

**UNIVERSITY OF PORT HARCOURT**

**EXTRACTIVE INDUSTRY AND  
NIGERIA'S DEVELOPMENT:  
WHERE DID WE GO WRONG?**

By

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## **PROGRAMME**

- 1. GUESTS ARE SEATED**
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- 3. THE VICE-CHANCELLOR'S OPENING  
REMARKS**
- 4. CITATION**
- 5. THE VALEDICTORY LECTURE**

The lecturer shall remain standing during the citation. He shall step on the rostrum, and deliver his Valedictory Lecture. After the lecture, he shall step towards the Vice-Chancellor, and deliver a copy of the Valedictory Lecture and return to his seat. The Vice-Chancellor shall present the document to the Registrar.

- 6. CLOSING REMARKS BY THE VICE-  
CHANCELLOR**
- 7. VOTE OF THANKS**
- 8. DEPARTURE**

## **DEDICATION**

Dedicated to Professor S J S Cookey, in profound gratitude for his mentorship, encouragement and inspiration.

## ACKNOWLEDGEMENT

I wish to acknowledge and thank my wife Rose, and our children Adamma, Chioma, Emeka, Ngozi and Izu; my brothers and sisters, and all members of the extended Oti family for their love, encouragement and support through the years.

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Finally, I thank the Almighty God for His mercies and blessings.

# **Extractive Industry and Nigeria's Development: Where Did We Go Wrong?**

## **Introduction**

At Independence in 1960, Nigeria had so much going for it. There was much optimism for the emerging 'Giant of Africa'. Things were looking good, and the future was bright and promising.

Much of that optimism stemmed from its rich natural resource endowment, particularly mineral resources, which formed the very incentive for colonial rule by the British. Ordinarily, these geological resources should have catalysed unprecedented and sustained growth and development in all aspects of our dear country, Nigeria, spanning the whole spectrum of our infrastructural, economic, socio-political and cultural development as a people and nation.

By all reckoning, with these resources and a large population, Nigeria had momentum, indeed unparalleled momentum, with which it could have run the course of sustained development, but it did not and has not. Nigeria's peers with similar circumstances ran with their own momentum, and today they constitute some of the so-called Transition Economies that have escaped the derogative tag euphemistically called 'Third World Countries' or 'Developing Countries'.

What went wrong; where did we go wrong?

Firstly, let us firmly establish that something did in fact go wrong, as Figure 1 vividly portrays.



Figure 1. Failure to Launch: Comparison of Economic and Developmental Trajectories of Emerging East Asian versus sub-Saharan African countries (including Nigeria) from 1948 to 2014

**Source:** UN Conference on Trade and Development (UNCTAD), and The Economist, Nov. 2015

Exports represent a vivid barometer to measure a country’s economic power, and hence its industrial, infrastructural and socio-political development. Figure 1 aptly summarizes the state of affairs between us and East Asia. Rising exponentially to a current 20%, the trajectory for Emerging East Asian countries stands in sharp and opposing contrast to the downward spiral of Nigeria’s and other sub-Saharan countries’ to less than 2.5%. Paradoxically, it seems these latter countries did better in colonial times, a curious and damning conclusion, it would appear. Indeed, our failure to launch has cost us dearly and is still doing so.



Again, what went wrong; where did we go wrong? So many things did go wrong, and I have been reflecting on some of the issues for a very long time. The extractive industry surely is one of them, and I invite you to share some of my thoughts in this valedictory lecture.

It seems to me that perhaps, we have missed strategic opportunities at their critical moment of presentation. It is often said that when opportunities present themselves during favourable times, the wise should seize them, for they may never come again. Nigerian parlance puts it more bluntly: ‘Opportunity comes but once’. William Shakespeare, the great master of letters, crafts it more poetically in his play, *Julius Caesar* when Brutus uttered the words in the following verse:

*“There is a tide in the affairs of men,  
Which taken at the flood, leads on to fortune;  
Omitted, all the voyage of their life is bound  
in shallows and miseries...  
We must take the current when it serves  
Or lose our ventures all”*

In the play, we recall that after the brutal assassination of Caesar by his fellow senators, in the chambers of the Roman Capitol, in full plenary session, a civil war eventually broke out between his loyalists led by Mark Antony and Octavius, and the conspirators (or coup plotters) led by Brutus and Cassius. At the onset of the battles, Brutus saw and recognized a critical, favourable opportunity to launch a crushing attack which would have won them the war – and with it the rulership of the Roman Empire - but his ally Cassius vacillated, was hesitant and indecisive, so they missed the opportunity. From that point

on, things started spiraling down. Eventually, they lost the war, committed suicides, end of story.

Although Nigeria failed to “take the current when it served’ and is not in particularly good shape today on account of the missed opportunities, our story, unlike that of Brutus and Cassius, is far from ending, let alone ended. And although it would be quite difficult to accomplish, our present challenging circumstances can eventually be reversed if only we can do the right things. Nigeria still has enormous potential, but potentials are worthless if they remain unrealized. For example, if a child has the potential to be successful later in life, but failed through no fault of his to be educated by his parents, and ends up as a thug and convicted felon, that initial potential has come largely to nothing. The unfortunate details of what led to his failure do not change the material fact that he is a failure and is incarcerated behind bars in prison.

As intellectuals in the Ivory Tower, I am aware that individual disciplines notwithstanding, we are expected to devote some, if not considerable, attention to society and its welfare. And so from my own perspective in the fields of geosciences and mining, I would be focusing on the extractive industry to illustrate the issues that represent missed opportunities in the on-going course of our national development. These missed opportunities have created most of the intractable problems confronting us as a nation since independence.

### **Early Origins of Mining and the Extractive Industry in pre-Colonial Nigeria**

The mining of geological resources - solid minerals and petroleum - from mother Earth form the basis of the extractive industry. Mining has been practiced by mankind, even primitive man since his origins. Worldwide, at the onset of the

Stone Age, during which period he crafted hunting weapons from rocks, the earliest origins of the technological advancement of mankind and early societies can be traced to the beginning of the Iron Age, followed by the Bronze Age, when mankind developed the rudimentary technology to extract iron and other metals found as minerals in rocks. With these metals and their alloys, he was able to fabricate primitive but pragmatic tools and weapons, with which he mastered and dominated his immediate environment. Beside their practical utility as tools and weapons, these metals were also widely utilized in cultural artworks, and artifacts in religion.

Much later man would learn to extract gold, silver and gemstones from rocks, and to these he would assign arbitrary values with which he measured wealth, affluence and influence. Our ancestors who inhabited different parts of what would later be called Nigeria, participated fully in these developments. Iron-working civilization of the **Nok** culture flourished in the Middle Belt area around 300BC and later, bronze works of the **Igbo Ukwu** in the southeast reached its peak around 700AD, and similar bronze cultural developments took place in **Ife** and **Benin** in the 13<sup>th</sup> and 17<sup>th</sup> centuries, respectively. Gold extraction was known in ‘the golden lands of Wangara’ in the **Hausa** kingdoms around the 11 century, a little earlier than the Ife and Benin developments. Mining, smelting and alloying technologies, albeit in their rudimentary forms, are therefore some of the oldest economic activities in Nigeria<sup>1</sup>.

### **Global Impact of the Extractive Industry in Modern Times**

In these modern times, however, the extractive industry has assumed a much larger, indeed, an over-arching and critical role in the development of nations, including Nigeria. Minerals and petroleum have strategically impacted and continue to

impact the development of national economies, their GDPs, their physical infrastructures, and their socio-political development, including health, education, happiness and overall well-being of their citizens.

On the global scene, the world economy and many aspects of international diplomacy - even peace and war - are driven by the geopolitics of minerals and petroleum, just as some of these resources were the incentives for colonialism itself and the attendant brutal oppression that accompanied it. Apartheid South Africa, Belgian Congo (modern Zaire & DRC), German Southwest Africa (modern Namibia), and most countries on the African continent, are excellent examples.

