

# POWER IN NIGERIA

Will there ever be light?

Samuel Akinyele Caulcrick



## **Power In Nigeria: Will there ever be light?**

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25, Ijoko Road, Akute via Ojodu Berger, Lagos.

bsbtosin@yahoo.co.uk

+234 8023122408

## DEDICATION

To my wife, Pheola, who had to endure my late nights in the study, each time an idea came to my mind to put on paper; and for being my greatest critic; my two sons, Mayowa and Dami, who for the most part engaged me intellectually and my relaxed and knowledgeable friends, who listened and queried most of my assertions in the propagation of the theory of how we took a turn that impacted on Nigeria's fortunes.

To earn their respect is a joy.

WILL THERE EVER BE LIGHT IN NIGERIA?

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## PROLOGUE



*If history repeats itself, and the unexpected always happens, how incapable must man be of learning from experience!*

**– George Bernard Shaw.**

**I**t all started with an event in a faraway land in Iran. The 1979 Iranian Islamic Revolution was then innocuous to Nigeria and its people, but it turned out to impact on the lives of Nigerians and their country's fortunes. In the wake of that revolution was the global oil glut of early 1980 that precipitated the prolonged global recession of the mid-1980s to early 1990s. Consequently, in response to that trying period, Nigeria in 1986 tweaked its resource allocation, but not before a countrywide deliberation - the Structural Adjustment Programme debate. The outcome liberalised the country's foreign exchange allocation formula as the antidote, at the time, to contain the fallouts of that recession. The nation thus did away with the allocation of resources based on the import licensing financial system and replaced it with a liberalised currency market.

The government at the time, adopted the bidding method at the foreign exchange market to allocate resources; in other words, to sell to the highest bidder - the first in Nigeria's history. The concept of the neoliberal economic policy, popularised and encouraged by the IMF and the World Bank in the early 1980s was to allow an economy, particularly in the Third World, to operate freely based on market forces and devoid of central planning. It was a difficult time as the politicised and corrupted import licensing system for resource allocation had become a bottleneck and had started weighing down the development in the country. It was a landmark decision that has had a profound effect on Nigeria's economic fortunes.

Future historians, sitting in their quiet moments, might question the wholesome adoption of a liberalised currency market in 1986. The economy that ensued in the late 1980s and beyond saw a distinct pattern of performance based on either short-term or long-term investments. Economic activities with quick returns on investments would perform better and flourish but to the detriment of other segments. Buying and selling imported finished products powered by the oil receipts dominated forex allocation as traders outbid other sectors at the foreign exchange market. Critical sectors of the economy such as import substitution activities that ought to preserve the nation's wealth, even if they do not add much to the sovereign wealth lost out in forex allocation.

Long-term investment activities such as education; manufacturing; farming; animal husbandry; mineral

extraction, to name a few that use engineering principle to create wealth by adding physical or intellectual values, somewhat continue to struggle. These socioeconomic activities regrettably could have improved immensely or multiply the sovereign wealth of the nation valued in real terms, by either additional forex earning through exports or by way of preservation of Nigeria's wealth using import substitutions with locally made products and produce.

The Nigerian economy reacted to the market forces as economic activities with faster returns on investment regularly outbid other sectors at the forex market, hence securing a more substantial portion of the country's resources. With this, development could not match the gains in oil receipts as import substitutions continue to lose out at the forex market and 30 years on, overshadowed by imports of various finished products from all over the world. Activities, such as the time it takes to produce a doctor or to harvest a crop, to name a few pursuits that could add wealth to the nation, became suppressed, and people now see trading in whatever form as a way out of poverty. The first reaction to the adoption of the neoliberal policy in 1986 was "the Andrew effect" of the early 1990s, which prompted an exodus of Nigeria's best brains into the diaspora in search of value for what they were worth.

Two years, after the introduction of the structural adjustment programme, when the adjustment was to terminate, the country had hoped that the market would right itself, but as time went by it never did; thirty (30) years on, development had stagnated; buoyed only by the proceeds of oil. With the absence of central planning that

the IMF did not encourage and believed to interfere with free enterprise, there has been no instrument to recalibrate this distortion in the economy. Most achingly and regrettably, is the manifestation of a seemingly unpatriotic and quick take-profit mentality of most Nigerians that has assaulted all the civilising infrastructures of an organised society.

Within ten years of the introduction of SAP, Nigeria had become the dumping ground or generously put, a showroom for all manner of finished products from every corner of the world. Its oil receipts frittered away on many fronts, and the foundation for massive unemployment began in earnest. As the free market dictated the direction of the economy, mercantile activities determined the exchange rate. With no sound tax administration, governance became a problem. Trading and those with corrupt or slush funds always outbid others for forex. In no time, those that intended to capital flight found haven in the process and had more access to the oil capital than sectors that could develop the economy. The only significant source of funding the public treasury is the conversion of the petrodollars into Naira at the foreign exchange market to meet government's obligation of salaries, overheads and pay for contracts.

Consequently, quality deliveries in schools, hospitals, roads, rail, etc. became an illusion. And by the year 2018, there is hardly any household that does not engage in the business of buying or selling one thing or the other to survive. Long-term investors always find it difficult to plan - not sure of what will become of their investment or the

local currency, down the line. The government runs week by week, while the citizens await decisions at the weekly Federal Executive Council, which mostly preoccupies itself to disbursing the millions of devalued Naira - the proceeds of the exchange of petrodollar at the Central Bank essentially with traders. It is to fund imports of finished goods into the country, and little for anything else - intrinsically a runaway hollow economic arrangement that has stagnated development in Nigeria.

To get a grip of the state of Nigeria's development, a visit to a showroom with a backroom would be aptest. There are few job opportunities in showrooms, which only display and sell finished products as against the high employment opportunities available in the backrooms that produce the product. This scenario is a microcosm of Nigeria's economic development - depicting why the unemployment figure in Nigeria is massive. Nigeria has become a showroom where finished products from all over the world are on display. The country practically imports almost all its needs, and in reality has outsourced its backrooms to other countries that manufacture the imports into Nigeria or provide health care for instance, etc. The backrooms of the Nigerian economy are the factories; schools; agriculture; mining; transport system of roads, rail and air; hospitals, etc., which ought to preserve the sovereign wealth as a way of forex substitution, but they continue to struggle.

In the meantime, the mercantile sector continues to thrive, and in its wake determines the exchange rate at their whims. The government, of course, seems more than glad

since the Treasury increasingly earns more Naira (devaluing), frequently, for less dollar. It is a muddled economic process that defies the indices of production; allowing currency speculators to dilute the gains of the labour of the citizens. It lowers the purchasing power of the people and kills real wealth-creating enterprises and the reason why there is also no light also. As the traditional import substitute-segments began to decay one after the other, Nigerians started to look elsewhere for alternatives. The international air transport sector, for instance, has no longer a substitute to preserve Nigeria's wealth as it has lost out to foreign carriers; the health management sector that could conserve the sovereign wealth is in a dismal condition, and people now go abroad on medical holidays, to name a few. In the secondary education sub-sector, it is a drain on the sovereign wealth when Nigerian children go outside the country.

The "Showroom/Backroom" characteristics aptly manifest in the amount of energy Nigeria needs. Whereas a showroom's need for power is only for lighting and probably for air-conditioners, maybe not more, tenfolds of that requirement are the minimum for production in the backroom to power the pieces of industrial machinery. Thusly, the existing energy delivery of 5,000 megawatts is unsustainable, and a little less than 4,000 megawatts seems like the saturation ceiling for Nigeria's "showroom" status; anything above this level, since the country does not produce, has become difficult to sustain. Admittedly as many Nigerians would swear, there is an inadequate supply of public electricity in Nigeria. Two factors,

however, negate the provision of a constant power supply; firstly, the country's low per capita limits most Nigerians' ability to pay the reflective cost tariffs, unless subsidised. Secondly, the manufacturing industry that ought to create incentives for investments in the power sector does not command a sizeable market share for local products to sustain higher installed capacity utilisation.

Have Nigerians shot themselves in the foot then? Most likely. Most Nigerians' preference for imported goods against locally manufactured products reduces the market share of the country's industrial outputs. In turn, it lowers the installed capacity utilisation of local producers, which translates to a lower need for power. These and others are the pictures a potential investor in the power sector sees, and they are ugly. Apart from the lack of adequate patronage of locally made goods, which reduce employment opportunities for Nigerian youths, it has turned out to contribute to the no light situation in Nigeria significantly.

Glaringly, it is becoming evident that only enormous energy necessary for higher industrial outputs will stimulate interest in investors to finance the power sector. Electricity is a delicate and volatile commodity that requires immediate usage after generated and a consistent demand by industry is security to the investment in the power sector. Therefore, there must be a continuous demand for power before generation, as the Nigerian experience has shown and not the other way round. There has to be steady higher installed capacity utilisation by the local industry for Nigeria to have light. Unfortunately, the

assault on locally made products by imports into Nigeria has not allowed higher installed capacity utilisation of the domestic manufacturing sector. Thus, their level of electricity needed for production does not guarantee the security for investment in the power sector.

In a different circumstance, the shortage of power for household and light business energy ought to attract investment in the power sector anywhere else. Nigeria's per capita is low and that is a stumbling block; should the buying power of most Nigerians increase, it would provide most people with the means to afford the reflective cost of uninterrupted power supply. Later in the book, we shall see there is a complicated additional cost to provide continuous public power supply.

The model followed by China at the start of their current industrial drive is worthy of consideration. In the beginning, China's public power supply was a far cry to the over one (1) million megawatts of electricity it has today. China began to nurture its manufacturing industries, by banning imports of finished products only raw materials. With cheaper power provided by coal, mined at almost zero labour cost, sometimes allegedly using prisoners, and less expensive Chinese labour, China attracted foreign investors. Today, China has made its brand names all over the world, and its industries now use cleaner energy provided by foreign investors in their power sector.

Questions get often asked if the free market was a wrong choice for Nigeria. The context of free enterprise inspires the writing of this book; however, it highlights the



consequences of some decisions taken that impacted negatively on the development in the country. The work attempts to connect the dots in the economic activities in Nigeria in its entirety with consideration to improve the power sector at no extra budgetary cost or burden on the Treasury. Nevertheless, there are assumptions that the government will alter its policies to exit this embarrassing logjam in the power sector. The book deliberately stays clear of the wasteful gas flaring that the country ought to pipe to utility ends to power industries and other areas of the economy. The proposed scheme as being suggested premises an awareness to link the poor patronage of locally made goods to the country's no light situation.

