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**Devolution of Powers
on the National Grid System and
Sub-National Revenue Growth**

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The IGR Initiative supports subnational governments in improving their internally generated revenue through research, consultancy engagements and capacity building. The Initiative holds regular webinars, debates and ideation sessions with the public and practitioners to reinforce learning, innovation, reform actions, and advocacy that help strengthen the entire IGR expansion process and for all stakeholders at the sub-national level. It is a registered trademark of Citizens Collective Finance Expansion Ltd/GTE.

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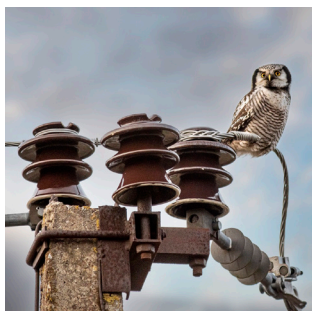
Devolution of Operational Powers on the National Grid System and Sub-National Government Revenue Prospects

By

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Summary: Nigeria has a fertile electricity market. In turn, vast direct and indirect economic and independent revenue opportunities await subnational governments that can effectively utilize the provisions of the 2022 Electricity Act. This article thoroughly examined the 2022 Electricity Act and its implications for states and their internally generated revenue growth objectives to highlight the connection to these opportunities. It gave a historical account of Nigeria's power sector reforms and offered insights into the Nigerian grid system, electricity market compositions, and characteristics. It presented the vertical and deregulated electricity market models as viable alternatives for forward-looking state governments and an exposition of the enormous revenue growth potential in the Nigerian electricity market.

Background



Since the 1960s, Nigeria has implemented numerous power sector reforms. These reforms were to ensure reliable and affordable access to electricity for all Nigerians to promote economic growth, reduce unemployment and alleviate poverty. The reforms resulted in mergers, commercialization, and unbundling of state-owned utilities through legislation. The outset of these reforms is traceable to the formation of the National Electric Power Authority (NEPA) in 1972, which saw the merger of the then Niger Dam Authority and the Electricity Corporation of Nigeria. The failure of NEPA to measure up to the sector's demands led to the promulgation and amendment of the electricity act of 1990 in 1998. The amendment stripped NEPA of



its monopoly in power generation and opened the power generation space for independent power producers (IPP).

The 21st century has witnessed continued reform attempts to address the challenges of the electricity sector. It began with the 2001 national electric power policy, which aimed to establish an efficient electricity market in Nigeria. In 2005, the electric power sector reform act came into force, repealing the 1990 Electricity Act as amended, as well as NEPA and established Power Holding Company of Nigeria (PHCN) as an initial holding company. This Act also birthed the Nigerian Electricity Regulatory Commission (NERC) as an independent regulatory body for the electricity industry. In 2010, the Nigerian Bulk Electricity Trading Plc (NBET) was established as a credible off-taker of electric power from generation companies. The privatization and unbundling of the electricity sector was concluded in 2013, bringing to an end the existence of PHCN. The privatization exercise led to eighteen (18) successor companies which comprise six (6) generation companies, eleven (11) distribution companies and a transmission company.

The 2005 electric power sector reform Act was repealed very recently, giving rise to the 2022 Electricity Act. The presidential assent on March 17th 2023, consummated the process. It consolidated all legislation dealing with electricity supply. It provided an omnibus and ideal institutional framework to guide the post-privatization phase of the Nigerian Electricity Supply Industry (NESI) and encouraged private sector investment.

These reforms came into existence because of the apparent challenges facing the country's power sector with retrogressive adverse effects on businesses. Rolling black/brownout, or load-shedding, is a typical daily Nigerian experience. Nigeria is one of the world's lowest per capita electricity consumers at around 144 kilowatt-hours (kWh) per annum. It is important to note that the existing power challenges are one of the colonial legacies. Unfortunately, Nigeria has never been able to close its power supply gap. In 2020, Nigeria's economic cost of power outages was approximately \$2 billion annually, equivalent to about 2% of the national gross domestic product. Nigeria has the lowest electricity access, as 46% of the population lacks access to electricity. Policy inconsistency, corruption, inadequate gas supply, poor transmission network, political interference, inadequate investment, and weak regulatory framework collectively account for the power sector's multiple challenges to date.