As a synoptic preview on the impact of products of the extractive industry on the development of society and nations, consider the simple rock type, *coal*; where would the world be today without this fossil fuel that triggered and fueled the Industrial Revolution that gave birth to modern Britain, France, Germany, and many, many others? Or *iron ore*, which metal is the basis of the steel industry, and without steel there can be no industrial development (manufacturing industry, construction industry, ships, trains, railway lines, motor vehicles, power turbines, dams, etc.) Or **precious metals** and rare earths metals mineralization in rocks without which we would have no computers, mobile phones and other electronics? Or **uranium minerals**, the source of nuclear power and nuclear bombs? Or **petroleum** resources and their indispensability as energy feedstock and industrial raw materials? Or even the simplest industrial minerals such as dimension stone (granite, marble, etc), crushed rock, aggregates, and even sand and clays?

In this valedictory lecture, we shall be reflecting on our extractive industry to see how it could have driven the political,

infrastructural and socio-economic development of Nigeria from colonial times to the present, but has failed to make any significant difference, unlike the case with other countries. We would then reflect on possible remedial actions.

Following their historical sequence, our focus will be on the following few sub-sectors:

- Tin and Coal Industry - in colonial and post colonial times
- Iron and Steel Industry - post colonial
- Oil and Gas Industry - post colonial

### **Birth of Nigeria's Extractive Industry and Its Early Impact**

In 1884, William Wallace (subsequently Sir William) of the National African Company noticed that tin was being produced by the natives who won the product from the riverbed sands in the Jos Plateau, Northern Nigeria. The natives used simple methods of panning the sediments with their large calabashes to recover the tin, and smelting it for their rudimentary agricultural tools, other implements and simple weapons. Wallace also observed that the local industry had been going on for more than a century.<sup>2</sup>

Later, Colonel Laws of the Royal Niger Company was sent to survey the area in 1902-1903, paving the way for the British who, through his efforts, had now acquired some geological data to start mining the deposits almost immediately, in 1904.

Having muscled in, the British soon displaced the natives from their lands by enacting a Lands Edict, and took over the business. Initially, they adopted the technology of the natives, producing a modest harvest of about 1000 metric tons per year with conscripted labour and hired hands.

Organized mining thus started in Nigeria in 1904 when the British colonial government began to exploit deposits of tin and the associated tungsten and tantalum metals in Jos Plateau, Northern Nigeria. These metals were extracted from their ores of cassiterite, columbite and tantalite, respectively, mined from weathered granitic rocks constituting the Jos Plateau.

Tin mining in the north was soon followed by the discovery of coal, a fossil energy mineral, in Enugu, Southeastern Nigeria, in 1909, again by the British colonial authorities. About four years later the mining of the coal deposits commenced. These mining activities led to the rapid development of both cities with the influx of migrant workers, economic support services and other commercial activities. Exports of coal, tin, tungsten and tantalum reached their peak after the World War II, and Nigeria, at a point, was a leading producer and exporter of tin. The British also discovered large deposits of other economic mineral resources which were widespread across the entire country and this contributed in no small measure to the motivation for the political amalgamation of the Northern and Southern Protectorates in 1914, for the easier colonial management of these resources to boost the UK's economy. The amalgamation gave birth to the political entity known as Nigeria. These mining activities led to the development and growth of the newly initiated colonial railway transportation infrastructure. According to historical accounts, by 1914, the year of amalgamation, the first consignment of coal was already on its way to the UK from the newly established port city of Port Harcourt.<sup>2</sup>

Apart from infrastructural development, the operation of the mines led to socio-economic and political development of the nascent Nigeria. In the case of coal in particular, early

beginnings of organized labour and trade unionism are believed to have received a major boost with the 1949 coal miners' strike in Enugu which led to the Iva Valley Massacre in which the British shot and killed 21 miners. The tragic event contributed to igniting the national agitation for independence, as riots and disturbances soon spread to Onitsha, Aba, and other towns around the country. Ordinary docile folks soon began to openly challenge colonial rule as it was deemed unjust and unacceptable<sup>2</sup>.

### **The Rise and Fall of Tin Mining in Nigeria: Impact on Development**

Once the brightest star of the Nigerian colonial economy in the extractive industrial sector, tin mining is now considered a comatose, sunset industry. Apart from its catalyzing the growth of Jos as an important urban centre with so many migrant workers, among which were so many Europeans, it also catalysed the development of the colonial railway network and other infrastructure. More importantly, tin in the North together with coal discovered only a few years later in Enugu in the South, underpinned the major economic reasons for the political amalgamation of the Northern and Southern Protectorates by the British in 1914 for more efficient exploitation of Nigeria's resources.

The nascent tin mining industry catalysed other development initiatives, including the linkage of Jos to rail lines from Bauchi, Zaria, Lagos and Port Harcourt between 1914 and 1927, the establishment in 1929 of the first Independent Power Provider (IPP) called Nigerian Electricity Supply Company (NESCO) specifically to supply power to the mines in Bukuru and Rayfield areas of Jos. The enabling economic environment led to the springing up in 1963 of indigenous manufacturing

firms such as NASCO Group that competed with the likes of multinationals such as PZ and Lever Brothers.

At its peak in the 1970s, there were over 100 well-established companies and many small-holding indigenous tin mining entities spread all over the Plateau, employing thousands of workers, producing some 17000 ton of tin per annum.

The 1970s also marked the beginning of the demise of tin mining, when the Federal Government, seeking to break the dominance of expatriates in the industry, introduced its ill-fated indigenization policy that wrested control into ill-prepared Nigerian hands. With the indigenization decree, controlling shares in the foreign companies were compulsorily acquired by the Nigerian government, and this led to loss of enthusiasm and mass exodus of the foreigners. Following the acquisition, the government established a new entity, the Nigerian Mining Corporation (NMC), later re-naming it the Consolidated Tin Mines (CTM). Both entities suffered from incompetence and rampant corruption which eventually led to huge losses. Obsolete machinery could neither be maintained nor replaced, and with the tin 'low-hanging fruits' gone, and without the funds, technology, equipment, and expertise to access deeper levels of the deposits, the fall in fortunes turned into a free fall. At this point the oil boom had arrived and nobody, except the artisanal (illegal) miners, had any interest in the industry (Fig. 2).





Figure 2: Unregulated Artisanal Tin Mining in Jos, Plateau State  
**Source:** The Rock Post, 2015

Tin is an important industrial metal and is useful in a broad range of applications: manufacture of modern weaponry, electronic circuit boards, protective coating of steel products to prevent corrosion, industrial welding and joining of steel pipes, medical applications in dentistry, etc, etc. Because of its broad value chain, some producing countries are reluctant to export the raw unprocessed tin, opting instead to reap several times its value downstream by processing and utilizing it in modern industry. The multiplier effects include the provision of jobs, growing their national GDPs, etc, etc. No wonder the most advanced industrial nations are its largest importers, even when they produce it.

Another major added value to tin mining in Nigeria from its ore mineral cassiterite, is its co-occurrence with the ore mineral of tantalum, called tantalite. The metal, tantalum, of which Nigeria was at a point one of the world's leading producer, as it was of tin, is a rare metal used by high-end technology and aerospace industries. It is widely used in production of electronic components as capacitors in mobile phones, tablet computers, personal computers and laptops, and automotive electronics. It is also used in the production of superalloys for jet engine components.

But where is Nigeria today in the scheme of things with respect to production of tin, tantalum and tungsten? Figures 3 and 4 show that Nigeria is irrelevant as far as the production of these metals and associated downstream benefits are concerned.

