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NAEE Energy Forum

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Message from the President

Musings in Surreal Times

It has been a great privilege to be the President of this very distinguished Nigerian Association for Energy Economics (NAEE), sequel to my election and assumption of office at the Annual Conference in 2019. I thank my predecessors, Professors Akin Iwayemi, Adeola Adenikinju and Wumi Iledare, all of whom have worked assiduously to lift NAEE and establish it as a notable voice in the Nigerian energy space. They continued to work toward the association's success. I am grateful. I thank the Executive Council and members who have not only allowed me to lead them, but have worked and given me their full support.



Shortly after the 2019 Conference, we commenced our preparations for the First Abuja Technical Forum, which was held on 6th December in Abuja. We were pleased to have the Ambassador of India to Nigeria, His Excellency, Shri Abhay Thakur as our Special Guest. The Forum, which was themed, **Making Energy for All in Nigeria a Reality**, had excellent presentations from Mr. Chiedu Ugbo, Managing Director, Niger Delta Power Holding Company; and Osaro Eghobamien and Oserogbo Akhigbe, both of Perchstone and Graeys, one of Nigeria's leading law firms. The Keynote Address was read by Hon. Madaki Ameh, Managing Partner, BHH Consulting and Convener, Oil, Gas and Power Forum. It was a very successful event, and we are grateful to all the distinguished panellists and participants.

We concentrated our efforts on planning for the 13th Annual Conference which was scheduled for our usual time at the end of April. We sent out a call for papers and invitations to all our speakers and panellists. We came up with a very topical theme: **Sustainable Economic Development in Africa: Rising to the Challenges of Energy Poverty and Climate Change**. We were also to have very interesting collaborative input from the Embassy of India, who had arranged to teach 100 secondary school students how to assemble solar lamps, which would then be presented to them. It was going to be both stimulating and meaningful. And then, the coronavirus pandemic broke out, and our world changed in a way that none could have imagined. The world went into a protracted lockdown. For a while, global transportation systems ceased. Without a doubt, the pandemic was the most important issue in 2020. It will surely be remembered as the Year of the Coronavirus. Happily, we were able to still hold our Annual Conference for a day in December. The Conference was themed to address what is now the topical issue, **Energy and Petroleum in a Post-COVID World**. It was our first hybrid conference, and so it was still global, notwithstanding the minimal travel at the time. Our 2021 Conference was once again a full conference. It ran for three days to accommodate those who had responded to our 2020's "Call for Papers" and to properly subsume our 2021 theme: **Strategic Responses of the Energy Sector to COVID-19 Impacts on African Economies**.

I am, therefore, glad to say that it has been a relatively active period, notwithstanding the coronavirus pandemic. The only lapse has been the absence of the regular publication of our NAEE Energy Forum which somehow fell between the cracks. Happily, this has now been rectified and I am therefore delighted to be writing in my capacity as President of NAEE.

(Continued on page 3)



Mission

To train Nigerians to qualify as graduates, professionals, technicians and craftsmen in the field of engineering, geology, science and management in the oil and gas industry in Nigeria or abroad.

Vision

To serve as a vessel for the development of indigenous manpower and technology transfer/acquisition in the petroleum industry as well as to make Nigeria a human resource center for the West African sub-region.

The Mandate

To develop the capacity, capability and competencies of Nigerians to play effective roles in the operational and management segments of Nigeria's oil and gas industry. This is achieved through Human Capital Development (Education and Training Programmes), Institution and Systems Development (PTI, NCPSK, University Upgrade Projects, Skills Development and Training Centre, NTI Bonny, Federal Polytechnic of Oil and Gas Ekowe etc), Promotion of Research and Acquisition of Relevant Technologies (Research Grant Competition, Professorial Chair Endowments), Manufacturing and Materials Development.



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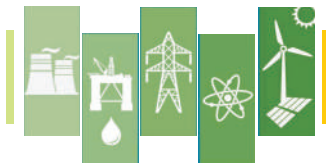
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NIGERIAN UPSTREAM PETROLEUM REGULATORY COMMISSION

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1. Membership shall be accomplished by submission of a written application (by completion of association's membership form) and payment of the first year's dues.
2. Each member shall have one vote, members may vote at meeting of the members in person or by written proxy.

Membership Dues

1. Regular Member: \$120/N60,000
2. Student Member: \$50/N30,000
3. Institutional Member: N300,000

NAEE ACCOUNT DETAILS

Bank Name: Guaranty Trust Bank Plc.
 Account Name: Nigerian Association for Energy Economics
 Account Number: 0110538168

Bank Name: First City Monument Bank
 Account Name: Nigerian Association for Energy Economics
 Account Number: 1392531018

WEBSITE

The Nigerian Association for Energy Economics is on the World Wide Web and its address is www.naee.org.ng
 The website has general information about the Association. You can also visit our website of the International body at www.iaee.org

Payment can be made online, Membership form can be downloaded from these websites.
 Contact: for more information, you can write directly to: Nigerian Association for Energy Economics (NAEE)

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Nigerian Association for Energy Economics (NAEE) PUBLICATIONS

1. Energy, Environment & Economic growth (2010)
2. Green Energy and Energy Security: Options for Africa (2011)
3. Energy Technology and Infrastructure for Development (2012)
4. Energy Resource Management in a Federal System (2013)
5. Energy Access and Economic Development: Policies, Institutional Framework and Strategic Options (2014)
6. Future Energy Policy Options: Assessment, Formulation and Implementation (2015)
7. Energizing Emerging Economies: The Role of Natural Gas & Renewable Energy (2016)
8. Energy, Economy and The Environment: The Interplay of Technology, Economics and Public Policy (2017)
9. New Era in Global Energy Landscape: Implications for An Emerging Economy (2018).

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I write with a sense of living in surreal times, even Kafkaesque times, in the wake of the COVID-19 pandemic and the unfolding Russian-Ukraine war, which has sent oil prices spiralling upward and led to a re-jigging of the emerging strong pull towards the enforcement of a global energy mix with reduced oil dependency. As I ponder further, I see that for Nigeria, our surreal times have continued for about a quarter of a century. As I have been preparing for the conference, I have had to take a critical look at the past, mainly because of a paper of mine that was recently brought to my attention. A few weeks ago, a dear friend and colleague who is also a respected traditional ruler in Osun state sent me a copy of a paper that I presented 24 years ago, on 5th June 1998, at the Annual Conference of the Nigerian Society of International Law, and the title was: 'Does Nigeria really want Development?' At the time the title was meant to be provocative. However, as I read what I wrote back then, I saw that it was a valid question but I didn't know it, because nearly a quarter of a century later, all the worrying issues that I highlighted then are now seemingly entrenched fixtures and part of the Nigerian landscape. So, at the dawn of a global changing landscape dominated by a war between Russia and Ukraine, climate change and a sense that we are entering into an era of pandemics (there is consensus that the coronavirus is only the first) when I critically examine actions of the Nigerian State and ask whether we really want development, I cannot answer positively.

In 1998 I commenced my paper by saying:

"Times are hard in Nigeria. For some years, certainly for the decade of the '90s. The country has been in the throes of a recession. To the vast majority of Nigerians, this recession is not only continuing, but it is also worsening. Notwithstanding statements to the contrary from key officials..."

My assertion was premised on the fact that, "so far, the utterances and actions of key Nigerians who are in a position to take actions to positively propel the country in a developmental direction do not apparently go together. For this reason, we have continually worsening situations in many key areas that impact on development and investment."

I then, proceeded to highlight and focus on the following areas which I identified as key.

- Constant blackouts
- Constant fuel shortage
- Colossal corruption
- Inefficient public services
- An unsafe environment
- An unhealthy environment
- A discriminatory environment
- An uncertain investment climate
- A collapsing educational system
- An unstable government

I was much younger then: maybe that was why I used fairly punchy language to describe these issues. I discussed against the background of the Vision 2010 Report which I noted was deficient vis-à-vis energy. Energy was not one of the Vision's deficiency. There was no subcommittee on energy, and the Desired Vision Targets did not include electricity, or greater energy efficiency and use. I noted that, in the absence of energy, notwithstanding any positive developmental traits, life in Nigeria would be "nasty, brutish, and above all, poor."

"The nation is currently wallowing in darkness." At the time access to electricity was 34 percent, mainly in urban areas, and the fortunate few had sporadic bouts, with continuous blackouts as a common occurrence in many areas.

On the perennial electricity shortage, I wrote: "The nation is currently wallowing in darkness." At the time access to electricity was 34 percent, mainly in urban areas, and the fortunate few had sporadic bouts, with continuous blackouts as a common occurrence in many areas. This sounds eerily familiar to anyone living in Nigeria now, as we have witnessed total grid collapse on a few occasions within the last few months. The primary difference between then and now is that electricity was government-controlled in 1998, under the management and administration of the National Electricity Power Authority (NEPA). In 2022, the electricity grid covers about 50 percent of the population and we operate a privatised system but the service has not improved. In 2022, it is true to say that the electricity situation in the country is alarming and not working. Private generation is ubiquitous; every Nigerian who wants to be productive has the best type of generator that he or she can afford, and this generator operates as the mainstay, with grid electricity as a backup and not *vice versa*.

At that time, fuel queues were a regular occurrence and I wrote about that, citing the lack of coordination and planning in downstream. I also noted the policy of Lagos state at the time, where petrol stations could only sell odd and even-numbered cars on specified days. I remember those days and they seemed so surreal. Fast forward to 2022, the great news is that, finally, we have a new legal framework in place with the enactment of the Petroleum Industry Act, after twelve years in the pipeline; and a brand new functional Midstream and Downstream Regulatory Authority with full powers to regulate the midstream and downstream sectors of the industry. We have no even or odd-numbered policies in place anywhere, but fuel queues have remained with us, and are in Abuja even at the time of writing. The Authority is the only brand-new institution in the petroleum industry and so we are patiently awaiting its activities to truly make downstream product scarcity in our petroleum-endowed country a thing of the past. Unfortunately, practically all the societal ills that I mentioned at the time remain present in 2022. Many have worsened. For instance, the tertiary education system has been characterized by strikes and shutdowns, and as we write, university students have been out of school for about five months and that is a sobering thought.

Unknown to us, that conference of the Nigerian Society of International Law would come to have some significance as one of the last functions before the commencement of a critical period in Nigeria's history. Three days later, on 8 June 1998, the military Head of State General Sani Abacha died, and General Abdulsalami Abubakar took over as the Head of State. On 7 July 1998, the winner of the annulled 1993 elections Chief Moshood Abiola died in detention, and an electoral process commenced, leading to the beginning of the Second Republic, with General Olusegun Obasanjo re-emerging as a democratically elected president of Nigeria on 29 May, 1999. We have since had four presidents and next year, we shall be electing a fifth. As I write, I look forward to the end of surreal times for us in Nigeria.

Thank you very much for being part of making this Conference a great success, and for playing your role in propelling the Nigerian energy forward so that it can truly be the driver of the sustainable development that we all truly desire.

Prof. Yinka Omorogbe SAN, FNAEE, FICMC, MCI Arb. (UK)



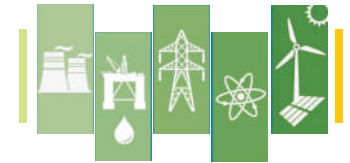
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NAEE Mission Statement

About NAEF: The Nigerian Association for Energy Economics (NAEE) is the Nigerian affiliate of the International Association for Energy Economics (IAEE) with a presence in over 120 Countries all over the World. The NAEF is however the first and currently the only affiliate of the International Association for Energy Economics in Africa. The NAEF was formally inaugurated in Nigeria in December 2006 at the Nigerian National Petroleum Corporation (NNPC) Towers, Abuja, and one of the fastest growing affiliate in the IAEE.

Mission Statement: The Association is a nationwide nonprofit organization of business, government, academic and other professionals that advances the understanding and application of economics across all facets of energy development and use, including theory, business, public policy and environmental considerations.



A Note from the Editor

I welcome you heartily to the eighth edition of the Nigerian Association for Energy Economics (NAEE) Energy Forum, the Official Newsletter of the NAEF. The NAEF Energy Forum gives a unique opportunity for members to share insightful opinions and reviews across the nexus of the multidisciplinary profession of Energy Economics, Environment, Engineering, Law as well as allied areas. The last edition of the NAEF Energy Forum was in 2019, no thanks to the COVID-19 pandemic. In the last seven editions, readers have been treated to articles on current developments in the domestic and global energy industry. This edition, though aligning with the theme of this year's NAEF/IAEE International Conference – "Energy Transition and Climate Change Policy: Pathways for Sustainable Development in Africa", also touches on other contemporary energy issues.

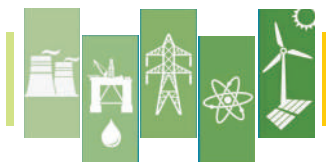
The global energy system is more likely than not to undergo a fundamental restructuring because of global warming. This restructuring will create challenges and opportunities for global economies, especially for petroleum-dependent economies in Africa. The urgency and determination to shift the global energy mix toward a renewable energy system, which has the unique attribute to produce energy with no associated emissions of greenhouse anchors the climate policy debate. Of course, that renewable energy offers a clear path to net-zero emissions is not conjectural but the transition speed to achieving this outcome is neither unique nor homogeneous.

In this edition, Professor Wumi Iledare looked at the issue of the energy transition trilemma: Balancing energy security and equity with environmental sustainability matters in Africa. He concluded that the essential steps to finding an optimal transition pathway rest on the government because energy transition is a policy issue. Government must set the transition agenda and perhaps the African Union (AU) needs to have an AU strategy like its counterparts in the EU. Government should create energy transition frameworks that attract investments by rewarding entrepreneurship and innovation and constraining inefficiency and waste.

Professor Adeola Adinkinju reflected on the Fuel Subsidy in Nigeria. He observed that after the initial shocks following the removal of fuel subsidy, the adjustment process in fuel prices will follow those of other normal commodities delivered by the market. Fuel prices will move more instantaneous around their long-term trends rather than proceed in fits and jumps that have caused major shocks in the economy.

Temitope Laniran and Adeola Adenikinju examined the issue of diversification of the Nigerian economy by moving away from oil to the Service Sector in Nigeria and its implication on external reserves accretion and the way forward. They concluded that there is a need for improvement in the areas of skill acquisition, especially in science and technology as this would address the knowledge gap in the sector. This can be achieved through partnership agreements that would lead to technological transfer from the international organizations currently operating in the core service sub-sectors in Nigeria. This includes key players in transportation, construction, tourism, and the financial sector.





Ademola Adolpus, Onyewuchi Amaechi Ben-Obi and Ben Obi looked at the effect of global economic uncertainty on energy production and total productivity by applying the wavelet analysis. The results raise a significant issue about the role of global economic uncertainty as a driver of risk transmissions through energy markets and also offer an opportunity for authorities to promote strategies to handle energy risks, according to the various factors of global economic uncertainty.