The Nigeria Grid System

The grid system is a network of interconnected transmission lines and substations that ensure the delivery of generated/converted power to end users. In Nigeria, the government operates the transmission segment. The grid system also comprises privately dominated generation and distribution companies. Before the unbundling of the grid system in 2013, the country operated a vertically integrated grid structure. Under this structure, the government owned and operated the generation, transmission, and distribution sectors. Vertically integrated grid structure was the common form of electricity utility structure until the 1990s wave of liberalization. The unidirectional nature of the Nigerian grid system implies the one-way flow of electricity from generation outlets to end users over the transmission lines and not vice versa.

According to the Nigerian Electricity Regulatory Commission (NERC), the generation sub-sector presently includes 23 grid-connected generating plants in operation with a total installed capacity of 12,522 MW (available capacity of 6,056 MW) with thermal based generation having an installed capacity of 8,457.6MW (available capacity of 4,996 MW) and hydro-power having 1,938.4 MW of total installed capacity with an available capacity of 1,060 MW. This comprises the privatized generating companies (GENCOS), independent power producers (IPPs) and the generating stations under the national integrated power project (NIPP). Nigeria's transmission network consists of high-voltage substations with a total (theoretical) transmission wheeling capacity of 7,500MW and over 20,000km of transmission lines. Currently, the transmission wheeling capacity is higher than the average operational generation capacity of 3,879MW, but it is far below the total installed generation capacity of 12,522MW. The entire infrastructure is radial, without redundancies, thus creating inherent reliability issues. At an average of approximately 7.4%, transmission losses across the network are high compared to emerging countries' 2-6% benchmark. The grid is characterized by load rejection as generation companies often accuse transmission and distribution entities of deliberately refusing to take generated power.

The 2022 Electricity Act

The 2022 Electricity Act established a comprehensive legal and institutional framework to guide the Nigerian Electricity Supply Industry (NESI). It de-monopolized the generation, transmission, and distribution of electricity at the National level, giving states, companies and individuals power to generate, transmit and distribute electricity. States can issue licenses to private investors who can operate mini-grids and power plants within their territory. Still, such licenses should not extend to other states or transnational electricity distribution. The Act provided that no license would be required for persons who want to generate power not exceeding a megawatt.



Ideally, it should be noted that electricity operation in Nigeria hasn't been an Exclusive Federal matter. This is guided by the provisions of the Concurrent Legislative List of the Constitution (in Item 14, Part II of the Second Schedule), which sets out the extent of Federal and State legislative powers. By this provision, States are empowered to make laws with regards to the establishment and management of electric power stations in their states as well as the generation, transmission, and distribution of electricity to areas "not covered" by the national grid "within" the state. The 2022 Electricity Act restates this constitutional provision but goes further to provide for areas of collaboration between the state, federal government, and the private sector. It further recognizes the state assemblies' power to legislate on electricity and clearly states that such laws made within the scope of the constitution shall not be invalidated.

Additionally, the 2022 Electricity Act gave legal backing to renewable energy development and deployment in Nigeria. The Nigerian electricity regulatory commission is mandated to simplify licensing of renewable energy companies, award of mini-grid concessions and unhindered access to the grid and distribution networks to such companies. Furthermore, the Act also prohibited receipt of funds by distribution companies from electricity consumers to purchase electricity equipment, mainstreamed gender consideration in the design and implementation of electricity projects and provided prison term and fines for electricity theft, among others. With this amendment, the Federal government can concentrate on the export of electricity to neighbouring countries. The amended Act will enable states to engage in an electricity management model that works for them. This will ensure electricity supply to unserved and under-served sections of the country.