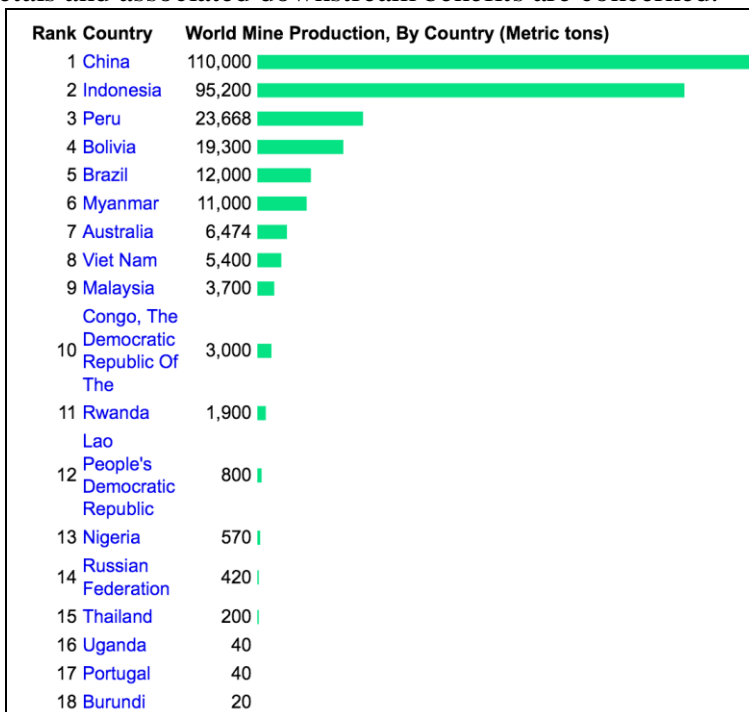


Figure 3: Tin Production by Country (Metric tons) in 2013

**Source:** United States Geological Survey (USGS) Mineral Resources Program

Although Nigeria occupies the 13<sup>th</sup> position with its 570 metric tons per annum,<sup>3</sup> this is a far cry from its late 1950s early 1960s figures when it produced more than 18,000 tons annually, making it one of the five top world producers. And because nearly 100% of all its production is carried out by the largely

unregulated artisanal miners, very little income is received by the Federal Government by way of royalties as confirmed by the (Nigerian Extractive Industry Transparency Initiative (NEITI) Audit Report 2015, following statistical data provided by the Mines Inspectorate Department of the Federal Ministry of Mines & Steel<sup>4</sup>.

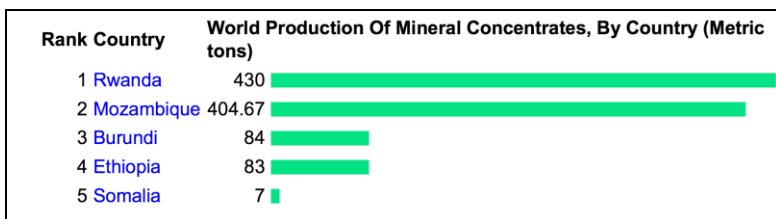


Figure 4: Tantalum Production by Country (Metric tons) in 2009

**Source:** United States Geological Survey (USGS) Mineral Resources Program

The above charts do not convey the full picture of world production figures as they fail to include the DRC (Congo) which produces 30-45% or nearly half of the output of tantalum alone. This is because of international constraints imposed by the US Congress, through section 1502 provision of the Dodd-Frank Act of 2010 against the use of so-called “**conflict minerals**” coming from war-torn countries such as the DRC and its immediate neighbours where the trade in tin, tantalum, tungsten and gold by warlords continue to fuel unending wars and mass atrocities.<sup>5</sup> Mobile phone, computers and other electronics manufacturers such as Apple and HP, automobile and aerospace industry such as Boeing, General Electric and many others are now required by law to disclose their use of “conflict minerals” if they were ‘necessary to the functionality or production of a product’. The US Congress passed the law ‘because of concerns that the exploitation and trade of these metals by armed groups was helping to finance conflict in the

Democratic Republic of Congo and is contributing to an emergency crisis.’ Because of smuggling through DRC’s neighbouring countries, the law also extends to South Sudan, Uganda, Rwanda, Burundi, Tanzania, Malawi, Zambia, Angola and Central African Republic. US listed companies are by this Act required to carry out supply chain due diligence. Similarly, the Organization for Economic Cooperation and Development (OECD) countries, some African countries, China, as well as the UN Security Council have developed comprehensive due diligence guidelines for companies across their jurisdictions.



Figure 5: Mining of “conflict minerals” in eastern DRC (Congo) by warlords’ militias

Congo is rich in mineral resources and its economy relies heavily on mining, despite its on-going and unending wars. The World Bank estimates that mining accounts for over 12% of its GDP, compared to Nigeria’s abysmal 0.3%. In the case of the Congo, the economic impact is much larger than the conservative World Bank figures, because of the businesses and services that are attracted by the industry, and much of their activities are not captured in the GDP data because they occur in the informal sector.

Nigeria has a great window of opportunity here: our tin, tantalum and tungsten are conflict-free. Nigeria ought to revive its once-flourishing mining of tin, tantalum and tungsten, among other solid minerals, without further delay.

### **The Rise and Fall of Nigerian Coal Mining: Impact on Nigeria's Development**

Coal is a strategic and most abundant energy mineral on our planet; it plays a major role in delivering electricity to the world. It is also a critical component of global steel production, the backbone of industrial development. Without power and steel, the world would still have largely remained in the Stone Age.

Economic and social development, and hence political stability and stature, hinge on the increased use of energy and energy intensive materials such as steel, cement, aluminium, glass, etc. which are necessary for the construction and development of transport, energy, housing and water management infrastructures. Coal is therefore critical for all economies, but particularly so for developing economies. Nigeria is therefore fortunate to have substantial deposits of coal reserves, currently estimated at over 2.8 billion metric tons.

Coal was first discovered in Nigeria in Enugu in 1909 by a British geologist/mining engineer, Albert Kitson, who was prospecting for minerals in the Udi hills. Production started in 1914 at the beginning of World War I when the Ogbete mine yielded over 24,000 metric tons of coal which was quickly shipped off to Britain to aid the war effort. Production peaked by 1956 at nearly 800,000 metric tons. In 1950, the British colonial government set up the Nigerian Coal Corporation (NCC) to manage the resources, and for the local economy, the

coal was needed to power the locomotive engines of the emerging railway system, as well as for electricity production from coal-fired plants, notably the Oji River power plant<sup>6</sup>.

The coal mining industry had a profound and positive impact on Nigeria's pre-independence economy, as well as the development of Enugu itself which grew to become the capital of eastern Nigeria in 1938. The number of workers employed in the industry by 1958 stood at some 8,000 men, the vast majority of whom were hewers and miners. Other services entities, artisans, traders and migrants soon flocked into the town and converted it to a thriving metropolis of an estimated 70,000 inhabitants by 1952<sup>6</sup>.



Figure 5: Coal miners in the Onyeama Mines, Enugu, late 1970s  
**Source:** Heinrich Böll Stiftung, Nigeria

But as soon as oil was discovered in Nigeria in 1956 coal production started its steady decline, as the railways soon switched from coal to diesel to power its engines, and the Nigerian Electricity Corporation also switched to diesel for its turbines. The loss of these two major domestic clients was disastrous for the Coal Corporation, as government investments

for equipment and machinery for the mines soon dried up. The final death knell was the civil war in Biafra, when the Enugu coal mines were abandoned altogether due to hostilities. Since then, a number of attempts made to attract foreign investors to revive the mines have largely been unsuccessful, and the government's attempts to privatize the Corporation also failed. Today, the NCC is moribund, and its coal production from the Enugu coal fields has ceased. Recently, a local private company began producing a small output of coal from Okaba in Kogi State. The total current production from Nigeria according to estimates of the US Energy Administration International Energy Statistics is only some 35,000 metric tons<sup>7</sup>, just a little above its 1914 figures, and well below even its colonial peak production of approximately 800,000 metric tons per annum. The abysmal performance of the coal sector is corroborated by NEITI from data provided by the Mines Inspectorate Department of the Federal Ministry of Mines & Steel Development (Fig. 6)

Coal accounted for a sizable portion of Nigeria's revenue and contributed substantially to funding of infrastructural development of the nation's pre- and early post independence period.

Besides, it also contributed to the socio-political development of the country in trade unionism and the agitation for independence, as indicated earlier.

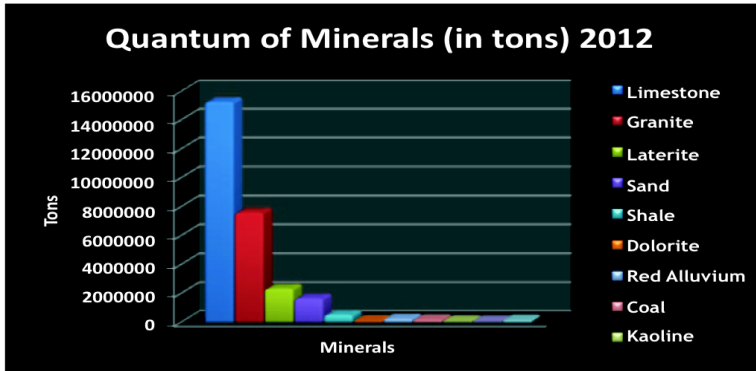


Figure 6: Nigeria Mineral Production Data for 2012

**Source:** Nigerian Extractive Industry Transparency Initiative (NEITI) 2012 Solid Mineral Audit Reports, after data from Mines Inspectorate Department, Federal Ministry of Mines & Steel Development.