The government needs to defend the local industrial outputs against imports for Nigeria to have light. There should be zero duties for industrial pieces of machinery, raw materials and their spares. Also, the government will reduce the value-added tax (VAT) on local produce and products, and with the support of the banks, start a credit facility for Nigerians when only purchasing made-in Nigeria goods. The primary target is thirst for more energy for higher industrial outputs to attract investors to the power sector. The plan will alter the laissez-faire attitude of the government in business. Nigeria's locally produced goods must gain market share as a national project. At some point, there will be the need for government to redirect a fraction of the current subsidies on PMS to subsidise the gas or diesel bills for production of those on the scheme. The target is the present subsidy on petrol that fuels the over 58 million petrol-driven generators because homes

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and businesses in the design will have constant light. In summary, it will be an executive order to shrink unemployment figures and the blackouts drastically.



## CAUSE AND EFFECT

**T**rade or mercantilism, for long in human history, has made nations prosperous if conducted across national borders. Trade creates wealth by way of commissions charged for transactions for outflow of deals made or goods exported. It seldom, though, adds physical value to whatever products exchanged, or if any, little for services. The returns on investment in mercantile activities are faster when compared to sectors that require engineering principles to add either intellectual value as in learning or physical value as in manufacturing. The time it takes to reward on investments in mercantile activities is an advantage during the bid for foreign exchange allocation at Nigeria's foreign exchange market. While other sectors in the economy might still have their investments locked in, waiting for harvest, the turnaround time in any form of trading allows outbidding others. Banking, stock exchange, buying and selling, and general services, including information services, to name a few are examples of the activities in the mercantile sector, and they have

performed quite well in Nigeria since the adoption of the liberalised financial market.

Nevertheless, the mercantile sector has not added to the external earning of Nigeria. The nationalisation of some of the trading businesses, however, may have preserved the national wealth to some extent. It sure did not create enough wealth for Nigeria to develop, in real term, except increased activities of buy and sell, hence higher GDP. The long-term investment sectors, on the other hand, employ the principles of engineering to create wealth by adding either intellectual or physical value to whatever raw materials to develop human or other materials into desirable products and thus have greater potential. Thus, manufacturing in a factory; farming in the field; mineral extraction; learning process to impart knowledge onto a pupil, and animal husbandry, to name a few are examples. The long-term investment sectors characteristically lag in the time it takes to reap returns on their investments, such as the time it takes to train a professional or fabricate a desirable product or harvest a crop. However, it is these long-term investment activities that most likely would build on and multiply the sovereign assets of the country more; these long-term investment sectors regularly come second best while bidding for forex at the Central Bank of Nigeria (CBN).

In spite of the advantages of quicker turnaround time, easier access to forex for imports and being the domineering players in the forex market, the mercantile sector only generated a "lot of movement, but no motion". The trading sector that does not engage in an outflow of

goods and services of Nigeria's origin will not add to the country's wealth comparatively. It is more of the proverbial of burying the talent as the sum-total of Nigeria's wealth is practically the same as earned from oil plus the remittances by Nigerians abroad. The exports of products and produces of Nigeria's factories, farms, quarries and schools would have performed better. At a time when things got unbearable and a lot of Nigerians, particularly the best graduates of Nigeria's preSAP educational system, left Nigeria's shores into the diaspora, the country has benefitted immensely in remittances back home. And in 2017 alone, it amounted to well over \$20 billion. Were these Nigerians to be still around to contribute to the nation's building, the gains could have been several times more. The country's cash pot seems only the oil and the Nigerians in the diaspora.

Welfare economics is the branch of economics, though normative, it deals with how well an economy performs and not necessarily how it works. In contrast, macroeconomics and microeconomics explain how the economy works. The distortions in the Nigerian economy ought to have been a subject of review using the welfare economics principles long after the introduction of the structural adjustment programme in 1986. That did not happen; one has to lay the blame on the country's economists who generally are hooked on neoliberal economic policies. Nigeria's economists, over the years, subjected the people to complex economics jargons, which meant little in the face of poor performance. Nigeria continues to panel the struggling economic policy. In the

book, the work takes an economics' eavesdropper approach and not what economics principle to adopt, but an attempt to find how best to manage the power sector within the present economic structure by suggesting ways out of the current no power logjam in Nigeria.

The evident "stunted growth" in the power sector is a direct result of poor performance in the manufacturing industry. Regrettably, the mercantile sector that flourished used a higher allocation of the country's resources, at the expense of the long-term investment sectors. It, however, had less demand for electric power to function - the nature of their type of business. As it has turned out, trading or mercantile creates a lower incentive for potential investment in the power sector. The manufacturing industry, on the other hand, with a higher need for public electricity cannot compete for forex on the same platform and thus continually lose out in the country's resource allocation. It is easier to calculate than all the yardsticks of socioeconomics, the size of the damage to Nigeria's development that trails the adoption of the forex bidding methods. Perhaps if the country had factored considerations to the time it takes an investment for returns, the result today could have been much better. The Nigerian experience in resource allocation has become a test case in most ivy league universities around the globe as a validated wrong financial policy for sustained growth.

Subsequent upon the long-term investment sector lacking the ability to compete in the foreign exchange market for spare parts and raw materials, and the resultant low industrial outputs after that, particularly the

manufacturing sub-sector, the situation cascaded into the lack of adequate power supply in Nigeria. The engineering-based sector, apart from being the largest employer of labour, is most likely the sector to demand a large quantity of electricity for its operations. Unless a sustained, sufficient, need for public electric power by factories in Nigeria is in place, the power sector will remain unattractive to potential investors. Nigeria has to sustain an insatiable desire for a large volume of electricity, stimulated by the greater patronage of made-in-Nigeria goods, which ultimately will support an increase in the installed capacity utilisation. Only then would there be an attraction index for investment in the power sector.

Almost forever, power outages, whether blackouts or brownouts are a part of expectations in Nigeria for both the residents and visitors to the country alike. The no-light situation is a norm, and people crack ribs joking about it. Nigeria's showroom characteristics create unpredictable demand for electricity by the manufacturing industry due to less market share, even with the backdrop of the shortage of electricity supply to households and light businesses - an albatross in Nigeria's electricity logjam. Two key things ordinarily bother investors - returns on investment and security of investment funds. For returns on investment, the household and light business is incapable of affording uninterrupted supply because of Nigeria's low per capita plus the need to hold some power in reserve to prevent system collapse on the grid. The manufacturing industry, on their own, has not been able to sustain the demand of public electricity because their products do not command

enough patronage to keep the production lines running. The government also, presently, does not have the economic capacity to refinance the power sector, and therefore, private sector sector partnership is inevitable.

For as long as Nigeria's "backroom" (factories, schools, hospitals etc.) remains in a state of decrepitude, countries that manufacture the products imported into Nigeria will continue to attract investors to their power sector. Globalisation facilitates investment in the power sector possible in any country that continually produces finished products for the world. Hence, the meteoric growth of the power sector in China. Politicians, in Nigeria, aspiring to public office, have always made it a campaign promise to address the low regime of the public electric power supply but to no avail. Consequently, there is now a need to step out of the box. The theme of this book is a radical approach, to better the state of the no-light situation at no extra cost. Whatever is presently on the table is not sustainable. The development in Nigeria gets a knock from free enterprise as practised in Nigeria, and theoretically solvable as it seems, it needs a reinventing of the Nigerian wheel. The concept of spending the oil money, exchanged with importers to bring in commodities from all over the world to satiate the needs of everybody is anti-growth; it is time, therefore, to come down to brass tags. The idea put forward in this book is an alternative rope to pull Nigeria out of the economic quagmire and place the country, yet again, on the path of growth with mitigation of the existing high unemployment figure.



Governance in Nigeria is replete with numerous elements of inefficiency. It is inescapable if Nigeria has to grow, therefore, for the country to start to separate equity from efficiency in the economy. There must be a definite plan to decrease the squandering of Nigeria's resources. However, this does not preclude the current fight against corruption. Should the country wait for sufficient power supply to launch its industrial revolution or does it start to nurture the local productive sector, protect the local industrial products and produces to increase their share in the Nigerian market, which will stimulate investment in the power sector? An increase in installed capacity utilisation of Nigeria's industries is possible only if there is protection for the local products against imports - if nothing, but to reduce the import bills to free the budget to finance other infrastructural developments. The people in Nigeria fail to realise that inadequate attention to bad roads, for instance, and other insufficient facilities in all aspect of their lives get withheld by their lifestyle of love for imported goods. Most successful economies had had to protect the local industries at one time or the other to grow. Alternatively, Nigeria could continue the perpetual subsidies on consumption, most of which are finished products manufactured outside its borders. People believe the politics of "subsidy", in whatever form, is the arteries that slush funds flow to the "cabal" - a real vehicle for sleaze.

One of the measures a government, in power, takes to make available some essential commodities to the majority of its citizens is by way of subsidies, which is a form of equity. It is a concept of social justice that there are some

basic needs that people should have and spread without impartiality. The subsidy on petrol, commonly known as premium motor spirit (PMS) has been the most contentious in Nigeria for a long time. Petrol has attained a cult dimension with an emotional impact on the lives of most Nigerians, and why not? Gasoline is the fuel for millions of inefficient mass-transit contraptions in Nigeria, and millions of cars due to the middle-class prosperity. Of most interest to this book is the use of petrol for the over 58 million petrol driven private generators that litter the country's landscape, put to use because of the no-light situation. The current subsidies on PMS for both on the road and in others like households and light businesses to generate power are not sustainable, particularly as it squanders the country's resources. Besides, there ought to be a fuel tax at the petrol pump to build and maintain decent road conditions.

For as long as there are subsidies on petroleum products, there will always be a strong argument for their removal; this may be the time to revisit, yet again. Down the ages, philosophers have failed to address the issue of the chicken and the egg; which one came first? Does the country put out an economic recovery plan to nurture its industrial outputs by subsidising production, or does it allow the whims of the free market to exit this bewilderment? Nigeria's lingering massive unemployment is a ticking bomb but is somewhat intertwined with the low regime of the power supply. Manufacturing outputs in Nigeria are low and locally manufactured products do not command sufficient patronage to sustain a high installed capacity

utilisation. Even if Nigeria has an adequate power supply today, the seeming level of the apparent adequacy in power is unsustainable until Nigerians start to patronise made in Nigeria goods in great quantity to support a higher installed capacity of the local factories.