The Nigeria Electricity Market

The Nigerian electricity market is expected to witness a compound annual growth rate of approximately 13% from 2022 to 2027. The Covid-19 pandemic positively impacted the distribution of electricity in Nigeria. Under the lockdown scenario, Lagos witnessed an increase in residential electricity demand up to 49% from 43%. This resulted in load reallocation among competing consuming sectors. Favourable government policies largely drive the Nigerian electricity market. However, the absence of needed infrastructure coupled with a lack of local skilled labour hinders the efficiency of the electricity market in the country.

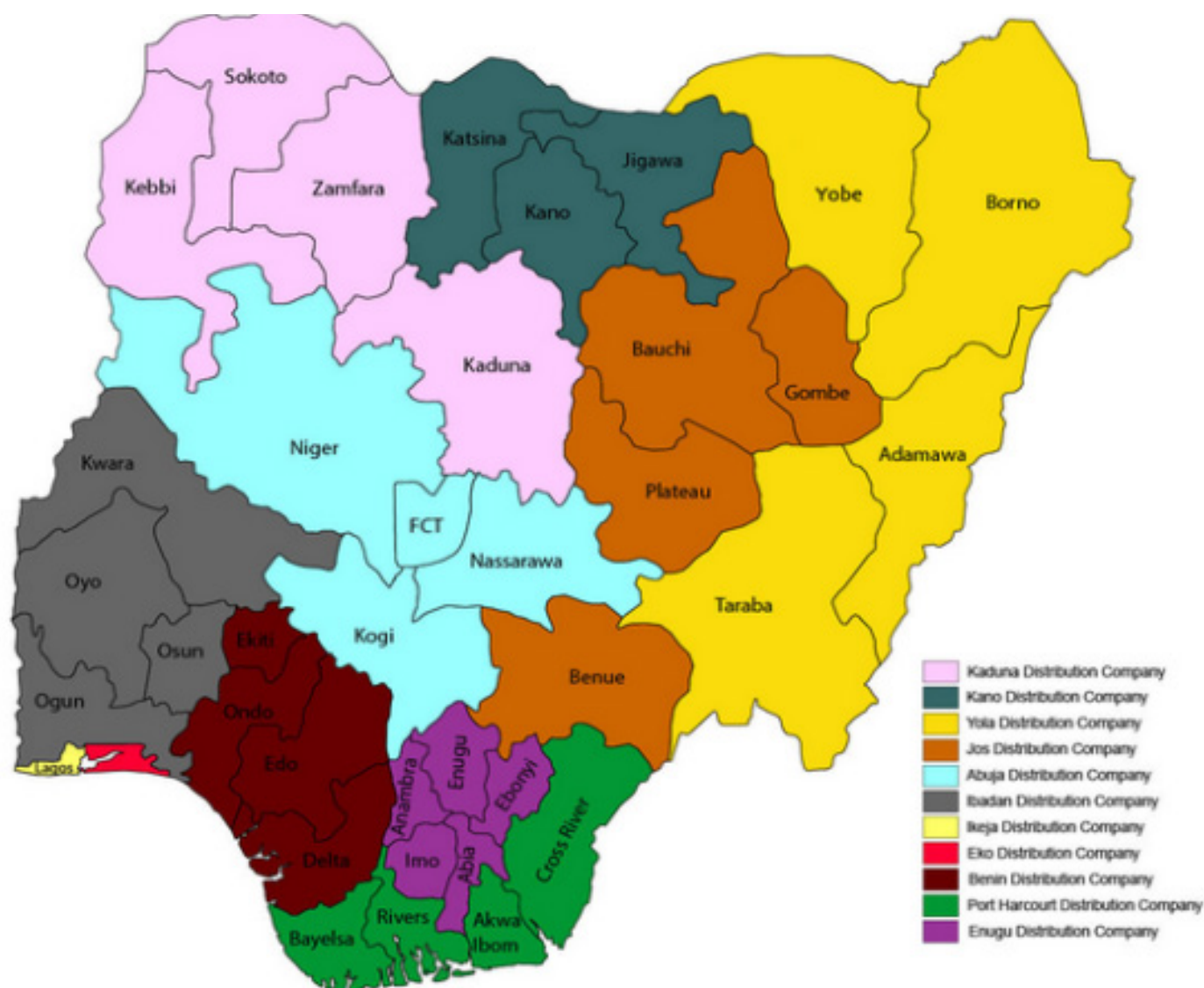
At the apex of electricity governance in Nigeria is the Federal Ministry of Power. It is saddled with power provision responsibility and coordination of efforts across the electricity industry. On the other hand, the Nigerian Electricity Regulatory Commission is an independent body established by the 2005 Electric Power Sector Reform Act to undertake technical and economic regulation of the Nigerian electricity supply industry. The Commission is to, among others, license operators, determine operating codes and standards, establish customer rights and obligations and set cost-reflective industry tariffs (<https://nerc.gov.ng/index.php/about/role>). The existing generation and distribution companies in Nigeria are depicted below.

