Transition to Green Energy and Sustainable Development in Nigeria: A Prospective and Evaluative Analysis

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Abstract
Since the global discussions on climate change and environmental sustainability began, Nigeria has been actively involved in terms of participating, flowing with global trends and meeting its international obligations in that context. Thus, from the United Nations Framework Convention on Climate Change (UNFCCC) to Kyoto Protocol and then the Paris Agreement, Nigeria has been involved as it ratified and became a Party to them. Corollary to being a Party to the Paris Agreement, Nigeria committed itself to reducing its carbon emissions by 2030 by embracing clean, low carbon alternative energy sources to meet its domestic energy needs. Nigeria's commitment is not without challenges considering a number of factors, namely it is dependent on fossil fuels for its foreign exchange earnings, it has a lingering problem with gas flaring and oil spills, its energy holdings are mainly dependent on fossil fuels, and there is evident lack of capacity and capability to harness its renewable energy resources. These challenges notwithstanding, Nigeria has developed various policy frameworks with targets and projections aimed at harnessing its abundant renewable energy resources in order to transit to green economy. The question that this paper attempts to address is whether Nigeria has been able to harness its renewable energy resources to address its energy challenges as well as transit to green energy as envisaged by its various policy documents. This paper engages secondary data in evaluating the extent to which the country has or has not transited to green energy as projected and targeted. This paper finds that the policy projections of transiting to green energy have no discernible pathways to assure its sustainable realization. It also finds that this disconnect between green energy transition targets and non-realization is linked to inadequate influx of private investments and therefore, recommends the provision of regulatory framework necessary to inspire investors' confidence and commitment.

1. Introduction

It is globally agreed that climate change constitutes the biggest threat facing humanity and the earth in contemporary times. The global agreement on the deleterious impacts of climate change rides on the categorical scientific evidence by the United Nations Intergovernmental Panel on Climate Change (IPCC), which indicated that climate change is real and its main causes are anthropogenic activities [1]. The major culprit in the buildup of greenhouse gases (GHGs) in the earth's atmosphere are fossil fuels [2]. Fossil fuels produce carbon dioxide (CO2), which constitutes about two-thirds of GHGs. The concentration of GHGs in the earth's atmosphere has been rising steadily since the period of the Industrial Revolution and is directly linked with the rise in the mean global temperature on earth [1]. However, in addition to the direct environmental impact of climate change, it poses serious threats to sustainable national development as a result of the multiplier effects of extreme climate events manifesting in interchanges of droughts and

floods and their predilection to increase the likelihood of food insecurity and incidences of communicable and non-communicable diseases [3-5].

The recognition of the threat which climate change poses to the earth and the place of human activities in the calculus spurred global conferences and extracted various forms of commitments from states to deal with the causative factors, especially anthropogenic activities. The world has come to realize the imperative of positive actions to salvage the earth and protect its further degradation. The IPCC has emphasized the urgent need for the global community to drastically reduce its CO_2 emissions to net zero by 2050 if it hopes to prevent global warming of 1.5°C or more above pre-industrial levels [6]. Net zero CO_2 emissions mean eliminating the superfluous CO_2 in the atmosphere by balancing off anthropogenic CO_2 emissions and anthropogenic CO_2 removals over a specified period [6]. The achievement of GHG reduction entails the adoption of a new energy system that would rely on renewable resources.

Nigeria has abundant renewable resources ranging from biomass, hydropower, solar, wind and geothermal among others, from which it could generate alternative energy to meet the country's energy requirements. However, these resources are under-tapped as the country relies on fossil fuels for its energy needs. Nigeria's reliance on fossil fuels for its energy needs makes it a major emitter. Since the global discussion on climate change began, Nigeria has been an active participant, aligning with global trends and meeting international obligations. Nigeria's credentials in terms of domesticating its international climate obligations are quite impressive. Nigeria became a Party to the UNFCCC in 1994 and ratified its Kyoto Protocol in 2004 [7].