In other words, an attitudinal shift in preferences for made-in-Nigeria goods by Nigerians would create the need for more electricity by the local industry and make the power sector attractive for better returns on investment in the power sector. Nigerians should not complain if their shunning of local products prevents the growth in electricity that could have been possible by default. Ultimately, through economies of scale, the high volume of megawatts of the country's power supply, if sustained by industrial demands, will eventually enhance the energy security of households and light businesses and reduce light users' electricity tariffs. By redirecting the subsidies on the petrol that powers the petrol-generators alone to the productive sectors, like the manufacturing sector, millions of new jobs will come begging, which are likely to alter the socioeconomic matrix in Nigeria.

The intelligent question Nigerians should be asking themselves, or is it a dilemma, is should there be sufficient power supply first, to spur an industrial revolution, or should the country nurture the products of the local industrial outputs to gain market share that will demand more power to produce, which eventually could attract investment in the power sector? Considering Nigeria's per capita, the writer will settle for the egg, in the chicken and egg legend. Nurturing of Nigeria's industrial outputs is the

sensible way to go for sustained growth in the power sector, particularly in the regime of low purchasing power of most Nigerians, where reflective cost tariffs in the power sector are beyond their means.

There is a conscious need for Nigerians to start patronising made-in-Nigeria goods as a factor to attain a reliable power supply. It is pertinent to those desirous to gain employment and those working as security for their jobs to at least join and create the awareness. For parents and guardians, it is to generate job opportunities for Nigerian youths. The country has gone around in circles as almost all policies tried have come to nought. Nigeria's per capita is embarrassingly low and not likely to improve soon unless Nigeria starts producing their needs locally. Electricity supply to homes and light businesses is presently unattractive to investors in the power sector, but that could change. Even the newly introduced Eligible Customers, where those who consume more than 2MW get their supply directly from the GenCos, is not sustainable unless the government protects their products against comparable imports. It is a higher sustained industrial output with a constant thirst for a large quantity of electricity that would discount the light users' tariffs eventually. Unless that, the power saturation most likely will remain at the 5,000 megawatts ceiling tops, irrespective of the sector's higher capacity.

A paradigm shift in the people's attitude and the government policy is inescapably imperative. The people must realise that preferences of foreign-made goods over locally manufactured ones is equivalent to an extra night of

no light. The government should also understand, to kickstart the industrial revolution, a separation of equity from efficiency in the economy is inescapable. Judging from the country's experience, the current low capacity on the grid cannot support both light users and the maximum demand consumers together. Therefore, it would be discerning to suspend the connection of some maximum demand consumers (MDC), for the time being, from the grid. The purpose is to release more grid power supply to the household and light business users, who will not mind higher tariffs if there is constant light; this will, as expected, cut down the home/light business use of the private generators that mostly run on subsidised PMS, and ultimately save on their subsidies..

There are an estimated fifty-eight (58) million petrol-powered generators in Nigeria of various capacities that run on subsidised PMS. The existing subsidy on their petrol can discount the gas or diesel bills in the manufacturing sub-sector should there be constant lights in the households and light businesses. Constitutionally, it may be difficult to achieve these by presidential order to discount from the national treasury, without first declaring a state of emergency in the power sector. The power sector is already in a state of emergency in any case, so what will be the delay?

The proposed scheme requires more remote power generating stations as a priority to ease the burden of energy subsidies on the treasury on the long run. Large power stations are usually justifiable considering the economies of scale as they produce cheaper electricity than

individual factories' power plants or even the contemplated modular power stations. Investment in renewable power is a good addition but pales in comparison to the country's needs. It is strange that people have never asked why investors, both local and foreign, have always shunned putting money in the power sector. Electricity is unlike other commodities that one can put into storage on a national demand like putting oil in a drum to keep. Once produced and not used, for instance by manufacturers for lack of adequate market share and unsold goods in their warehouses, the electricity companies are bound to incur losses for the unused electricity. In the design, the reconnection of those participating on the off-grid project would be as the country commissions more generating stations or when capacity allows. The partakers in the program will source their gas and diesel at commercial rates upfront and only make application to the treasury for reimbursement later. The formula for compensation could vary, such as the number of jobs created or sustained; the volume of production, the contribution to external earnings (exports), etc.

The aforementioned wealth-creating sectors, particularly manufacturing and agriculture, for a while yet will remain the largest employers of labour in Nigeria. Efforts to lower the obstacle to growth in these engineering-based production lines will boost the country's development. The mercantile sector, a more or less a "pay for service" sector, adds little or no value to the commodity in exchange; it presently increases little to the sovereign wealth. The situation is even worse in the general trading

sub-sector, where employment opportunities are as few as just a storekeeper, cashier, and security man; yet the allocation of resources in forex is multiple of that of a factory that manufactures what the store sells. There is no criminality in the process but what the market dictates. It is sad that thousands of imported used vehicles, parked along the roadsides, scattered over the country's landscape, wait for buyers for months on end. These resources, drawn from Nigeria's sovereign wealth, get tied down after outbidding the wealth-creating sectors at the forex market.

One of the anticipated downside in the project is urban migration, particularly of youths, which is the byproduct of modernisation and a desire to secure gainful employment. The mercantile sector has not created enough opportunities to limit rural drifts. The purpose of credits proposed in the scheme will mitigate development gaps between the federating units of the Nigerian union. Each local government in Nigeria and the country has over 770 local governments, must have an industry for whatever is unique in their area. There should be zero import duties on pieces of machinery, raw materials and spares to manufacturers and factories. There could be after sales taxation on locally made goods, but competitive to allow protection against imports. Every federating states would have to begin to add value to whatever agricultural produce, like processing and packaging to fast-track industrialisation and redress the inequalities among the federating states, and also mitigate urban migration. The bigger picture is the Nigerian brand as a driving force and encourages cooperation among the federating units, with

the aim to conquer the universe in this world of globalisation. Not every stakeholder is likely to key into this project initially, particularly those in the mercantile sector, and most especially the importers. The importers need to realise they are already in a pole position in the business of goods movement, and with a small adjustment turn the movement of goods in the opposite direction to market and sell Nigeria, firstly to Africa then to the world.

The book, on purpose, does not dwell on Nigeria's economists' unwillingness to employ welfare economics to assess how well the country's economy has performed, but to learn from it. It is ironic for Nigeria with the benefits of abundant human and material resources to often diagnose, for the most part cursorily, its problems and thus regularly miss the elements. Numerous in-depth analyses by experts often gloss over the underlining causes but only dwelled on the visible effects. Perhaps, by linking the various dots in the economy, using a different lens, the country could tackle the logjam in the power sector. It is an alternate approach purposefully designed to find a way forward to develop Nigeria in general, and in particular, the power sector and in doing so, to mitigate the massive unemployment condition that is more than sure likely to explode soon.







## BACKGROUND

**E**lectricity plays a significant role in the socio-economic and technological development of every modern nation and has become the backbone of modern industrial society, with its versatility as a source of energy. Limitless use of the application of electricity is in transport, cooling, heating, communications, lighting, manufacturing and computation.

- a.) Universally, an uninterrupted supply of this type of energy requires the constant generation of more than needed; a reserve capacity to spare. Anything short requires a radical approach.
- b.) In Nigeria today, demand for electricity far outstrips its supply. As the country faces acute electricity problems with the epileptic supply, it increasingly hinders Nigeria's development.
- c.) Unfortunately, it is against the backdrop of the vast availability of natural resources that could have

enhanced a reliable and uninterrupted commercial electric power generation.

- d.) A textbook approach to get Nigerian out of this embarrassing situation of "no-light" is proving increasingly untenable, and Nigeria may have to re-invent the wheel.
- e.) A shortfall in reserve capacity of public utility electrical energy requires a radical approach to guarantee a reliable power supply. The country has had to grope in a regime of perpetual "low capacity" for too long a time.
- f.) Sunlight is not available at night, and it is understandable because the earth rotates on its axis; seasons also are because the earth revolves around the sun. People then know when to expect sunrise and sunset at a given location or season. One only imagines the turmoil if sunrise and sunset were to appear randomly without a pattern; the distress residents in Nigeria experience on the power supply.
- g.) Almost forever, those who live in Nigeria grapple with the irregular supply of public electricity, with no forward notice of when to anticipate power-supply. Consequently, Nigerians seem more depressed by the unreliability of the little supplied than the inadequate supply itself.
- h.) Presently, own generation of electrical power has become the norm, as over 60 million Nigerians now own generators in a mix of diesel or petrol driven. In

most cases, a few hours of public utility supply in a week, if one is lucky, is available. The uncertainty of light from the electricity distribution companies (Discos), makes privately produced electricity a nerve wrecking adventure.

- i.) In Nigeria today, and without delusion, the available generated capacity of commercial electricity in Nigeria (7,000 Megawatts at peak and 2,500 Megawatts somewhat sustainable) is inadequate for the domestic/light business and the industrial users - maximum demand users (MDCs), put together on the grid.
- j.) Disconnection of one of the sections in the supply chain from the national grid, at this time, will release more capacity to the remaining ones; seems the only option available to break the 5,000-megawatts ceiling in power availability, which has bogged down the nation for so long.
- k.) The maximum demand consumers (MDCs) have enough capacity to generate energy needs for their operations, which presently is about 4,500 megawatts. They should be the ones to most logically go off the grid, in the meantime. All this, while the country doubles its effort to build more power stations, and evacuate the more than 12,000 megawatts already built.
- l.) The maximum demand consumers disconnected from the grid, in line with the scheme as premised,

are to have their energy bills discounted from the federal treasury. The increased consumption of electricity would make the sector attractive to investors, and the government would offset the subsidy through increased VAT and other taxes.

- m.) This off-grid scheme will create enough capacity in the remaining sections of the distribution lines that are still connected to the grid and offset the disruptions and loss of power that often occur; guaranteeing constant power supply to those connected.





# HISTORY OF ELECTRICITY IN NIGERIA

**C**ommercial electricity was first introduced in Nigeria as far back as 1896 in Lagos, and that was only fifteen years after a similar introduction in England. In spite of this long history, however, improvement in Nigeria's commercial electricity has remained slow. *Ref: Power Sector Reform: The Nigeria Experience.*

*Engr. A. D. Okafor; B. Eng., M. Eng. 2005*

- I) In 1950, Electricity Corporation of Nigeria (ECN), now defunct, was established by the legislative council as a central body for electricity supply and development.
- ii) Bodies such as Native Authorities and Nigeria Electricity Supply Company (NESCO) were later licensed to produce electricity in some other locations, in Nigeria.
- iii) The Niger Dams Authority (NDA) was another body established by the act of parliament with the sole

purpose for construction and maintenance of dams and other works on the River Niger and elsewhere.

