty incidence and the resulting increase in socioeconomic stability necessitate small business development. Scaling down the idea of an industrial park to a small village square might prove more beneficial.

The final problem with the Nigerian Power Reform Roadmap is its assumption that, upon privatization, market forces will dominate to encourage economic growth and development. However, under Nigeria's current privatization schema, no commercial competition will exist between the Nigerian power distribution firms. The GON has assigned each privatized firm a geographic area of responsibility (see Figure 7), inside which that firm will (at least initially) be the sole DISCO.⁴⁸ In any one location a customer will only have

one choice of power provider; free market competition will not yet exist. As a result, despite years of effort to privatize the distribution companies, the Nigerian people still will not realize the benefits expected of a commercial marketplace.

(Em)Powering the People: A Co-Operative Approach

The key to solving Nigeria's distribution dilemma is developing rural electrical cooperatives (co-ops) modeled after those in US Rural Electrical Associations.⁴⁹ Co-ops are local community organizations designed to deliver a bottom-up, decentralized solution to the rural electricity distribution problem. They are nonprofit organizations, charging just enough to cover operating expenses.⁵⁰ They determine priorities for where power lines should go, provide labor for installation, and own, operate and maintain all their required equipment.⁵¹ In the US, the government's primary role was to regulate design standards and provide start-up capital via low-interest loans through the US Rural Electrification Administration.⁵² Outside these areas, the co-ops operate independently of government control.

The most enticing feature for applying the co-op model is the grassroots nature of the organizations – it puts the locals in charge, which generates a number of benefits pertinent to Nigeria's situation. With over 250 sub-cultures in Nigeria, it allows communities to tailor a solution that meets their needs, abides by local cultural norms, and respects ancestral lands; there is no “one size fits all” program dictated upon them by the central government. The importance of this cultural respect is amplified by the current North-South divide in Nigeria and the fact that many Northerners feel the central government is not truly representing their needs.⁵³ Many Nigerians are concerned the privatized companies may not be much better, because “past leaders who showed little interest in the fate of the [PHCN] are now believed to be owners of the successful bidders.”⁵⁴ Localizing the solution by creating co-ops pushes

a major portion of the program's success – or failure – onto the local populace, subverting their ability to blame others for any shortcomings.

Local ownership of the solution would also deter insurgent vandalism against the distribution infrastructure. Currently, if Boko Haram attacks a distribution network, they can portray it as an attack against the GON; after privatization, it would be an attack against an evil corporate oligarchy. In either case, Boko Haram can depict the local population's loss of electricity as an unfortunate but necessary secondary effect. However, in a co-op system where the locals own the equipment, attacks against the distribution infrastructure become attacks directly against the local population, not purely collateral damage. Thus, the co-op model puts Boko Haram, an insurgency that must try to gain the support of the locals, in a bind. One could expect insurgent attacks against co-op owned distribution networks to decrease as a result. If this hypothesis proves to be incorrect, Nigeria must bolster security for the electricity infrastructure; the US could support Nigeria in this effort by providing Foreign Internal Defense (FID) training to the Nigerian military.

The US should offer assistance in several other areas beyond FID training. The US Embassy in Nigeria has recognized the value of community-based programs for rural development and recently launched an associated sponsorship program.⁵⁵ The co-op program is a natural extension of that concept. The US Agency for International Development (USAID), which has already been engaged in Nigeria to support power generation projects, should work with the GON to leverage US National Rural Electrical Cooperative Association (NRECA) capabilities.⁵⁶ Nigeria must undoubtedly modify existing statutes and regulations to enable co-op success, and the GON is also currently re-launching the Nigerian REA; NRECA's expertise can pinpoint potential problem areas and facilitate

both of these efforts.⁵⁷ NRECA also conducts international training programs that Nigeria can exploit.⁵⁸ Nigeria broke ground on the National Power Training Institute of Nigeria (NAPTIN) on 18 October 2012, so the timing is perfect to engage on a new co-op training syllabus.⁵⁹ As local Nigerian communities begin to stand up co-ops, they will need to purchase equipment. The US Embassy, USAID and the Department of Commerce should collaborate with US industry to develop incentives for the co-ops to purchase US goods. While several US companies (such as General Electric) already market systems in Nigeria, their connections are with the GON, not with the locals.⁶⁰ The US Embassy must facilitate these companies' communications with the co-ops at the local level.

In short, the co-op model that has proven successful in US rural communities has many advantages for application in Nigeria. Co-ops are a good fit with Nigerian culture, push accountability to the local level and can dis-incentivize insurgent vandalism. However, important environmental differences mean Nigeria cannot merely implement a rote copy-and-paste of the US system. Nigeria should use the US model as a baseline, yet adapt the model to fit the Nigerian own context, culture and regulatory systems. At the same time, Nigeria must also adapt its culture and regulations to implement the co-op model properly. These changes are bound to create friction, but Nigeria must overcome these potential barriers to ensure the co-op program's long-term success.

POTENTIAL BARRIERS TO SUCCESS

Nigeria will encounter its first major roadblock even before it establishes its initial co-op. Specifically, Nigeria has just undergone a long (and arguably painful) privatization process; the winning bidders will possibly see the co-op initiative as infringing on the spoils they were promised. The victors might even construe establishment of the co-op program as

a breach of contract by the GON. This is not the case. Because of the transition to privatized power generation and distribution, the GON recently had to relax several regulations, enabling the decentralization of control over the power sector and permitting development of “mini grids.”⁶¹ These changes enabled the establishment and growth of a competitive marketplace. The companies that bid on the existing DISCOs therefore should not have had a presumption of geographic exclusivity. That being said, the volume and speed of the protests filed after the GON announced the winners of the DISCO privatization provide an indicator as to how much power is at stake (pun intended), and the lengths that the players will take to secure their share.⁶² One could expect similar resistance to the co-op proposal.

Two other organized groups will likely resist the development of co-ops as well. The first would be the “REA Contractor” lobby. When the GON suspended the REA in 2009, there were 1946 projects abandoned by the GON, with the contractors working those projects owed ₦3.4 billion.⁶³ The contractors have since been pressuring the GON as one “lobby” to recoup the money owed to them by the GON. These contractors may view the co-ops as business competitors and oppose the change accordingly, but they should have plenty of business from the newly-privatized DISCOs, so hopefully their resistance is minimal.