Nigeria's first and second national communications to the UNFCCC were submitted in 2003 and 2014 respectively as well as the Intended Nationally Determined Contribution (INDC) in 2015. The country has also made attempts to implement the requirements of the protocols and Agreements that it is a Party to under the UNFCCC, including setting up administrative machinery and implementing associated projects such as the Clean Development Mechanism projects [8]. Additionally, the country has formulated policies and enacted legal frameworks with the sole aim of mainstreaming renewable energy into its energy mix.

The major question, which this paper grapples with, is whether the various policies and projections made by successive Nigerian governments have translated into reality in terms of renewable energy constituting an appreciable percentage of the country's energy holdings. In other words, to what extent has Nigeria translated its various renewable energy policies into concreteness to facilitate its transition to green energy and by extension sustainable environment. In addressing the above stated problem, this paper evaluates the nature of Nigeria's green growth strategies, and the level and intensity of their implementation as a means to determining the feasibility of the country's transition to green energy by 2030, which is the cut-off period in its projections. This paper finds a clear disconnect between the projections of transiting to green energy and actual trajectory towards it. This disconnect is mainly as a result government's seeming disinclination to walk the talk of green energy by meeting its various obligations, which is a necessary condition to spur private investments.

2. Literature Review

The global emphasis on, and trajectory to, green energy is essentially a product of scientific evidence of environmental degradation as a result of anthropogenic activities for centuries, especially since the advent of the industrial revolution. Thus, the scientific evidence about the deepening environmental problems provided a platform for collective action considering that the environment is a public good. The various global conferences specifically organized to discuss the environment unanimously called attention to the environmental impacts of human activities, which subsequently imposed on states, the duty of domesticating global prescriptions. As a result of the global efforts to safeguard the environment, states have been made to consider environmental preservation as one of their highest priorities [1], [6].

The key strategy for the protection of the environment within the context of multilateral climate negotiations is transitioning away from the current energy system dominated by fossil fuels, which is responsible for greenhouse gas (GHG) emissions, to green energy system considered as sustainable [9]. Several studies have demonstrated that carbon dioxide, methane, chlorofluorocarbons, perfluorocarbons, sulfur hexafluoride and nitrous oxide among others, which are major components of GHGs, are largely responsible for global warming [10-11]. In actuality, GHGs are found in the

atmosphere where they warm the earth at a suitable level conducive for the sustenance of life [12]. What has happened in recent times is their increasing concentrations due to human activities, especially technological advancement and its fallouts. The particular anthropogenic causality ranges from the impacts of burning fossil fuels, the use of inorganic fertilizers, generation and improper disposal of industrial wastes, as well as respiration from humans and animals [3] [11]. The combined impact of these factors is the creation of imbalance in the natural greenhouse composition.

The UNFCCC conceptualizes climate change within the context of natural and man-induced activities resulting in massive alteration to the global atmosphere as well as the natural climate over periods of time. The effect of such alterations is frequent extreme weather events, which result in both slow continuous rise in global mean surface temperature and global warming [13-14], [3]. In other words, climate change does not connote a mere variability in the standard climactic conditions but a serious and consistent deviation from the regular patterns of weather conditions as a result of direct and indirect alteration in the global atmosphere, especially due to human activities [13].

Climate change is recognized by the Conference of the Parties (COP) of the UNFCCC as one of the greatest challenges of the global environment. The challenge posed by climate change is in terms of its adverse effects on the environment generally. In concrete terms, these effects are varied and cover the entire spectra of the environment ranging from climactic variability, the frequency and regularity of extreme weather events, rise in sea levels; and continuous rise in maximum temperature [3], [15]. The scientific evidence on global warming was considered quite alarming, thus leading to more ambitious emission reduction benchmarks as captured under the Paris Agreement [15-16].