Table 1: Capacity, Generation, Type and Privatization Status of GenCos

GenCo	Installed Capacity (MW)	Type	Privatisation Status
Afam Power Plc	776MW	Gas	100% Sold
Sapele Power Plc	414MW	Gas	51% Sold
Egbin Power Plc	1,020MW	Gas	100% Sold
Ughelli Power Plc	900MW	Gas	100% Sold
Kainji Power Plant	760MW	Hydro	Long Term Concession
Jebba Power Plant	578MW	Hydro	Long Term Concession
Shiroro Power Plc	600MW	Hydro	Long Term Concession

Source: <https://nerc.gov.ng/index.php/home/nesi/403-generation>

Figure 1: DisCos and their coverage areas



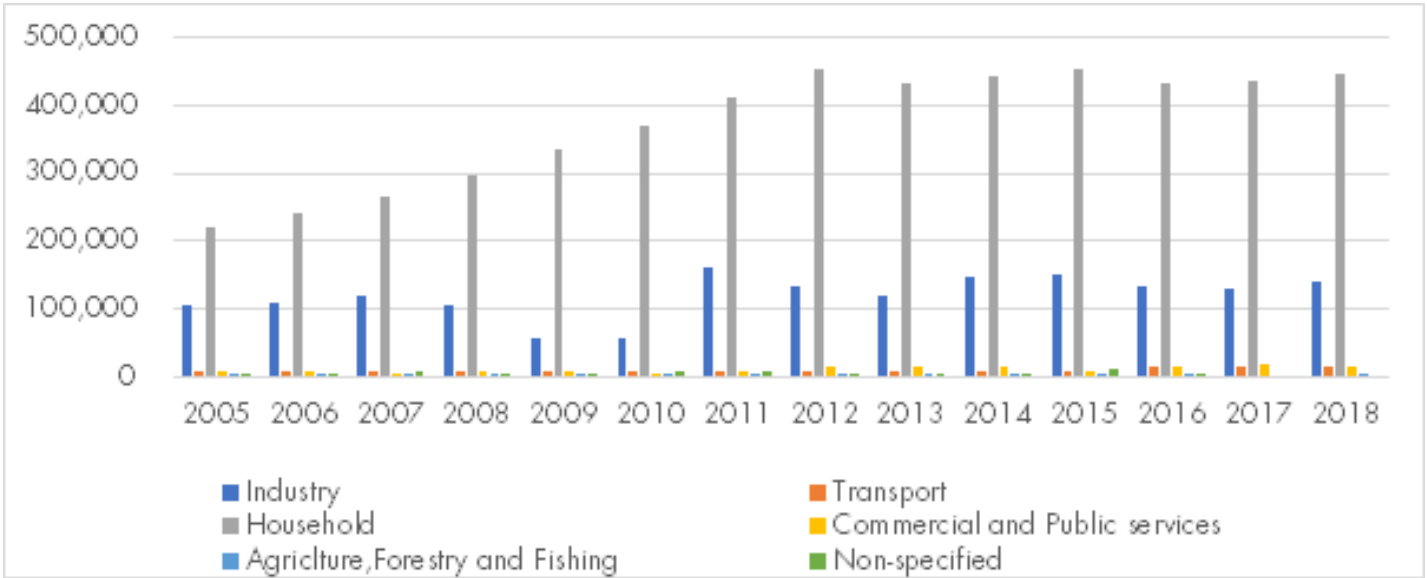
Source: <https://nerc.gov.ng/index.php/contact/discos>