Placating the alternative power interests will be more difficult. Alternative power is a \$10 billion per year industry in Nigeria, and as mentioned above has supported sabotage against the public infrastructure to hinder competition.⁶⁴ Unlike the situation with Boko Haram, the alternative power interests do not need to gain political support of the locals, so the co-op model does not create any new restraints to counterbalance the motives for vandalism. Such vandalism will be a common problem for both the co-ops and the DISCOs,

creating a shared interest from which to pressure the GON to address the issue; once again, US FID training would enhance Nigeria's ability to counter this threat.

A second interest shared by the co-ops and DISCOs will be the development of a skilled labor pool. The operational-level skills (linemen, etc.) will be common between both types of organizations, so the co-ops will be able to leverage the associated classes taught at the forthcoming NAPTIN. However, administration of a co-op is different than management of a normal business and requires specialized training.⁶⁵ As mentioned above, NRECA can guide NAPTIN to develop the syllabi required to support the co-op program.

As Nigeria develops its labor force, it must also make several regulatory changes to pave the way for long-term co-op success. Nigeria must continue to move towards a "fully-free" marketplace in the energy sector. As mentioned above regarding the "mini-grid" issue, some of these changes already have begun as a result of the ongoing privatization process. But permitting "mini-grids" and market competition is only part of the solution. The GON currently regulates electricity prices through a tiered price-setting scheme (known as "tariffs"). Poor people pay less for electricity than the rich, and the GON adjusts the rates every five years.⁶⁶ The GON must carefully examine its current price structure to ensure co-op viability. Because the ROI for rural projects is already marginal, and with co-ops abiding by a not-for-profit business model, any tariff set below actual cost will jeopardize the entire co-op program. Unfortunately, the GON just adjusted the tariff rates on 01 June 2012, so near-term implementation of the co-op initiative may force an out-of-cycle tariff review.⁶⁷

The final change Nigeria must make is one already highlighted by the GON as a requirement for the privatization program to be successful. Nigeria must inculcate a cultural change within its population, and begin treating energy like a commodity, rather than a

“right.”⁶⁸ With co-ops striving to operate just above the break-even line, it is imperative that customers pay their bills on time. Ensuring the rural populace understands the co-op concept, and that not paying one’s debts amounts to stealing from one’s neighbor, will be crucial to the co-ops’ ultimate success.

As Nigeria stands up its co-op program, not all the changes required must occur within Nigerian regulations or culture; the US co-op model must also adjust to operate inside those regulations and that culture. The largest challenge will be to overcome Boko Haram’s hardline anti-Western stance.⁶⁹ The GON could improve the chance of success in the Northeast (Boko Haram’s base of operations) by initiating the first few co-op programs in the North, but outside the area affected by the insurgency. This will enable the implementation teams to “tweak” the co-op model to be effective within the Nigerian culture and regulatory environment, and gather and apply lessons learned prior to instantiating co-ops within the insurgent-laden Northeast. Such a phased approach will allow the co-op developers to tackle one set of problems at a time, thereby maximizing the probability of success within the Northeast, the region that poses the highest risk of embracing the co-op initiative.

The final barrier will be persuading the GON itself to embrace the co-op initiative. The current DISCO privatization plan has been underway since Nigeria passed the EPSR Act in 2005 and possesses a significant amount of inertia. While the co-op model presents several significant advantages⁶⁹ over the current plan, these benefits in and of themselves might not be sufficient to alter the current momentum. The US must find additional incentives to entice Nigeria into implementing the co-op initiative.

While Nigeria must overcome several barriers to effectively implement the co-op initiative, none of these barriers is insurmountable. Overcoming the barriers will require

unified effort between the Nigerian people and their government, but the end result will be worthwhile. Community-based co-ops provide the best approach to expand electrical service into rural Nigeria, thereby enabling small business growth and promoting much-needed socioeconomic stability.

CONCLUSION

Nigeria has long understood the need to improve its electrical infrastructure in order to promote small business growth, reduce the poverty disparity prevalent in the country, and improve its overall stability. Unfortunately, results to date have been mixed, but the renewed emphasis placed on this area by President Goodluck Jonathan since 2010 is beginning to gain traction. Progress has finally been made towards privatizing the government-owned electrical infrastructure, a process that was supposed to be complete nearly five years ago. However, as the GON completes this privatization transition, it must modify its plans to optimize its chance of success. To promote small business growth and reduce socioeconomic instability, Nigeria must modify its current power sector development roadmap to focus on the North and enable development of local energy distribution co-ops.

Nigeria must concentrate its efforts on the North to minimize the disparities between North-South electricity availability. The existing imbalance leads Northerners to feel marginalized and increases North-South tensions; re-prioritizing assets towards the North will tend to alleviate these strains. Due to the North's large agricultural economy and associated rural population, Nigeria must reassess its current plans to depend solely on commercial companies for energy distribution. History has shown commercial companies tend to neglect energy distribution to rural areas due to the lower ROI. As a result, expanding electrical supply into new areas will be the lowest priority for the privatized

DISCOs. The solution to this dilemma is to use the distribution co-op model to promote electrical infrastructure development in rural areas.

The use of co-ops has many advantages for Nigeria. The grassroots nature of the organizations allows communities to tailor solutions to fit their specific cultural norms, and it pushes accountability to the local level. Community ownership also dis-incentivizes insurgent strikes against electrical infrastructure. The US Government must leverage its experience with co-ops to assist the GON and improve Nigeria's chances of success.

US assistance will be critical, as Nigeria must overcome several barriers to co-op implementation. The GON can expect push-back from the winners of the ongoing DISCO privatization process, the contractors previously employed by the REA, and the "alternative power" lobby. Nigeria must develop a workforce that understands the unique features of co-op operations and management. The US co-op model, the Nigerian regulatory system and Nigerian culture will all require adjustments to function together effectively, particularly in the insurgent-laden northeast.

Nigeria must take the steps to overcome these barriers now, before the existing insurgency has time to escalate and further deteriorate Nigeria's stability. Initiating the project now also facilitates integration with the newly privatized DISCOs and the re-emerging Nigerian REA. The result will be a modern Nigerian electrical grid that promotes small business growth, creates jobs, and improves socioeconomic stability. Working together, co-operatively, the Nigerians can make this dream a reality.