- iv) The dams improved and promoted irrigation and fish brines, but also generated electricity using the energy of flowing water sold to the then ECN for distribution at utility voltages.
- v) In 1979, a new Energy Commission of Nigeria (ECN), not to be confused with the earlier Electricity Corporation of Nigeria, was established by Act No. 62 of the same year, as amended by Act No. 32 of 1988 and Act No. 19 of 1989.
- vi) Statutorily, the commission was mandated for strategic planning and coordination of national policies in the field of energy and became the government's organ empowered to carry out overall energy sector planning and policy coordination.
- vii) On the Energy Commission of Nigeria's shift, the power sector did not witness any substantial investment in infrastructural development for 20 years until 1999 or thereabouts.
- viii) In that period, there was no construction of new plants, while there was no proper maintenance on the existing ones. That brought the power sector to an unforgivable state.
- ix) Meanwhile, demand for electrical power in the country has increased exponentially.

- x) By 2001, the generation had gone down from the installed capacity of 5,963MW to an average of about 1,750MW. The steady load demand, meanwhile, was 6,000MW or 8,000MW for reserve capacity to absorb disturbances.
- xi) Nineteen (19) out of the seventy-nine (79) installed generating units were the only ones operating at the time in 2011.



WILL THERE EVER BE LIGHT IN NIGERIA?





# PRESIDENTIAL PROPOSITION

In his paper, presented at the Sheraton Hotel and Towers in July 2008, A S. Sambo, the then Director General of the Energy Commission of Nigeria, used the International Atomic Energy Agency (IAEA) tools - Model for the Analysis of Energy Demand (MAED) to calculate Nigeria's energy demand and supply projections covering the year 2005 to 2030: *Ref: Energy Commission of Nigeria 2008.*

*Table (i) Electricity Demand Projections per Scenario, in megawatts (MW)*

Scenario	2005	2010	2015	2020	2025	2030
Reference (7%)	5,746	15,730	28,360	50,820	77,450	119,200
High Growth (10%)	5,746	15,920	30,210	58,180	107,220	192,000
Optimistic I (11.5%)	5,746	16,000	31,240	70,760	137,370	250,000
Optimistic II (13%)	5,746	33,250	64,200	107,600	172,900	297,900

- ❖ economic growth and structure of the economy was used
- ❖ electricity demand was projected and translated into a demand-for-grid electricity and peak-demand on the bases of assumptions for losses, auxiliary consumption, load factor and declining non-grid generation.
- ❖ the table indicated the electricity demand projections for four (4) scenarios; emphasised the demand indication in 2005 as a representation of suppressed demand, because of inadequate generation, transmission, distribution and retail facilities.
- ❖ in the analysis, demand was suppressed as non-existent by 2010. For the 13% GDP growth rate, demand was projected to rise from 5,746MW in the base year of 2005 to 297,900MW in the year 2030.
- ❖ this projected an average construction of 11,686MW every year to meet the demand. Correspondingly, the cumulative investment (investment & operations) was to cost US\$ 484.62 billion for the 25-year period.
- ❖ this was a colossal investment averaging US\$ 80.77 billion every five years.
- ❖ the studies did not preclude all the available energy resources in the country; they were only considered in order to broaden the nation's energy supply mix and enhance its energy security.

- ❖ for the total energy supply possibilities, Model for Energy Supply Strategy Alternatives and their General Environmental Impacts (MESSAGE) was used, which is another IAEA modelling tool as the projected energy demand in order to arrive at a supply strategy.
- ❖ MESSAGE represents energy conversion and utilisation processes of the energy system (or its part) and their environmental impacts for an exogenously given demand of final energy.
- ❖ MESSAGE is usually used for development of medium-term strategies of a planned horizon of 30 years; the time scope is limited by uncertainties associated with future technological development.
- ❖ the energy system dynamics were modelled on a multi-period approach, with an optimisation that used a set of existing and possible new technologies. This was used to select the optimal mix of technologies to cover the country's demand for various energy forms during the whole period that was studied.
- ❖ by using MESSAGE analysis, demand variations of various final energy forms during the day, week and year, as well as different technological and political constraints of energy supply were accounted for. It was an energy and environmental impact model.
- ❖ the application of the MESSAGE model results in the

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least-cost inter-temporal mix of primary energy, energy conversion and emission control technologies in each scenario as listed in the table below:-

### **Nigeria's Energy Supply Projected Scenario:**

***Table (ii) Electricity Demand (Peak) Projections.***

Scenario	2005	2010	2015	2020	2025	2030
Reference (7%)	5,746	15,730	28,360	50,820	77,450	119,200
High Growth (10%)	5,746	15,920	30,210	58,180	107,220	192,000
Optimistic I (11.5%)	5,746	16,000	31,240	70,760	137,370	250,000
Optimistic II (13%)	5,746	33,250	64,200	107,600	172,900	297,900

*Ref: Energy Commission of Nigeria 2008.*





# THE OLD POWER HOLDING COMPANY OF NIGERIA (PHCN)

On 7 October 2008 in Washington D.C, another analyst, Mr Bolaji Osunsanya, the then CEO of Oando Gas & Power, delivered a paper on “Meeting-Nigeria-Power-Infrastructural-Demand” at the U.S Africa Conference. He posited a truism at the time and made a forecast as stated below: Ref: Bolaji Osunsanya CEO Oando Gas & Power 2008 U.S.A

1. The Power Holding Company of Nigeria, PHCN was a state monopoly, with less than 40% of the populace connected to the national grid.
2. The peak load forecast, however, was at over 9000MW at the existing infrastructure in 2011. Moreover, seven of the fourteen generating stations were over 20 years old in 2011.
3. Petrol & diesel power generations, estimated over 3,000MW of self-generation, littered Nigerian

landscape this did not support sound economies of scale.

4. Transmission lines were poorly maintained and repeatedly vandalised; coupled with regular system collapse. It resulted in transmission losses of over 35% of electricity produced.
5. The revenue generation, in the sector, is a shortfall of the actual consumption due to poor billing procedures that are still less than 90% of consumed electricity.
6. The peak load forecast, however, was at over 9000MW at the existing infrastructure in 2011. Moreover, seven of the fourteen generating stations were over 20 years old in 2011.

#### **1.1. Low power generation relative to population hinders the real sector development**

- ❖ Low capacity in generation and supply underscores by a vast 40% alternative privately-owned capacity, made up of diesel and petrol generators.
- ❖ This alternative capacity produced at a premium of up to 800% of the grid price is a colossal waste to the economy.
- ❖ Currently, industrial consumers own the bulk of the alternative capacity, which is close to 4500MW.
- ❖ The country's per capita generation relative to other countries remains extremely low, and when

compared with GDP, this low generation slows down development of the real sector.

## **5.2 Government Intervention**

- a. The Government embarked on spending aimed at improving the power generation capabilities by implementing the National Integrated Power Project (NIPP) from December 2004.
- b. Five (5) Greenfield natural gas-fired plants (2,250 MW total) were in the Niger Delta region comprising 18 GE gas turbines:
  - One (1) 3,050 MW hydroelectric power plant in Mambila, Taraba State
  - 22 power transmission sub-projects; include 17 new substations and expansion of 32 existing substations
  - 250 power distribution projects
  - Several new gas pipelines and other related equipment and infrastructure
- c. The estimated total expenditure by the Federal Government on the projects was over \$16 billion, in 2011 financed from Nigeria's excess crude revenue account..
- d. Government coerced the international oil companies, IOCs, to invest in Power Generation Facilities.

### **5.3. Funding and Problems of Infrastructure**

In 2007 for instance, the Revenue Mobilisation Allocation and Fiscal Commission (RMAFC) obtained a court injunction restraining the FGN from utilising the excess crude oil account on the ground that the FGN, State governments, and local governments jointly own it:

- ❖ Consequently, the 2008 Federal budget did not include any substantial planned spending on the NIPP project and the FGN announced that it would source for alternate funding arrangements, primarily from the private sector.
- ❖ Federal Executive Council, FEC, due to regulatory constraints, did not declare the proposed emergency in the power sector.
- ❖ The government gave gas producers sufficient incentive to increase supply.
- ❖ Inadequate transportation infrastructure hindered the delivery of some turbines to their intended destination.
- ❖ There was no harmonised integrated infrastructure for the dispatch of gas gathered to the power stations.

### **5.4. 2009-2014 Administration Drive**

- ❖ Alternative funding from various tiers of government existed for NIPP projects.
- ❖ PHCN was unbundled



- ❖ Planned government-led spending for the distribution system implemented.
- ❖ Encouragement was given to the private sector to invest in new power projects; this was albeit at a slow pace.

### **1.5. Existing Power Generation Capacity**

The planned generation capacity for the future in Nigeria is bright; the supply of uninterrupted power currently is, however, faced with so many challenges:

- i. low capacity power generation;
- ii. a totally mismanaged supply system that seems to be left to luck
- iii. low staff morale
- iv. unregulated wiring at the consumer end (premises), which put undue stress on the grid
- v. delayed maintenance of facilities
- vi. insufficient of funding of power stations, grid maintenance and sub-stations
- vii. obsolete equipment and safety tools
- viii. Insufficient or/and irregular supply of gas/fuel/water level to drive power stations.

*Table (iii) Existing Power Generation Capacity in 2014*

S/N	PLANT	PLANT TYPE	LOCATION	AGE	UNITS	INSTALLED CAPACITY	UNIT AVAILABLE
1	Egbin	Thermal	Lagos	24	6	1320MW	4
2	Egbin AES	Thermal	Lagos	8	9	270MW	9
3	Sapele	Thermal	Delta	31	10	1020MW	1
4	Okapi	Thermal	Cross River	4	3	480MW	2
5	Afam	Thermal	Rivers	19	20	702MW	3
6	Delta	Thermal	Delta	19	18	840MW	12
7	Omoku	Thermal	Rivers	4	6	150MW	4
8	Ajaokuta	Thermal	Kogi	N/A	2	110MW	2
9	Geregu	Thermal	Kogi	3	3	414MW	3
10	Omotosho	Thermal	Ondo	2	8	335MW	3
11	Papalanto	Thermal	Ogun	2	8	335MW	4
<b>SUB-TOTAL (THERMAL)</b>					<b>93</b>	<b>5976MW</b>	<b>47</b>
12	Kainji	Hydo	Niger	42	8	760MW	6
13	Jebba	Hydro	Niger	26	6	5400MW	6
14	Shiroro	Hydro	Niger	24	4	600MW	2
<b>SUB-TOTAL (HYDRO)</b>					<b>18</b>	<b>1900MW</b>	<b>14</b>
<b>GRAND TOTAL</b>					<b>111</b>	<b>7876MW</b>	<b>61</b>

*Ref: Presidential Task Force on Power 2014.*

## 5.6 Near Future Generating Capacity

The government in its drive to get private investments involved in power generation, granted licenses to some private investors. The volatility of electricity as a product,

however, is a big concern to foreign investors. For this reason, investors have shied away from power generation in Nigeria.