This edition also contains information about the forthcoming NAAE and International Association for Energy Economics (IAEE) events, reports on activities carried out by the NAAE and the IAEE since the last edition, and adverts from our sponsors and partners. The NAAE appreciates our contributors to this and all previous editions. We are grateful for your support and contributions and look forward to continued impactful collaborations. Suggestions, views and comments on all aspects of the Newsletter are welcomed. We also welcome articles on energy-related issues and any subject of interest to NAAE members for publication in the next edition. Articles should be in English using the MS Word (1997-2007) format and Times New Roman font style, font size 12. Text layout should be kept simple, with regular headings, subheadings (where appropriate) and paragraphs. Articles should be in the region of 700-1,500 words; and should include the contributor's name, email address, phone number and affiliation. Pictures may be included in a separate file in JPEG format. Our contact email address is admin@naee.org.ng

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PROFESSOR BEN OBI
July, 2022

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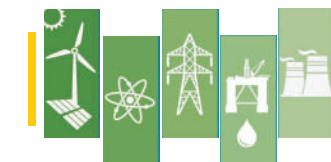
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Report on the First Abuja Technical Forum of the Nigerian Association for Energy Economics (NAEE) Held on the 3rd of December, 2019 Theme: Making Electricity for All a Reality in Nigeria

*Gabriel Efemuaye

Having carved an edge for itself in the energy industry and energy economics in Nigeria, the Nigerian Association for Energy Economics (NAEE), a professional organization specialized in facilitating the understanding and application of energy economics across all facets of energy development, realized the need to move a step further besides its annual conferences and for the first time organized an Abuja Technical Forum to further highlight their importance to the energy sector.

The forum was graced with the presence of eminent personalities and the attendees were dished with a series of intellectual and scintillating presentations by experienced academia and speakers who are also energy experts among whom were the following:

- Prof. Yinka Omorogbe, President NAAE (Chief Host);
- Mr. Chiedu Ugbo ESQ, MD/CEO, Niger Delta Power Holding Company Plc (Chairman);
- His Excellency, Mr. Abhay Thakur, Indian High Commissioner to Nigeria. (Special Guest of Honour);
- Hon. Madaki Ameh, Managing Partner, BBH Consulting and Convener, Oil, Gas and Power Forum. (Keynote Speaker);
- Osaro Egbhobamien, Managing Partner, Perchstone and Graeys (Guest Speaker); and
- Prof. Wumi Iledare, Immediate past President NAAE

Welcome Address

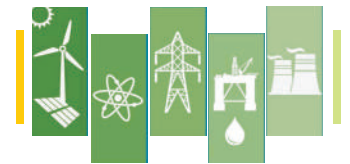
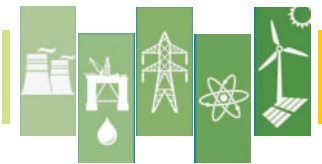
The welcome address was given by the chief host and President of the NAAE, Prof. Yinka Omorogbe. She said that the idea behind the forum was to come together to share areas of mutual concern especially as it pertains to the energy situation in the country. She observed that the NAAE as an association of economists, lawyers and engineers is aware of the situation of the Nigerian energy sector and how much it is in dire need of attention. She said further that energy matters are discussed worldwide and also the Sustainable Development Goals (SDG) 7 talks about ensuring affordable energy for all, which further leads to the two aspects of providing electricity for all as well as ensuring that there is clean energy for all which in effect also preserves the environment.

Chairman's Opening Remarks

The Chairman in his remarks added his voice to pay serious attention to the Nigerian energy sector as he agreed with the fact that access to electricity was inimical to the growth and development of any nation. He stated further that since the return to democratic rule in 1999, the Nigerian Government had aspired to improve the electricity situation in the country but yet

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observed that the country continues to be faced with the same energy deficit it seriously needs to be purged of.

He used the historical perspective of the energy situation from the administration of President Olusegun Obasanjo till the present dispensation in laying out his points. He started by saying that when President Obasanjo came into power in 1999, the installed capacity (available dispatched electricity for grid connection) in electricity in Nigeria was 5.8GW or 5,800 MW. He also said that out of the installed capacity only 2,300MW were available to be utilized while 3,500MW or more were bad. What could be generated as at then was a mere 1.8GW or 1,800MW. He observed that the government showed so much concern in tackling the problem but the question that still needed to be answered was 'why do these challenges still exist?' During the course of the forum, several attempts were made to answer the above pertinent question.

He went further to say that the Nigerian Electric Power Authority (NEPA) was the monolithic body in charge of electricity before Obasanjo came into power and it was obvious that NEPA could not solve the problem bedeviling the sector because it had a lot of problems including huge debts in its hands. The NEPA Act, as he observed, was however amended and Obasanjo took advantage and encouraged Independent Power Projects (IPP) which brought in about 1,320MW from Lagos alone. He said that Obasanjo introduced the National Electric Power Policy (NEPP) in 2001 together with the Electric Power Sector Reform Act (EPSR) 2005 and introduced the private sector into the industry which grew the installed capacity from 5,800MW to 8,100MW of which the available capacity also grew from 2,300MW to 4,000MW while the actual generation grew from 1,800MW to 2,500MW to serve a country of about 150 million citizens at the time.

Secondly, he talked about Yar Adua's administration which he said strengthened the institutional framework for electricity though with some setbacks which stunted the growth of the power sector as a result of the probe in the sector which lasted two years. He went on to say that despite the efforts made by that administration, the actual generation stagnated at 2,700MW. He then talked about the Goodluck Jonathan era which came with a roadmap that attempted to tackle the challenges in the power sector as well wherein a Bulk Trader was set up, 6 PHCN Power Plants were sold and transmission was immediately put under a management contract with Manitoba Hydro International all in a bid to improve electricity situation. He observed that the regime brought an increase in generation capacity from 8,100MW to 11,000MW and at that time the Niger Delta Power Holding Company Plc was established and at the end of five years, actual generation moved up from 2,700MW to 3,300MW. He however maintained that despite all these efforts, the efforts to provide affordable and clean electricity for all remained a challenge.

Next, he gave an account of the electricity situation in the present dispensation and began by saying that Buhari's administration met the same serious challenges hitherto witnessed by the past administrations, ranging from revenue shortfall to lack of investments, but the administration continued and continues to show even greater determination to making electricity for all a reality. He went on to say that in 2015, the total installed capacity moved to 12,000MW while actual generation increased to 3,500MW. And by the year 2016, there was a serious disruption caused by gas constraints because about 80 percent of electricity generation in Nigeria is fueled by gas; but by 2018 the average generation increased to 4,000MW and later to 5,500MW. Yet he maintained that despite all these efforts, there remained the problem of serious gas constraints in Nigeria even though the country is rightfully described as a gas territory, due to the quantity of its gas deposit. In addition to that, he said that there was also limited transmission coverage, tariff shortfalls, market shortfalls, corruption and indiscipline at the distribution end which all but starve the generation companies of revenue and as a result the average revenue generation companies receive is just about 25 percent. Hesitated that to tackle these challenges, the NDPHC has had to pay for its gas.

The chairman later pointed out efforts by the Government to tackle the challenges experienced in the sector of which metering electricity consumers was one of them, but he highlighted that the distribution companies were still posed with the problem of accessing capital to mobilize their investments. He explained further that the plan to rehabilitate the transmission arm of the sector was another way the government tried to tackle the problems and as such between 2015 and 2019, thirty huge transmission projects that were inherited from the past administration were completed in a bid to improve the transmission coverage and this, in turn, increased electricity supply in the country. He also

said that the government in conjunction with the German Government was making the necessary plans to ensure the clean-up of the networks to attain the goals of the SDGs of providing affordable and safe electricity for all. He added that the Rural Electrification Strategy and Implementation Plan was also set up to energize economies through electrification of markets like that of Lagos, Aba and Kano. There was a plan to initiate another phase to energize electrification in 37 universities and 37 teaching hospitals across the country.

He went on to highlight some of the efforts the NDPHC made towards tackling some of the challenges in the sector; he explained that on its own, 10 thermal plants (8 of which were completed between 2011 and 2016), were added to the energy mix which in turn added about 4,000MW installed capacity to the national grid. He praised the efforts of the Government as positive because they had increased the electricity supply to Nigerians.

He disclosed that the NDPHC had been working and is still working with the Transmission Company of Nigeria (TCN) to improve electricity transmission in Nigeria and this is evidenced by the projects currently being handled by the NDPHC which include the construction of 1,635KM of 330KV lines, over 720KM of 132KV Lines, and several transmission substations. He said that with the presidential initiative there are about 20,000 Solar Home Systems installed across 12 states which began from the north and the plan is to get it all across the country. The Solar Home Systems project, as he observed had impacted over 100,000 people, raised about 500 jobs, and created about 275 Direct IR and 250 Indirect which has improved the lighting in most homes, especially the ones that have never seen light before, and now people no longer have to pay to charge their phones and move around in the dark because there is street lighting. He also hinted that there are plans to increase access to Solar Home Systems to about 1,000,000 people in Nigeria.

The chairman in conclusion informed the gathering that the move of the government at the moment was to ensure that the citizens are served from the available power even as they continue to work towards making electricity for all a reality in Nigeria.

Keynote Presentation

The Keynote Speaker, Hon. Madaki Ameh, began his speech by saying declaring that his task was to help bring out the issues which are expected to get the people thinking around the very topical issues of how to make electricity for all a reality in Nigeria, more like a catalyst. He said that if we agreed with the position that nothing can be achieved without electricity then we should understand that efforts can never be enough to bring electricity to every corner of the country. Whilst appreciating the chairman for the talk he added that in truth we have much in terms of installed electricity capacity but the problem is that there is still not enough of that capacity translated to actual power and in a clear sense all the efforts of the government in tackling electricity deficit would come to waste if it cannot be translated to electricity.

He went further to say that the latest data shows that only about 60 percent of the country has been electrified but 86 percent of that percentage are the urban areas and only about 41% has electricity, and if translated into figures would mean that about 80 million Nigerians are without electricity and that is a large number. He also opined that wherever electricity exists, there will always be the challenge of getting the electricity available to homes because of problems with the distribution and transmission networks in Nigeria, which most often suggests that there is still a lot of work to be done and hence the importance of the workshop. On the issue of transmission, he said that a lot of work had been done in expanding the networks, but he exercised fears that spending so much on transmission networks may not be the solution but increasing the off-grid electricity access, whilst also stressing the need to harness Renewable Energy as another option and building more infrastructures to improve the Hydro and Biomass sources of energy which we have in abundance to boost access to energy.

He concluded by expressing optimism that at the end of the discussions and contributions, more and better ideas would have been raised which will do so much for electricity so that at the end of the day we will be able to note and itemize the things that need to be done to ensure that there is indeed access to electricity for every single Nigerian and enjoy the benefits it will have on the Nigerian economy.



Special Guest

The next speaker was His Excellency, Mr. Abhay Thakur. He admitted that he was not an expert in the power sector but a diplomat. As such, electricity matters also affect him in many ways. Whilst citing China, Indonesia and India as examples of success stories in its electricity infrastructure, he insisted that though Nigeria still suffered from electricity problems, Nigeria could solve its electricity problems. He said further that the private sector will only enter into a business investment that would yield profits and as such if the electricity distribution companies are unable to recover costs for the electricity they sell it most definitely would be bad business for them and they will not venture into it.

He also noted that in the area of Renewable Energy, India and France are in the lead and he emphasized the need for Nigeria to harness the opportunities that exist in that aspect of electricity generation and distribution as part of efforts at tackling the electricity challenge in the country. He observed that the cost of doing business in your home country is always cheaper than doing the same business abroad. He thus ended by saying Nigeria has to take full charge of the power sector and ensure that contracts awarded must achieve its objectives because success in the power sector in Nigeria would mean progress in every other sector.

Special Presentation

There was a special presentation by Mr. Osaro Eghobamien SAN of Perchstone & Graeys. It was made special with the presentation being more of an interactive session with the help of a colleague from his firm, Mr. Akhigbe Oserogbo, who provided answers to questions directed to him in an expository nature to easily highlight specific details which necessitated the success in the Indian power sector. We were made to understand that Mr. Akhigbe had done an understudy of the Indian electricity situation and also specializes in the Indian energy infrastructure.

In his opening remark, Mr. Osaro acknowledged the role the NNPC had played in giving opportunities to Nigerians to be involved in the energy and oil and gas industry which hitherto was only held by expatriates.

Interactive Presentation

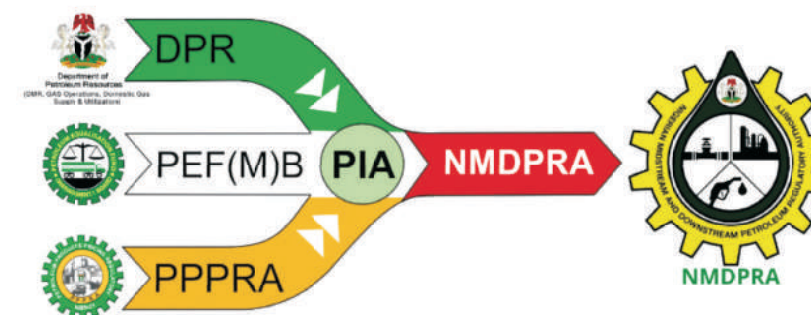
The interactive presentation exposed the differences between the Nigerian and Indian electricity setup and it showed why India has been largely successful and why Nigeria still struggles in trying to find a lasting solution to the problems currently being faced in the power sector.

The response to the questions in this session showed that whilst the Nigerian electricity regulation is largely centralized by the NERC, the electricity regulation in India is not centralized as they have the Central Electricity Regulatory Commission and the State Electricity Regulatory Commission. Thus, in Nigeria, the NERC resolutions must be approved by the Minister, while in India both the Central and State Electricity Regulatory Commission are independent of each other. They have their funding and they make their own decisions independently of the Minister.

Also, Mr. Akhigbe made us understand that in India tariffs are fixed differently according to states. By the virtue of sections 62 and 63 of the Indian Electricity Act, the determination of tariffs is very transparent by an open bidding process and by an open determination process and those within the distribution process are bound by them; the regulatory commission is also duty-bound to ensure that payments are made in line with the contract binding it. He said that in India, there is a provision for subsidy and this is paid before the consumer takes hold of the electricity. He also added that it is taboo for electricity consumers in India not to pay for the electricity they consumed which is why the regulatory commissions always ensure that consumers always paid for the amount of electricity they use. He said further that India's electricity system is transparent and devoid of corrupt officials and individuals compared to what is obtainable in Nigeria.

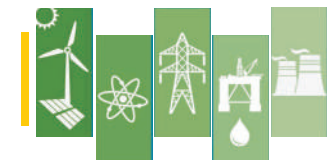
Another contrast between the Indian and Nigerian electricity infrastructure as observed by Mr. Akhigbe is that in Nigeria, the Transmission Company of Nigeria is in charge of transmission making it 100% controlled by the government; whilst in India, transmission is licenced and thus decentralized such that there are regional transmission companies with over 32 transmission companies which makes the states heavily involved in the scheme of things and as such everyone tries to protect the transmission utility that falls within their geographical location.

Continued on page 13



NMDPRA'S MAIN OBJECTIVES DERIVED FROM THE PIA ARE LISTED AS FOLLOWS:

1. Regulate midstream and downstream petroleum operations, including technical, operational, and commercial activities.
2. Promote a competitive market for midstream downstream petroleum gas operations.
3. Promote, establish, and develop a positive environment for international and domestic investment in midstream and downstream petroleum operations
4. Provide pricing and tariff frameworks for natural gas in midstream and downstream gas operations and petroleum products based on their fair market value of the applicable petroleum products.
5. Grant, issue, modify, extend, renew, review, suspend, cancel, reissue, or terminate licenses, permits and authorizations of midstream and downstream petroleum operations.
6. Improve capacity building for NMDPRA Staff to ensure efficiency in carrying out objectives.