The disagreement among countries at the initial period owing to incompatible definitions of climate change created an international stalemate. However, several conferences and negotiations have helped to narrow down areas of disagreement and established that climate change is real and constitutes a great threat to the world, thus paving the way for forging a consensual basis for global collaboration [17]. There has been a convergence to a green climate policy, which centers on improving energy policies as a major strategy to reducing the vulnerability of people and ecosystems to the deleterious impacts of climate change [1], [6].

In June 1992 at the Rio Earth Summit, the UNFCCC was signed by about 150 countries, signifying the global acknowledgement of the danger posed by climate change to the global environment and the preparedness for collective action against it. The UNFCCC entered into force in 1994 and has been ratified by over 196 countries. The key emphasis of the convention is drawing attention the high concentrations of greenhouse gases, whose emissions are linked to man's socioeconomic activities in varying dimensions [13]. Thus, the Convention's ultimate objective was the reduction of the concentration of greenhouse gases in the atmosphere to a level in which they would not have deleterious impacts on global climate [18-19]. The Convention required State Parties to commit themselves to emission reduction and develop strategies towards its realization. Although the main focus of climate negotiations under the auspices of the UNFCCC centers on extracting emission reduction commitments from State Parties, it does not prescribe specific policies and measures that countries should take to meet their commitments [19]. However, it is expected that State Parties would periodically make available their national inventories of anthropogenic emissions to the COP [18].

The Kyoto protocol was adopted in 1997 but came into force in 2005 following its formal ratification by the required number of states. The Protocol served as a framework for State Parties to work cooperatively in order to reduce and stabilize the concentrations of GHGs in the earth's atmosphere. On the platform of the Protocol, State Parties committed to meeting certain GHG emission reduction targets as well as to submitting to external review and enforcement [10], [18]. Directly emerging from the Protocol was the binding targets it set for industrialized countries to reduce their GHG emissions to an average of 5 percent against 1990 levels in the first commitment period of 2008-2012. In 2012, a further reduction target of at least 18 percent below 1990 levels was set for the second commitment period of 2013-2020 [18]. A key provision of the Kyoto protocol is the Clean Development Mechanism (CDM) designed to assist industrialized states to achieve their targets by collaborating with developing states in terms of undertaking clean energy projects in them [20-22].

The Paris climate agreement, which was adopted at COP21 in December 2015, came into force in November 2016 with its major quest being to hold global warming below 2°C above pre-industrial levels and pursue a limit of 1.5°C above pre-industrial levels. The projection is that this

range of warming would considerably lessen the risks and impacts of climate change [23]. The Paris agreement has been described as an aspirational global accord that has the potential to trigger and legitimize more climate action around the world, considering that it requires all countries to make significant commitments towards addressing the climate change challenge [15-16]. Although the Paris Agreement is anchored on voluntary country pledges, it however, has provisions that require countries to be held accountable for their commitments. While the Paris Agreement has been criticized as not constituting a solution to the climate change challenge, it is recognized as an ambitious path forward, which brings the world much closer to a safer climate trajectory [15-16], [24].

The key attribute of the Paris Agreement is the abandonment of the top-down negotiated emission targets of the Kyoto protocol and the adoption of a bottom-up mitigation strategy referred to as Intended Nationally Determined Contribution (INDC). The INDC places a demand on all Parties to report regularly on their emissions and implementation efforts as appropriate [23]. In other words, Parties have binding commitments to pursue domestic measures to achieve set emission targets. For instance, developed countries, especially, the United States and European Union made commitment to economy-wide emissions reduction targets, developing countries and emerging economies made commitments that reflect their level of development and contribution to climate change [16]. An important driving force that underpins the global efforts to contain the threats of climate change is the recognition that its impacts transcend the environment and encompasses development in view of its potential negative effect on economic activities and sustainable development of many countries [25].