- ❖ Electricity is a very volatile commodity that if not used immediately is not easy to store for future use and a high cost of export across the borders. For these, investors in the sector are wary of unaffordable tariffs and possible waste

*Table (iv) Future Generating Infrastructure and capacity*

S/N	POWER STATION	TYPE	LOCATION	CAPACITY (MW)	STATUS
1	Egbin	Thermal	Lagos	1320.00	Existing
2	Ijora	Thermal	Lagos	40.00	Existing
3	Afam	Thermal	Rivers	969.60	Existing
4	Sapele	Thermal	Delta	1020.00	Existing
5	Delta	Thermal	Delta	912.00	Existing
6	Geregu	Thermal	Kogi	414.00	Existing
7	Omoku	Thermal	Rivers	230.00	New IPP
8	Omotosho	Thermal	Ondo	335.00	New
9	Papalanto	Thermal	Ogun	335.00	New
10	Alaoji	Thermal	Abia	504.00	New
11	Sapele	Thermal	Delta	451.00	New IPP
12	Orji	Coal	Rivers	20.00	Existing
13	Rain/Ube	Thermal	Bayelsa	225.00	New IPP
14	Eyaen	Thermal	Edo	451.00	New IPP
15	Egbema	Thermal	Imo	338.00	New IPP

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16	Caliber	Thermal	Cross River	561.00	New IPP
17	Kainji	Hydro	Niger	760.00	Existing
18	Shiroro	Hydro	Niger	600.00	Existing
19	Jebba	Hydro	Niger	578.40	Existing
20	Mambilla	Hydro	Taraba	2600.00	New
21	Zungeru	Hydro	Niger	950.00	New
22	AES	Thermal	Lagos	300.00	IPP Existing
23	Agip Okpai	Thermal	Delta	480.00	IPP Existing
24	Ibom Power	Thermal	Akwa Ibom	188.00	IPP Existing
25	Omoku	Thermal	Rivers	150.00	Approved
26	Obajana	Thermal	Kogi	350.00	Approved
27	Ethiope Energy Ltd			2800.00	Approved
28	Farm Electric Ltd			150.00	Approved
29	Supertek Ltd			1000.00	Approved
30	ICS Power			624.00	Approved
31	Geometric Ltd			140.00	Approved
32	Westcom Tech Ltd			1000.00	Approved
33	First Independent Power Co. Ltd			150.00	Approved
34	Anita Energy			136.00	Approved
35	Lotus &Bresson Ltd			60.00	Approved
36	First Independent Power Co. Ltd			95.00	Approved
37	Mabon Ltd			39.00	Approved
38	Hudson Power Ltd			200.00	Approved
39	Ibafo Power Ltd			640.00	Approved
40	Agbara Shoeline Ltd			1800.00	Approved
41	Index Thermal Power Ltd			1800.00	Approved

The Old Power Holding Company of Nigeria (PHCN)

42	Shell Distribution			100.00	Approved
<b>TOTAL</b>				<b>24,106.00</b>	

*Ref: Presidential Task Force on Power 2014.*



WILL THERE EVER BE LIGHT IN NIGERIA?



# UNDERSTANDING FREQUENT SYSTEM COLLAPSE

## Public Utility Electricity

**C**ommercial electricity in Nigeria is fraught with uncertainties at the user end. For example, the DisCos are currently battling with system-collapse, and the generating companies, the GenCos, are suffering because they too cannot push all the power generated for the consumers due aged and inadequate transmission lines. As late as August 2017, the rejection by the DisCos to accept the volume of the electricity produced by the GenCos led to a series of system collapses. NNPC, the gas supplier rejected being responsible.

- ❖ Arguably, these are the chief causes of the unreliability of power supply in Nigeria.
- ❖ A little insight on how electricity works will shed more lights why there is the frequent collapse in Nigeria's electricity system.
- ❖ The term electricity in itself is loose because it encompasses a variety of phenomena resulting in the presence and flow of electric charge.

- ❖ Our interest is the electrical power that is provided commercially by the electric power industry.
- ❖ There are other sources of power – solar and battery, etc., but their storage capacity is finite.
- ❖ High electrical energy demand that a country needs has to be generated remotely and transmitted over long distances continuously over conductive transmission lines.

#### 6.1 **Electro-mechanical generators mostly generate electrical power.**

- ❖ The production of electrical power is mostly by electro-mechanical generators that are either steam driven or generated from fossil fuel combustion, or the heat released from a nuclear reaction or those by kinetic energy extracted from wind or flowing water.
- ❖ Faraday's electromagnetic principle still forms the core of modern electric power generation.
- ❖ Centralised power generation of electrical power at remote locations benefits the economies of scale, only if the energy generated can be transmitted to end users with less cost.
- ❖ The invention of the transformer makes it possible to transmit electrical power of the alternating type more efficiently at a higher voltage but lower current.
- ❖ This efficient electrical transmission allows electricity generated at centralised power stations and then transmitted relatively at long distances to the users needing it.



- ❖ All this does not preclude solar power and wind turbines.

## **6.2 Distribution of Electricity**

The “downstream” sector of the industry is the distribution of electrical power.

Power is delivered directly to industry and home/business via transmission lines and transformers of much lower capacity, ranging from 33KV/415V to 11KV/415V.

- ❖ This aspect of delivery gets the utility power company to interact with the consumer by overseeing regulatory wiring; meter installation; billing of energy consumed and revenue collection.
- ❖ The generated electrical power gets to the distribution stations from the transmission stations at 33KV, after which it is stepped down to 11KV (high tension voltage) on its way to the cities.
- ❖ The 11KV routes through “Ring Main Units (RMUs), at street intersections or roadsides in the cities..
- ❖ From the RMUs, the electricity is stepped down from 11KV/415V in the distribution transformers, down to 220/415V for household and general use.
- ❖ The distribution transformers feed the feeder pillars in four-phase circuits (Red, Yellow, Blue and Neutral phases) to the domestic consumers.
- ❖ Usually, big Industrial users get supplies directly at 33KV or 11KV; it would, however, be stepped down to manageable voltages of 220/415V before usage.

- ❖ One of the problems that power utility companies face' is the unregulated wiring in homes and business premises, which cause upsets in the smooth supply of electricity.
- ❖ The unbalanced load on the supply infrastructure contributes to system collapse, and thus the need for the mandatory use of licensed electricians as stakeholders, who would insist on wiring according to regulations.

### **6.3 Nature and characteristic of Electrical Power**

Electrical energy, unfortunately, cannot be stored economically in quantities large enough for demands on a national scale and as such, must be produced at the level as required at all times.

- ❖ It means that the electricity utility company, like Discos, will have to make careful predictions of their electrical loads and maintain constant co-operation with the power stations, the Gencos.
- ❖ A reasonable amount of generation must, therefore, be held in reserve (a luxury now in Nigeria) to cushion the electrical grid against inevitable disturbances or losses.

### **6.4 Uses of Electricity**

Demand for electricity has been growing with great rapidity worldwide, and in Nigeria, the drive is by the country's modernisation and has outstripped the growth of other forms of energy.

- ❖ Lighting was one of the first practical applications of public utility power, after the invention of the incandescent light bulb in the 1870s.
  - Public utilities were then set up in many countries

for that purpose; targeting the burgeoning market for electrical lighting in homes, industry and public places.

- Unfortunately, people living in Nigeria are yet to enjoy this practical application of public utility electrical power currently, without interruption.
  - The heating effect employed in the light bulb also powers more directly the electric heating.
  - Electric heating is a versatile application, but it is controllable as electrical loads associated with heating steadily rises and can easily be predicted and accommodated.
  - Countries such as Denmark, however, have issued legislation restricting or banning the use of electrical heating in new buildings to allow for planning.
- ❖ Electricity is the practical energy source for refrigeration with air conditioning being a growing sector for electricity demand.
    - The electric compressor is a significant component in refrigeration; it is an electric motor and an enormous energy disturbance of the grid system.
  - ❖ The relationship between magnetic fields and currents led to Michael Faraday's invention of an electric motor in 1821; it is a conversion of electrical energy into mechanical energy.
  - ❖ These days, electric motors consume more than half of the total electric power produced in a modern economy worldwide.

- ❖ Applications of electric motors are used to power most manufacturing, processing industry and recently also most of our home appliances.
- ❖ Electric motors' applications are as diverse as industrial fans, blowers and pumps, machine tools, household appliances (compressors, fans, and blenders), power tools, and more.

### **6.5 Cause of Disturbances or Loss on the Grid (System Collapse)**

The electric motor, however, while starting has a characteristic high inrush of current that is several times the rated power.

- ❖ In the industry, this phenomenon is called an across-the-line-starting and is usually six (6) times the rated power, but could be as high as ten (10) times for more efficient motors.
- ❖ If the electrical system supplying these starting currents does not have enough capacity, the inrush current will cause a voltage drop on the utility line.
- ❖ These line disturbances are what cause lights flicker; though it lasts for a few seconds while the motor gets to speed.
- ❖ This disturbance associated with motor starting can create more serious problems for other users on the line.
- ❖ When motors within a grid are starting, the electric utility company can become concerned, notably when a large phase converter on single-phase service, for example, operates large three-phase loads; this is because of the potential for line disturbances.

- ❖ The use of air conditioners has become widespread in tropical countries, including Nigeria because of the prosperity of the middle-class; one of the major components in air conditioners is the heavy-duty electric motor.
- ❖ Distribution companies, DisCos, should be concerned when compressors in air conditioners in various homes and offices start, because of the low capacity regime of the electrical system in Nigeria.