RECOMMENDATIONS

To improve its electrical supply and thus bolster stability, **Nigeria should:**

- Focus its electrical infrastructure developmental efforts on northern Nigeria, currently the area of greatest instability
- Implement a co-op based system for rural electrical distribution

To assist Nigeria in accomplishing these goals, **AFRICOM should:**

- Promote USAID and NRECA support to Nigeria to
 - Analyze and propose recommended changes to the Nigerian regulatory framework that will be necessary to promote the co-ops' success
 - Establish Nigerian training programs for co-op managers and workers.
- Collaborate with the US Department of Commerce and USAID to develop incentives for co-ops to purchase US-manufactured equipment
- Offer to assist Nigeria with Foreign Internal Defense (FID) training to secure the newly-developed infrastructure.

Figures

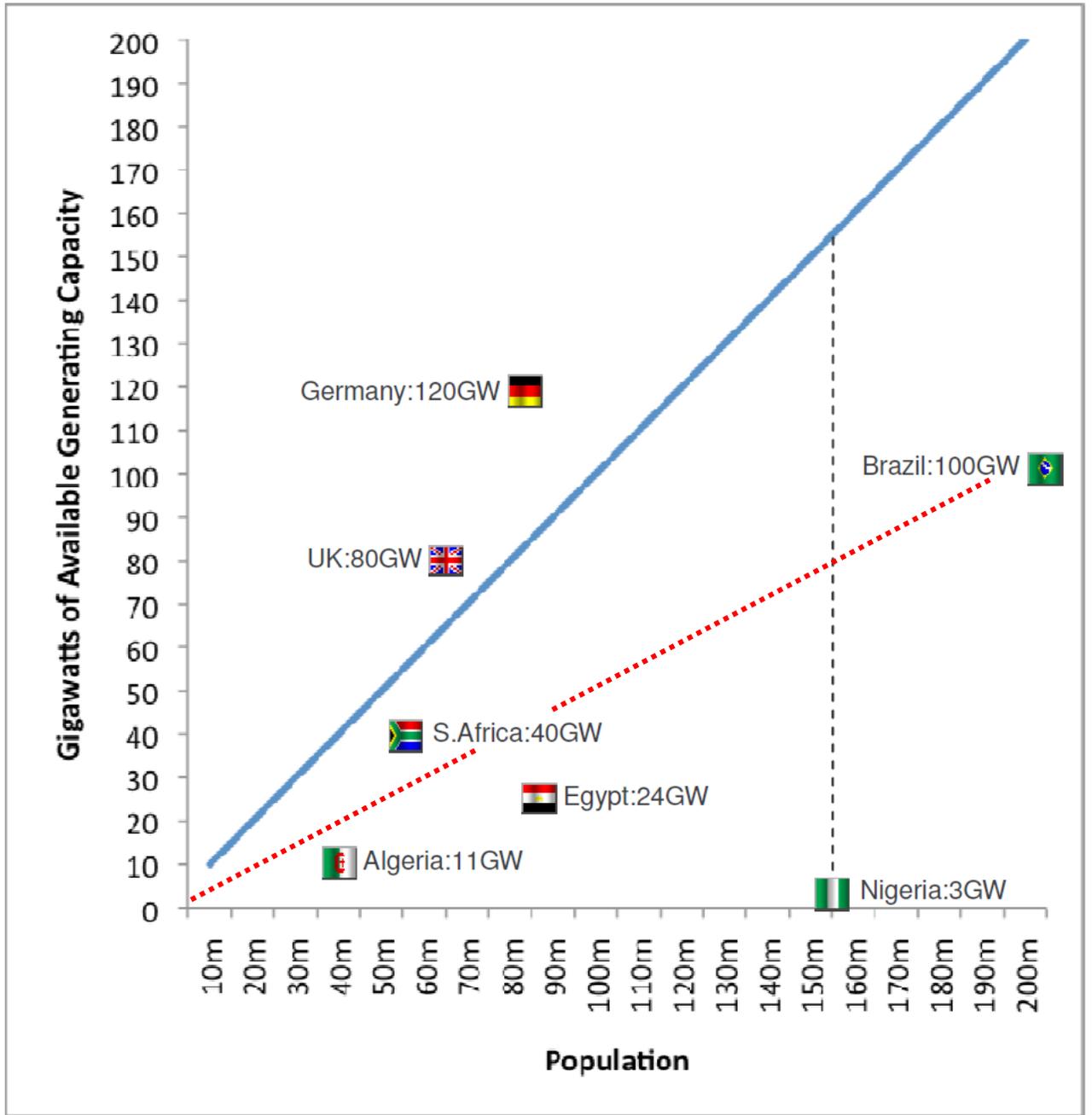


Figure 1: Nigeria's Estimated Electricity Generation Capacity Requirement⁷⁰



Figure 2: Nigerian Power Plant Locations⁷¹

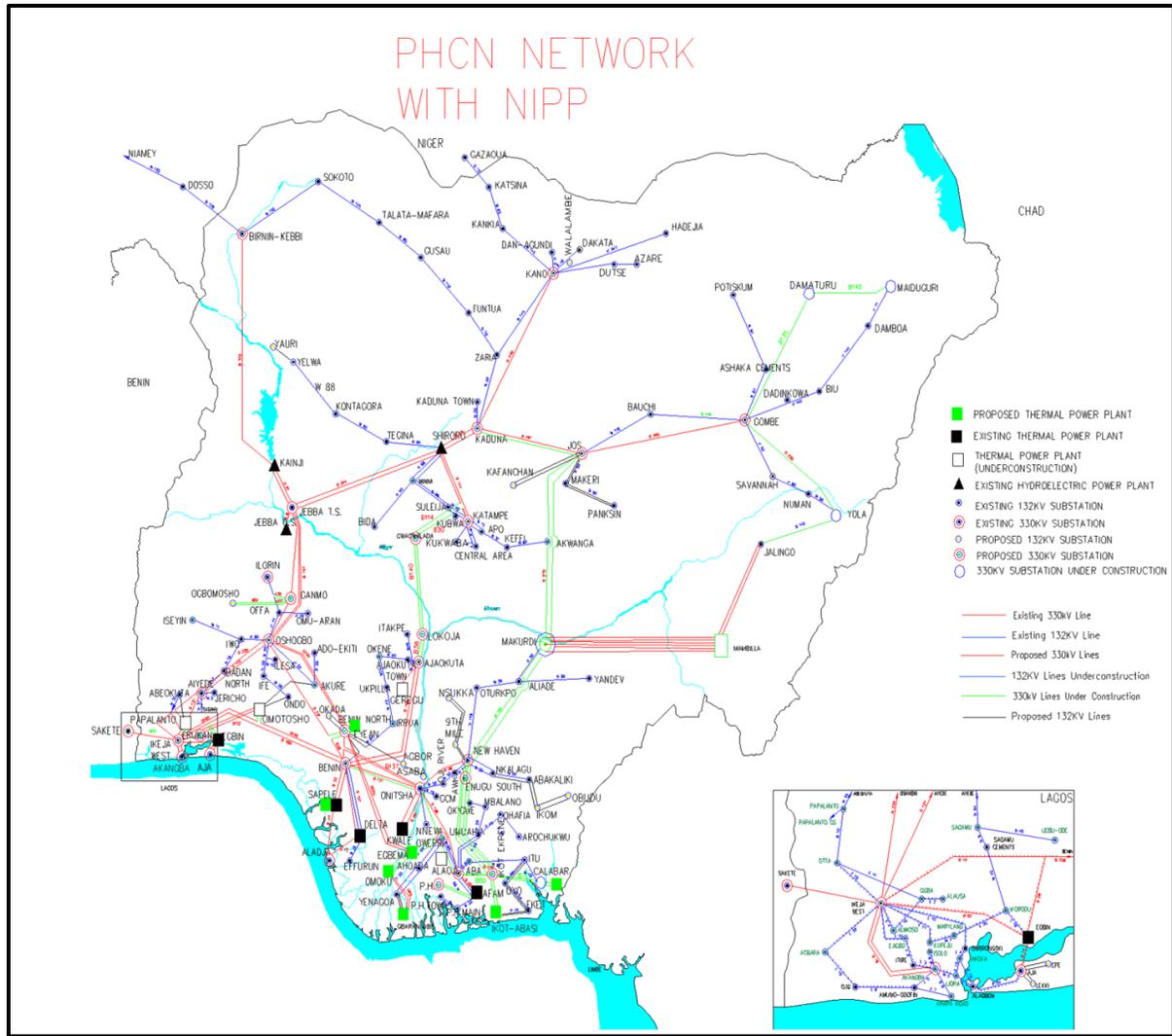


Figure 3: Nigerian Electrical Transmission Grid⁷²

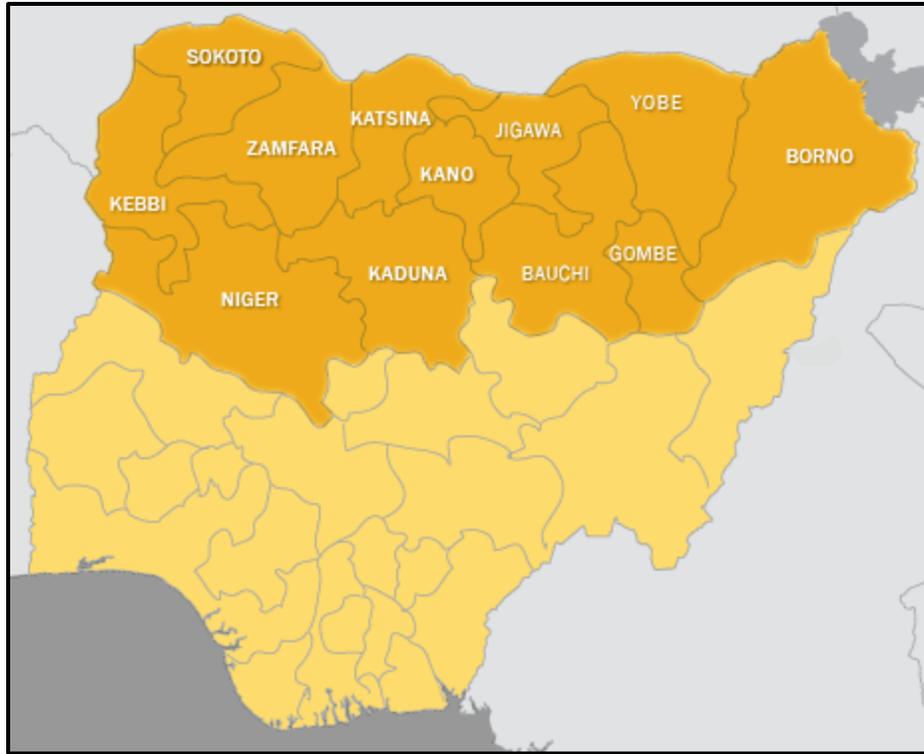


Figure 4: Nigerian States Under Shari'a Law⁷³

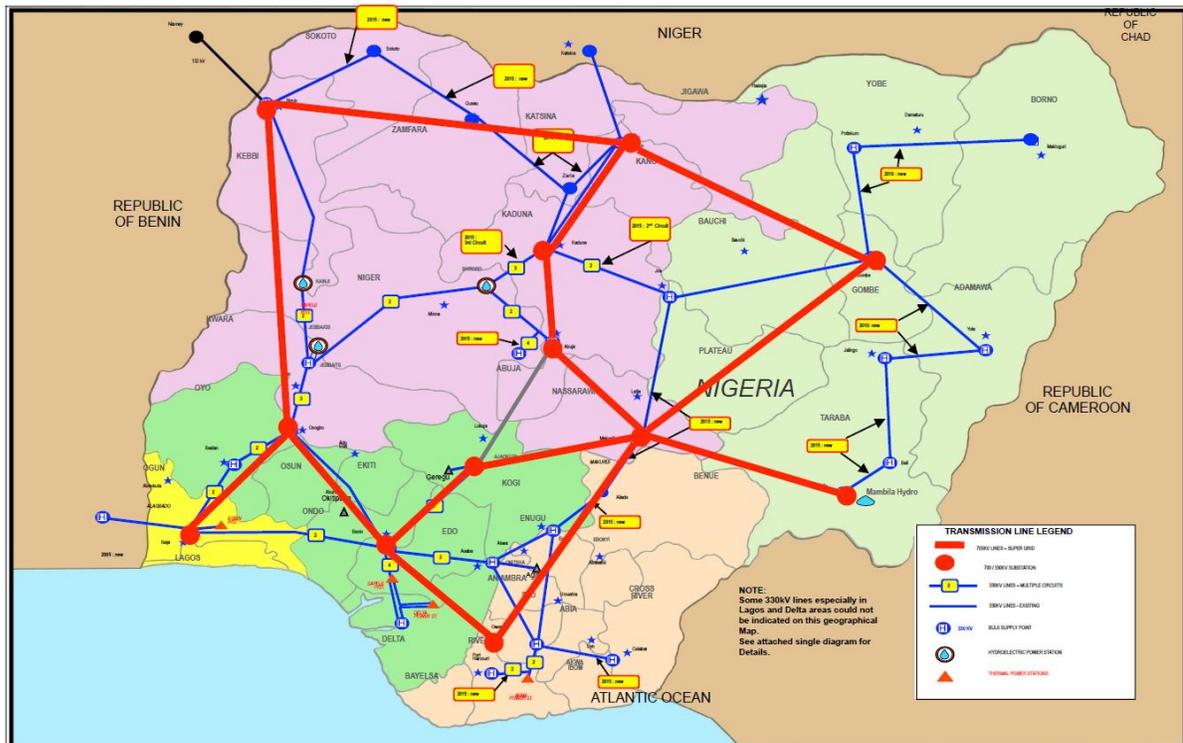


Figure 5: Location of Proposed Nigerian "Super Grid" Transmission System⁷⁴

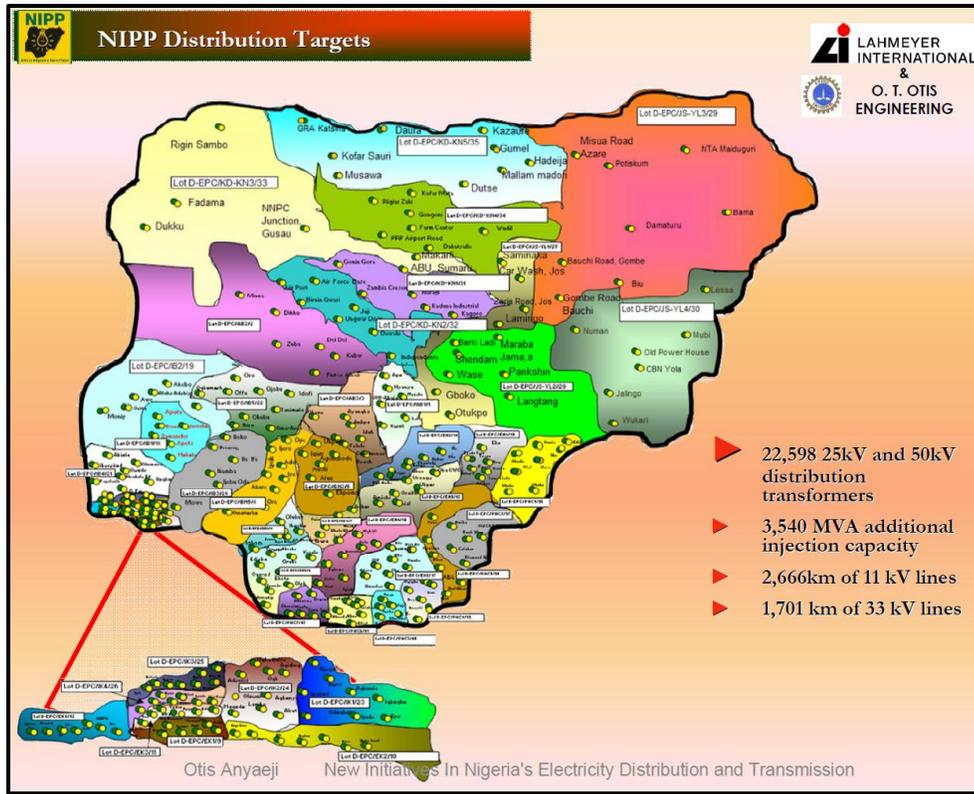


Figure 6: Planned Nigerian Electric Distribution Points⁷⁵

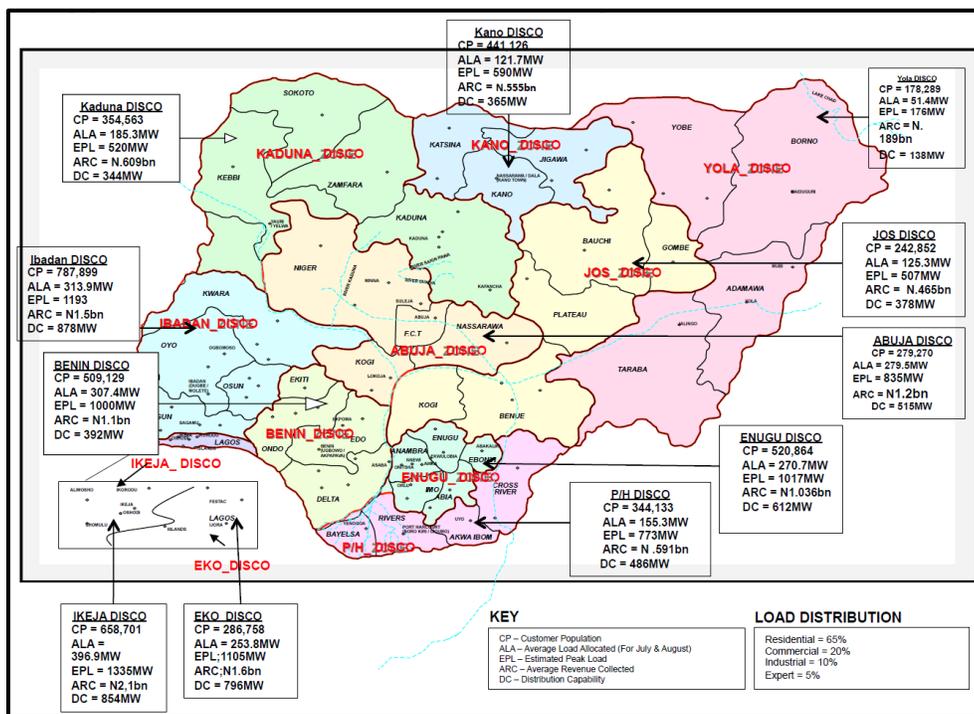


Figure 7: Geographic Boundaries of Nigerian Privatized DISCOs⁷⁶

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2. Lewis, "Nigeria: Assessing Risks to Stability, A Report of the CSIS Africa Program," 1.
3. "Nigeria: Poverty Rises Six Years In a Row Despite Economic Growth," *Nigerians Abroad*, 13 February 2012, accessed 19 October 2012, <http://nigeriansabroadlive.com/nigeria-poverty-rises-six-years-in-a-row-despite-economic-growth/>.