Although the aspiration of Nigeria to expand its hydrocarbon reserves is on course, it has equally evolved several policies to mainstream renewable energy in its bouquet of energy. Nigeria's various policy thrusts have tended to emphasize its commitment to contain the menace of climate change in line with global aspirations. Nigeria was signatory to the Kyoto Protocol, which became defunct in 2012 [7]. Not only is the country signatory to the Paris Agreement, the successor to the Kyoto Protocol, it ratified it on 16th May 2017, becoming the 146th country to do so [26-27].

The negative effects of climate change are evident in Nigeria in diverse forms such as variable rainfall, drought and desertification in some parts of the country, abnormal rise in sea level, episodic flooding, and land degradation among others [3], [28]. The focus of climate change mitigation and adaptation centers on evolving strategies to ensure the reduction of the sources of GHGs as well as the management of natural or human systems to ensure adequate response to climate change challenges. Notwithstanding the expectation of the 1992 UNFCCC framework that member states should adopt measures to facilitate the development of technologies to deal with climate change in all relevant sectors, including the energy sector, Nigeria did not adopt or enforce any national targets on renewable energy until much later [22]. The lack of national target or national measures to develop Nigeria's green economy was essentially due to incapacity to develop the appropriate technologies as well as the non-receipt of technology aid from developed countries as envisaged by the framework [22].

Nigeria is involved in various CDM projects. The CDM was initiated as a strategy to assist industrialized states to comply with their GHG emission reduction commitments by hosting project activities in developing states. Such projects would be real, measurable, and verifiable, thus leading to certified emission reductions (CERs) [21]. The CERs serve as credits, which can be used by industrialized states to meet part of their emission reduction targets. For instance, if a CDM project receives an x CER, it means that it has reduced an x tons of CO_2 compared to the baseline, which is reference point used to project the GHGs that would have been emitted in the absence of the project [20].

Nigeria met the requirements for participating in CDM in terms of: ratifying the UNFCCC and the Kyoto Protocol; voluntary indication of interest to participate; and establishing a Designated National Authority (DNA) in 2006 [20]. The relevance of the DNA is in its functions, which include: evaluation, endorsement and approval of proposed CDM projects based on national sustainable development criteria, and tracking CDM projects and updating the UNFCCC Secretariat through annual reports. The DNA also facilitates communication among investors and relevant stakeholders as well as provides information to support CERs marketing and platforms for capacity building to strengthen the overall implementation CDM projects [29], [20].

The broad objective of CDM is the reduction of GHG emissions but with specific benefits to both developing and developed states. The emphasis, therefore, is not strictly the creation of green

economy but to reduce emission in order to save the environment. In implementing the CDM projects, the projection is that certain outcomes such as cost-effective reduction in emissions with positive impacts on environment and poverty reduction would be achieved, thus contributing towards sustainable development [21].

Nigeria has implemented various mitigation projects under the auspices of the CDM and Program of Activities (POA). According to Nigeria's Department of Climate Change in the Ministry of Environment, Nigeria registered eleven (11) CDM and six national/regional projects under the POA [30]. Despite the few registered CDM project and POA activities, substantial emission reduction has been recorded. It is estimated that since 2015, the CDM and POA projects have resulted in an annual emission reduction of 6,967 gigagram and 215 gigagram respectively [30]. A major flaw of the CDM and POA projects is their lack of focused emphasis on the development of green energy potentials of Nigeria.

Nigeria's commitment to climate change has also catalyzed various policies aimed at strengthening the country's capability to harness its abundant bio-resources for renewable energy development. Since the submission of its first national communication to the UNFCCC in 2003 [31], Nigeria has prepared various climate response documents like National Adaptation Strategy and Plan of Action to aid its response to climate change. It also submitted the second national communication in 2014, which comprehensively presented the progress made in the climate change actions that the country had initiated and pursued since the first national communication as well as a summary of future actions towards climate-proofing of the country's environment [32].