Nigeria has Africa's largest population and economy. However, per capita, annual electricity consumption is only 3.5% compared to South Africa. The country's electricity demand is expected to increase as the population and economy grow positively. Self-generation is extremely prevalent in Nigeria as nearly 14GW capacity exists in small-scale diesel and petrol generators. As of June 2022, the price of electricity used in households in Nigeria amounted to N23 per kilowatt hour, some 0.05 U.S. dollars. On the other hand, industrial electric energy was priced at approximately N36 per kilowatt hour, roughly 0.08 U.S. dollars. At its peak, Nigeria's power sector can only generate about 15 per cent of the projected national daily requirement of 28,880MW. In 2022 and with the approval of the Nigerian electricity regulatory commission, the electricity tariff was increased to a maximum of N72.2 per kilowatt hour. Specifically, band A non-maximum demand customers increased from N56.16/kWh to N60.67/kWh. Furthermore, band B non-maximum demand customers were charged N59.64/kWh from the previous N56.64/kWh. It also applied to band E maximum demand customers with a new rate of N54.22/kWh from N50.72/ kWh. This took effect from January 1st, 2023. Many taunted this to be a higher price for poorer services.

The sectoral energy consumption in Nigeria presents a fascinating abnormality. The household sector is the highest energy consumer by a wide margin. This depicts the country as a consumption-based economy and shows the dormancy of industrial, agricultural, commercial and transport sectors, undoubtedly perceived as the engine of domestic productivity and growth. This gave credence to the campaign mantra of one of Nigeria's presidential aspirants in the just concluded February 2023 general elections.

It further presents a deviation from conventional electricity consumption patterns in developed and fast-growing/emerging economies such as the United States, Germany, China, and India. The above assertion is diagrammatically presented below.

Figure 2: Nigeria Energy Consumption by Sectors



Source: Author’s computation with data from African Energy Commission (AFREC)