## **6.6 Predicting and Anticipating System Collapse**

It is necessary for DisCos to predict the electrical loads and disturbances that may occur on the electricity grid; It is, however, compounded by the widespread use of one of Faraday's inventions the electric motor as stated earlier. Unlike other applications of electric motors, the startups of compressors in air conditioners and to a lesser extent in fridges are most unpredictable, because of various thermostats settings of air conditioners across the grid.

- ❖ Compensation for disturbances associated with compressor start-up will come from a high capacity grid, to prevent voltage drop or possible system collapse.
- ❖ It requires a high capacity electric power with reserve because it is difficult to predict when various compressors on the grid will start; an apparent waste, but it has to be paid for by the consumers.
- ❖ The startups of electric motors for industrial application, however, can reasonably be anticipated, if the pattern of usage is known.

## WILL THERE EVER BE LIGHT IN NIGERIA?

- ❖ An example is for a public utility company to up the level of generation of electricity to accommodate startups of machinery at factories if factory shifts are known to a utility company.
- ❖ Predicting aggregate electrical loads during startup of compressors, in a grid, will require a higher intelligence than is presently available in Nigeria. There should be a way around this.



# THE WAY FORWARD (Experts' Advice)

The two analysts considered, Sambo and Osunsanya, came to similar conclusions in their way forward. In reality, the road is long, even if we assume that funding is not a problem. They suggested the following:

## **7.1 Implementation of the Power Policy as enshrined in the Electric Power Sector Reform Act**

The Act is to provide comfort to interested private sector players as regard the ability of the system to ensure that participants will get paid in either of the following ways.

- ❖ Determine the short-term subsidy level required for the industry and set up a transitional fund to pay it.
- ❖ Fast track the Multi-Year Tariff Order (MYTO) as put forward by the Nigerian Electricity Regulatory Commission (NERC) to implement a cost

recoverable end-user tariff structure for the purchase of Electricity.

- ❖ Develop, in partnership with the private sector, a concession plan for the distribution sector as a first step to eventual privatisation.
- ❖ It allowed the private sector to create the demand, but this is becoming untenable due to industrial growth stagnation.
- ❖ Must involve a commitment to carry out upgrades and capital investment in the area to reduce distribution losses and enhance billing and collection.
- ❖ Should also encourage Independent Power Plants who can execute bi-lateral agreements with the concessionaires.

## **7.2 Redeploying Existing NIPP Equipment to New Private Sector-led Projects**

- ❖ Transfer / Lease any number of 125MW turbines and relocate to an economically viable area with established fuel supply capability; however, militancy could hamper this.
- ❖ Involvement of the Private Sector in the construction and operation of the plant to sell electricity to an identified area.
  - It allows generating power quickly while relieving the nation's stress and free capacity to



other parts of Nigeria with no existing gas infrastructure.

- ❖ Leverages proximity and access to existing infrastructure (Gas Supply and Transmission Infrastructure) with cost-effective options to increase infrastructure capacity where necessary.
- ❖ Sale/Concession of NIPP Power Plants.
- ❖ Concession of the existing NIPP projects to the private sector, which subsequently funded and completed the projects.
- ❖ Leverages the project work to date to complete projects on a fast track basis.
- ❖ Eliminate the risk to the government of stranded assets and investments.

### **7.3 Get the Infrastructure and Pricing Right (luckily we now have a blue print of sorts)**

- ❖ Prompt execution of the Gas Pricing Regulation.
  - Aggregator (suggest a nominee of the foreign & local gas supply companies).
  - Aggregate pricing.
- ❖ Execute Infrastructure Blueprint via Private Sector Participation.
  - Allocate segments of the network system to

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capable consortia that can finance & develop the projects within the next 2 – 4 years (includes: pipelines, CPFs, Compressors).

- ❖ Proactively put in place fiscal incentives for private sector developers.





# POWER GENERATION 2018

**T**he generation companies, with installed capacity of 12,500 megawatts, had only 8,000MW available as at April 2017. In August 2017, only 6,800MW was available, but the wheeling capacity had increased from 5,000MW to about 6,700MW. However, by December of 2017, Nigeria could only 4,713.40MW, which was only 37% of the installed capacity. There are constraints for increased power generation, which could be mitigated by the following:

- ❖ Development of industries
- ❖ Extension of power supply to rural areas
- ❖ Moderate relief on congestion and overload of power lines, transformers
- ❖ Attraction of both local and international investors
- ❖ Increase pace in development and refurbishing of power project

- ❖ Improvement in network coverage
- ❖ Development of the economy
- ❖ Improvement of consumer satisfaction

## **8.1 POWER GENERATION TARGET**

The country is aiming to generate an excess of 40,000 megawatts of energy mix that constitutes 69% thermal, 17% hydro, 10% coal, and 4% renewable energy by the year 2020.

## **8.2 CONCERNS AND CHALLENGES**

In 2018, electricity demand still exceeds supply by a wide margin. Nigeria with a population that is over 180 million, attracts more direct foreign investments than any other in Africa, is was short of the United Nations estimate for developing countries demand of 1000MW per million people. This means Nigeria should generate 180,000 MW. The following are the constraints:

- ❖ Actual power generation is a third of capacity (peak 4,700MW and TCN wheeling capacity of 6,700MW)
- ❖ Constraints in power distribution as Discos regularly reject loads
- ❖ Constraints in availability of gas, particularly now that 74% of generation is on gas
- ❖ Epileptic power supply due to Discos poor performance

### **8.3 GOVERNMENT ACTION ON POWER IN 2018**

The government has decided to diversify the current sources of power generation away from the dependence on gas, against the backdrop of Nigeria having a commanding supply of gas. Therefore, 14 solar Power Purchase Agreements (PPA) with 14 developers to deliver 1000MW of solar power is part of the power upgrade. Government is working seriously to invest in the sector and hopes to attract investors in generation, transmission and distribution sub-sectors.

In addition are the following:

- ❖ NERC developed regulation on embedded generation to open access for power generating plants to be directly connected to the distribution network and evacuate power
- ❖ TCN secured \$406 million World Bank loan for the expansion of transmission projects in Nigeria
- ❖ Advanced stage for procurement of 6 small hydro-dams for operation by the private sector
- ❖ Government to invest more on projects that will mitigate what confronts the Discos. Problems bordering epileptic power supply
  - Sources: [www.thisdaylive.com](http://www.thisdaylive.com);  
[www.financialnigeria.com](http://www.financialnigeria.com);  
[www.nigeriaelectricityhub.com](http://www.nigeriaelectricityhub.com);

[www.nercng.org](http://www.nercng.org); [www.premiumtimesng.com](http://www.premiumtimesng.com);  
[energymixreport.com](http://energymixreport.com) and [www.nsong.org](http://www.nsong.org).

#### **8.4 TRANSMISSION COMPANY OF NIGERIA (TCN) Ref: Nigerian Daily Trust/ Nigerian Electricity Hub**

The only remaining wholly government owned component in the public power supply chain is the Transmission Company of Nigeria (TCN). It recently secures over \$1.57 billion (N567.3 billion) multilateral funding to raise grid capacity. Before February 2017, Manitoba Hydro International was managing the TCN on behalf of the government for four years at a fee of over \$23 million. However, due to mismanagement, the company was almost in total collapse.

Now the new management has established the Transmission Rehabilitation and Expansion Programme (TREP) to upgrade the grid in modernity, and the following are the results:

- ❖ Frequency control achieved (49.5Hz and 50.5Hz)
- ❖ NERC approved competitive procurement of spinning reserve for ultimate 450MW
- ❖ TCN is procuring 300MW of spinning reserve presently and would increase later by another 150MW

### **8.4.1 STRATEGIES FOR TRANSMISSION**

- ❖ Upgrade of the significantly deficient Supervisory Control and data Acquisition (SCADA); presently can only cover 40% of the network
- ❖ SCADA upgrade has to wait until after fixing the communication backbone; otherwise it will amount to nought without an adequate communication structure
- ❖ Plans to critically invest in lines and substations and put N-1 for extra capacity to take in emergency. These are to draw from the \$1.57 billion (N567.3 billion) raised from multiple sources

### **8.4.2 ACHIEVEMENT IN LESS THEN 2 YEARS**

- ❖ Raising \$1.57 billion from donors
- ❖ Raising the moral of engineers for in-house work to finish projects that were not completed and could not draw from the funds newly raised as per conditions attached to the funds

### **8.4.3IMPROVEMENT OF DISTRIBUTION NETWORK**

- ❖ TCN manages the N72 billion fund to improve some distribution networks
- ❖ Investment needs of the Discos are nothing compared to the N72 billion fund; anyway the government has 40% share in the DIScos

- ❖ The Discos from TREP analysis will require close to \$4 billion for their injection substations
- ❖ TCN continues to work with the Discos because it is the Discos that know their networks

#### **8.4.4 ENERGISED TRANSFORMERS UNUSED**

- ❖ TCN and Discos need to reduce their excess cost and mismanagement and put the money in investments
- ❖ Some Discos have not installed their transformers under the NEGIP World Bank programme initiated before privatisation
- ❖ TCN is installing two transformers, but none by the Discos after privatisation

#### **8.4.5 GENCOs AND THE ELIGIBLE CUSTOMERS**

- ❖ Some Discos kick against the eligible customer policy of the government. However, in 2015 when NERC transferred the 132KV and 33KV customers from TCN to the Discos, they did not complain. It was illegal and against the Power Sector Reform Act 2005 (EPSRA)
- ❖ TCN's Transmission Use of System (TUOS) is with Mainstream Energy, the concessionaire of Kainji and Jebba Gencos who are supplying to 5 eligible customers



- ❖ The agreement has Liquidated Damage Clause so that if TCN fails there is a penalty to pay, including the Gencos
- ❖ The Discos can also be part of it because those on the Discos networks would only need to pay DUOS charges to the Discos
- ❖ The policy provides for Competitive Transition Charge (CTC) to compensate the Discos for any revenue loss
- ❖ TCN is making the Discos to cooperate



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# GENERATING COMPANIES (GENCOs)

*Ref: Association of Power generation Companies (APGS)*



A group of power generating companies manage the power generation in Nigeria and regulated by the Nigerian Electricity Regulatory Commission (NERC). This group is known as GenCos, a term that came into effect in 2013 following privatisation of the power generation companies. There are 23 grid-connected power plants, which are successor companies of the privatised plants, Independent Power Producers (IPP), and Niger Delta Power Holding Company (NDPHC). The successor companies of PHCN, however, dominate the grid. The IPP companies were before privatisation a private sector run, e.g. Ibom Power, AES Barges, NESCO, and SPDC. In recent time, the GenCos are fraught with difficulties and are threatening to shut down because of the following:

- ❖ the inability of the Transmission Company of Nigeria (TCN) to transmit the available volume of electricity generated into the national grid.