### Coal in Electricity Generation

Many developed and developing countries use coal-fired power plants as a key component in their energy mix for power generation, despite current concerns on emissions which drive global warming and climate change. In developed economies, these concerns have led to the concept of “**clean coal**” use, whereby technologies such as carbon capture and storage (CCS), or carbon capture and sequestration, are being developed and tested.

According to the World Bank, coal-fired power plants currently fuel 41% of global electricity on the average, and in some countries coal fuels higher percentages of electricity generation<sup>8,9</sup>. The following examples, selected from the World Bank data for developed and developing economies, are presented to illustrate<sup>8</sup>: China 75.3%, Australia 64.7%, Botswana 87.3%, India 72.8%, Denmark 41.1%, Germany 46.8%, Japan 32.4%, Malaysia 38.6%, Niger 53.3%, **Nigeria 0.0%**, Poland 85.2%, South Korea 41.4%, South Africa 93.7%,



UK 37.0%, USA 39.9% and Zimbabwe 46.4%. It should be noted though that the developed economies previously had much higher percentages in the past but have been scaling down, while increasing the use of renewable energy sources in their energy mix, due to environmental concerns.

Where is the Giant of Africa in all of this? Compare Nigeria's 0.0% with figures of other sub-Saharan countries such as South Africa, Botswana and even Niger, let alone the Asian industrial leaders such as China and India. Nigeria seemed to have showed early promise in this regard when its figure reached 2.3% from its 30MW coal-fired power plants in 1974 mainly from its colonial-built Oji River power station, but fizzled out due to neglect. South Africa has even gone a step further in its use of its coal: apart from generating nearly 94% of its electricity from coal, it converts some of it to liquid fuels for domestic consumption. It also exports some of its produced coal: in 2014 it exported 78 million metric tons (of 286 million tons annual production) to Asia, Europe, Africa & Middle East, and the Americas, earning substantial revenues from the trade.

What is more, Nigeria could have exploited its coal resources to develop its infrastructure when it had the opportunity to do so, like other countries did (and still do), before the world became aware of carbon emissions and climate change. Recently, there are talks of plans by a Nigerian company to build a 1000MW coal-fueled power station in Enugu. With coal deposits in Enugu, Benue and Kogi states, Nigeria can easily ramp up that figure multiple-fold if the political will is there and investment climate provided. This will enhance power supply security in view of the precarious and unreliable gas delivery situation to gas-fueled power plants, and water level fluctuations of the hydro-power station at Kainji.

What about use of coal for steel production in Nigeria? That also is a sad story of failure, as Nigeria's once-promising Iron & Steel industry has also failed, and is discussed separately.

### **Solid Minerals Mining: Comparisons between Nigeria and South Africa**

Statistics preclude any meaningful comparisons between Nigeria's and South Africa's mining industries although both countries are richly endowed with solid mineral resources. It would seem that the discovery of oil in Nigeria completely truncated and destroyed its potential solid minerals mining industry.

According to the South African Chamber of Mines, South Africa's mineral wealth is currently estimated at some \$2.5 trillion. Its economy is built on gold and diamond mining. It is also a major producer of platinum, chromium (of which it is the world's largest producer) and manganese and coal. It is a recognized world leader in mining<sup>10</sup>.

South Africa's mining industry accounts for about 1 million jobs (500,000 direct, and 500,000 indirect), 18% of GDP, one-third of market capitalization of the Johannesburg Stock Exchange, attracts significant foreign savings of 2 trillion Rand (\$190bn) or 43% of value of the JSE, accounts for 93.7% of its electricity generation via coal power plants, and about 37% of its liquid fuels via coal-to-liquids conversion (CTL technology)<sup>10</sup>.

Despite being endowed with large deposits of many different types of economic solid minerals, across all the States of the Federation, Nigeria's solid minerals industry is insignificant to practically non-existent, save for activities of local, undocumented, unregulated, artisanal miners (Figs.3 & 8). The sector contributes only 0.3% to GDP and, according to NEITI

latest audit report, currently accounts for only 0.02% of total export earnings.



Figure 7: Images from gold mining and processing, South Africa  
Source: South African Chamber of Mines



Figure 8: Scenes from artisanal gold mining and production, Kebbi State, Nigeria.  
Upper left and below, Gold ore crushing; Upper right, Gold sluicing.  
Source: The Rock Post, Issue 3, 2015

## **Nigeria's Failed Iron & Steel Industry**

Steel, due to its excellent strength-to-weight ratio, is the world's most versatile and commonly-used construction material. It is also exceptionally rugged and durable. Consequently, it is the backbone of industrialization and industrial production, and therefore indispensable to all economies whether they are developing, transition or developed. In short, it is the cornerstone and key driver for the world's economy.

In 2015, total world steel production was 1,600 million metric tons (mmt). World largest producer is China which accounted for 50.3% in 2015.

Steel finds application across a myriad of sectors. It is an essential material used in the construction industry to build high-rise buildings, bridges, tunnels and viaducts; it is also used in the transport sector to build railroads, trains, aeroplanes, ships and car bodies, as well as for the building of energy infrastructure, namely, electricity pylons, offshore oil platforms, hydroelectric power stations, wind turbines, etc.

It is indispensable to the defence sector, as well, for the manufacture of arms and ammunition, military tanks and shells, missiles and rockets, etc.

Finally, an array of common goods, such as machines, tools and household appliances are unthinkable without steel. (figure 9).

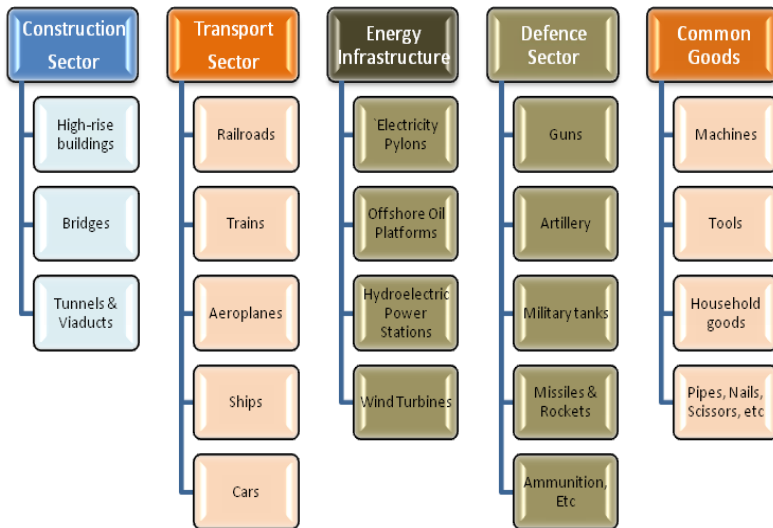


Figure 9: Industrial Applications of Steel

Recognizing its indispensability for a developing nation's economic and industrial growth, Nigeria started mulling the idea of setting up a government-owned steel company as far back as the early 1960s, shortly after gaining independence from Britain. The case for the establishment of such a steel plant was reinforced by the country's rich endowment of the required raw materials, namely, iron ore, coal and limestone. However, it was not until 1971 that it signed a contract with the Soviet Union, which it had earlier commissioned in 1967 (probably in gratitude for its support in the Nigerian civil war) to carry out a feasibility study on the setting up of an integrated steel plant in Nigeria. In the same year, it promulgated a decree establishing the Nigerian Steel Development Authority (NSDA), whose responsibility it was, with Tiajpromexport (TPE) of USSR, to drive the process of steel production in Nigeria. With the confirmed availability of abundant raw

material of iron ore in Itakpe in Kogi State, coal, and limestone in nearby locations in Nigeria, the parties agreed to site the plant in Ajaokuta, Kogi State in 1975. The production capacity of the new Ajaokuta Steel Company (ASC) was planned to start at 1.3 million metric tons per annum, and progressed in phases through 2.5mmt to finally 5.0mmt per annum, within a few years<sup>11</sup>.