3. Methodology

This paper focuses on the broad question of Nigeria's efforts at adapting to and mitigating climate change through the instrumentality of transiting to green energy. The major objective of this paper is to evaluate the nature of Nigeria's green growth strategies, and the level and intensity of their implementation in terms of transiting to green energy within the context of the green growth strategies it has evolved. In seeking to meet this objective, the question that arises is the extent to which Nigeria's green growth strategies have spawned sustainable green energy alternatives capable of supporting the country's green economy.

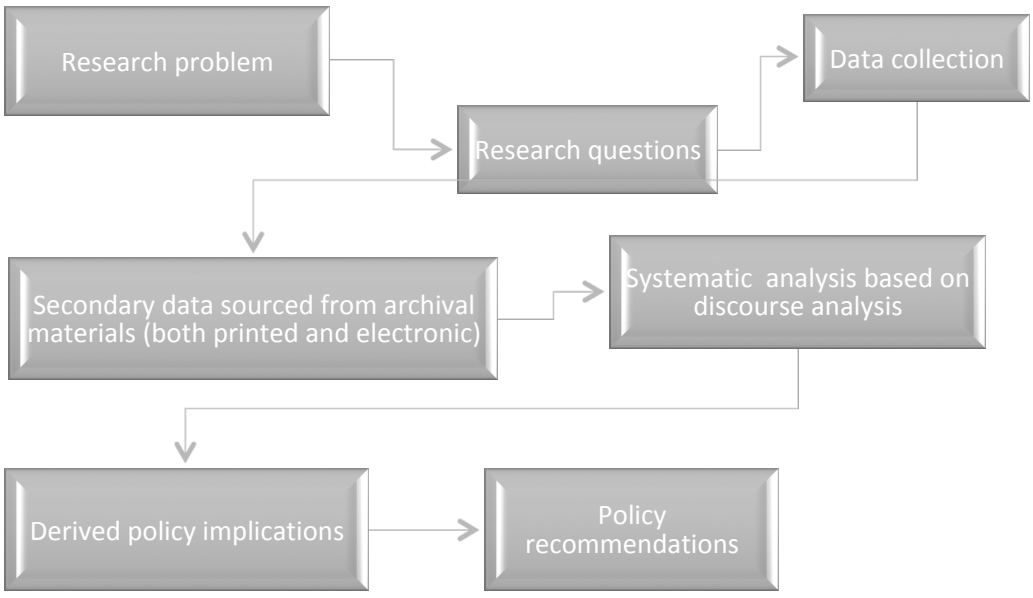

Fig. 1: Methodology flow chart

The data for this paper are basically secondary data, which are sourced from diverse documents both printed and electronic materials. The documents are thoroughly examined and studied in order to extract meaning, gain deeper understanding, and develop relevant empirical insights

necessary to illuminate the major problems being examined by the paper, which is the green energy growth agenda. The documents used for this paper are systematically analyzed in the tradition of discourse analysis, which is anchored on a systematic review and evaluation of all relevant documents.

4. Results and Discussions

Nigeria is endowed with abundant renewable resources that transiting to green energy need not be a serious challenge. However, it is a serious challenge owing to the fact that Nigeria's energy arena is dominated by non-renewable energy, which is inefficiently exploited. Nigeria has enormous deposits of hydrocarbons, especially crude oil, natural gas and lignite coal. Nigeria's hydrocarbon holdings place it among the major producers in the world. For instance, Nigeria's proven reserve of crude oil as at the end of 2018 was 36,972 billion barrels [33]. There is concerted effort by the government to increase the reserve to 40 billion barrels by 2020 and beyond [34]. Nigeria also has impressive holdings of natural gas. The 2018 estimate of the country's proven natural gas reserve was 5,675 billion standard cubic meters, which placed it among the top 10 in the world [33], [34].