- ❖ The generation companies (GenCos) were increasingly facing lower capacity utilisation despite the fact they operate their turbines and machines far from the base-load settings - a significant factor in load shedding and power fluctuations in the country and have resulted in low efficiency in the power system.
- ❖ Operating the GenCos' plants outside base-load conditions has severe damaging effects on the plants that lead to more consumption of gas for their thermal plants at an extra cost on their part..
- ❖ In April 2018 alone, the TCN could only transmit an average of 3985.15MW, 53 per cent of the available capacity of 7484.88MW produced daily by the GenCos.
- ❖ All thermal and hydropower plants are designed to operate optimally and efficiently at base-load. However, running these plants outside base-load conditions has led to a reduction in efficiency, with implications for an increase in consumption of gas for thermal plants by as much as 15 to 20 per cent (extra cost not recognised by the Nigerian Bulk Electricity Trading (NBET) nor captured in the Multi-Year Tariff Order (MYTO)
- ❖ Generally, the damaging effects include thermal stress on steam turbine blades; creep of compressor and turbine blades; cracks on exhaust sleeves; uneven heating and cooling cycles of hot gas path

components; cracks in ceramic tiles of the combustion chamber; defective gas control valves due to wear and tear, among other effects.

- ❖ The grid, presently, cannot conveniently take over 4500MW without rejecting load. Generation above 5,000 MW may either be lost or discarded either by the Distribution Companies (Discos) or the Transmission Service Provider's (TSP) inabilities primarily due to infrastructural challenges like line cuts and transformer faults and unavailability thereby causing grid frequency to be very high.

The following tables are the generating status in 2017 as reviewed. (Sourced from National Bureau of Statistics of Nigeria.)

*Table (v) Future Power Capacity Infrastructure*

POWER STATION	COMMUNITY	CAPACITY	STATUS	YEAR COMPLETED
AES Barge (IPP)	Egbin	270MW	Unserviceable	2001
Aba (IPP)	Aba	140MW		2012
Afam IV-V (FGN)	Afam	726 MW (Afam IV Afam V -2 x 138 MW	Unserviceable	2001
Afam VI (IPP)	Afam	624MW	Partially Operational	2009 (Gas) 2010 (Steam)
Alaoji (NIPP)	Abia State	1074MW	Unserviceable	2014
Calabar (NIPP)	Calabar	561MW	Partially Operational	2012 - 2015
Egbema (NIPP)	Imo State	338MW	Unserviceable	2012-2013

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Egbin Terminal	Egbin	1320 MW (six 220-MW units)	Partially Operational (1000MW)	1985-1986
Geregu I- Privatized	Geregu Kogi State	414MW	Partially Operational	2007
Geregu II Power Station (NIPP)	Geregu Kogi State	434MW	Partially Operational	2012
Ibom (IPP)	Ikot Abasi	190MW	Partially Operational (90MW)	2009
Ihovbor (NIPP)	Benin City	450MW	Partially Operational	2012-2013
Okpai (IPP)	Okpai	480MW	Operational	2005
Olorunsogo	Olorunsogo	336 MW, (8 x 42) MW	Partially Operational	2007
Olorunsogo II Power Station (NIPP)	Olorunsogo	675 MW NDPHC (4x112.5) MW and 2x112.5 MW steam turbines	Partially Operational	2012
Omoku (IPP)	Omoku	150 MW (6 x 25 MW gas turbines)	Operational	2005
Omoku II (NIPP)	Omoku	225 MW (2 x 112.5 MW gas turbines)	Non- operational	Incomplete
Omotosho I (FGN-Privatized)	Omotosho	336 MW ; (8 x 42 MW)	Partially Operational	2005
Omotosho II (NIPP)	Omotosho	450 MW, (4x112.5 MW)	Partially Operational	2012

### Generating Companies (Gencos)

Sapele-Privatized	Sapele	1020 MW (Phase I: phase II: 1981)	Partially Operational (135MW)	1978 - 1981
Sapele (NIPP)	Sapele	450 MW (4x112.5 MW)	Partially Operational	2012
Transcorp Ughelli (privatised)	Ughelli, Delta State	Partially Operational (465 MW)	Partially Operational	1966-1990 Plant I: 1966, II: 1975 MW, III: 1978, IV: 1990
Ibom Power Plant	Template: Ikot Abasi	191MW	Operational 2009	2010

## Natural Gas

*Table (vi) Proposed natural gas power plants*

Azura Thermal (IPP)	Benin City	Gas Turbine	1,500 MW	In development	TBD
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## Coal

*Table (vii)*

POWER STATION	COMMUNITY	TYPE	CAPACITY	STATUS	YEAR COMPLETED
Itobe Power Plant	Itobe Kogi State	Circulating Fluidized Bed Technology	1200MW	Planned	2015-2018 (600 MW)

The Oji River Thermal Power Plant was a coal-fired power plant. It is no longer operational.

## Hydroelectric

*Table (viii) In service*

HYDROELECTRIC STATION	TYPE	CAPACITY (MW)	YEAR	NAME OF RESERVOIR	RIVER
Kainji	Reservoir	800	1968	Kainji	Niger
Jebba	Reservoir	540	1985	Jebba	Niger
Shiroro	Reservoir	600	1990	Shiroro	Kaduna
Zamfara	Reservoir	100	2012	Gotowa	Bunsuru

*Table (ix) Under construction or proposed*

HYDROELECTRIC STATION	TYPE	CAPACITY (MW)	YEAR COMPLETED	NAME OF RESERVOIR	RIVER
Kano	Reservoir	100	2015		Hadejia
Zamfara	Reservoir	100	2012	Gotowa	Bunsuru
Dadin Kowa	Reservoir	40	2018		Benue
Mambilla	Reservoir	3050	2018	Gembu, Sum Sum and Nghu	Donga







# THE WAY - OUT OF THE BOX

- ❖ The ideal solution is to generate, sustainable, more than enough capacity to absorb the upset inherent in the start-up of compressors and other factors that militate against steady and reliable power supply.
- ❖ However, in the current low capacity regime of grid situation in Nigeria, that is impossible. But “Impossible is nothing, “to borrow from the advert of “Adidas,” the German sportswear maker.
- ❖ First of all, Nigeria needs to burst through the 5,000-megawatts ceiling, through the growth of the capacity of the maximum-demand consumers (MDC) of electricity. Only increased installed capacity utilisation of existing manufacturing and setting up of more industries can achieve that.
- ❖ Higher installed capacity utilisation is directly linked to market share, as factories cannot continue production if their warehouses are full of unsold

goods. The local markets need protection against imports if Nigeria wants a sustained demand for commercial electricity that will tear through the 5,000-megawatts ceiling.

- ❖ There has to be a sustained high demand for industrial electricity consumption to mitigate the investors continuing to shy away from investment in the power sub-sectors of generation, transmission and distribution. High megawatts of electric power will trickle down to household users of electricity with affordable tariffs.
- ❖ The scheme must have a “gestation period” of 5 years or more, where power for industrial production is subsidised to allow for the global competitiveness of Nigerian produce and products, build the market and ultimately grow the Nigerian brands.

### **9.1 Managing the Present Low Power Capacity Situation**

Sustaining the little power generated can still provide relief to the majority of the people in Nigeria, by rendering a reliable power supply, even if it is not 24/7. Electricity could be reliable by containing the incidence of system collapse, among other things. Discos seem not to have a solution yet.

- ❖ System collapse is a result of the inability of the low electrical load capacity to absorb the inrush currents that occur during startup of various electric motors or other appliances across the grid.

- ❖ The control of the inrush starting currents of compressors, precisely, across a grid is beyond the compass of control of an electric public utility company, such as the Discos, in a low power capacity regime..
- ❖ The authorities and the Discos will have to set up public enlightenment program to educate consumers, on the aggregate effects of the motor component in air conditioners in a low capacity electrical system as it is presently in Nigeria.
- ❖ Some countries that have experienced such situations at one time or the other, like Japan, Ghana, UK, etc. would be good models for adoption.
- ❖ These countries specifically singled out the effects of using air conditioners during their low power outputs. They cautioned the residents to minimise its use during a time of inadequate supply, to allow stable electrical power for the majority of consumers.

## ❖9.2 **Managing the Present Low Power Capacity Situation**

While most Nigerians set their attention to the inadequacy of available public power supply, they often forget that they need to manage the situation. Polls suggest that the unreliability of the power supply impedes the happiness of the residents more than the little power supply.

- ❖ Available power is not enough for both domestic and industrial users put together; it, therefore, makes

logical and economic sense to disconnect the maximum demand consumers from the national grid, for now.

- a. It will release more electric power to the domestic and the light businesses for more reliable power to those sections of the economy.
- b. The incidence of system collapse, brownouts and blackouts will reduce, if not non-existent.

Most of the maximum demand consumers rely on private electrical generating plants for their operations and contribute approximately 4,500MW of privately generated power, and likely to go up as demand for production goes up.

- a. This type of self-power generating will be reliable and only on demand, which will mitigate waste; if subsidised, it will make their products competitive and use the subsidised period to build their brands in the market, locally and globally.
- b. Increased production and competitiveness will create new jobs.
- c. A reduction in unemployment figure will swell the national treasury through personal income tax and VAT due to increased consumer spending.

❖ Besides, “everybody goes home happy,” because

there will be light at home and public endearment to the administration is a possibility.

- ❖ The use of diesel will now be limited to only heavy industrial users; mass transit operation; rail, and haulage of produce and goods. These are wealth producers and subsidy to produce more wealth is of course logical.
- ❖ The government could hedge diesel and gas in large quantities for good economies of scale and market to the productive sector at discounted rates towards improved productivity.
- ❖ The industrial end users will still buy at a premium market price, but would have to justify a refund based on the units of production, jobs created, and foreign earnings as applicable.

### **9.3 Paying For the Subsidised Energy Bills of Off-Grid Maximum Demand Consumers (MDCs)**

The Federal government may need to re-introduce the Excise Duty, which is an index of production, and use the process to fund the energy bills of the disconnected maximum demand consumers (MDCs).

- ❖ Subsidised energy bills will increase installed capacity utilisation and more than pay for itself.
  - Power will be reliable during the period of the scheme since it will be “generate as need”, and controlled by the owners of the generating

plants. and if subsidised, will make products competitive.