Proposed State Participation Model

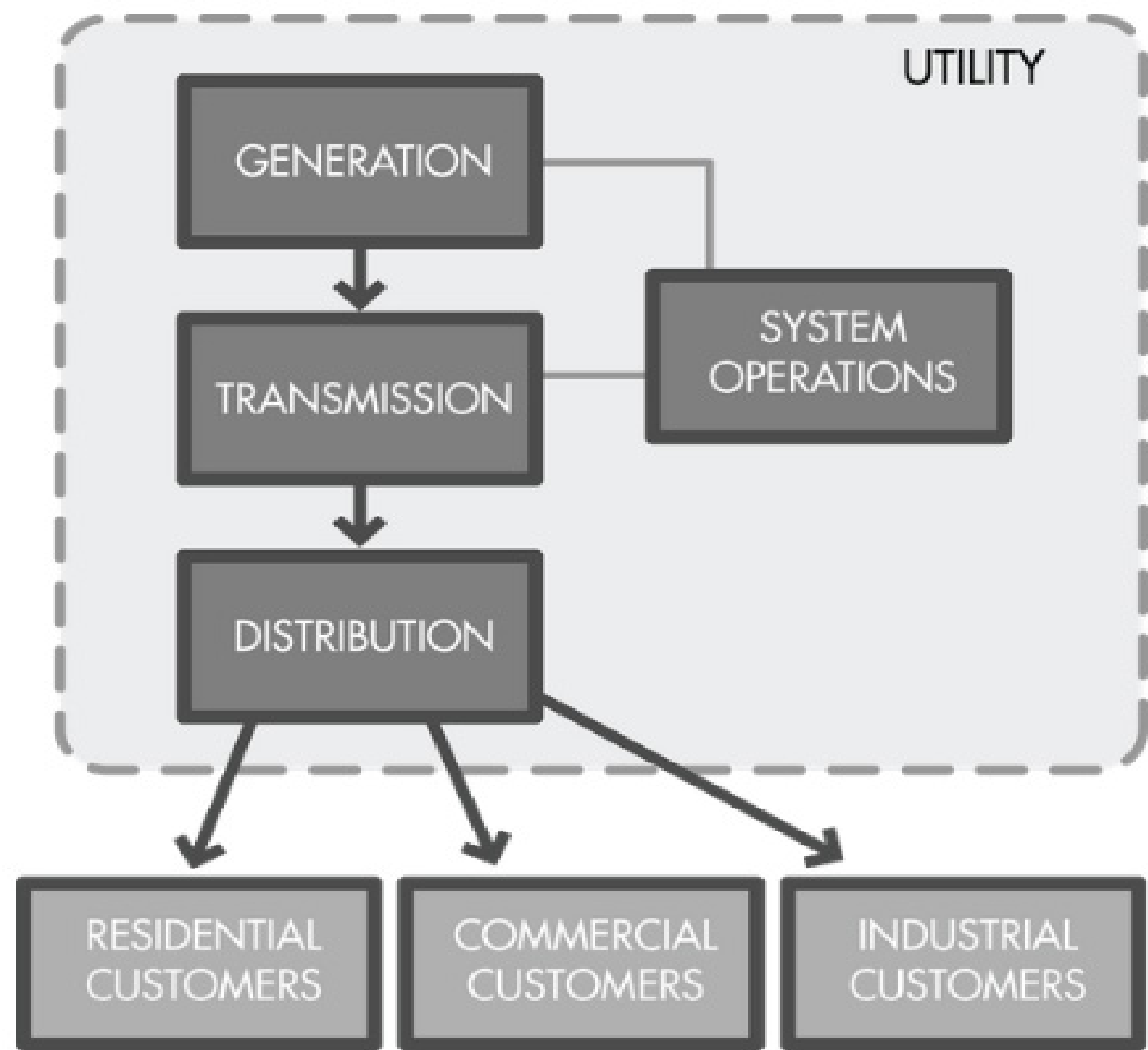
The recent electricity amendment elicited mixed reactions from energy experts. Some applauded the development with the view that states can independently develop their distribution networks, generate, and consume power based on local needs. Insights were drawn from the activities of the Lagos state electricity board, which compiles data and research on its power capacities/needs. By so doing and at a glance, state energy demand and available investment opportunities are known. States can therefore exploit available local electricity generation resources to their unique advantage. States such as Ondo, Kogi and Enugu can look towards their coal resources for electricity generation while using carbon capture methods to cater for its carbon footprints.

Conversely, some experts are worried about the workability of the new system. They revealed the complications of how states can play in a sector dominated by licensed operators and asked if states will develop grid networks along existing ones or use the same. It is important to understand that the amended electricity act can incentivize new investment or create more hurdles for industry players. This is based solely on implementation as poor implementation will defeat all intended possible positive outcomes. This article aims to provide clarity through insights on participation models available to ambitious state governments. The recommended models are as follows:

Vertically Integrated Model: This model involves the combined ownership and operation of all levels of the supply chain; generation, transmission, and distribution by a single entity, either the government or private utility granted the franchise within a service territory. In the latter scenario (as the former appears obsolete), the private utility shoulders the obligation to serve all customers in the territory and submits itself to government regulations. The government ensures the provision of safe, reliable electricity at just and reasonable prices. In this role, the government sets the private utility’s rates, oversees complaints, ensures consumer protection, and provides expert oversight as to the prudence of investments. This is to ensure an appropriate balance between consumer benefits and the necessity that a utility recovers its investments and expenses, along with a reasonable return. This is also known as an investor-owned and state-regulated system. An aspect of this model involves delineating the service territory into economic municipalities with its separate grid connections. By so doing, the system will be independent, thereby allowing municipalities to satisfy their electricity needs. However, the municipalities are still under the

strict regulation of the government electricity board/agency. In this model, state governments in Nigeria will assume the regulatory role while the licensed private utility takes over the real business of generating, transmitting, and distributing electricity. Diagrammatically, this model is presented below.