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From page 10

He also talked about the principle of 'Open Access' as a unique feature of the Indian Electricity Act whereby any company that generated electricity and wishes to transmit it to a distribution company could go ahead and pay one of the transmission companies, as long as there is a transmission line available and it must get utilized. He said in essence that as a result of this mandate every distribution company must ensure that its utility is always open for business, and this he observed is lacking in the Nigerian system as electricity generated is, as a matter of procedure, always expected to be transmitted to the national grid before it can be distributed.

In conclusion, the presenters observed that the major difficulty in generating electricity within states and distribution is the bureaucratic nature of doing things in Nigeria. They explained that for instance, electricity generated must first be sold to the Nigerian Bulk Electricity Trading Company Plc (NBET), which then sells to the distribution companies and this remains a clog in the distribution process in Nigeria. They also observed that in contrast to that, India has no intermediaries and as such, has zero bureaucratic hindrance because there is always an available transmission utility for any electricity generated. They noted further that at the time, NBET was also facing the problem of not being able to issue any credit notes due to difficulty in accessing the National Assembly to raise money through dollars and as such generating companies were threatening to close down their generation. It could be gathered from the presenters and also as they noted, the problems are hinged on the current laws in operation, especially the Constitution of the Federal Republic of Nigeria, which gives states the power to participate in electricity but in reality it is not the case. They however suggested that states in Nigeria should be allowed to participate directly in electricity matters and as such state electricity regulators are created to exist in the regions.

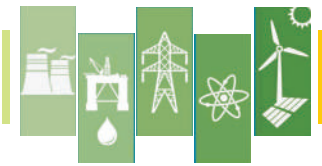
One more problem they highlighted as associated with the Nigerian system is that the distribution companies are having serious difficulties collecting their tariffs unlike in India where the distribution companies are penalized for every minute that electricity is interrupted, also there are penalties for electricity consumed without payment while this is not obtainable in Nigerian. They suggested that we must revisit the regulatory framework in Nigeria as well as the laws in operation if we are serious about improving the current electricity situation in Nigeria.

Discussions

The chairman opened this session which was meant to entertain contributions from all participants on the theme of the discussion. He responded to some issues raised during the interactive presentation to the effect that the Law allowed for states' participation in electricity in Nigeria and that transparency in the tariff process which the presenters talked about as obtainable in India is also guaranteed under the Nigerian law. He also clarified the issue of the mandatory supply by the generation companies to the NBET and said that the generation companies are allowed by law to sell directly to the distribution companies.

The President of the NAEE also added her voice and said that the ideal customer for electricity is a very poor impoverished person. She said further that one wonderful thing we need to note is that the law needs some tweaking and some changes to make things work. She also pointed out that monitoring and evaluation is another problem in the sector and then advised that if we do not get good results from a venture it is better to try something different; suggesting that other methods of tackling the problems should be explored. She concluded by saying that the situation of having only half of the installed capacity of generation available for consumption is not good enough for the huge population and that the forum should be seen as a wake-up call for all of us because development is not possible without electricity.

One of the participants, Mr. Godnews Okezie, also contributed by saying that what was holding the distribution companies could be their inability to comply with the Industrial Energy Efficiency Accelerator (IEEA) standards and that the discos have lost the capacity to sustain the structures they met. He, therefore, advised that we should devise a management system whereby we can distribute the 3,500MW electricity that is currently available at the time all around the country.



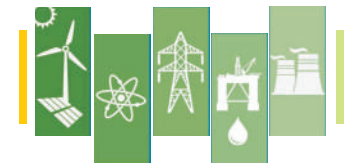
Other contributors to the discuss included Dr Nkiru, Mr. Emeka Onyegwe and Mr. Harrison Okafor. They observed that there is a huge deficit in the distribution of electricity generated by the generation companies and this is majorly due to the huge debts from electricity consumers, especially government institutions, who never pay for the electricity they consume. They also added that the distribution companies need to be more responsible in their dealings so that Nigerians can genuinely pay for the electricity that they consume.

In his closing message, Mr. Osaro said that for electricity projects to become bankable projects, there must exist cost-reflective tariffs which is the only way in achieving an efficient distribution system in Nigeria. He added that the way to raise capital for these projects is in connection with the capital market in every part of the world, and that is to issue notes and trade them for other goods to raise domestic debts to be able to deal with their utilities. He said further that the structure in Nigeria does not support that and even when the commercial banks finance the discos they always use short-term facilities and this will not work because it must always be from the capital market; in addition, there must be a cost-reflective tariff. He ended by saying that we should set up a mechanism or index to record the success of the discussions at the conference so that in the following year we could measure the successes that have been achieved within the period.

Closing Remarks

The Chairman thanked all present for a robust discussion and the active participation of everyone present and he also added that several issues had been raised either from the investor's side or the customer's side. In conclusion, he said that the president of the association should look into these issues that have been raised to see how far they could go in tackling the problems already highlighted.

At the end of the day, it can be unanimously agreed that the technical forum was indeed rich and scintillating. It could also be safe to say that every participant benefitted immensely from the presentations by the seasoned speakers. It is hoped that in the coming years and indeed the future, the ideas and expositions brought here would be implemented or at the least impacted on the regulatory agencies, the industry players and other stakeholders as well as institutions and hopefully they will go a long way in providing the needed solutions to the energy deficit in Nigeria which continues to be a huge challenge. We just might be able to finally get it right and achieve what has been the theme of the workshop all along, 'Making Electricity for All a Reality in Nigeria.'



Reflections on Fuel Subsidy in Nigeria

*Adeola Adenikinju, FNAEE, FEI

1. Introduction

Fuel subsidy has assumed a very emotional subject in Nigeria. If Nigerians, under age 50 account for 70 percent of the population. It then implies that 70 percent of the Nigerians alive today have lived all their lives under fuel subsidies. They have not lived under any other energy pricing regime. This is a major reason a change from the present regime would be difficult for them.

Fuel subsidy was first introduced in Nigeria in 1973 as a palliative measure to cushion the landing cost of petroleum products delivery to refineries following the need to carry out Turn Around Maintenance on them. It has since been used as a social transfer mechanism to ease the burden of high fuel prices on the masses. Before then, the price of petrol was fully determined by the market to reflect costs of crude plus costs of processing of the crude, transportation, and marketing costs, and in some cases, local taxes. Hence, prices of fuel vary across the country, lowest in towns and cities close to the refineries and highest in furthest distances from the refineries.

With the rising population and growing demand, the burden of sustaining fuel subsidies has been heavy. In 2011, the government spent US\$8.4 billion on gasoline subsidies. An estimated ₦10 trillion is reported to have been spent on subsidies between 2006 and 2018. In 2022 alone, an estimated ₦5 trillion will be spent on subsidies. This has made it difficult for the government to have enough revenue to fund the provision of basic social amenities and critical infrastructure.

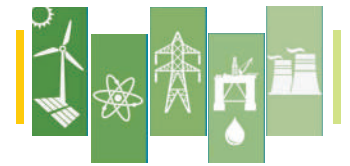
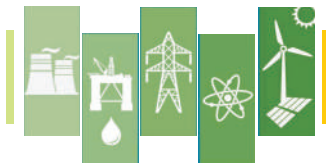
In addition, Nigeria's fuel subsidy scheme has been laden with corruption and fraud. The report of a presidential committee on verification and reconciliation of fuel subsidy payments between 2009 and 2011 revealed that the government wasted up to ₦667 billion (about US\$4.3 billion) annually subsidising millions of litres of petrol that Nigerians never used, or even needed, and some of which could not be traced (Adenikinju and Oyefusi, 2019).

Fifty years of the implementation of fuel subsidy has imposed huge costs on the Nigerian economy. The period coincides with the collapse of the downstream petroleum infrastructure, including the refineries, depots, pipelines, and storage facilities, among others. For a while, we were net petrol products exporters, the position that Dangote Refineries will soon fill. Nigerians, like most other West African countries, will soon start importing refined products from Dangote Refineries Ltd.

The sad thing is that the current discussion around fuel subsidy has focused narrowly on fiscal loss and household income loss. Yes, while the impacts of fuel subsidy on fiscal loss are significant and we will discuss it in this essay, I also agree that the impacts of price adjustments on households' real income may be significant. The debate is, however, more extensive, and broader beyond the two issues above.

In this paper, we examine some of the popular arguments around fuel subsidies. We provide evidence to show that some of these popular views are sometimes half-truths and provide incomplete pictures of the reality of the fuel subsidy situation.

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2. Overview of some Key Statistics

In the following few charts, we present some facts about Nigeria's fuel situation. Appendix 1 provides a more detailed trend in fuel prices from the time of General Gowon to the current administration. In figure 1, we see the trend in fuel prices from 2000. Fuel price rose 8-fold from N22/litre in June 2000 to N165/litre in April 2022. Except for the period 2004 to 2012, fuel price adjustments have been an annual event in Nigeria. While the general trend has been that of an increase in price, there were at least two times, in January 2015, and March 2020, when the price was adjusted downwards.

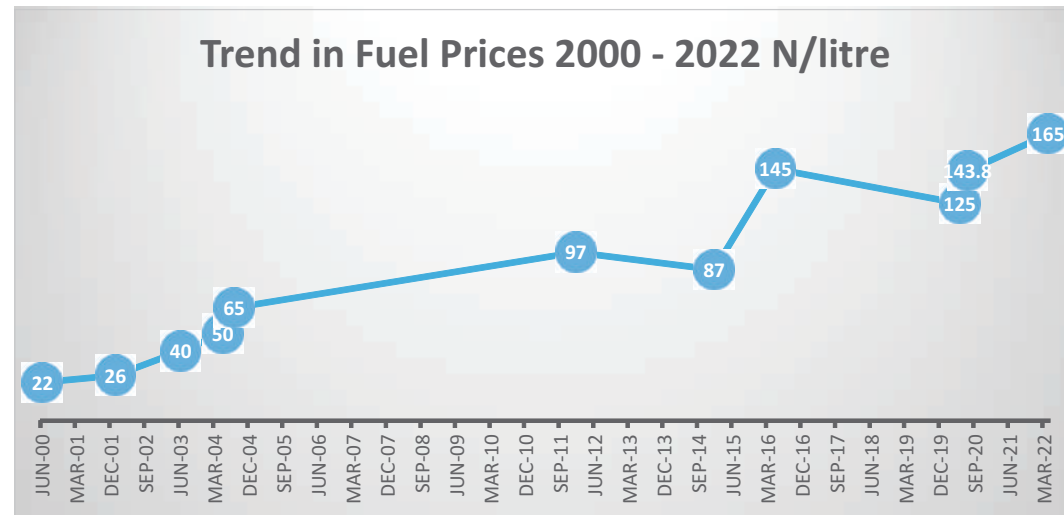


Figure 1: Trend in Fuel Price between 2000 and 2022

Table 1 shows the comparison of fuel prices and per capita GDP in 2022. Nigeria has the lowest price compared to her neighbours and this is even though some of the countries like Cameroon are also a net exporter of fuel products. The huge difference provides huge incentives for arbitrage by selling in those countries. The implication is that Nigeria finance fuel consumption in those countries. By showing the per capita income among our neighbours, we can also see that poorer citizens in those countries are paying higher prices for fuel compared to their counterparts in Nigeria. If they could afford to pay, why is it that some people argued that Nigerians would not be able to afford to pay? The Table also shows that higher fuel prices in those countries did not correlate with high inflation. Nigeria with fuel subsidies has a significantly higher inflation rate than other African countries without fuel subsidies.

Table 1: Fuel Prices and Per Capita GDP in some African Nations, 2022

Country	Petrol/Gasoline Price per litre (US\$)	Diesel/Gasoil Price per litre (US\$)	GDP per capita (US\$)	Inflation (%)
Ghana	1.38	1.80	2,303.29	16.3
Nigeria	0.43/ 0.45	1.93	2,355.69	16.1
Libya	0.031	0.031	7,196.79	3.7
Cote d Ivoire	1.175	0.983	2,574.09	5.5
Burkina Faso	1.143	0.31	598.85	6.0
Togo	0.999	1.055	999.93	4.6
Liberia	1.295	1.520	776.35	8.2
Sierra Leone	1.366	1.366	513.34	17.3
Senegal	1.423	1.047	1,330.37	3.0
Benin	0.959	1.068	1,432.30	4.6
Cameroon	1.037	0.957	1,637.77	2.9

Source: Energynewsafrika.com, Wikipedia accessed 25/6/2022; 5.20pm

Figure 2 shows the composition of Nigeria's top eight imports in 2021. Premium Motor Spirit (Gasoline) and Gas oil (Diesel) account for over 50 percent. This means that fuel imports account for a significant share of foreign exchange disbursement. The priority access to limited foreign exchange available in the economy restricts access of other users to foreign exchange on the one hand, and the pressure on the exchange rate on the other hand.

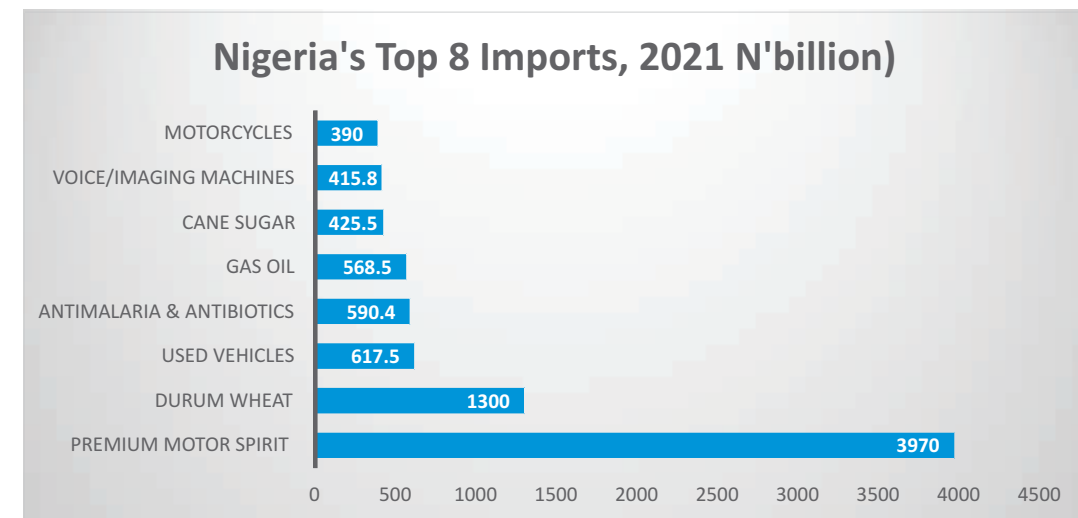


Figure 2: Nigeria's Top 8 Imports, 2021 (N'billion)
Source: #StatiSense (NBS)

3. Analytical Discussion

a) Definition of Subsidy

We need to answer the question, what is a subsidy? In the layman's language, it is simply the difference between the price paid by the consumer and the cost of supply. The way fuel subsidy is implemented in Nigeria is that the Federal Government fixes the pump price for gasoline and then pays the difference between that and the open market price. Currently, the cost of supply of PMS is around N396 per litre. However, the same litre of fuel is sold at the pump to consumers at N165 per litre. Now, using our definition above, for every litre of fuel consumed, the subsidy is at least N231.