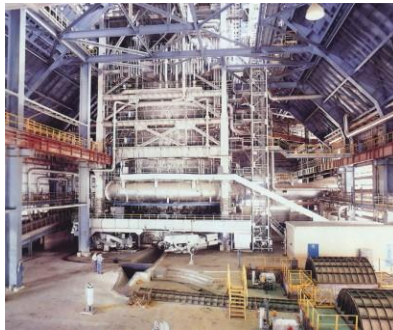
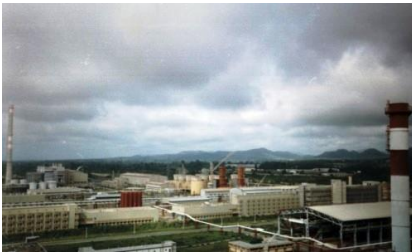


Figure 10: The multi-billion dollar Ajaokuta Steel Complex, Kogi State

In 1977, an additional steel plant, the Delta Steel Company (DSC) with 320,000 metric tons rolling capacity, was set up by the government at Ovwian-Aladja in Delta State, but this time with a German Consortium, and production commenced in 1982. The government also set up three other Rolling Mills, each with 210,000 tons capacity, at Katsina, Oshogbo and Jos, all of which began production by 1983. In addition, a R&D centre - the National Metallurgical Development Centre - was

set up to carry out research on beneficiation of local raw materials, as well as develop technical processes and innovations.

Finally, to ensure the availability of junior and middle level technical personnel for the Steel Industry, the government established the Metallurgical Training Institute at Onitsha.

With these measures in place, the Nigerian Government, by any standards of assessment of its policies and intentions, had acted responsibly and ostensibly in the national interest. But like all government-owned enterprises, it did not take long for things to begin to nose-dive. Eventually, the enterprises limped to a halt, and became moribund, perhaps through incompetence or corruption, or both. In the end, they became drain pipes for scarce national resources.

The Delta Steel Company ran aground, so also all the other government white elephants in the Nigerian Steel Industry. And with them Nigeria's dream of industrial development remains merely a dream. The recorded failure has been attributed to the "Nigerian factor", whatever that means.

There have been plans since 1999 to revive or privatise the Ajaokuta Steel Company, which is now tangled up in a legal quagmire, and lack of investment cash. First, it was concessioned to an Indian company, Global Infrastructure, but was revoked by a succeeding administration. This has created a legal conundrum. The current administration is reported to be doing all it can to resolve the issues and find capable investors who are willing and able to invest some \$1 billion to get it and its sister company – the National Iron Ore Mining Company (NIOMC) in nearby Itakpe - back on stream. Currently, the Ukrainians, the Russians and the Chinese are said to be

interested. Meanwhile, Nigeria continues to spend billions annually importing steel.

It has been said that Nigeria allowed its steel industry to die, because it thought it makes enough revenue from oil and can import anything it fancies, including steel. No, steel production is different; it is strategic to national development and national security. It is a measure of a country's industrial clout, political stature and influence, and ranking among the comity of nations. Nigeria's fellow oil producers and OPEC members – Saudi Arabia, Algeria, Libya, Venezuela, Indonesia and Mexico – all produce steel, let alone South Africa, India, China, South Korea, Iran, Pakistan, Turkey, Australia, Germany, France, Canada, UK, USA, etc.

Japan, a world leader in steel production, has no iron ore, but imports the mineral from Brazil, Australia and others to produce steel, in order to maintain its industrial output and edge.

### **Oil & Gas Industry**

Most of the challenges in this sector of Nigeria's extractive industry are in the public domain and well known, and therefore need little or no further elaboration.

However, let us review some key data: Nigeria's current proven hydrocarbon reserves stand at 37 billion barrels of crude (second only to Libya on the African continent), and 187 tcf of gas. Nigeria is a key member of OPEC, the Organisation of Petroleum Exporting Countries, having joined the organization in 1971. Within the framework of its allotted quota by OPEC, the country produces some 2.4 million barrels per day, when there are no disruptions. It is the largest oil producer in Africa, and the world's fourth-largest LNG exporter in 2015.



Nigeria's oil sector key indicators for the period 2005-2012, according to the IMF<sup>12,13</sup> and the US Energy Information Administration, are summarized in Figure 11.

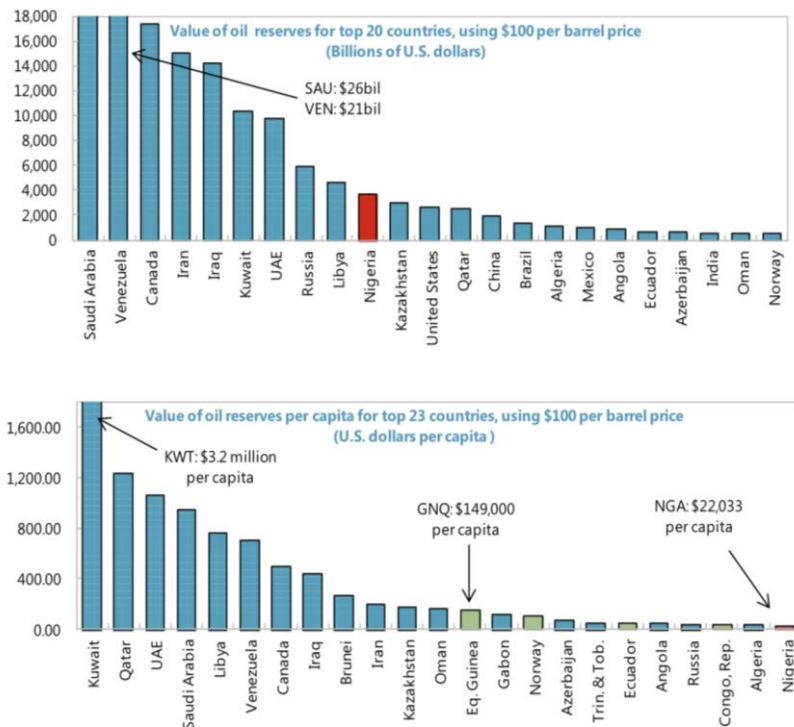


Figure 11: Nigeria: Key Indicators of the Oil Sector, 2005-2012; Upper Bar Chart: Value of oil reserves for Nigeria among top 20 countries, using \$100 per barrel price (in Billions of US \$); Lower chart: Value of oil reserves per capita for Nigeria and others, using \$100 per barrel price (in US \$ per capita)

Source: International Monetary Fund, International Energy Agency, 2015

It is clear from Figure 11 that Nigeria's apparently huge oil reserves when matched against the country's relatively large population of about 180 million is not as significant as generally believed. Using 2012 per barrel price of \$100, Kuwait's oil reserves value per capita is the world's highest at

\$3.2 million compared to Nigeria's paltry \$22.033. Nigeria is even way behind Equatorial Guinea which has a per capita of \$149,000, as it is also behind Gabon, Angola, Congo (Rep.), and Algeria in Africa.

In its latest Oil & Gas Audit Report figures for 2012, which was presented to the National Assembly in June 2016, and which is now in the public domain, the Nigerian Extractive Industry Transparency International (NEITI) reports that Nigeria produced 862,713,312 barrels of crude oil from which she earned a total of \$62.994 billion in 2012<sup>14</sup>. NEITI is yet to release its reports for the subsequent years.

For more recent revenues reporting, the IMF estimates that earnings from Nigeria oil and gas exports in 2014 stood at almost \$87 billion, accounting for more than 95% of the country's exports in 2014. However, due to significant fall in oil price and other causes, notably disruptions, the IMF estimates for 2015 is \$52 billion, amounting to \$35 billion less than its 2014 figures.

Nigeria clearly is not a poor country by any measure and has earned quite substantial revenues over the years, but unfortunately it runs a monolithic economy based only on petroleum which is the mainstay of its economy and foreign exchanges earnings. Consequently, any price fluctuations in the commodity – and this occurs quite often and without prior warning - seriously affects the fortunes of the country and shakes it to its foundations. For example, the values shown in Figure 11 which were computed using \$100, immediately reduce to less than half with the current oil price of a little less \$50 per barrel. This translates to enormous hardship for the country, as currently being witnessed.