- The subsidies will increase the competitiveness of the industrial products and increase production to reduce the unemployment index.
- An improved unemployment figure will swell the national treasury through personal income tax, and grow the GDP by way of higher consumer confidence.
- Higher consumer spending occasioned by addition of those newly off the unemployment market will also swell the national treasury by way of the VAT.

#### **9.4 Tariff: Reform in Electricity Sector**

Tariff adjustments in the sector will always be a thorny issue. Domestic consumption of electricity will always remain secondary to manufacturing demand. For the cost of electricity to be cheap, there must be a high demand for power from the manufacturing sector that will invariably reduce the domestic tariffs. However, unless there is a realistic tariff structured, it will not attract investment - both locally and from abroad (foreign).

Electrical energy is highly volatile and cannot be stored economically on a national scale; It, therefore, must be put to use immediately. Additionally, a reserve capacity to cater for disturbances and system loss will sustain an

uninterrupted supply. All these have to be borne by the consumers.

The argument for an increased tariff sometimes does not follow natural justice. Consumers that do not upset the system, whose only needs are lighting points or those that are light electrical load users, should not pay for the cost of disturbances on the grid. The following are possible suggestions:

1. Average monthly energy consumption of six (6) lighting points of 60 watts of incandescent bulbs per consumer could be given at affordable tariff to all consumers across the board to form the first part of electricity billing; any kilowatts over the threshold will attract higher.
2. There would be a progression of tariffs for those whose needs in addition to lighting points also power applications for other uses, but with fewer inrush currents such as air conditioners.
3. Up in the tariff-scale is for the actual cause of upsets on the grid with the use of air conditioners and other high inrush-current appliances. Reserve generation of power is necessary for this type of consumers, and they should pay for it.

At last, consumers that do not contribute to the inrush of current on the grid would have money for the value of their low buying power and stop subsidising the consumption of the rich.

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There is technology to detect inrush current and identify and those that cause disturbances on the grid to pay for the reserve capacity generated for the purpose.

The regulatory body, NERC, may, on the other hand, revise up the domestic and light business tariffs when the near 24-hour supply becomes a reality. The present industrial electricity tariff is a viable figure to the households and light businesses if there is a regular, uninterrupted supply of electricity. It should more than adequate to make the DisCos viable and attract investments into that sector.







# EXPECTATIONS

**E**lectricity consumption pattern presently is skewed towards the South West in general, the Lagos/Ogun state axis in particular. There ought to be a redress to balance youth migration. Each state in Nigeria must, as a matter of urgency and national policy, be made viable by pushing manufacturing jobs to them.

- ❖ It is attainable if the movements of good across states and for exports are only processed and packaged products, thereby adding value. It is a process that requires energy, which in turn would raise the power demand index to attract investors in the power sector.
- ❖ The federating units in Nigeria must cooperate for the bigger goal to make the country great but remain competitive. There is a need to lessen unnecessary migration within the states due to economic disadvantages. Therefore, this is a perfect period to give incentives to potential job-creating businesses to

## WILL THERE EVER BE LIGHT IN NIGERIA?

locate to economic disadvantage states. It could be energy subsidies.





## CONCLUSION

- ❖ The government must complete the construction of the power stations it started, and allow investors unfettered access to the power sector. The long-term aim is to deregulate the entire chain, particularly the generation, transmission and the distribution sub-sectors. The maximum demand consumer taken off-grid would be given timelines for reconnection back to the grid at the start of the programme.
- ❖ The expectation is that the domestic and the light business sub-sectors will continue to grow as the economy improves and needing a connection to the grid also. The Denmark experience that manages the grid connection based on adequate supply is a model to examine. There is no reasonableness in adding to the grid load if there is no sufficient supply.
- ❖ The plot is to rob Peter to pay Paul by substituting a portion of the current subsidies on PMS to nurture the production sectors; a process to the ground to

industrialise the nation, and it has to be a conscious exercise. You cannot make an omelette without breaking eggs; so the saying goes; all over the world, there is "no pain without gain".

- ❖ Public enlightenment, based on the devastating effects on the grid by some appliances prone to inrush currents, such as air conditioners, may ameliorate the distress of the no-light situation in Nigeria. Every day people are switching to air conditioners, but the low power regime can hardly prevent system collapse. The authorities should do more to appeal to the people; there is no harm in trying.
- ❖ A lasting solution is to generate more than enough electric power capacity than the average consumption as a reserve to absorb surges on the line. The apparent waste is at a cost to the consumers, but it is the best bet to prevent system collapse on the supply chain.
- ❖ Nigeria's epileptic public power supply is not an accident, but a product of an unplanned, mismanaged and perhaps left-to-luck project. Currently, it seems the authorities in Nigeria discountenance the fundamentals that contribute to an uninterrupted electrical power supply in a modern economy. Now very clear, in the minds of most Nigerians that there is more to public utility electricity than just generating and distributing electric power.

- ❖ The scheme requires boldness and a political will. It seems a big gamble, but feasible as well as doable. Over the years, the narratives about why there are no lights have been too numerous to mention. A familiar few are the low level of water or insufficient supply of fuel or gas; system collapse; not enough generation; inefficient power transmission; not enough transformers; unpaid bills; unrealistic tariff; low buying power of the generality of consumers; sourcing of spare parts, and more.
- ❖ Apart from the salaries and other remunerations of the power utility workers, the rest of the components of production that go into the power supply (generation, transmission and distribution), in Nigeria, are “U.S. dollar” based. The purchasing power of most Nigerians against the backdrop of the exchange rate of the local currency, the Naira, makes uninterrupted grid electricity beyond the reach of most Nigerians.
- ❖ The modalities for discounting of fuel or gas bills from the national treasury could vary using various indices. It could be the number of jobs created; the volume of production; export to earn foreign exchange; disadvantaged states' incentive, and much more.

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## OFF-GRID SCHEME

**T**he permanent removal of subsidy on imported premium motor spirit (PMS) is a must if the country has to move forward economically. Nevertheless, the argument put forward by the government is less convincing. Some guarantees must be on the table before Nigerians can willingly accept a permanent removal of subsidy for the interest of the people and the country.

Petrol is an inefficient fuel to generate electricity, more so if there are over 58 million gasoline-powered generators in an economy running on subsidised fuel. It is squandering of the country's resources. Transportation of the ordinary people should run on more efficient fuel like diesel or electricity. Urban mass transit should be diesel-driven to shield the majority who rides in such vehicles away from the cost of petrol.

A scheme to wean the masses away from using petrol in any form or even have a sniff of it is possible. Firstly, a policy to

ban new registrations of vehicles engaged in commercial transportation could come in place immediately. The existing ones (minibuses, tricycles, motorcycles) would continue to run but phased out gradually with a timeline to allow returns for the owners that have invested.

The proposed switch from petrol (gasoline) to diesel, in the meantime, would put immediate pressure on the supply of diesel. Currently, there are no subsidies on diesel, but those that would make use of diesel for their operations would now be limited to, the maximum electricity-demand consumers on the off-grid scheme; commercial trucks; commercial buses; tractors, and many more commercial implements used for productive activities. Discounting the cost of diesel from the national treasury, across the board, may now take a different dimension from the ones earlier proposed.

Diesel engines compared to gasoline-driven ones are 40% more efficient, and it is the overriding factor for the proposed switch, as regards commercial transportation; it is to mitigate the squandering of the country's resources. Furthermore, equity is justifiable in this case to allow affordable access to modern transportation for the majority of the people. The concerns of the industrial sector are a temporary measure for the time it takes to provide energy generated from large generating stations to those on the scheme. The treasury should still fund these subsidies as part of a development drive to boost the economy.



The estimated petrol consumption averages 55 million litres per day and the following should justify the consideration for the scheme:

*Table (x) Existing Fuel Consumption*

Commodities	Cost/ Unit	Logistics	Price	Subsidy	Volume/ Ltr/Mt	Industry/ LtrMt	Annual Subsidy	Treasury Savings
Petrol	N171.00	N30.00	N145.00	N56.00	1,650m		N1.11tn	-1.11tn
Diesel	N200.00	N30.00	N220.00	NIL	360m	25m	NIL	Zero

The N1.11 trillion subsidies on PMS is about 56.7 for road usage and the remaining powers the over 58 million petrol-powered generators, as sourced from the Nigerian National Bureau of Statistic. Should there be an improvement in the power supply to homes and light businesses, there would be savings of nearly N480 billion that can be diverted to discount the gas and the automotive gas oil (AGO), otherwise known as diesel, of the MDCs on the Off-Grid scheme. The government may have to subsidise gas and diesel for industrial energy needs

*Table (xi) Existing Subsidies*

PMS Consumers	Subsidy on PMS/Road	Outside Road	% Usage Road	Treasury Savings
Household and Light Business	N630 billion	N480 billion	56.7%	-N1.11 trillion
Manufacturing	Almost Zero	Zero	Zero	Zero

*Table (xii) Off-Grid Subsidy Scheme*

<b>Diesel Consumers</b>	<b>Subsidy on Diesel Road</b>	<b>Outside Road Location</b>	<b>% Usage Out of Road</b>	<b>Treasury Subsidy</b>
<b>Household and Light Business</b>	Not Applicable	Not required	0%	Zero
<b>Manufacturing</b>	Not Part of Scheme	N480 billion	100%	-N0.48 trillion
<b>Haulage</b>	Not Part of Scheme	Not Applicable	100%	Zero
<b>Passenger Transport</b>	Not Part of Scheme	Not Applicable	100%	Zero

With the loss of revenue to the DISCOs of highly priced consumers, MDCs, an upward review of tariffs in the non-industrial sections, to cushion the shortfall in revenue is imperative. Household and light businesses would accept even the present industrial electricity tariffs provided there is an uninterrupted power supply and every consumer metered.

Should the utility providers assure at least 20 hours of power daily with a defined pattern, households and light businesses would embrace the scheme. The reliability in supply, in any given location for a 20-hour power, if the mode of operation is known will make life easier for those that live in Nigeria and visitors alike; it will afford the consumers to know when to expect light in their area, and they could organise their lives better.

The economy as a whole and the manufacturing sector, particularly those on the off-grid scheme would be the beneficiaries. The gestation period of the scheme is an

appropriate time to power production lines only as necessary to meet the market demand for individual industrial products. By building the market share of their products, it would boost investors' confidence in the power sector.

END

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