But more formally, subsidy for a tradable energy product like PMS, a subsidy is the difference between the sale price and the marginal opportunity costs (MOC), where the MOC is the export price (FOB) or the import price (CIF). The MOC for an exhaustible commodity like fuel should reflect the costs of production, the user cost (since future generations are deprived of the use of the same product) and the environmental cost to the current generation. The tradable price (export price or import price) captures the MOC. The implicit role of the exchange rate then becomes a very important determinant of domestic price for any tradable commodity.

This is the reason that even if our refineries are working, the domestic price of fuel should still reflect the MOC, not the average costs of production as non-energy professionals would argue. Otherwise, only public refineries would be operational, and then they would be operating at losses, as has been the case for domestic refineries over the year.

Table 2 shows the cost structure for gasoline in Nigeria. There are three major components: direct cost (costs of crude, costs of refining and freight, port, and storage charges), distribution margins and taxes. In many countries, fuel taxes constitute a useful source of government revenue to fund subsidise public transportation, road construction and road maintenance, and provide social services. In Nigeria, fuel taxes are zero as can be seen in Table 2.

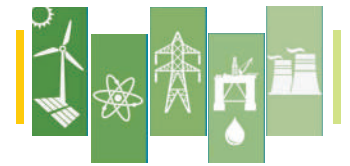
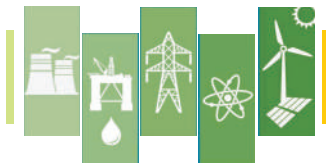


Table 2: Cost structure for Gasoline in Nigeria

No	Cost Items	% Share of items in total
Direct Cost		
1	Cost + Freight	71.9
2	Trader's Margin	1.4
3	Lightering Expenses (SVH)	4.3
4	NPA	0.7
5	Financing (SVH)	0.1
6	Jetty Depot Thru' Put Charge	0.9
7	Storage Charge	3.3
8	Landing Cost	82.8
Distribution Margins		
9	Retailers	5.1
10	Transporters	3.3
11	Dealers	1.9
12	Bridging Fund	6.5
13	Marine Transport Average (MTA)	0.2
14	Admin Charge	0.2
15	Subtotal Margins	17.2
Taxes		
16	Highway Maintenance	
17	Government Tax	
18	Import Tax	
19	Fuel Tax	
20	Subtotal Taxes	
21	Total Cost	100.0

Source: PPPRA Template

A relevant question is, what are the impacts of domestic refining on final fuel price or subsidy? In the above framework, domestic production of fuel will knock out about 20 percent of the actual price of fuel (costs of freight, NPA, lightering, storage, financing, traders margin, etc.). Hence, given the analysis above, the actual price of oil should be $N396 - 20\%(N396) = N316.80$. This is still substantially higher than the N165 per litre at the pump.

b) The economy-wide impacts of subsidies are discussed below

Fuel subsidy has significant economy-wide impacts that are often lost in the discussion around subsidy removal. Figure 3 illustrates the extensive impacts of fuel importation subsidies and poorly performing refineries on the Nigerian economy.

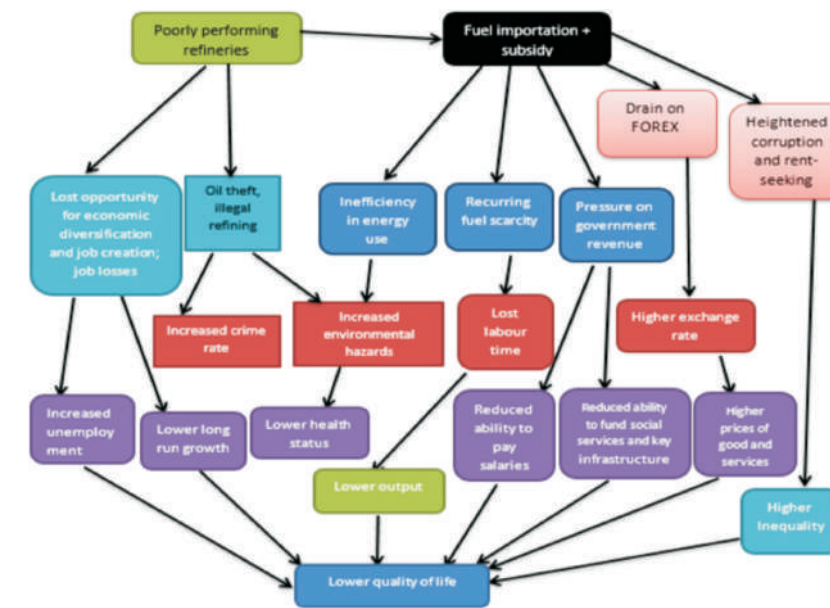


Figure 3: Poor performing refineries, subsidy policy, and quality of life: transmission mechanism
Source: Adenikinju and Oyefusi (2019).

Another general equilibrium impact of fuel subsidy can be gauged through the loss of Investment and employment foregone. It is difficult to directly measure the impacts of investment loss and jobs foregone as a result of fuel subsidies. However, we can make indirect inferences. The example of the telecommunication sector provides a very good comparison. The oil refining sector was a bigger sector than the telecommunication sector in 1981. Oil refining was the 27th largest sector in the GDP in 1981, out of the 46 sectors in the national accounts, while telecommunication was the 33rd largest sector. However, with the liberalization of the communication sector from 1999, the sector witnessed an influx of investments and multinational companies (MTN, AIRTEL, GLO, etc.), as well as thousands of direct and indirect jobs. By 2017, the two sectors have changed relative positions, telecommunication has risen to become the 4th largest sector, while oil refining regressed to the 28th largest sector in the economy.

Figures 4 and 5 compare the relative contributions of the two sectors to GDP, over two sub-samples, 1981-1999, before the liberalization of the telecommunication sector and the period afterwards, 2000-2017.

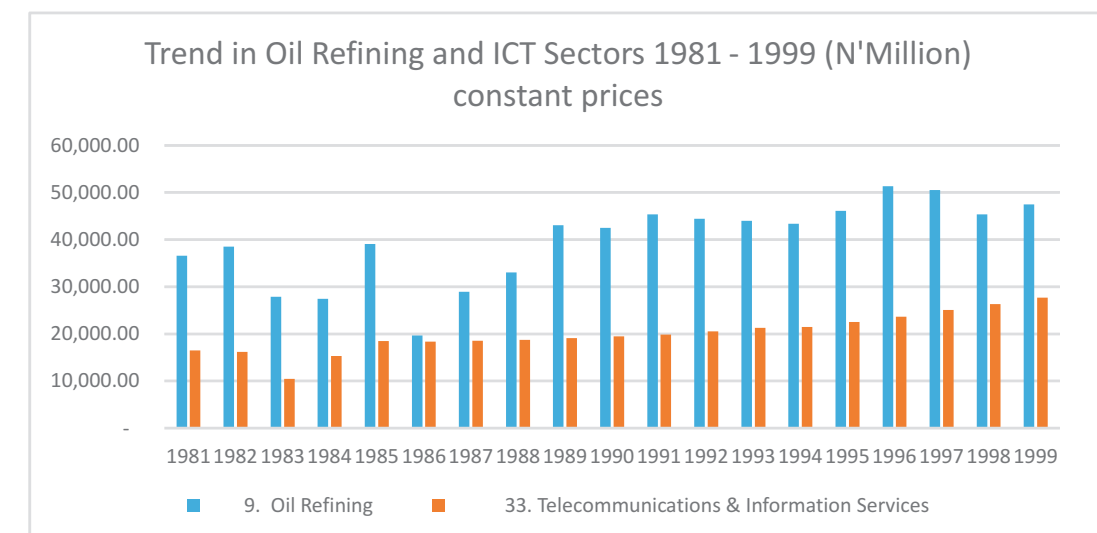


Figure 4: Trend in Oil Refining and ICT Sectors 1981 – 1999 (N'million) at constant prices.

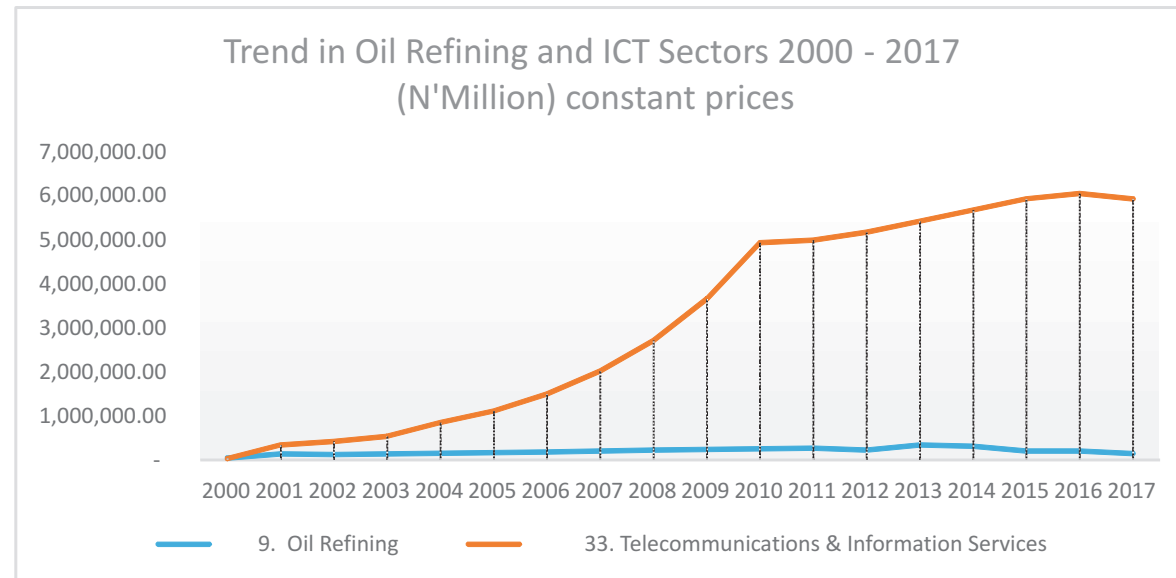
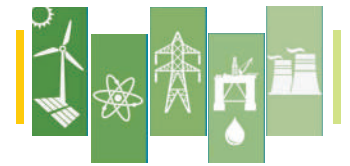
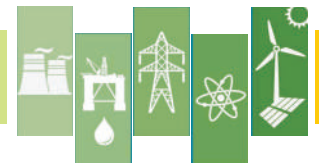


Figure 5: Trend in Oil Refining and ICT Sectors 2000- 2017 (Million) at constant prices.

Figure 6 shows that the ICT sector was 45 percent of the size of oil refineries in 1981. However, by 2017, the ICT sector was 4000 times the size of oil refineries.

Without the data on employment and investment in the two sectors, we can infer that given the known statistical relationship between output, and employment and investment, the massive increase in output of the ICT sectors would be directly related to investment and employment. Liberalisation of the ICT sector engenders competition and market forces to operate and determine economic activities in the industry. The competition and market forces unleash forces that force real growth in investment in telecommunications.

Apart from the effects on investments and employment, MTN is the highest tax-paying organization in Nigeria. The significant increase in non-oil revenue of the government comes from the taxes from key players in the telecommunications sector, MTN, AIRTEL, etc.

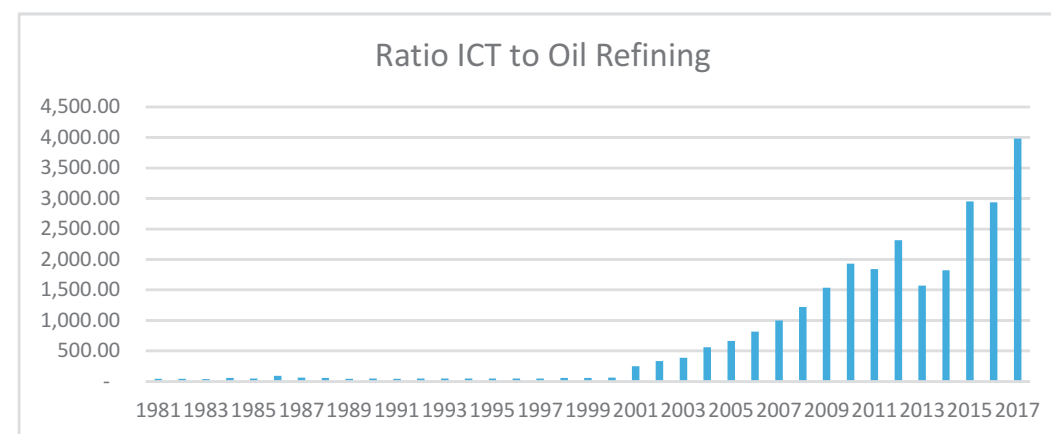


Figure 6: Ratio of telecommunication to Oil Refining

Nigerian citizens have also benefitted from ownership of shares in telecommunication companies quoted on the Stock Market. MTN is currently the biggest company on the NSE.

What the examples of telecommunications have shown in terms of growth in output, employment, investment, tax revenue and equities opportunities are some of the lost opportunities that the country is missing from the non-liberalisation of the downstream petroleum sector.

c) Subsidy and Inflation

Proponents of defenders of the current subsidy regime are that subsidy removal would cause inflation, as higher costs of production would be passed on to final consumers. This is true. However, the increase in the average price level would be proportional to the share of fuel in overall costs of production or share in consumers' expenditure. Hence, for the low fuel-intensive sector, the direct impact of higher fuel prices would be low. However, the extent to which the increase in price from higher fuel prices can be passed on to consumers would depend on the nature of elasticities of demand and supply for the product.

However, what many people fail to appreciate is that the current subsidy regime also fuels current inflation through higher budget deficits that is financed through way and means and other forms of public debts. Most economists agree that budget deficits financed through ways and means are inflationary. Current data shows that 95 percent of government revenue is spent on payments of interests on government debts. It follows, therefore, that nearly all non-debt recurrent expenditure is financed by debt, including fuel subsidy; this is inflationary.

Unfortunately, besides the fact that the current fuel subsidy is inflationary, it has additional negative consequences on the economy, as seen in Table 3.

Table 3: Comparing the efficiency effects of the current subsidy regime vs subsidy removal

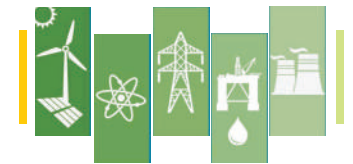
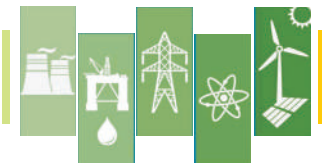
	Inflation	Crowding out of private investment	Rise in public debt	Higher fiscal burden on future generation	Loss of private investment in the downstream	Pressure on exchange rate
Current Fuel Subsidy	✓	✓	✓	✓	✓	✓
Subsidy removal	✓	No	No	No	No	No

Table 3 simply shows that the efficiency costs of the current subsidy regime far outweigh that of subsidy removal. As we argued in the previous section of the paper, current fuel subsidy and removal of subsidy are both inflationary. However, a shift to liberalization will ensure that fuel prices like other commodity prices will crawl around a long-term trend rather than by fits and jumps that cause significant price shocks in the economy. This will be a lot easier for consumers to adjust to, and less disruptive of economic agents' budget constraints.