And as if oil price fluctuations alone were not enough to destabilize the economy, add the fact that the US, once Nigeria’s largest destination for its oil exports, is now self-sufficient – thanks to its own increased production from conventional and non-conventional shale oil and gas. Finally, add into the mix, corruption, frequent disruptions from militancy, pipeline vandalism and oil theft<sup>15</sup>, and the prospects are truly grim.

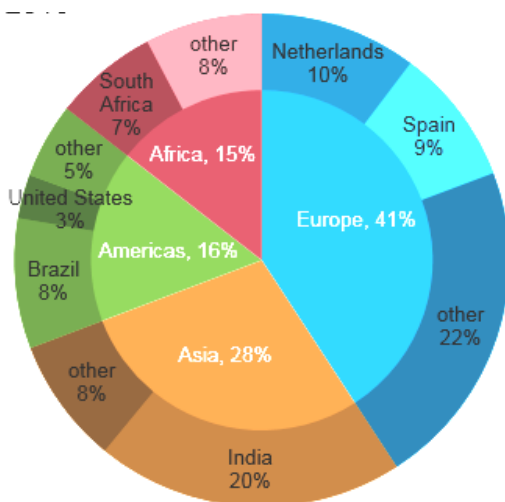


Figure 12: Nigeria Exports of Crude & Condensate by destination in 2015. Crude and condensate exports averaged of 1.98 mil barrels/d in that year. **Source:** US Energy Information Agency, based on BP Statistical Review of World Energy; and OPEC.

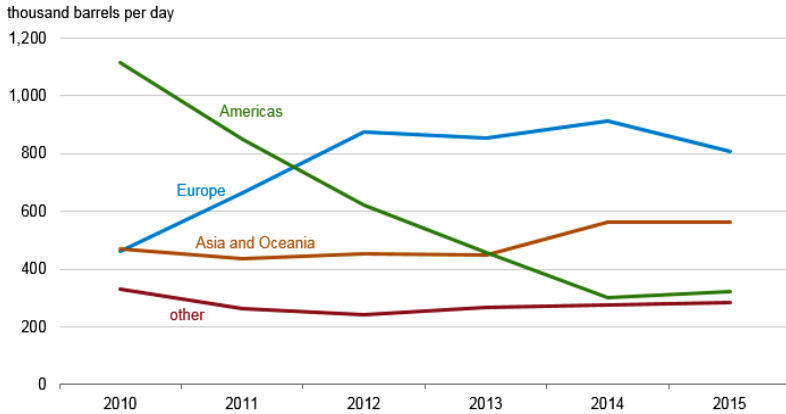


Figure 13: Nigeria’s crude and condensate exports by region, 2010-2015

**Source:** US Energy Information Administration, 2016

### **The Petroleum Industry Bill (PIB) Debacle: Investment Flight & Loss of Revenue**

Regulation of the industry has not been optimal and reforms have been in the offing since 2008 when the Petroleum Industry Bill (PIB) was first proposed. The PIB was designed to change the organizational structure of the NNPC to make it more transparent and efficient, provide a more structured role for the International Oil Companies vis-à-vis the Nigerian state, and recast the fiscal terms governing the oil and gas industry. It was also expected to deregulate the downstream sector of the industry. Some areas of the various PIB drafts soon became contentious to the IOCs and various political interests in the country. For IOCs in particular, these include the potential for changes in tax and royalty structures, a concentration of oversight authority in the Minister of Petroleum Resources (a political appointee), and a mandatory contribution by the IOCs of 10% of monthly net profits to the Petroleum Host Communities Fund, among other concerns. The 10% payment

to host communities soon became hotly politicized, as some sectional groups were not supportive.

For these reasons and the controversies generated, the PIB has not been enacted into law despite several modifications to the original draft over the years. The regulatory uncertainty due to non passage of the bill has hampered investments in new oil and gas projects, and no licensing round has been conducted since the PIB debacle. The International Energy Agency estimates that Nigeria loses as much as \$15 billion each year as the PIB debate rages and uncertainty prevails<sup>16</sup>, because operators are cautious about investing money in Nigeria that may well be lost. Instead, the investment cash earmarked for Nigeria has moved elsewhere.

To say that Nigeria has all its eggs in one basket is a metaphorical understatement. With oil and gas alone, Nigeria seems to be perched on a fragile and precarious economy, as the geopolitics of the global oil commodity price is not within its control.

As new technologies are being developed to unlock hard-to-reach reserves, more and more nations are finding and producing their own oil. Furthermore, the advanced countries are increasingly shifting their energy mix in favour of more renewable sources due to environmental and sustainability concerns. Already, there is glut in the global oil supply which is exacerbated with Iraq and Iran revving up their own production after their long absence from the scene. The scenario is further compounded by the prospect of the US shale frackers getting back to business as prices improve, throwing up more global glut and leading to grimmer economic outlook for countries like Nigeria that depend on oil, and oil alone.

Nigeria has to quickly diversify its economy from oil. The oil-rich Gulf States have already done so: UAE, Bahrain, Abu Dhabi lead in this respect, with Dubai having been transformed into a tourism and real estate wonder of the world.

Notwithstanding, Nigeria has earned quite much from its oil. During the boom years of the mid-1970s, the then Head of State acknowledged that much to the extent he was reported to have said that Nigeria's problem was not money, but how to spend it!

Now, that discussions are increasingly trending towards *life after oil* many in Nigeria are wondering what the country has to show for all the oil wealth it once earned.

### **Refineries**

Nigeria's oil wealth cannot be said to have significantly impacted the well-being of her citizens to any great measure. One of the most glaring shortcomings include the inexplicable paradox of perennial fuel shortages<sup>17</sup> by a top world producer of oil, evident as frequent fuel queues (Figure 14).

The country failed to set up adequate refineries and maintain them. There are currently only four refineries located in Port Harcourt I & II, Warri and Kaduna, respectively, running mostly much below their combined refining capacities of 445,000 bbl/d and inefficiently serving the domestic market of a population of 180 million. Nigeria has a GTL plant in Forcados owned by Chevron (75%) and NNPC (25%), and operated by Chevron. The plant, designed to convert 325 million cubic feet of gas per day, should be delivering 33,200 b/d of synthetic diesel at full capacity. It only started operations in 2014, nearly a decade behind schedule.



Figure 14: Common scenes during fuel shortages in 2016

Hopefully, with the eventual coming on-stream of the privately owned Dangote refineries with a proposed installed capacity of 500 bbl/d in Lagos, the country will begin to get some respite.

Local and foreign investors have been discouraged from investing in construction of new refineries due to the artificially low prices of fuel deriving from government subsidy.

In the meantime, while the government has been planning to build additional new refineries, the shortages continue unabated, and the country must continue to import refined petroleum products to meet the insatiable needs of its ever growing population.

In contrast, South Africa with a population of about 55 million, has four efficient refineries with installed capacity of 503,000 bbl/d, according to the Oil & Gas Journal<sup>18</sup>. This is in spite of the fact that it has to import all the oil it refines mostly from Nigeria (31%) and the Middle East (47%), as the country has very limited petroleum resources, except for minor amounts of conventional and unconventional gas. Consequently, that country wisely operates a sophisticated synthetic fuels industry producing petrol, diesel, kerosene, and other fuels from its Secunda coal-to-liquids (CTL) plant using the country's abundant coal resources, and the Mosel Bay gas-to-liquids (GTL) plant, to satisfy a large portion of its domestic demand for petroleum products. The country's CTL alone has installed capacity of 160,000 bbl/d of oil equivalent, and there are plans to increase this by a further 110,000 bbl/d capacity.<sup>18,19</sup>

### **Nigeria's Gas Exports and Domestic Utilization**

Nigeria has made commendable progress in reducing the amount of associated gas that it wastefully flares, and has a thriving Liquefied Natural Gas (LNG) facility at Bonny through which it exports LNG to the world, ranking as the world's fourth largest exporter after Qatar, Malaysia and Australia. In 2014, it exported some 900 bcf of gas as LNG, according to NNPC and OPEC.<sup>20,21</sup> Asia receives most of Nigeria's LNG



(52%), with Japan topping the list at 25%, followed by South Korea with 17%, see Figure 15. The US has stopped importation of LNG from Nigeria, as it has also done with crude oil. The Bonny LNG plant, known as the Nigeria Liquefied Natural Gas Ltd (NLNG) is run by a consortium comprising NNPC (49%), Shell (25%), Total (15%) and Eni (10.4%). The facility, currently operates six liquefaction trains, and has a production capacity of 22 million ton per year (or 1,056 bcf/y). There are plans to install a seventh train to increase production capacity. There are also plans to establish another LNG plant in Brass which will have two liquefaction trains with a total capacity of 10 million tons per year.