4. Ibid. Also see Abdu Ja'afaruBambale, "National Economic Empowerment Development Strategy and Poverty Reduction in Nigeria: A Critique," *Economics and Finance Review* 1, no. 1 (2011): 20., "Nigeria Vision 20:2020, Abridged Version. 1st NV20:2020 Medium-Term Implementation Plan (2010-2013)," (Abuja, Nigeria: Business Support Group, National Steering Committee of Vision 2020, 2010), 7. and "White House Hosts Forum for Young African Leaders," *Foreign Policy Bulletin* 20, no. 4 (2010): 8.
5. "Meeting Everyone's NEEDS: National Economic Empowerment and Development Strategy," (Abuja, Nigeria: Nigerian National Planning Commission, 2004).
6. See "National Economic Empowerment Development Strategy and Poverty Reduction in Nigeria: A Critique.", "Nigeria Vision 20:2020, Abridged Version. 1st NV20:2020 Medium-Term Implementation Plan (2010-2013)," 14. and "Background Note: Nigeria," Bureau of African Affairs, U.S. Department of State, accessed 15 September 2012, <http://www.state.gov/r/pa/ei/bgn/2836.htm>. Also Country Operations Department, West Region, "Federal Republic of Nigeria: Extension to 2011 of the 2005-2009 Country Strategy Paper," (Abidjan, Côte d'Ivoire: African Development Bank African Development Fund, 2010), paragraph 2.2.12. and TradeInvest Nigeria Staff, *Finding Solutions to Nigeria's Power Crisis*, 2010. Frontier Market Intelligence.
7. Vijaya Duvvuri, "Awakening the Sleeping Giant: Revitalizing and Diversifying the Nigerian Economy. A Private-Sector Led Strategy of Growth, Inclusion and Poverty Reduction" (Tufts University, 2006), 71. See also Country Operations Department, West Region, "Federal Republic of Nigeria: Country Strategy Paper 2005-2009," (Abidjan, Côte d'Ivoire: African Development Bank African Development Fund, 2005), 31.