In Table 4, it is shown that both current fuel subsidy and what will occur after subsidy removal have negative equity effects. Nearly, 80 percent of current subsidies are appropriated by the top 20 percent of the society. The last 40 percent of the society benefit less than 10 percent, with poor rural folks even with lesser benefit. In the short term, the poor will not only lose their share of the benefits but also pay some share of the inflationary costs. It is this category of society that should be considered in petrol price adjustments. Some forms of cash transfers, or more appropriately channelling more government expenditure to support commodities that the poor consume could be one way to mitigate the economic impacts on the poor. The subsidy recovered from the rich can be used to support the poor.

Table 4: Comparing equity impacts of the current subsidy regime and subsidy removal

	Overall equity effect	Impact on the Rich	Impact on Urban Poor	Impact on Rural Poor
Current Fuel subsidy	-ve	> 80% of current benefit	> 8% of current benefit	About 2% of current benefit
Subsidy Removal	-ve	Lose all benefit + inflationary cost	Lose current benefit + inflationary cost	Lose current benefit + inflationary cost



d) Fuel subsidy and Corruption

Another common argument against subsidy removal is that the additional revenue from subsidy removal will be stolen or misappropriated by the government. This argument does not recognize the essential element of liberalization. The current subsidy regime has given so much discretionary power to government officials that have turned the administration of subsidies over the year to a cesspool of corruption. The sudden increase in daily petrol consumption from 30 million litres less than five years ago to a current estimate of around a 100million litres per day is a testimony of underlying sleaze and perhaps smuggling effects, as fundamental economic drivers do not justify the growth, after controlling for the rise in the price of fuel, a downturn in economic activities due to the pandemic, insurgency, decline in transportation activities, among others. The 2012 House of Representatives report on the downstream petroleum sector shows the network of corruption in the regulated environment, including the foreign exchange sleaze that took place during the period.

With liberalization, government involvement in the sector will move from direct participation to indirect, as is happening in another network industry, the telecommunication sector. The downstream petroleum sector should be able to attract global players in the sector like MTN, Airtel, Globalcom and others. MTN and Airtel today are among the largest contributors to domestic investment, employment, and tax revenue. According to the Federal Inland Revenue Service (FIRS), the combined taxes revenue from the top 17 companies listed in the Nigerian Exchange Limited (NGX) was N589,6 billion in 2021. MTN paid N138.03 billion, second only to Dangote Cement Ltd which paid N173.92 billion. Total company income tax in 2021 was N1747.99 billion, while total Petroleum Income Tax was N2006.45 billion. In other words, MTN alone pay nearly 8 percent of total company income tax in 2021.

In other words, with the liberalization of the downstream petroleum sector, government direct participation will cease, and hence that source of corruption will be removed. The government will only depend on tax revenue from players in the downstream petroleum sector. Hence, corruption from fuel subsidy management will disappear or be substantially reduced as was the case with the liberalisation of telecommunication, and the electricity sectors.

4. What will Post-Subsidy Era Economy Look like?

In concluding this reflection, I would like to discuss what a post-subsidy era economy will look like in Nigeria in the long-term. First, there will be an influx of new private companies in the sector that will bring innovation, efficiency, competition, investment, and new jobs, and that would pay billions of naira into government coffers as taxes.

Next, we will have a sector with new and modern infrastructure including refineries, pipelines, depots, storage tanks, and petrol stations. Long queues, and fuel adulteration will no longer be a regular occurrence across the country. There will also be less dependence on inefficient fuel tankers to deliver fuel over long distances. Normally, fuel trucks are supposed to carry fuel from the nearest depots to fuel stations in the city or town. The current practice of using trucks to move fuels from Lagos to different parts of the country has destroyed our roads, led to the deaths of innocent Nigerians and the destruction of properties.

In addition, smuggling of fuels to neighbouring countries will no longer be profitable as prices of fuel across the region will closely align. Nigeria will no longer subsidise fuel consumption across the neighbouring countries and provide a source of revenue for their governments through taxes imposed on fuels smuggled from Nigeria. Government-controlled refineries will likely be sold to the private sector or run like private sector companies. Nigeria will no longer spend N13 billion every month on refineries that are not producing and are inefficient.

Furthermore, the removal of subsidies will encourage efficiency in fuel consumption, and promote the switch to green energy in the energy consumption mix of Nigeria. The rich folks will pay for the fuel they consumed, while some support will be provided for the poor, for instance, by diverting more government expenditures to social goods.

After the initial shocks, the adjustment process in fuel prices will follow those of other normal commodities delivered by the market. Fuel prices will move more instantaneous around their long-term trends rather than proceed in fits and jumps that have caused major shocks in the economy.

References

Adenikinju, A. and A. Oyefusi (2019), Oil and Gas Sector Management and Quality of Life in Nigeria. Final Report Submitted to FOSTER.

**Appendix 1:
Trend in Petrol Prices in Nigeria between
1967 and 2022**

- Gowon – from 6k to 8.45k
- Murtala Murtala – from 8.45k to 9k
- Obasanjo – from 9k to 15.3k
- Shagari – from 15.3k to 20k
- Buhari – from 20k to 20k (Price remains the same)
- Babangida – from 20k to 39.5k
- Babangida – from 39.5k to 42k
- Babangida – from 42k to 60k (Private Vehicles)
- Babangida – from 60k to 70k
- Shonekan – from 70k to N5 (Naira)
- Abacha – from N5 to N3.25k (Price drops)
- Abacha – from N3.25k to N15
- Abacha – from N15 to N11 (Price drops)
- Abubakar – from N11 to N25
- Abubakar – from N25 to N20 (Price drops)
- Obasanjo – from N20 to N30
- Obasanjo – from N30 to N22 (Price drops)
- Obasanjo – from N22 to N26
- Obasanjo – from N26 to N42
- Obasanjo – from N42 to N50
- Obasanjo – from N50 to N65
- Obasanjo – from N65 to N75
- Yar'Adua – from N75 to N65 (Price drops)
- Jonathan – (New year present) N141
- Jonathan – (After labor strike) N97
- Jonathan – (As Feb, 2015 Election approaches) N87
- Buhari – from N87 to N165 (Present price)

Petrol Prices in Nigeria Today (June 2022) (nigerianprice.com), accessed 26/06/2022.

Amazing Experience at the **14TH NAEE/IAEE ANNUAL INTERNATIONAL CONFERENCE**



THEME: STRATEGIC RESPONSES OF ENERGY SECTOR TO COVID-19 IMPACTS ON AFRICAN ECONOMIES

Date: July 25-28, 2021
Venue: PTDF Building, Abuja



Cross section of participants



Some NAEE Council members



Professor Yinka Omorgbe, NAEE president



Presentation of Conference souvenir to Emeritus Prof. Wumi Iledare



Presentation of Conference souvenir to Prof. Adeola Adenikinju



Prof Yinka Omorgbe, SAN (NAEE President) with Prof. Uche Nwogwugwu and Emeritus Professor Wumi Iledare among others



Cross section of participants at the opening ceremony



Participants at the registration venue



NAEE President Prof Yinka Omorgbe with some delegates



Mrs. Folashade Oje, Prof. Yinka Omorgbe, Prof Nwogwugwu among others



Presentation of Conference Souvenir to one of the delegate



Dr Timothy Okon, Teno Energy and Prof Adenikinju at the Dinner Award Night



From Right: Emeritus Professor Wumi Iledare and Dr Timothy Okon posed with some delegates



Presentation of Conference souvenir to Prof. Eli Jidere Bala, DG, ECN



Prof. Eli Jidere Bala with some other delegates



Cross section of participants



Dignitaries at the Conference



Presentation of Award



Professor Akin Iwayemi, CPEEL, UI



Some participants at the venue



H.E. Abhay Thakur (India High Commissioner to Nigeria) with Professor Yinka Omorgbe, NAEE President



Delegates at the Registration Desk



Dinner Award Night



Students participants



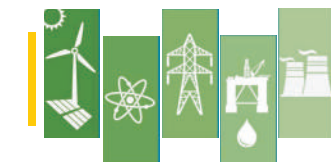
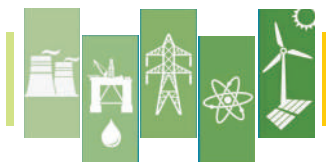
Prof. Nwogwugwu (Right) with some Participants



Students participants



Some dignitaries at the conference



Energy Transition Trilemma: Balancing Energy Security and Equity with Environmental Sustainability Matters in Africa

*Omowumi O. Iledare, PhD.

1. Preamble

The global energy system is more likely than not to undergo a fundamental restructuring to decarbonize. Decarbonization is expected to create challenges and opportunities for the petroleum industry and petroleum-dependent economies. The key and most dependable primary energy sources in petroleum-dependent economies and Africa so far, are fossil fuels, which have been identified as the primary source of greenhouse gas emissions. It is natural, therefore, to assume that the fight against climate change must largely begin with the advocacy to eliminate or reduce as much as possible, the use of fossil fuels. Unfortunately, depending on the speed of the transition, there will be some unintended consequences, such as energy poverty, energy availability, and energy affordability leading to diminished quality of life in some parts of the world, including Africa, and south of Sahara countries. Therefore, the global quest to either stop or drastically reduce the use of fossil fuels as the primary energy source has more than ever created the need to adopt zero or less carbon dioxide emitting energy sources otherwise known as green energy sources.

Interestingly, tackling the global warming phenomenon requires strategic thinking to find the optimal transitioning pathway from fossil fuels to non-fossil fuels, especially in Africa. This is necessary to safeguard energy security, energy equity and energy sustainability, in the long run, worldwide. Thus, I agree totally with the statement by the Secretary-General of OPEC at COP26 that divestments from petroleum resources may be antithetical to a strategic balance between energy equity, security, and sustainability. Consequently, while there is the recognition of the importance of renewable energy in reducing global warming, there is the pervading view that aggregate energy transition may be a threat to energy security. It is not conjectural that renewables like solar and wind are intermittently making them unpredictable and unreliable without technological advancement in energy storage.

Regardless of the side of the debate, one might belong, that global energy transition either in part or in whole will have some consequences on petroleum-producing and consuming economies. The effect on these economies will differ relative to the extent of the dependency on fossil fuels. There are evidentiary lessons to be learnt from the different economic and health impacts of the COVID-19 pandemic as well as the adopted transition speed. It is, therefore, not speculative to suggest that the vulnerability of global economies to rapid global energy transition from fossil fuels to zero-carbon emission energies is going to be dissimilar worldwide. A possible rapid shock to the petroleum industry is expected with an increase in the use of renewable energy, all things being equal, translating to a decrease in the use and production of fossil fuels. This decrease will be a loss to agents in the petroleum-dependent economies and thus making a high incidence of economic vulnerability in these economies. Also, rapid energy transition may increase the volatility of petroleum prices and, therefore, increases the vulnerability of petroleum-producing and consuming countries. Perhaps, using technology to optimize energy mix and adopting natural gas as the global transition fuel would facilitate the reduction of carbon emissions with the less unintended energy crisis in the journey to net-zero carbon emissions.

2. Transition and Energy Resources Outlook

The forces shaping the global energy transition trend to 2050 and the key parameters surrounding the transition are not deterministic. The key players in the global energy supply dynamics are many with diverse interests and attaining the global transition goals requires a heterogeneous approach rather than a homogenous strategy. For example, the energy transition era has not changed OPEC's strategic objective, which is to maximize the economic wellbeing of its citizens through optimal petroleum resource development. The petroleum importing countries represented mostly by the G7 Countries or IEA countries consider energy affordability, energy sustainability, and energy security to be paramount to the economic wellbeing of their citizens as well. Thus, one thing held in common among all energy transition stakeholders is enhancing the quality of life of human beings, which petroleum has sustained over the years. Energy trilemma suggests that not paying attention to one at the expense of the other two dimensions, equity, or security, is as detrimental to enhancing the human quality of life, as environmental sustainability. The world may not necessarily be energy comfy by solving only the sustainability aspect of the trilemma at the expense of equity and security and *vice-versa*.

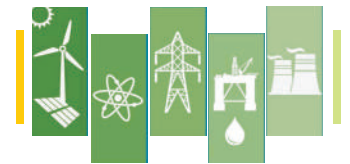
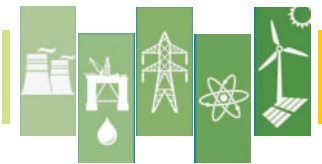
The global urgency and determination to shift the global energy mix towards a renewable energy system seem obvious. This is because renewables have a unique attribute to produce energy with no associated emission of greenhouse gases. To the extent that some are debating whether natural gas is green enough to be the consensus transition fuel. Of course, that renewable energy sources offer a clear path to net-zero emissions is not conjectural but the transition speed to zero carbon emissions is conjectural and cannot be homogeneous. The three main scenarios in consideration now are Rapid, Net Zero, and Business-as-usual. These scenarios provide a range of possible outcomes to understand the range of uncertainties ahead for global economies. A historical review of renewable energy contribution to the primary energy mix shows the extent of the daunting task ahead and why proffering a uniform approach to effectively mitigate global warming by mandate is less likely than not to succeed.

Here are some important facts on primary fossil fuel energy sources — coal, crude oil, and natural gas. First, Coal supplies a third of all energy used worldwide and makes up 38 percent of electricity generation, as well as playing a crucial role in industries such as iron and steel. Coal reserves grew by 20 percent from 2010 to 2020, perhaps because of declining consumption and nearly 50 percent of the growth was in the Asia Pacific region. Climate change mitigation demands, transition to cleaner energy forms and increased competition from other resources are presenting challenges for the coal sector. The Asia-Pacific region accounted for a significant carbon emission over the period, 2010-2020. Secondly, Crude oil is the base for lots of products. These include transportation fuels such as gasoline, diesel and jet fuel which account for about 30% of primary energy consumption worldwide. They also include fuel oils used for heating and electricity generation. Crude oil also creates petroleum products. When combined with other chemicals, oil is the base for over 6,000 items. Petroleum byproducts are tar, asphalt, paraffin wax, and lubricating oils.

Crude oil reserves increased by 26 percent from 1,300 billion Barrels in 2000 to 1,637 billion barrels in 2020. Despite rising production worldwide, the estimated crude oil reserves at the beginning of the year 2021 were 1,732 billion barrels. Certainly, the world is not running out of oil but into the oil. Natural gas supplies 22 percent of the energy used worldwide, and makes up nearly a quarter of primary energy for electricity generation, as well as playing a crucial role as a feedstock for industry. Hydrocarbon is a versatile fuel, and its growth is linked in part to its environmental benefits relative to other fossil fuels, particularly for air quality as well as greenhouse gas emissions. The estimated 6,800 TCF of gas reserves can last 50 years at the current global annual consumption rate. Thus, natural gas fits the gap as a global transition fuel very well as the world seeks green energy with net-zero carbon emission. The reserves-life-year in non-OECD countries, however, is significantly higher at 70 years compared to the OECD reserves production ratio of just 13.7 years. The Middle East has a gas reserves-life-index of 110 years, while Africa has about 56 years. It is going to be foolhardy to not investigate Natural Gas in the Middle East and Africa as a legitimate transition fuel to green energy in the transition era.