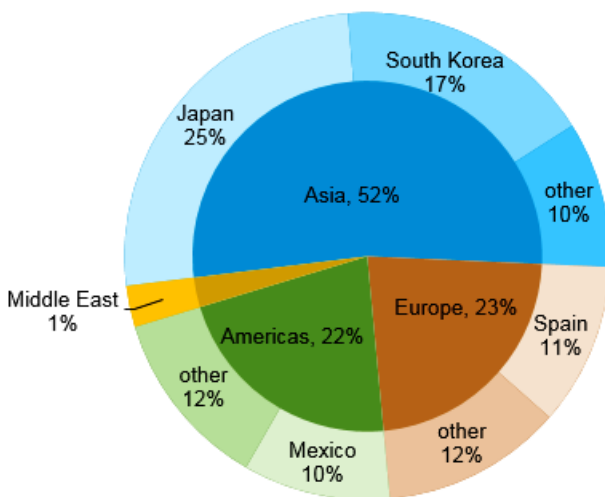


Figure 15: Nigeria Exports of Liquefied Natural Gas (LNG) by destination in 2014, totaling 900 bcf

**Source:** US Energy Information Agency, based on BP Statistical Review of World Energy, 2015.

A limited amount of gas is also exported to some West African countries through the West African Gas Pipeline. It is jointly owned by Chevron, NNPC, Shell, Ghana, Togo, etc., and began commercial operations in 2011.

But Nigeria still flares gas, and it is an irony that domestic gas utilization for power generation is still problematic and this continues to hurt the economy very badly, and has stunted economic growth in every sector of the economy. Domestic natural gas utilization (in homes, offices, and factories) is terribly constrained by the lack of infrastructure to supply these consumers. That is a paradox for a country that not only produces and exports gas, but also wastefully flares it.

### **The Fuel Subsidy Albatross**

Nigeria's practice by successive governments, until recently, to subsidize fuel costs for its citizens was based on sentiments and political considerations, not economics. This was because the citizens expected, and the governments were fully in agreement, that for a country that has huge petroleum resources, its citizens should pay lower prices for the commodity.

But eventually, with the rising cost of petroleum and its products, coupled with the rapid increase in population which led to higher consumption rates, the cost of subsidy began to rise exponentially, to the extent that in 2011 alone fuel subsidy cost the country an estimated \$8 billion, accounting for 30% of government expenditure and 118% of the capital budget.<sup>22</sup>

Even more worrisome, was the fact that the poor, for whom the subsidies were meant in the first place, benefitted the least. Smugglers were taking the cheap products across the borders

and reaping huge profits. Corrupt importers and their cronies were claiming payments for products which were not supplied — and more devastating to the economy, investors declined building new refineries because the artificially low cost at which they must sell their products, as ordered by the government, did not guarantee any returns on investment. Consequently, despite the fact that 20 refinery licences were granted from 2000 till date, not a single new refinery has been built, except the recent efforts by the Dangote Group to establish one in Lagos.

The colossal subsidy expense continued to be detrimental to the development of the country as it was crowding out spending in other developmental sectors, such as **education** and **health care** which received allocations of about \$2.2 billion each or slightly higher (in the case of health care) by comparison. Clearly, the \$8 billion or more annual subsidy waste could have been better applied to these **social services** and other critical infrastructural needs such as **roads, railways** and **electricity**.<sup>22,23</sup>

Now, that the new government has removed the contentious and wasteful subsidy, it is hoped that the funds saved will be applied to develop the country for the benefit of all.

## **Some Critical Infrastructure Deficits**

### **Roads**

Our dear country, Nigeria, has some of the world's worst roads (Figure 16). The situation leads to avoidable road accidents with attendant loss of lives. The roads are also impediments to free movement of goods and persons, and consequently to substantial losses in the national economy.

A country that is a major oil & gas exporter of the world, and which has been earning huge revenues from that resource since independence ought to have done better with respect to road infrastructure.



Figure 16: Road scenes across Nigeria. Poor road infrastructure exert a heavy toll on safety and the economy

## **Railways**

The history of the first major transportation infrastructure in Nigeria, the railways, which was initiated, built and developed by the British colonial administration is intimately tied to the strategic need of the British to evacuate mineral and, to some extent, agricultural produce, from the hinterlands to the sea ports of Lagos and Port Harcourt, and thence to Europe.

The colonial railways started as far back as 1898, and by 1912 the Lagos Government Railway and the Bar-Kano Railway were amalgamated, preparatory for the political amalgamation of the Northern and Southern Protectorates in 1914. In 1955, the Nigerian Railway Act was passed, giving the railways its current name of Nigerian Railway Corporation (NRC), as well as the exclusive legal right to construct and operate rail services in Nigeria. Reaching its peak shortly after independence in 1960, the NRC, with a network of 3,505 kilometres of single track, 3ft 6 in gauge, started a steady and irreversible decline from which it has not recovered. In 1988, the Corporation declared bankruptcy and ceased operations. Successive governments, military and democratic, have been unable to revive it till date, perhaps due to haphazard efforts to do so, and currently the NRC, like almost everything else bequeathed to Nigeria at independence, is all but a shadow of its original self. It is difficult to say if corruption had any role to play in the demise of our railways.

Recently, the Nigerian Senate began debating a Bill to repeal the current Nigerian Railway Act and enact a new Bill which, if passed into law, will deregulate the sector and open it to private sector investment which it is hoped will transform it to 'be in consonance with international best practices'.

It is argued, and rightly so, that the long years of neglect of the railways have resulted in the worsening of the state of our

roads, as haulage of cargo by heavy duty trucks which would otherwise have been by rail like in other countries, continue to be transported by road.

An efficient railway system and network would have spared our roads from endless wear and tear; we would also have been spared the damage to our cars by bad roads with the attendant need to import spare parts with scarce foreign exchange, not to mention the daily bloody carnage in accidents on our highways, exposure to armed robbery, etc.

We would also today be enjoying efficient, comfortable and secured mass transit like people do in other countries. Imagine what might have been if we had had the common sense to develop our railways from where the British left it! It is left to be seen when and if Nigeria will revive and modernize its railways.

### **Electricity**

*“There’s never been a country that developed with intermittent power”*

Jim Yong Kim, President, World Bank

Despite its coal and gas resources Nigeria’s net electricity generation, which has been fluctuating between 3,000 and 4,000 MW for several years, is one of the lowest per capita in the world. Many problems beset the sector: poor maintenance culture, gas supply disruptions and shortages, low water levels for its hydro-plants, poorly developed transmission and distribution networks, sabotage and, not the least, alleged corruption. It has been said that private generators are the main power supply source, with the public utility sources acting as back up, instead of the other way round.

In a 2013 privatization action, Nigeria sold off all its previously unbundled state-owned power behemoth (PHCN, formerly NEPA)) successor companies called GenCos (for generation) and DisCos (for distribution). Yet, the power situation has barely improved.

As already indicated, the oil revenues wasted on subsidies and alleged corruption could have provided Nigeria with the power it needs for all-round industrial output and development.

## **Conclusion**

The extractive industry gave Nigeria an early head start to set the compass for the course of its further development at, and since, independence from colonial rule. It appears that we went the wrong way at various crossroads. We should have stayed the course with the exploitation of our solid minerals, among other resources (especially agriculture), before the discovery of oil. Even when oil appeared on the scene, we should not have abandoned all the other sectors of our emerging economy.

In particular, our coal resources should have been better exploited for power generation at the early stages before our energy needs grew out of pace with rate of population increase; the extraction and use of our industrial metals (tin, tantalum, tungsten, lead, zinc, etc.) could have catalysed industrial manufacturing; and our iron and steel industry might have transformed our nation into a manufacturing and construction giant. All of these could have ensured a healthy economy, jobs provision and self-reliance. Finally, our oil and gas resources should have been better utilized to provide better social services such as education and health, and infrastructural development in transportation (railways), roads network, electricity supply, etc, and a better life for all our citizens.