8. For "...the area most devoid of electricity," see Figure 3. For "the highest incidence of poverty..." see Duvvuri, "Awakening the Sleeping Giant: Revitalizing and Diversifying the Nigerian Economy. A Private-Sector Led Strategy of Growth, Inclusion and Poverty Reduction," 80. and "Country Data Portal: Nigeria," (2012). For "...where instability remains..." see "Background Briefing by a Senior State Department Official En Route to Abuja, Nigeria."
9. Malcolm Fabiyi, "Transforming the Nigerian Power Sector – Thoughts On the Roadmap for Power Sector Reform," 2 September 2012, accessed 19 October 2012, <http://saharareporters.com/column/transforming-nigerian-power-sector-%E2%80%93-thoughts-roadmap-power-sector-reform-malcolm-fabiyi>.
10. Estimates for this value vary. For 35% statistic, see Chineme Okafor, "FG Targets 75% Electrification Across Nigeria," *This Day Live*, 23 October 2012, accessed 27 October 2012, <http://www.thisdaylive.com/articles/fg-targets-75-electrification-across-nigeria/128452/>.

In 2005, the African Development Bank put the value at 40%. Country Operations Department, "Federal Republic of Nigeria: Country Strategy Paper 2005-2009," 12.

In 2010, the GON estimated the number at 40%. "Nigeria Vision 20:2020, Abridged Version. 1st NV20:2020 Medium-Term Implementation Plan (2010-2013)," 24.

The World Bank had estimated the value at 50% from 2007-2011: Belinda Baah, "Lights Out? Nigeria's Electricity Woes," *Consultancy Africa Intelligence*, 16 October 2012, accessed 27 October 2012, http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=1146:lights-out-nigerias-electricity-woes-&catid=82:african-industry-a-business&Itemid=266.

11. Linda Van Buren, "Europa World Plus, Nigeria: Economy," Routledge Taylor & Francis Group, accessed 29 August 2012, <http://www.europaworld.com/entry/ng.ec>.