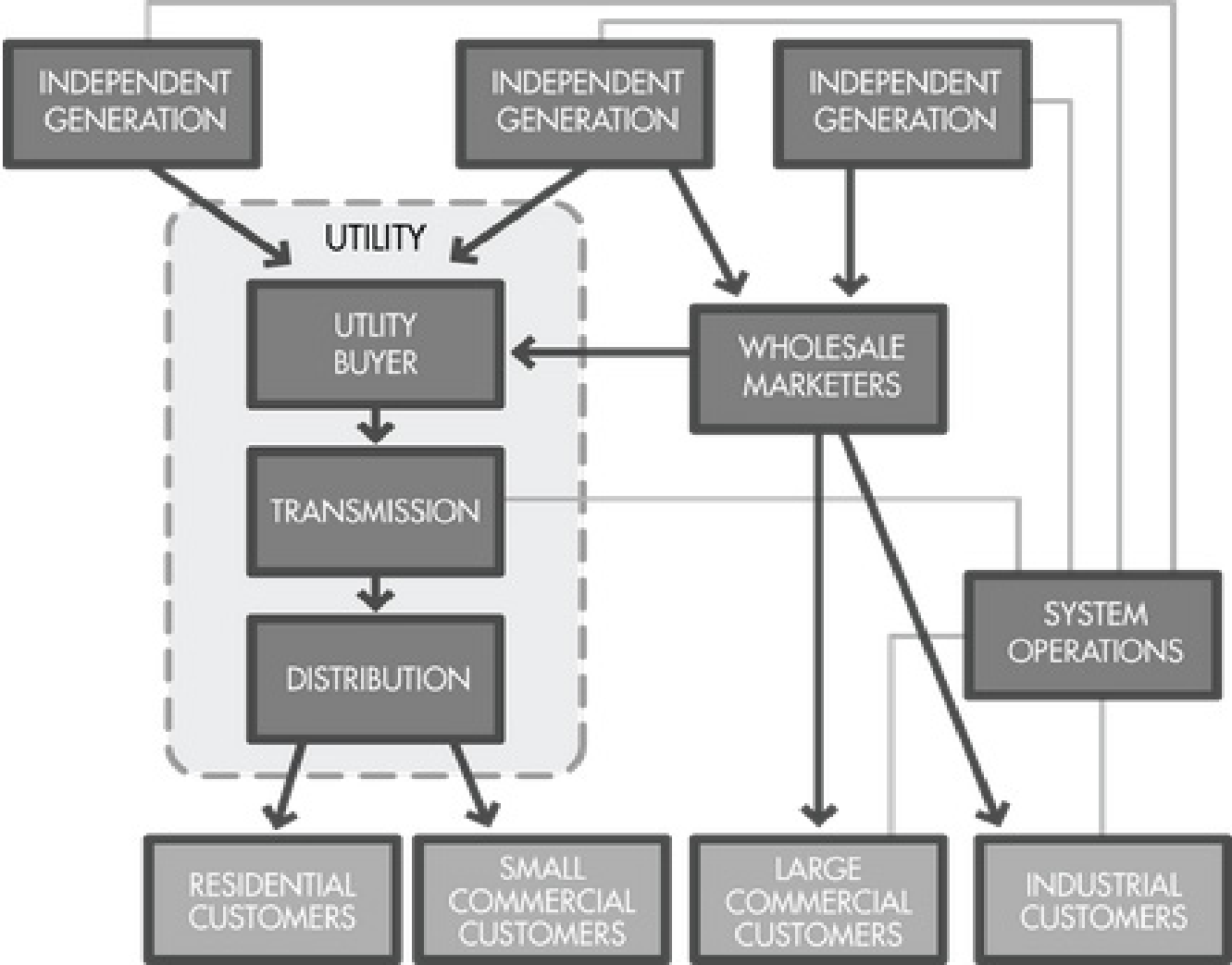
Figure 3: Vertically integrated monopoly utility model