It is never too late. We should begin to retrace our path, re-set our priorities, re-visit those critical areas where we may have missed the opportunities for sustainable growth, diversify our economy, abhor corruption, and re-commit ourselves to building a more successful, just and prosperous Nigeria, in peace and unity.

Ladies and gentlemen, I thank you for your attention.

Professor Dr. rer.nat. Michael N. Oti



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## **EPILOGUE**

### **Why and How I Came to Serve the University of Port Harcourt**

I returned to Nigeria and straight to University of Port Harcourt on February 24, 1981, at the instance and invitation of Professor Donald E U Ekong, the great chemistry scholar who was Uniport's first and founding Vice-Chancellor. Donald Ekong, was my very senior fellow alumnus, having studied at Heidelberg University himself in the 1960s and had even left there long before I arrived to commence my own studies in 1971. But I had heard of him, as he was still quite famous there, having broken all manner of academic records in chemistry, and the first thing all new African science students, not just Nigerians, got to be told by the Germans when they arrived was to emulate the legendary Ekong in every respect - behave like Ekong, think like Ekong, stay out of trouble like Ekong, be clever like Ekong, and so on.

So for me he was like an unknown role model, and I had no difficulty connecting with him when I eventually met him during his visit on a recruitment drive to Heidelberg in 1980. He had come to try to persuade some German professors to relocate to Choba, Nigeria, to help him in his efforts at establishing Uniport properly. Unfortunately, none would come with him; instead they informed him of a freshly minted Nigerian PhD, who was still there doing post-doctoral research work; and that Nigerian happened to be me.

Months before my encounter with Ekong, I had been offered international employment by Elf in Paris, and Shell in London, besides academic positions in the US, and was just waiting to conclude my post-doctoral commitments in Heidelberg before

taking a final decision on which of the offers to accept. After my meeting with the revered Ekong and listening to the intense passion and force with which he spoke about his 'unique Uniport', I decided to accept his offer to return to Nigeria and join the University of Port Harcourt as lecturer. And so on February 24, 1981, after a decade-long uninterrupted sojourn in Europe, I arrived in Choba and proceeded with my suitcases straight to Vice Chancellor Ekong's office. I did so because he had specifically instructed me to do so since he was the only contact person I had in Port Harcourt and the university. He greeted me warmly in German (perhaps to put me at some ease, after the not-so-smooth journey to Choba from Germany) - and I felt immediately at home. The rest, as they say, is now history.

As I leave, I wish to express my profound gratitude and indebtedness to late Professor Dr.rer.nat. Donald E.U. Ekong for bringing me to Choba to serve the University of Port Harcourt.

## CITATION ON



### **PROFESSOR MICHAEL NDUBUISI OTI**

#### **Birth & Early Education**

Michael Ndubuisi Oti was born on 27<sup>th</sup> August, 1946, to the family of late Mazi Daniel Oji Oti and Mrs Eunice Nwaugbo Oti of Ujari Village, Arochukwu in Abia State. The young Michael started his primary school education in Warri in 1952, continued in Lagos and completed that phase of his education at Aggrey Primary School, Arochukwu where he obtained his First School Leaving Certificate in 1959 with distinction. In 1960, he proceeded to Aggrey Memorial College also in Arochukwu, where he earned his Cambridge School Certificate in record time of four years (instead of five) in 1963.

He then worked briefly from 1964 till 1965 as Clerical Officer at the Federal Ministry of Internal Affairs, Lagos, before enrolling at the Federal School of Science, Lagos, for his GCE A Levels. Unfortunately, the Nigerian Civil War disrupted his education at FSS which he continued after the war in 1970 and obtained his GCE A Levels in June, 1971.

### **University Education & Early Professional Experience**

In same year 1971, he proceeded to the University of Heidelberg in Germany where he received the Vordiplom-Geologie (Bachelors in Geology) in 1976, the Diplom-Mineraloge (Masters in Mineralogy & Petrology) in 1977 with distinction, and the Dr.rer.nat. (PhD) in Sedimentology & Petroleum Geology in 1980 with *magna cum laude*. During the PhD programme, he worked briefly as an intern at Deutsche Texaco, in Celle, Germany. After the PhD, he did a one-year post-doctoral research at the Institute of Sedimentological Research, University of Heidelberg.

In 1980, he accepted the offer of a lectureship position at the University of Port Harcourt despite the fact that he had earlier been offered international employment by Total Elf in Paris, and Royal Dutch Shell in London, and a number of universities in the US.

### **Academic and Professional Career**

On February 24, 1981, Dr. Oti arrived in Choba to commence a career at the University of Port Harcourt that spanned over 35 years in which he served in various capacities. He rose through the ranks from Lecturer II in 1981 to become Professor of Geology in 1995. He was a two-time Head of Geology department (1984-1986, 2000-2002) and contributed immensely to the department's growth and ranking as the foremost petroleum geology department in Nigeria. Furthermore, he was team leader of the Petroleum Geosciences Research Group which successfully executed several high-profile industry-tailored studies for NNPC and the multinational oil companies.

Prof. Oti has been a mentor and role model to several generations of students and contributed significantly to manpower development for the energy and minerals industry, having supervised over 70 MSc and 13 PhD students, some of whom are now professors in their own right, while others are leaders in the local and international oil & gas industry. A world-class researcher, author and consultant, Professor Oti has over 70 journal articles, books, and over 60 proprietary

technical studies reports for government and corporate entities in the oil and gas sector.

He was Visiting Professor at the Sedimentology Research Institute, University of Heidelberg in 1987, and at the Department of Geology & Geophysics, University of Connecticut, Storrs, USA in 1991.

In 2005, he was appointed by Federal Government of Nigeria (Department of Petroleum Resources) to serve as Member of the Nigerian National Committee of the World Petroleum Congress (2005-2012).

Professor Oti has served from 2006 to 2012 as a regular member of Accreditation Teams for the Council of Mining Engineers and Geoscientists of Nigeria (COMEG). He is also since 2013, an expert peer review consultant to the Nigerian Geological Survey Agency, Abuja.

Professor Oti served as a permanent member of Senate for well over two decades. He also served two consecutive terms as member of the University of Port Harcourt Governing Council (2000-2004), as well as in many ad-hoc and statutory committees of Senate and Council. He was Chairman, Board of Uniport Investments Ltd, 1999; Chairman, Senate Ad-hoc Committee on Guidelines for Inaugural and Valedictory Lectures, 2013, as well as Chairman, University-Industry Partnerships Committee, 2010-2015, among several others.

A seasoned Sports Administrator and former athlete, Professor Oti served as Chairman of the Sports Council for much of the 1980s; National Chairman, Nigerian Universities Games Association (NUGA) from 1986-1988; Member, Board of Directors, National Sports Commission of Nigeria (1986-1988); Member (the first from sub-Saharan Africa) of the Executive Committee, International Federation of University Sports (FISU), governing body of World University Games, from 1987-2001; Member, Executive Committee of African Federation of University Sports (FASU), 1987-2001; and of WAUG (West African University Games) 1987-2001. He was

also two-time Chairman of the Organising Committee of NUGA Games held in Uniport (in 1988, and up to a point for the 2004 Games) having with the then incumbent Vice Chancellors attracted the games to Uniport in order to fast-track infrastructural development of the university.

Professor Oti is an active member of the American Association of Petroleum Geologists (AAPG), the Deutsche Geologische Gesellschaft (German Geological Society), the Nigerian Mining and Geosciences Society (NMGS), the International Association for Geochemistry & Cosmochemistry (IAGC), Fellow of the Nigerian Association of Petroleum Explorationists (NAPE), and a distinguished Fellow of the Alexander von Humboldt Foundation of Germany, among others.

### **Community and Family Life**

Professor Oti is active in the development of his home community of Arochukwu. In recognition of this, he was honoured by the Arochukwu traditional institution with the traditional title of *Oganivu Ibom Isii* of Arochukwu Kingdom.

He is married to Mrs Rose Nonyelum Oti *nee* Boyd, and they have 5 children (now adults) and 3 grand children.

Mr. Vice Chancellor, I present to you, our distinguished Valedictorian, Professor Michael Ndubuisi Oti, to present the 8<sup>th</sup> Valedictory Lecture of the University of Port Harcourt.

**Professor Enuvie G. Akpokodje**  
**Orator**