12. Baah, "Lights Out? Nigeria's Electricity Woes".

13. Charles Kumolu, "Power Promise A Year After: Expectations for Electricity Get Darker," *Vanguard*, 16 May 2012, accessed 20 October 2012, <http://www.vanguardngr.com/2012/05/power-promise-a-year-after-expectations-for-electricity-get-darker/>.

14. For current output, see Professor Bart NNaji, "Electric Power in Nigeria: The Sun on This Rubble" (paper presented at the Executive Intelligence Management Course 5, The Institute for Security Studies, Abuja, Nigeria, 11 June 2012).

For estimate of the total requirement, see Figure 1. The 80,000 MW estimate correlated to the power requirements of an emerging economy such as South Africa or Brazil, whereas the 150,000 MW requirement represented a fully industrialized society.

15. Ibid. See also Fabiyi, "Transforming the Nigerian Power Sector – Thoughts On the Roadmap for Power Sector Reform".

16. Vetiva Equity Research, "Meeting the Power Target...", (Lagos, Nigeria: Vetiva Capital Management Ltd, 2009), 4.

17. The Presidency, Federal Republic of Nigeria, "Roadmap for Power Sector Reform," (Abuja, Nigeria, 2010), 53. and Fabiyi, "Transforming the Nigerian Power Sector – Thoughts On the Roadmap for Power Sector Reform". Also Vetiva Equity Research, "Meeting the Power Target...", 4. and TradeInvest Nigeria Staff, *Finding Solutions to Nigeria's Power Crisis*.

18. Reference "single point of failure," there is no redundancy in the current radial system design; loss of one line can take out large regions. See The Presidency, "Roadmap for Power Sector Reform," 82. and Otis Anyaeji, "New Initiatives on Electric Power Transmission and Distribution in Nigeria" (paper presented at the 6th Annual German-African Energy Forum, Hamburg, Germany, 22-25 April 2012), 5.