Non-fossil fuels are receiving increasing attention within the context of addressing global climate challenges. Some well-known alternative fuels include biodiesel, bio alcohol (methanol, ethanol, and butane), refuse-derived fuel, chemically stored electricity (batteries and fuel cells), hydrogen, non-fossil methane, non-fossil natural gas, vegetable oil, propane, and other biomass sources. Solar, wind, nuclear and hydroelectric are contributing about 15% to generating power. Renewables contribute less than 10 percent to the primary global energy mix in 2020, but the contribution, though inching up may not be able to turn the

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tide against natural gas by 2050. In a global sense, even though the growth in the last 10 years is about 10 percent per year, according to BP Statistical Review, 2021. Renewables alone may not lead us to the net-zero target and divestment in petroleum would make the matter worse off because of the unintended impact on the energy trilemma index.

3. Energy Transition and the Trilemma Conundrum

As mentioned earlier, carbon dioxide emissions are the primary driver of global climate change and to avoid the worst impacts of climate change, the world needs to urgently reduce emissions. Unfortunately, sharing the responsibility between regions, countries, and individuals has been an endless point of contention in international discussions. The reasons for the contention are obvious and anchoring mostly on energy security, energy sustainability and energy equity aptly described as the energy trilemma. Some regions are more energy secure than others, while energy equity in terms of affordability, availability, and accessibility leave much to be desired in some regions. Yet the need for environmental sustainability cuts across the globe even though contributions to carbon emissions differ significantly, across the regions. Africa, for example, contributes cumulatively to date, less than 3 percent, of the aggregate CO₂ emissions.

Thus, for regions that are energy poor, like Africa, the South of Sahara, there is the anxiety, and rightly so, that transitioning rapidly to renewables from fossil fuels, will more likely than not, reduce the ability to supply reliable and affordable energy to households and commercial users in some regions in Africa, making the region very vulnerable in terms of energy equity. Africa remains the region with the lowest average consumption (15 GJ/head) and four (4) out of five (5) people in Africa use some form of wood fuel as their primary source of domestic energy. Additionally, even with petroleum produced in these African countries, physical and economic access to modern energy sources is still a major challenge buttressing home the fact that having resources without being resourceful can be detrimental to energy equity and security in the long run. Adopting energy transition in Africa, requires a lot more strategic thinking and apolitical planning than sentiments or mantras, like the decade of gas mantra, in Nigeria.

Invariably, then, the energy transition and trilemma conundrum demand dissimilar energy transition strategies and speed, keeping in perspective that each of the three aspects of energy trilemma cannot be treated in isolation. Does a region because of sustainability abandon cheaper power sources in its region to maintain energy affordability or go for the more expensive renewable energy, which promotes sustainability? This looks like classic energy sustainability and equity quandary. Additionally, do countries with poor energy infrastructure and low natural resources import expensive sources of energy and compromise energy affordability? This permits the the importation of more affordable sources, which compete with ambitions for more sustainable energy. This is also a classic rapidity versus adaptability quandary in this energy transition discourse. Africa must not take the bait of aid and grants to transit from its abundant resources in the race to attain energy sustainability at the expense of energy security and equity. The optimal transition rapidity must be such that the strategic arrangements, simultaneously, keep in balance the three energy trilemma anchors in a dynamic sense. It cannot and must not be a static equilibration because of intergenerational implications.

4. Transition and Energy Mix Strategy for Africa

The energy trilemma forces Africa to think strategically in response to the energy transition. There ought to be a balance between energy security, equity and sustainability, enabling accessibility, affordability and adaptability of energy to promote quality of life. The train is moving and not responding is not an option but strategically thinking of how to find the balance is the key. Thus, Africa must keep talking about the energy transition talk and embrace the transition, and strategize to find the optimal roadmap to net-zero emission in 2050. An energy mix roadmap with natural gas as the transition fuel seems to be worthy of exploring. Fortunately for Nigeria, it has taken the right steps with the adoption of a gas-to-power strategy along with hydroelectricity and renewable energy policy. The design of the fiscal framework in the Petroleum Industry Act 2021 lends credence to the decade of the gas mantra of the Federal Government. The three classical instruments, taxation, the royalty scheme, and incentives are highly favourable to natural gas development for domestic use. So also, the

infrastructure fund for midstream natural gas investments exits in the PIA. Of course, the government still struggles with petroleum subsidy removal because of political expediency and economic populism. Certainly, petroleum subsidy payment is antithetical to a smooth energy transition because subsidies crowd out private investment significantly, and renders ineffectual Forex management and the aggregate money supply.

The benefits of the energy mix are substantial towards balancing energy security in terms of current and future energy demands at a reliably affordable price, enhancing energy sustainability in terms of high environmental quality in production and use of energy, as well as managing resource depletion. Of course, energy equity is maximized when it is affordable and available. For Africa with a cumulatively low emission so far and abundant natural gas resources in the golden Gulf of Guinea, waiting to be explored and extracted, the energy transition dynamics are not complicated, though a transformational leadership mindset is required. Further, the energy mix strategy offers Africa to ameliorate the growing energy poverty even as technological advancements help to mitigate carbon emissions from oil and gas production. This is ongoing right away with carbon capture technology. Adding renewables to energy resources at a pace not detrimental to energy equity is good as long as the comparative advantage of natural gas is not compromised because of unsustainable aids or grants as mentioned earlier. Additionally, too, energy mix protects countries from energy disruptions and strengthens energy security. It protects importing countries in Africa from market risks such as fluctuations in supply or pricing. Energy mix reduces the risks posed by political unrest or natural disasters and the development of renewable resources, as solar and wind power diminishes the threat of energy scarcity.

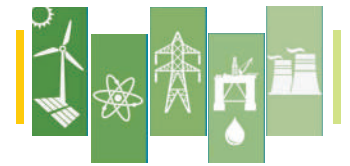
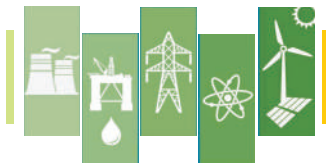
5. Concluding Remarks and Recommendations

Energy is life, its consumption drives prosperity and sustainable economic development. Africa must go after a robust energy mix driven purely by economics, technology, public policy, and good governance. Through strategic thinking, which disavows political expediency in manpower development and deployment, the government in Africa needs an energy transition framework that balances energy security, equity, and sustainability in an efficient, effective and equitable manner with a transparent and accountable mindset.

The essential steps to finding an optimal transition pathway rest on the government because energy transition is a policy issue. Government must set the transition agenda and perhaps the AU needs to have an AU strategy like its counterparts in the EU. Government should create energy transition frameworks that attract investments by rewarding entrepreneurship and innovation and constraining inefficiency and waste. Public-Private Partnership is required in identifying and developing alternative energy sources. It is congenial too, that Africa may have to look inward for the type of investment fund required for the energy mix strategy to work if petroleum is defunded. It is also imperative not to work in isolation but work with the international community to establish and enforce environmental standards related to energy exploration and generation. I know this is easier said than done, government must learn to be apolitical when it comes to engaging experts to identify the best mix of energy resources.

Finally, there are other essential skill sets needed for an effective transition strategy. In the energy transition era, transformational leadership must be enshrined in the energy sector. Meaning transactional leadership with Esau's syndrome must be disavowed to balance the energy trilemma challenges. The management team must have operational control skillsets and possess the capability to be an effective manager of the energy workforce. Professional promotion must be apolitical along the cadre. Energy transition and trilemma quandary call for a rekindling of our engineering education. Without being too sentimental, I remember with good feelings my petroleum engineering education days in the 1970s and we may need to revisit those years to reinvent what we did right as the energy transition evolves. One thing we did right was practical training in the field to complement the classroom experience. Equally important is technical education. Unfortunately, nearly every African country, even at their low level of infrastructure development, did not appreciate the relevance of technical education for sustainable development. I am hopeful that as Africa begins to understand the transition dynamics from fossil fuels to renewables, it will dawn on the continent the relevance of technical education to diminish the effects of energy trilemma anxieties on the transition dynamics.

**Updated Version of Article in the Oil and Gas Value Chain Magazine, February 2022*



Diversification Away from Oil to the Service Sector in Nigeria: Implication for Accretion to External Reserves and the Way Forward

*Temitope Laniran and **Adeola Adenikinju

The quest for structural transformation from a primary commodity-dependent economy to one whose production activities are beyond extraction and value addition remains the priority in the development plan of Emerging and Development Market Economies (EMDEs). The achievement of this plan entails technological advancement, innovation and efficient service-oriented economic activities. In this thought, a well-functioning service sector is considered important for the overall assessment of economic performance.

Services, which is the main subsector that indicates whether a country has attained this level of economic advancement, contribute immensely to not only domestic output, but in its tradeable form, is a bait for earning foreign exchange which by effect would drive external reserves accretion through the balance of payments channel. Besides, a more productive service sector also strengthens the performance of other sectors such as manufacturing and industry.

Nigeria's service sector has gained substantial attention in recent times, owing mainly to the drive-by governments to diversify the economy away from its primary dependence on oil. To foster a smooth diversification of the economy, the Federal Government, in collaboration with the Central Bank of Nigeria (CBN) and international organizations have over the years deployed a blend of policy initiatives to boost domestic output, and engender reserve accretion through the strengthening of the service sector.

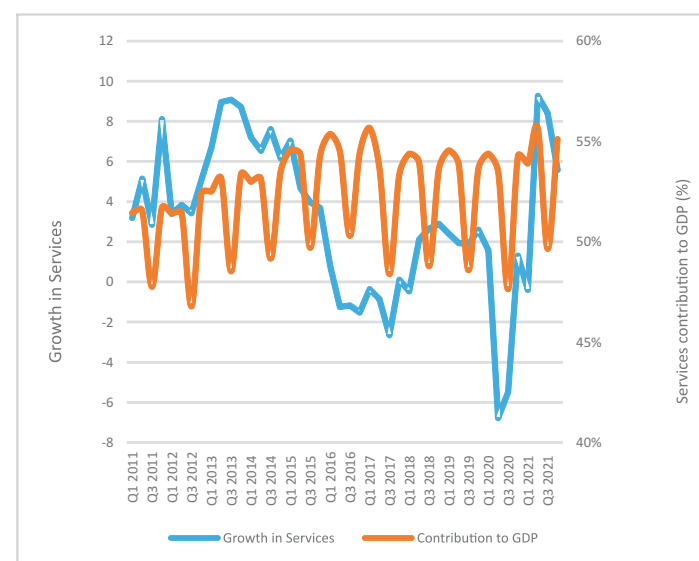


Figure 1: Contribution of Services to Growth
Source: CBN Statistical Bulletin (2021)

Aside from the systemic changes that have taken place in the sector (prominent among them was the 2004/2005 banking sector consolidation), the CBN has deliberately invested massively to boost output in the sector. As of End-December 2021, the CBN disbursed a cumulative N795.7 billion through the Salary Bailout Fund (SBF) and the Excess Crude Account (ECA) in its development finance scheme. Owing partly to these efforts, services have steadily contributed above 50 per cent to the overall GDP between 2010 to 2021 (As shown in figure 1) with trade, information communication technology, and real estate being the major contributors to GDP in 2021. This commendable growth in the sector has unfortunately not been reflected in the contribution of the sector to reserve accretion as shown in the Balance of Payments data.

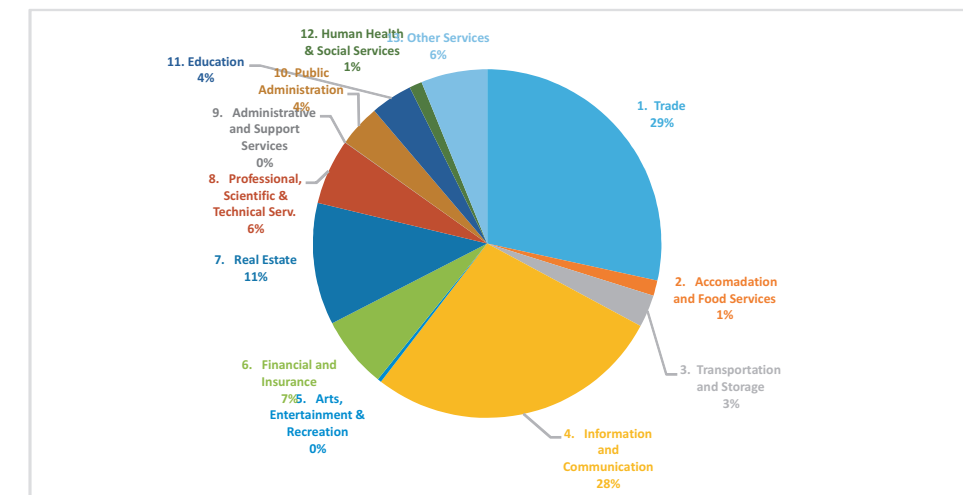


Figure 2: Contribution of Services to growth
Source: CBN Statistical Bulletin

Despite the laudable performance of the service subsector which is evident in its contribution to domestic output growth, there exists a huge deficit in the net value of services in the balance of payments account. Between 2008 to 2021, the net value of services in the balance of payments account averaged a deficit of N4.83 billion with other businesses (operational leasing services and miscellaneous business, technical, and professional services), travel (personal travel), and transportation being the major contributors to the deficit balance in services owing to the debilitating state of transport infrastructure in Nigeria.

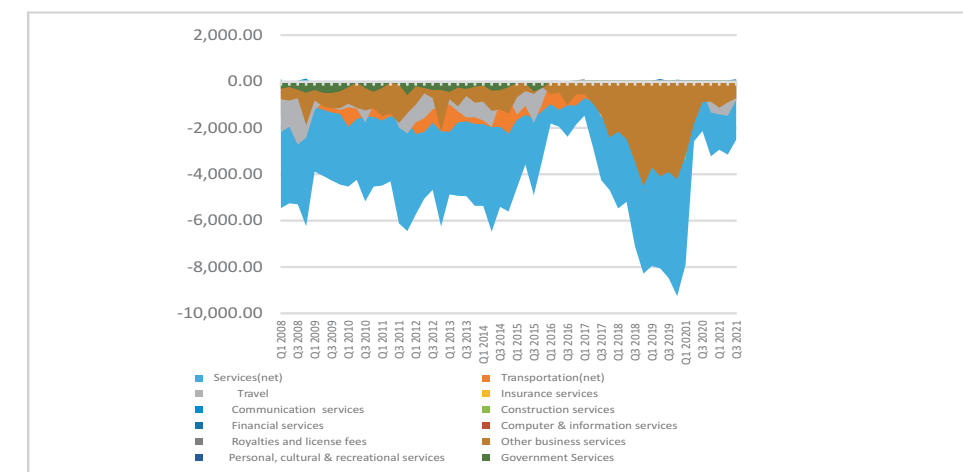
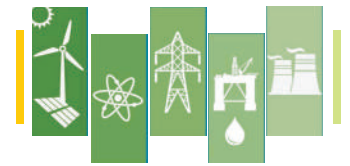
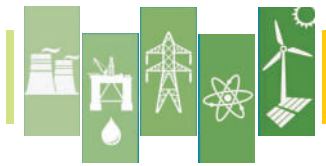


Figure 3: Breakdown of services in the current account
Source: CBN Statistical Bulletin 2021

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Nigeria's domestic and external sector paradox reflected by the contribution of services to the economy is closely linked to the level of development and the quality of services rendered in the various subsectors. For instance, the pace of financial development in Nigeria has remained very slow. According to World Bank's Global Financial Development Index (2021), Nigeria's development index stood at 19.98 index points at the end of 2020 from a peak of 126.00 index points in 2006.