Source:<https://energyknowledgebase.com/topics/vertically-integrated-monopoly-utility-electric-market-model.asp>

Deregulated Model: In this model of participation and unlike the vertically integrated model, different companies along the supply chain provide generation, transmission, and distribution services. On the generation segment, independent power producers exist as entities separate from the rest of the supply chain. At the distribution end, the entities procure power from generators, pay for transmission, and sell to their customers. It is also important to highlight that there is a possibility of having retail entities responsible for the direct sale of electricity, different from the existing Nigerian model where distribution companies oversee the retail sale of electricity. This model is still under strict regulation by the government. This model promotes efficiency in the generation and distribution segments of the chain as utilities are motivated to generate/distribute power at the least cost for maximum benefit. This model is diagrammatically presented below.

Figure 4: Wholesale/industrial competition model



Source: <https://energyknowledgebase.com/topics/wholesaleindustrial-competition-electric-market-model.asp>

With appropriate legislation, Nigerian states can adequately oversee the activities of licensed entities across the entire supply chain in their domain. This will ensure healthy competition among sector players. Based on local yearnings, ambitious states in Nigeria can decide which model aligns appropriately with their electricity goals.

It is worth mentioning that with the amendment, Lagos, Akwa Ibom, and Rivers, among other states, have moved to establish appropriate structures for establishing state regulatory commissions and licensing of investors interested in investing about \$10 billion in their electricity sector.

Revenue Growth Pathways

The electricity sector is a capital-intensive industry. However, the enormous returns available in the sector adequately compensate for this. According to the National Bureau of Statistics, distribution companies realized N828 billion from 11.05 million customers in 2022. This represents an 8.7% increase when compared to 2021 figures. On the generation segment, Geregu Power Plc reported revenue of N39 billion for nine months ended on September 30th, 2022. This shows the electricity sector’s enormous revenue earning and growth potential, irrespective of the chosen engagement model. Fortunately, this represents but a fraction of revenue potential in an economy with an estimated population of over 200 million persons and a supply gap of about 23 GW.

The primary revenue sources available to the states include license charges, personal income tax,

finer, and penalties (for infractions) for utilities across the supply chain. Wheeling charges come into play should any state own/manage the transmission lines. When the state ventures into the retail/distribution end of the chain, the direct sale of electricity constitutes a large chunk of returns. Installation, reconnection, metering and maintenance charges also represent viable revenue channels. States with excess generation capacity can sell such to the national grid.

By way of the multiplier effect, a state's ability to guarantee reliable electricity within its borders will lead to a massive inflow of individuals, companies, and manufacturers. This will undoubtedly increase local and foreign investments, create jobs, and improve the internally generated revenue available to such states. The availability of electricity serves as a huge business incentive. Its unavailability has unfortunately led to the closure and movement of industries to nearby African countries, such as Ghana, with better electricity conditions. With states in control, new operators will be on-boarded across the chain, driving competition and reducing consumer prices. This is cost-saving for businesses/households. A significant drop in noise and air pollution caused by prolonged generator usage is also a desirable by-product.

Policy Recommendations

Ambitious states need to seek an adequate understanding of the workings of the electricity industry to maximize the opportunities presented by the 2022 Electricity Act. This is achievable through the adoption of the following recommendations:

- Establishment of state electricity commission/agency.
- Promulgation of state electricity laws.
- Promotion of electricity sector transparency and accountability.
- Engagement of electricity industry experts.



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