19. "Nigeria Vision 20:2020, Abridged Version. 1st NV20:2020 Medium-Term Implementation Plan (2010-2013)," 25.

20. For 75% of Nigeria's population living in rural areas, see Country Operations Department, "Federal Republic of Nigeria: Country Strategy Paper 2005-2009," 24. See also "Background Note: Nigeria".

For the comment about "only 10% of rural households had access to electricity," see "Federal Republic of Nigeria: Country Strategy Paper 2005-2009," 12. That statistic is three years old, but due to the GON's dissolution of the Nigerian REA from 2009-2012, many of the planned projects were put on hold, so no significant progress has been made to improve that number. See Juliet Alohan, "Rural Electrification Project:

Contractors Are Owed N3.4bn," *Leadership*, 11 September 2011, accessed 21 October 2012, http://leadership.ng/nga/articles/8022/2011/11/09/rural_electrification_project_contractors_are_owed_n34bn_%E2%80%93_nnaji.html.

21. Heather Murdock, "Nigeria Seeks to Meter Electricity, Boost Output," *Voice of America*, 27 April 2012, accessed 28 October 2012, <http://www.voanews.com/content/nigeria-seeks-to-meter-electricity-boost-output-149354125/369932.html>.

22. The Presidency, "Roadmap for Power Sector Reform," 46.

23. Even the current Nigerian administration has publicly stated it views electricity as a "fundamental right of the people." See NNaji, "Electric Power in Nigeria: The Sun on This Rubble."

For the culture of not paying bills, see "Nigeria: Electricity Distribution - Assessing Investors' Competence," *Vanguard*, 02 October 2012, accessed 16 October 2012, <http://allafrica.com/stories/201210031218.html>. The power sector reform roadmap alludes to this problem as well: "Retail and wholesale customers alike should treat their obligation to pay their bills and protect the country's power assets as a matter of sacred national duty." The Presidency, "Roadmap for Power Sector Reform," 13.

24. In October 2012, the GON just announced the winning bids for DISCO privatization, but the process to relinquish control still has several steps to go. See "Power Distribution: Govs Reject Bid Winner," *Online Nigeria*, 18 October 2012, accessed 20 October 2012, <http://news.onlinenigeria.com/nigeria-news/4674-power-distribution-govs-reject-bid-winner.html>.

25. See Duvvuri, "Awakening the Sleeping Giant: Revitalizing and Diversifying the Nigerian Economy. A Private-Sector Led Strategy of Growth, Inclusion and Poverty Reduction," 70-77. and "Nigeria Vision 20:2020, Abridged Version. 1st NV20:2020 Medium-Term Implementation Plan (2010-2013)," 25.

26. For resistance from the alternative fuel lobby, see Camillus Eboh, "Nigeria Seeks Bidders for Power Distribution Firms," *Reuters* 2010. and Fabiyi, "Transforming the Nigerian Power Sector – Thoughts On the Roadmap for Power Sector Reform".

For disputes over land rights and usage, as well as the poor transportation system, see Anyaeji, "New Initiatives on Electric Power Transmission and Distribution in Nigeria," 8.

27. NNaji, "Electric Power in Nigeria: The Sun on This Rubble."

28. Nigerian electrical output has grown from roughly 3300 MW in 2005 to about 4400 MW in 2012. That's approximately 33% growth in seven years. For 3300 MW estimate, see Country Operations Department, "Federal Republic of Nigeria: Country Strategy Paper 2005-2009," 12.

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31. Fabiyi, "Transforming the Nigerian Power Sector – Thoughts On the Roadmap for Power Sector Reform".

32. Nigerian National Bureau of Statistics and Small and Medium Enterprises Development Agency of Nigeria, "Survey Report on Micro, Small and Medium Enterprises (MSMEs) in Nigeria," (2010), Preface p. 1.

33. Discussion of amnesty program's success is at Xan Rice, "Nigeria Rebels Swap Weapons for Welding," *FT.com*, 05 July 2012, accessed 29 August 2012, <http://www.FT.com>. and Lewis, "Nigeria: Assessing Risks to

Stability, A Report of the CSIS Africa Program," 10-11. For northern Nigeria being the largest area of instability, see "Background Briefing by a Senior State Department Official En Route to Abuja, Nigeria."

34. John Campbell, "Nigeria: The Morning After," *The New York Times*, 02 May 2011, accessed 19 September 2012, <http://www.nytimes.com/2011/05/03/opinion/03iht-edcampbell03.html>. Also see Lewis, "Nigeria: Assessing Risks to Stability, A Report of the CSIS Africa Program," 9.

35. "Nigeria: Assessing Risks to Stability, A Report of the CSIS Africa Program," 1.

36. Campbell, "Nigeria: The Morning After".

37. Distributing the power generation decreases the dependency on the transmission system and tends to reduce single-point-of failure problems.

38. See Emeka Anuforo, "Wind Energy as an Option to Power Nigeria," *The Guardian*, accessed 10 October 2012, http://nrguardiannews.com/index.php?option=com_content&view=article&id=95062:wind-energy-as-an-option-to-power-nigeria&catid=72:focus&Itemid=598. and Okoye Elochukwu Obinna, "An Overview of Windpower Planning in Nigeria," (Slideshare.net, 2011). Also M. S. Adaramola and O. M. Oyewola, "Wind Speed Distribution and Characteristics in Nigeria," *ARPJ Journal of Engineering and Applied Sciences* 6, no. 2 (2011).

39. Regarding the northwest and northeast having the highest poverty, see "Nigeria: Poverty Rises Six Years In a Row Despite Economic Growth".

40. The Presidency, "Roadmap for Power Sector Reform," 10.

41. See Harold V. Hunter, "A Brief History of the Rural Electric and Telephone Programs," (Washington, D.C.: Rural Electrification Administration, Department of Agriculture, 1982), A-1. and Deane Morrison, "Looking Back at a Current Event," *UMNews*, 27 March 2009, accessed 21 October 2012, http://www1.umn.edu/news/features/2009/UR_CONTENT_099002.html.

42. National Rural Electric Cooperative Association (NRECA), "Co-Op Facts and Figures," NRECA, accessed 21 October 2012, <http://www.nreca.coop/members/Co-opFacts/Pages/default.aspx>.