Critical challenges of inadequate infrastructural facilities, weak fraud prevention and monitoring system, and inadequate and inefficient technological and operational services by financial institutions have limited the achievement of significant development in the sector. Technological innovation has exposed the sector to frequent cyber-attacks and operational halts driven by poor information and communication system in Nigeria, especially from the mobile network providers. This contributes negatively to the development of the sector and by extension, it erodes foreign demand for services in the financial sector.

The value of Construction services in Nigeria's balance of payments has remained in a deficit net position at US\$14.7 million for more than 50 quarters to date. This is in the face of average sectoral growth of 43 per cent in 2021 and approximately 11 per cent contribution to real GDP in 2021. The implication of this is that growth in the construction industry is fuelled by imported factors of production including labour and construction materials. One of the major causes of this is lack of adequate technology to prevail in a highly competitive global environment. For instance, in China's recently approved five-year plan for its construction sector, emphasis has been laid on the use of on-site robotic facilities and upscale prefabrication of houses. Unless Nigeria invests in its science and technology to meet the global standards, foreign demand would remain very low as industries with high and sophisticated technologies would outpace their contemporaries.

Transportation services in Nigeria are equally plagued with foreign dominance. Freight transportations averaged USD917 million deficit between 2008 to 2021 while passenger transportation recorded a deficit of US\$627.85 million in the same review period. This reflects the dominance of foreign transportation and logistics companies in Nigeria including international shipping and airlines. This is a major source of outflow of foreign exchange thus, leading to depletion of external reserves and widening of the deficit.

The movement in Nigeria's external reserves reflects the balance of payments position. This is because it is the earnings from international trade activities that contribute to reserves accretion.

Thus, policy measures that would improve the performance of services in the current account would equally drive its contribution to the external reserves.

The improvement of the contribution of services to the external reserves strongly depends on the level of reforms which would take place in the sector. Firstly, a holistic development plan focused on revamping activities in the sector and encouraging the use of more domestically oriented factor inputs and technology would drive the necessary outcome that is envisaged.

Specifically, there is a need for improvement in the areas of skill acquisition especially in science and technology as this would address the knowledge gap in the sector. This can be achieved through partnership agreements that would lead to technological transfer from the international organizations currently operating in the core service sub-sectors in Nigeria. This includes key players in transportation, construction, tourism, and the financial sector.

It is also pertinent for the government to sustain and further boost the level of investment in mass infrastructure in the sector by deploying state of the art equipment and facilities which would drive productivity at an efficient level.

In generality, there is also an urgent need for the government to fix persisting structural challenges in the economy which include insecurity, low power supply, unstable mobile broadband access stifling financial transactions, and other challenges contributing to increased cost of operation of businesses in Nigeria.

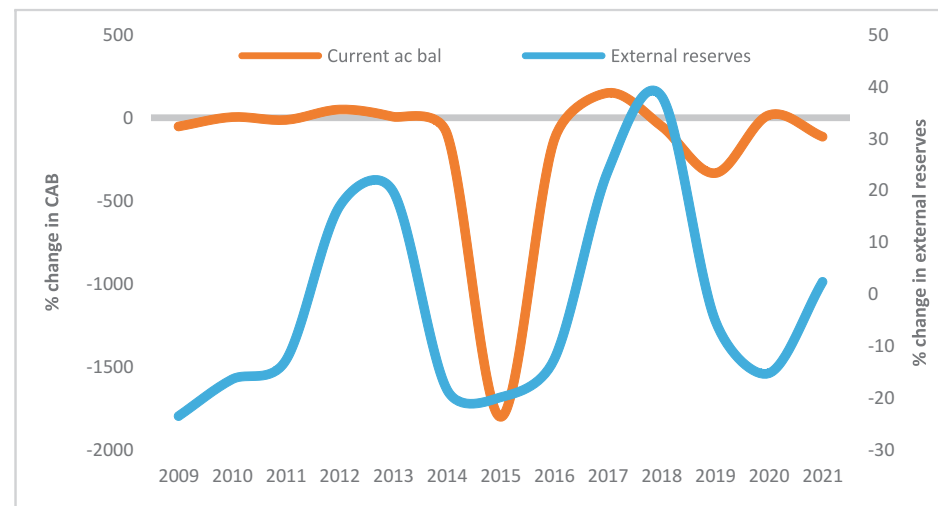
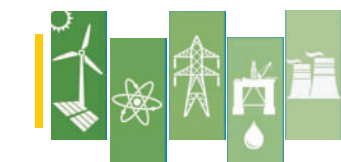
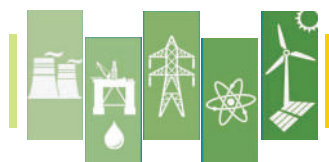


Figure 4: Movements in the Current Account Balance and the External Reserves
Source: CBN Statistical Bulletin 2021



Global Economic Uncertainty, Energy Production and Total Productivity: An Empirical Evidence on Nigeria

*Ademola James Adolphus, **Onyewuchi Amaechi Ben-Obi, Ben Obi

1. Introduction

Travel restrictions and government-imposed lockdowns – designed to halt the spread of coronavirus had a considerable impact on energy supply and demand. With industrial capacity significantly reduced due to social distancing requirements and disrupted shipments, the need for oil and other forms of energy was significantly lower. The COVID-19 (Coronavirus) outbreak has had a global impact on the World Economy. The Energy Sector is in deep crisis and oil-dependent mono-economies, like Nigeria, are hit the most. The impact of the virus on the Energy Sector is still evolving, thereby requiring constant reviewing of events and development strategies to revive the sector and economy as a whole.

With global economic uncertainty worsened by the COVID-19 pandemic, countries race to stop/reduce the spread of the disease hoping to achieve herd immunity in the vaccination and quick reopening of their economies following strict restrictions put in place to curtail the spread. All the sectors of the global economy were affected and the energy industry was not left out. The global oil demand continued to dip as major energy consumers, Europe, India, and China among others, battle with the third wave of COVID -19 Pandemic.

Consequently, countries took strict measures. Most industries were shut down during lockdowns, which reduced drastically the level of energy production and consumption thus affecting the energy industry. The Nigerian oil sector for instance cut down its projected oil (and condensate) production from 2.18millionbpd to 1.712millionbpd, while Nigeria's GDP declined by 6.1 percent in the second quarter of 2020 (CBN Report, 2020).

Compared to energy consumption, the fluctuation of energy production not only influences enterprises' development but also residents' lives. Because an economic subject cannot forecast accurately whether, how, and when the government will adjust to the relative global issues and uncertainties, energy production, as a vital driver of economic development, has to be changed in the face of global economic uncertainty. An examination into the nexus of global economic uncertainties, energy production and total productivity thus contributes to the existing literature and presents important policy implications to authorities. The objective of the study is to examine the impact of global economic uncertainties on energy production and total productivity in Nigeria covering the period of 2017 to 2020.

2. Theoretical Underpinning

Mainstream economists usually think of capital, labour, and land as the primary factors or inputs used for production. In the Neoclassical production function, this approach has led to a focus on the primary inputs, in particular on capital and labour, and not much emphasis is placed on the role of energy in the production process. The primary energy inputs are stock resources such as fossil fuels. But these are not given an outright role in the standard productivity theory, which focuses on labour and capital. Natural scientists and some ecological economists have placed a very heavy emphasis on the role of energy and its availability in economic production. Energy is also an essential factor of production, all economic processes require

energy, and some service activities may not require the direct processing of materials. In the Neoclassical production function technology is an endogenous factor. From the foregoing, we can derive the aggregate production function of the Neo-classical model as follows:

$$Y=F(A, K, L) \tag{1}$$

Where;

Y = aggregate real output.

K = stock of capital.

L = stock of labour.

A = Total Factor Productivity (TFP) or the Solow Residual.

Total Factor productivity could be related to energy. Without adequate energy supply (in this case electricity or petroleum) then Total Factor Productivity is practically useless. The law of thermodynamics helps to justify this by stating that "no production process can be driven without energy conversion". Energy is not the sole determinant of Total Factor Productivity but is a necessary factor to ensure that other inputs (at whatever level) are being utilized. Conversion of energy in its raw state into a useful state is highly technology-oriented. It is also known that energy production is capital intensive. Huge machinery and equipment are required to produce useable energy.

The neo-classical production function is stated as;

$$Y=AK^{\beta_1}L^{\beta_2}e^{\mu} \tag{2}$$

Where β_1 and β_2 are partial elasticity of capital and labour, and $\beta_1 + \beta_2 = 1$ indicates a constant return to scale. μ is the error term.

3. Analytical Discussion

We adopted a wavelet co-movement analysis presented by Aguiar-Conraria *et al.* (2012) to show high-and low-frequency co-movements of the variables within the analytical periods. The wavelet analysis and its different variations are now considered as standard techniques by researchers in many fields. It is extensively used in natural sciences such as physics, signal processing, astronomy, engineering, etc. However, wavelet transformation is relatively new in economics and finance. The literature on the subject has been growing rapidly for the last decade since there are a lot of application problems where wavelets could be effectively used.

The Wavelet co-movements between WUI and the other variables (COAL, ELEC, OIL and TFP) are presented in this section. Co-movement ranges from blue (lower degree of dependence) to red (higher degree of dependence). The y-axis means frequencies; the x axis denotes the time period tests.

OIL and WUI Bi-Wavelet

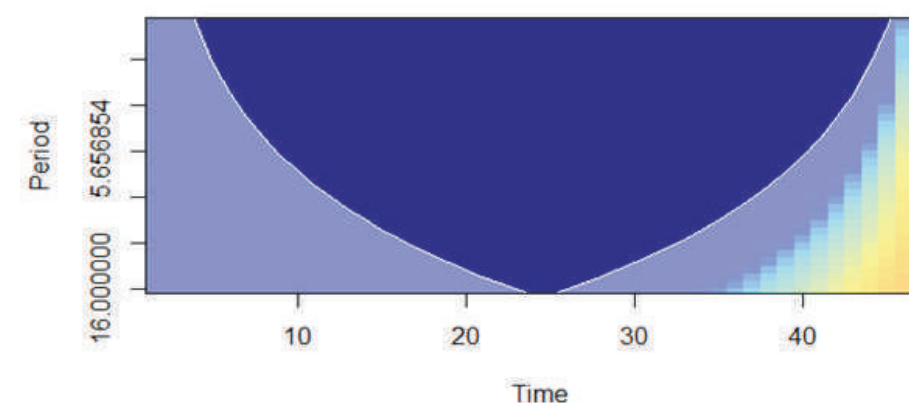


Figure 1: OIL and WUI Bi-Wavelet

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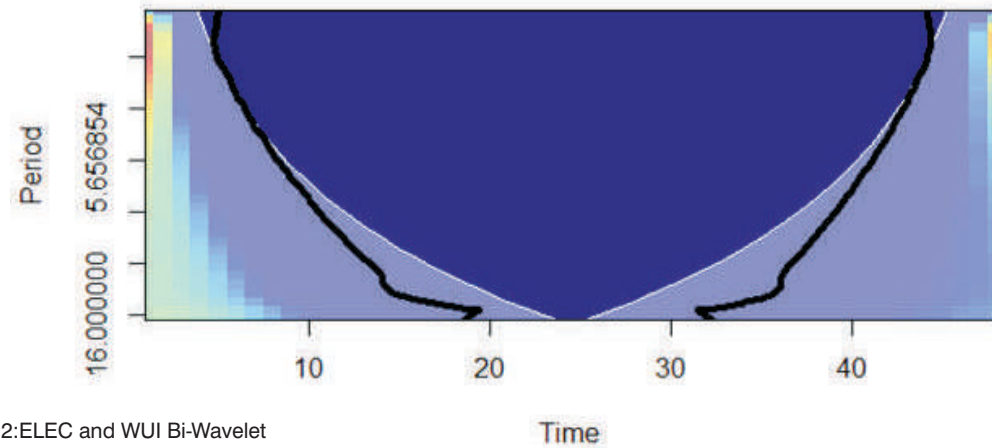


Figure 2: ELEC and WUI Bi-Wavelet

Figure 2 shows there is co-movement between ELEC and World Economic Uncertainty (WUI) before period 10 (i.e. from 2017M01 to 2017M10). Again, towards the end of the time period after 40 (2020M03), there is also some elements of Co-movements between ELEC and WUI. Although this dependency is very minimal as indicated by the diagram. Thus we may conclude that WUI did not really impacted on electricity generation in Nigeria.

COAL and WUI Bi-Wavelet

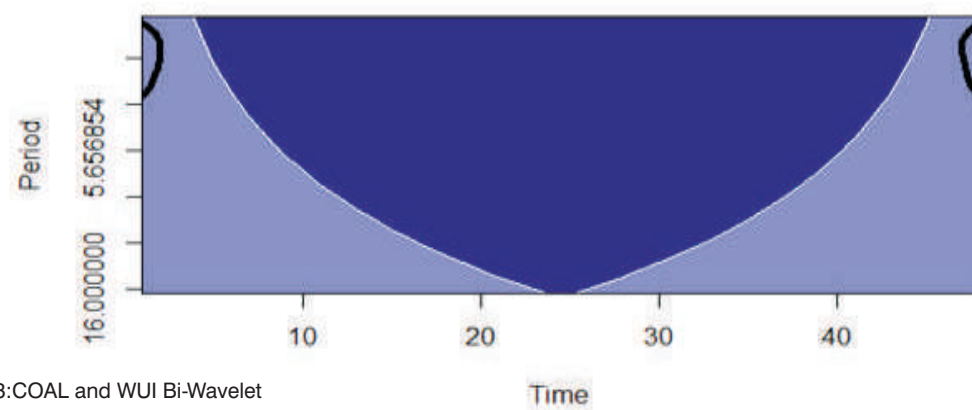


Figure 3: COAL and WUI Bi-Wavelet

Figure 3 shows there is no co-movement between COAL and World Economic Uncertainty (WUI) over the time horizon as indicated by the bi-wavelet analysis.