43. Ibid.

44. Morrison, "Looking Back at a Current Event". Also Chineme Okafor, "Nigeria: Federal Government Moves to Reactivate Rural Electrification Agency," *This Day*, 27 August 2012, accessed 10 October 2012, <http://allafrica.com/stories/201208270934.html>.

45. The Roadmap for Power Sector Reform specifies a minimum of 51%. The GON's initial call for bids advertised a 51% share for the winning bidders, but as of 23 October 2012 it appears the final percentage may increase to 60%. See The Presidency, "Roadmap for Power Sector Reform," 8; "Nigeria: Electricity Distribution - Assessing Investors' Competence". and Austin Oboh, "Contending With PHCN Sale Controversy," *Daily Independent*, 23 October 2012, accessed 28 October 2012, <http://dailyindependentnig.com/2012/10/contending-with-phcn-sale-controversy/>.

46. NNaji, "Power Sector Outlook in Nigeria: Government's Renewed Priorities," 25.

47. TradeInvest Nigeria Staff, *Finding Solutions to Nigeria's Power Crisis*.

48. NNaji, "Power Sector Outlook in Nigeria: Government's Renewed Priorities." Also Vetiva Equity Research, "Meeting the Power Target...", 15.

49. The author admits a personal bias towards the effectiveness of rural co-ops. My grandfather helped start his county co-op in rural Minnesota; since then, 3 uncles and 5 cousins have also worked for various co-ops throughout Minnesota. The author has seen first-hand the co-ops' effectiveness due to the fact that they are comprised of friends and neighbors taking care of one another, versus large corporate entities providing service to a random customer.

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51. "Co-Op Facts and Figures".

52. Hunter, "A Brief History of the Rural Electric and Telephone Programs," A-1.

53. Kumolu, "Power Promise A Year After: Expectations for Electricity Get Darker".

54. Oboh, "Contending With PHCN Sale Controversy".

55. Agency Reporter, "US Embassy to Support Rural Projects in Nigeria," *Punch*, 22 March 12, accessed 21 October 2012, <http://www.punchng.com/news/us-embassy-to-support-rural-projects-in-nigeria/>.

56. For discussion of USAID agreement to provide support to Nigeria, see Francis Obinor and Emeka Anuforo, "U.S., Nigeria Seal Fresh Pact On Power Generation, Supply," *The Guardian*, 11 August 2011, accessed 21 October 2012, <http://odili.net/news/source/2011/aug/11/28.html>. NRECA is also already involved in Nigeria, but as a sub-contractor to Geometric Power Limited, the DISCO in Aba, Abia State. See job advertisement posted at <http://jobs.climber.com/jobs/Public-Utilities-Services/-US/Transmission-Engineer/23161869>, accessed 30 October 2012. The NRECA website (<http://www.nrecainternational.coop/Projects/Pages/default.aspx>, accessed 21 October 2012) does not list any current co-op projects in Nigeria.

57. As mentioned previously, Nigeria is in the process of re-establishing its REA. As of August 2012 the Jonathan administration was in the process of "developing a roadmap" to stand up the new organization. See Okafor, "Nigeria: Federal Government Moves to Reactivate Rural Electrification Agency".

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60. For discussion on GON negotiations and agreement with General Electric, see Ameto Akpe, "GE to Construct 10,000 MW Power Plant in Nigeria," *Business Day*, 09 February 2012, accessed 21 October 2012, <http://www.businessdayonline.com/NG/index.php/news/76-hot-topic/32869-ge-to-construct-10000mw-power-plant-in-nigeria>.

61. Previously, although several private industries had invested in power plants to provide electricity to their own businesses, they were not allowed to sell excess energy and compete with the GON-controlled power sector. They could only connect directly with the national grid, and sell power to the GON. Because the distribution companies are going to be privatized, the GON was forced to amend the regulations. See Fabiyi, "Transforming the Nigerian Power Sector – Thoughts On the Roadmap for Power Sector Reform". Also "Nigeria: We Will Create a Strategic Sector Profile - NERC Chairman," *Leadership*, 22 October 2011, accessed 29 October 2011, <http://allafrica.com/stories/201110220100.html?viewall=1>.

62. See "Power Distribution: Gobs Reject Bid Winner". and Oboh, "Contending With PHCN Sale Controversy".

63. Alohan, "Rural Electrification Project: Contractors Are Owed N3.4bn".
64. Fabiyi, "Transforming the Nigerian Power Sector – Thoughts On the Roadmap for Power Sector Reform". Also Vetiva Equity Research, "Meeting the Power Target...", 4. and TradeInvest Nigeria Staff, *Finding Solutions to Nigeria's Power Crisis*.
65. National Rural Electric Cooperative Association (NRECA), "Education and Training," NRECA, accessed 21 October 2012, <http://www.nreca.coop/programs/educationandtraining/Pages/default.aspx>.
66. For the tiered rate structure, see Baah, "Lights Out? Nigeria's Electricity Woes". For the five-year adjustment increment, see NNaji, "Electric Power in Nigeria: The Sun on This Rubble."
67. "Electric Power in Nigeria: The Sun on This Rubble."
68. The government has recognized this cultural change is required. See The Presidency, "Roadmap for Power Sector Reform," 13.
69. Even the insurgent group's name reflects this bias: "Boko Haram" roughly translates as "Western education is a sin" or "Western education is forbidden." See "Boko Haram," Wikimedia Foundation, Inc., accessed 10 October 2012, http://en.wikipedia.org/wiki/Boko_Haram.
70. "Roadmap for Power Sector Reform," 16. The blue solid line appeared in the original publication and indicates the power requirements for a fully industrialized society. The red dotted line did not appear in the original document, but was added to indicate an approximate requirement for an "emerging" economy comparable to South Africa or Brazil.
71. From Vetiva Equity Research, "Meeting the Power Target...", 6.
72. Taken from Figure 2 in International Atomic Energy Agency, "Federal Republic of Nigeria," accessed 10 October 2012, <http://www-pub.iaea.org/MTCD/publications/PDF/cnpp2009/countryprofiles/Nigeria/Nigeria2009.htm>.
73. PBS Newshour, "Nigeria: States Under Shari'a Law," (Public Broadcasting System (PBS), 2012).
74. NNaji, "Power Sector Outlook in Nigeria: Government's Renewed Priorities," 19.
75. Anyaeji, "New Initiatives on Electric Power Transmission and Distribution in Nigeria," 16.
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