TFP and WUI Bi-Wavelet

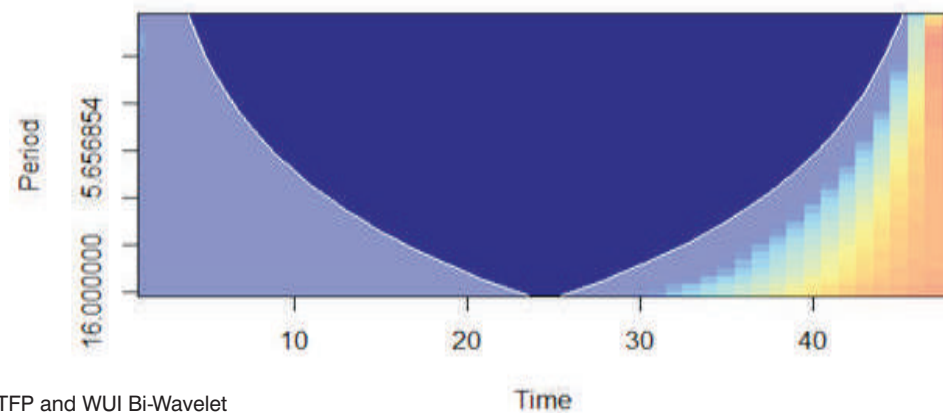


Figure 4: TFP and WUI Bi-Wavelet

Figure 4.0 depicts there is little co-movement between TFP and World Economic Uncertainty (WUI) from 1 to 30 which coincide with 2017M01 and 2019 M06. However, the Co-movement began to increase after 30 (2019M06). The bi-wavelet indicated a high degree of dependency towards the end of the time period after 40 (i.e. Above 2020M03) as shown by the yellow portion which later turned to red during the end of the period (i.e. 2020M12). This indicated that COVID-19 impacted total factor productivity in Nigeria.

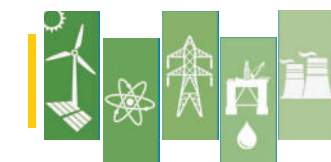
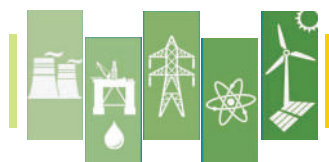
4.0 Conclusion

Global economic uncertainty is widely taken as a vital component affecting the energy sector, there has been limited research that particularly concentrates on the nexus between disparate energy productions and global economic uncertainty. Compared with past literature that exclusively conducts investigations in the time domain, this paper examined the relationship between different energy productions and global economic uncertainty via a dynamic co-movement in both time and frequency domains. The paper employed three types of energy production, coal, oil, and electricity covering the sample period from January 2017 to November 2020.

To gain more evidence of time and frequencies for the series, we also utilize an advanced method of wavelet analysis to observe dynamic co-movements and the causal relationship among the variables. The study also presents a robust analysis denoting a co-movement exists among disparate energy productions and global economic uncertainty. Generally, we see the samples have a strong level of co-movement in high frequencies (short-run fluctuations); however, the evidence for low frequencies (long-run fluctuations) is relatively weaker. The study also validates a dynamic causal nexus among disparate energy productions and global economic uncertainty following a positive causality. Overall, the results raise a significant issue about the role of global economic uncertainty as a driver of risk transmissions through energy markets and also offer an opportunity for authorities to promote strategies to handle energy risks, according to the various factors of global economic uncertainty.

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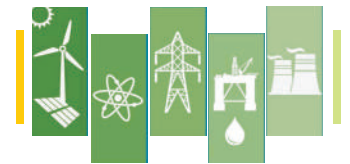
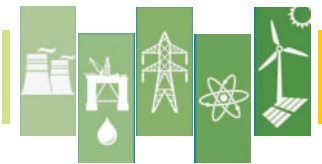
Aguiar-Conraria L, Magalhães P, Soares MJ (2012) Cycles in politics: wavelet analysis of political time series. *Am J Polit Sci* 56(2):500–518.




CHAIRMAN AND KEYNOTE SPEAKER OF EACH OF THE PAST NAAEE CONFERENCES IN NIGERIA, 2008-2021


CONFERENCE	THEME	KEYNOTE SPEAKERS	CHAIRMAN	DATE AND VENUE
1st Annual Conference	DEVELOPING AND SUPPORTING CRITICAL ENERGY INFRASTRUCTURE FOR VISION 2020: CHALLENGES, CONSTRAINTS AND PROSPECTS.	CHIEF P. C. ASIODU, CON	Ambassador Baba Gana Kingibe, former Secretary to the Federal Government of Nigeria	29th-30th April, 2008. Transcorp Hilton Hotel, Abuja.
2nd Annual Conference	ENERGY INDUSTRY: RESTRUCTURING INTERACTIONS BETWEEN BUSINESS, ECONOMICS AND POLICY	Dr.Taiwo Idemudia, former Head, Economic Section OPEC	Engr. Mutiu Sunmonu MD, Shell Petroleum Corporation of Nigeria	23rd-24th April, 2009. Sheraton & Towers, Abuja.
3rd Annual Conference	ENERGY, ENVIRONMENT AND ECONOMIC GROWTH	Prof. A.S. Sambo, FNAEE, Director General, Energy Commission of Nigeria and Special Adviser to the President on Energy	Dr Emmanuel Egbogah, Former Special Adviser to the President of Nigeria on Petroleum Matters.	19th - 20th April, 2010. New Chelsea Hotel, Abuja.
4th Annual Conference	GREEN ENERGY AND ENERGY SECURITY: OPTIONS FOR AFRICA	Mr. OstenOlorunsola, former Vice President, Gas, Shell Africa, former Director, DPR	Engr. Chimalbenechie, former Honourable Minister, NLNG	28th – 29th April, 2011. Sheraton Hotel & Towers, Abuja,
5th Annual Conference	ENERGY TECHNOLOGY AND INFRASTRUCTURE FOR SUSTAINABLE DEVELOPMENT.	Professor Einar Hope, 2010 IAEE President	Prof. A.S. Sambo, FNAEE, Director General, Energy Commission of Nigeria and Special Adviser to the President on Energy	23rd – 24th April, 2012. Abuja Sheraton Hotel, Abuja.
6th Annual Conference	ENERGY RESOURCE MANAGEMENT IN A FEDERAL SYSTEM: CHALLENGES, CONSTRAINTS AND STRATEGIES”.	Chief Philip Asiodu, CON, Former Minister of National Planning	Dr Emmanuel Egbogah, Former Special Adviser to the President of Nigeria on Petroleum Matters	22nd-23rd, April, 2013. Sheraton Hotel, Lagos.
7th Annual Conference	ENERGY ACCESS FOR ECONOMIC DEVELOPMENT: POLICIES, INSTITUTIONAL FRAMEWORK AND STRATEGIC OPTIONS	Professor Yinka Omorogbe, Nabo Graham Douglas Distinguished Professor of Law, Nigerian Institute of Advanced Legal Studies (NIALS), Abuja.	Professor Chinedu O. Nebo, Ph.D, OON, NPOM Honourable Minister of Power, Federal Republic of Nigeria.	16th -18th, February 2014, Sheraton & Towers, Abuja.

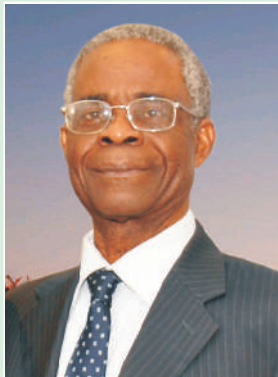
CONFERENCE	THEME	KEYNOTE SPEAKERS	CHAIRMAN	DATE AND VENUE
8th Annual Conference	FUTURE ENERGY POLICY OPTIONS: ASSESSMENT, FORMULATION AND IMPLEMENTATION TRENCHARD HALL, UNIVERSITY OF IBADAN, IBADAN, NIGER	Austin O. Avuru, FNAPE, MD/CEO, SEPLAT Plc	Dr. Emmanuel Egbogah, OON, P. Eng. Chairman, Emerald Energy Resource &, Former Special Adviser to the President on Petroleum Matters	26th- 28th, April, 2015, Trenchard Hall, University Of Ibadan, Ibadan, Nigeria
9th Annual conference	ENERGIZING EMERGING ECONOMIES: THE ROLE OF NATURALGAS & RENEWABLE ENERGY	His Excellency, Professor Yemi Osinbajo, SAN, GCON, Vice President, Federal Republic of Nigeria, Abuja	Dr. H. Odein Ajumogobia SAN, Former Honourable Minister of External Affairs and Honourable Minister of State for Petroleum Resources, Federal Republic of Nigeria	24th – 26th April, 2016. Sheraton Hotel & Towers, Abuja.
10th Annual conference	ENERGY, ECONOMY AND THE ENVIROMENT: THE INTERPLAY OF TECHNOLOGY, ECONOMICS AND PUBLIC POLICY	Dr. E. Ibe Kachikwu, Honourable Minister of State for Petroleum Resources, Abuja	Dr. E. Ibe Kachikwu, Honourable Minister of State for Petroleum Resources, Abuja	23rd-26th April, 2017. PTDF Conference Center, Abuja, Nigeria.
11th Annual Conference	NEW ERA IN GLOBAL ENERGY LANDSCAPE: IMPLICATIONS FOR AN EMERGING ECONOMY	Mr. Austin Avuru, CEO, SEPLAT Petroleum Development Company PLC	Engr. Funsho Kupolokun (Director, First Ally Capital Limited	22nd-24th April, 2018, PTDF Conference Center, Abuja, Nigeria.
12th Annual Conference	ENERGY EFFICIENCY AND ACCESS IMPERATIVES FOR SUSTAINABLE DEVELOPMENT IN EMERGING ECONOMIES	Engr. Funsho M. Kupolokun, Director, First Ally Capital Limited	Professor James A. Momoh, Nigerian Electricity Regulatory Commission	14th-16th April, 2019. PTDF Conference Center, Abuja, Nigeria,
13 th Annual Conference	“ENERGY AND PETROLEUM IN A POST-COVID WORLD”	H.E. Chief Timipre Sylva, Honourable Minister of State for Petroleum Resources	H.E. Chief Timipre Sylva, Honourable Minister of State for Petroleum Resources	17 th December, 2020. PTDF Conference Centre, Abuja, Nigeria.
14 th Annual Conference	STRATEGIC RESPONSES OF ENERGY SECTOR TO COVID-19 IMPACTS ON AFRICAN ECONOMIES	H.E. Mohammed Sanusi Barkindo, OPEC Secretary-General	H.E. Chief Timipre Sylva, Honourable Minister of State for Petroleum Resources	25 th July, 2021. PTDF Conference Centre, Abuja, Nigeria.




DISTINGUISHED FELLOWSHIP AWARD (FNAEE)

	Name	Organisation	Year of Award
	Prof. A. S. Sambo	Former Director General, Energy Commission of Nigeria	2010

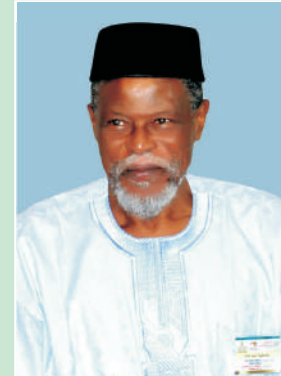
	Name	Organisation	Year of Award
	Prof. A.O Adegbulugbe	Former Special Adviser to the President on Energy Matters	2010


	Name	Organisation	Year of Award
	Prof. Akin Iwayemi	Former President, Nigeria Economic Society (NES) and Nigerian Association for Energy Economics (NAEE)	2011

	Name	Organisation	Year of Award
	Prof. Wumi Iledare	2014 IAEE President and Director, Emerald Energy Institute, University of Port Harcourt, Rivers State, Nigeria;	2013

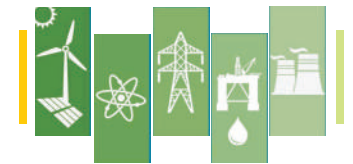
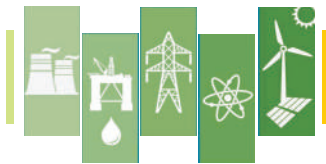
DISTINGUISHED FELLOWSHIP AWARD (FNAEE)

	Name	Organisation	Year of Award
	Prof. Yinka Omorogbe	Nabo Graham Douglas Distinguished Professor of Law, Nigerian Institute of Advanced Legal Studies (NIALS)	2013

	Name	Organisation	Year of Award
	*Prof. Layi Fagbenle	Professor of Mechanical Engineering, University of Ibadan and Former Energy Adviser to Botswana Government	2013
	*Late		

	Name	Organisation	Year of Award
	*Dr. Emmanuel Egbogah, OON	Chairman, Emerald Resource &, Former Special Adviser to the President on Petroleum Matters	2014
	*Late		

	Name	Organisation	Year of Award
	Dr. Tim Okon	Chief Executive Officer, International Institute of Petroleum, Energy Law & Policy (IPELP), Abuja.	2014



DISTINGUISHED FELLOWSHIP AWARD (FNAEE)

Name	Organisation	Year of Award
	Prof. Adeola Adenikinju Director, Centre for Petroleum, Energy Economics and Law, University of Ibadan.	2016
Name	Organisation	Year of Award
	Dr. Bello Aliyu Gusau Executive Secretary, Petroleum Technology Development Fund (PTDF)	2018
Name	Organisation	Year of Award
	Mr. Osten Olorunsola Chairman, Energy Institute	2018

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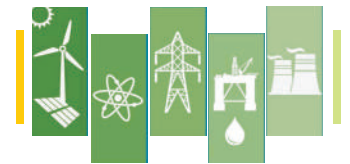
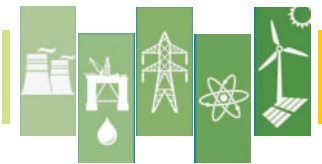
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About Nigerian Association for Energy Economics (NAEE)

About NAEF

The Nigerian Association for Energy Economics (NAEE) is the Nigerian affiliate of the International Association for Energy Economics (IAEE) with a presence in over 120 Countries all over the World. The NAEF is however the first and currently the only affiliate of the International Association for Energy Economics in Africa. The NAEF was formally inaugurated in Nigeria in December 2006 at the Nigerian National Petroleum Corporation (NNPC) Towers, Abuja, and one of the fastest growing affiliate in the IAEE.

Mission Statement

The Association is a nationwide nonprofit organization of business, government, academic and other professionals that advances the understanding and application of economics across all facets of energy development and use, including theory, business, public policy and environmental considerations.

To this end, the Association:

- * Provides a forum for the exchange of ideas, advancement and professional experiences in energy economics.
- * Promotes the development and education of energy professionals
- * Foster an improved understanding of energy economics and energy related issues by all interested parties.
- * Provides a forum for contribution to national discourse on energy policy issues in Nigeria.

Activities of the NAEF

The NAEF seeks to achieve its objectives through the following activities:

- * Publication of Professional Journal, Books, Newsletters and Press release.
- * Organizing Seminars, Conferences, Workshops, Public Lectures and other similar fora.
- * Meetings and such other activities that will promote the objectives of the Association.

MEMBERSHIP

Membership of NAEF is open to interested persons from the academia, corporate sector, scientific fields and government. According to the IAEE Bylaws, to which NAEF subscribes, any person interested in economics of energy and willing to pursue the objectives and abide by the policies of the Association is eligible for membership.

The Association has the following categories of Membership:

- Direct Members
- Student Members
- Honourary Members
- Institutional Members

Membership of NAEF confers one with the following Benefits:

1. Receiving periodic issues of the Energy Journal as well as Economics of Energy & Environmental Policy
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4. IAEE Energy Blog
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6. Workings Paper Series
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12. IAEE membership
13. NAEF Membership Directory
14. Free downloading of materials in NAEF Website
15. NAEF Membership
16. Receiving Nigerian Energy Newsletter

HOW TO BECOME A MEMBER

Any person interested in the economics of energy and willing to pursue the objective of the Association is eligible for membership.