Nigeria is also endowed with high quality lignite coals. Coal does not constitute part of Nigeria's current energy mix. There are 17 coalfields identified as having proven reserves of coal to the tune of 639 million tonnes. However, estimates put Nigeria's potential coal holdings at over 2.8 billion tonnes [35]. Coal deposits are largely located around the Anambra basin, the Benue trough and, to a lesser degree, along the stretch of Bida and Sokoto basins. However, Nigeria's coal resources have since been abandoned. The abandonment of coal was principally as a result of the discovery of oil in commercial quantities as well as global embracement of oil and trajectory away from the coal economy. Thus, despite its earlier contributions to Nigeria's development, especially during the colonial epoch, between 1909 and the 1960s, in terms of foreign exchange earnings and power generation, Nigeria's coal resources have been abandoned and, therefore, unexploited [34].

Nigeria's contributions to the GHG emissions are mainly from the inefficient methods of exploiting its non-renewable energy resources and the survival strategies adopted by its teeming population to augment the serial structural and systemic inefficiencies that characterize the energy sector. For these reasons, Nigeria is among the top six GHG emitters in Africa [5]. For years, gas flaring in Nigeria has been a major challenge with the country currently ranked 7th on the list of top ten gas flaring countries in the world [36]. Fig. 2 below shows Nigeria in the midst of top ten gas flaring countries.

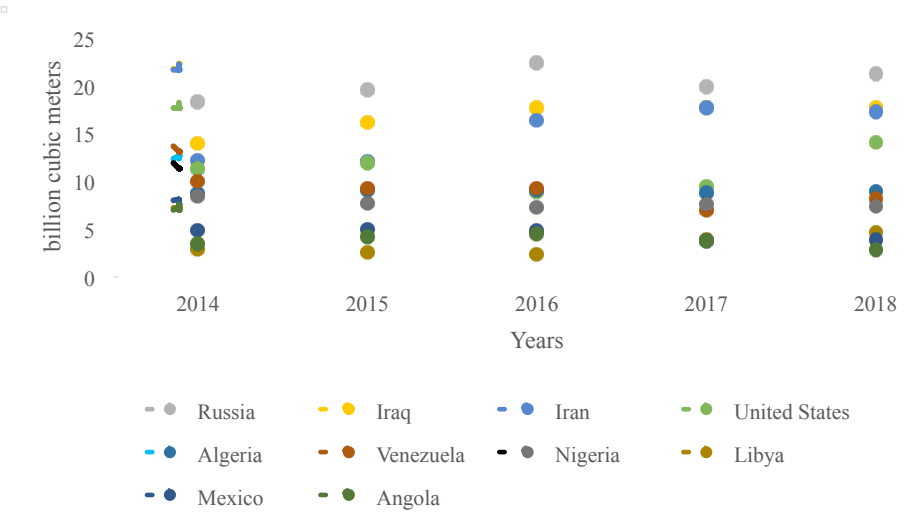

Fig. 2: Gas flaring trend of top ten countries in the world, 2014-2018. Source: [36]

However, the ranking is a great improvement considering that in 1991, when the world average for flared gas hovered around 4 percent, Nigeria's rate was 76 percent, which accounted for 13 percent of the world's total volume of flared gas and made it only second to the Russian Federation

[37]. But since 2010, there has been significant downward trend in Nigeria's gas flare profile (see Fig. 3). The estimate between 2008 and 2017 indicated that Nigeria flared some 4.498 trillion standard cubic feet (tscf) of gas [38]. The vastness of gas flaring is demonstrated by the sheer number of sites from which gas is flared as well as the millions of tons of CO_2 that are released into the atmosphere. In terms of GHG emissions, World Bank sources indicated that Nigeria emitted 457 million metric tons of greenhouse gases between 1999 and 2009 [39]. It is estimated that about 755 to 800 million standard cubic feet (mscf) of gas are flared daily from 178 sites [39]. According to Nigeria's National Oil Spill Detection and Response Agency (NOSDRA), Nigeria flared 425.9 billion standard cubic feet (bscf) of gas between January and November, 2019 and emitted 22.6 million tonnes of carbon dioxide into the environment [40].

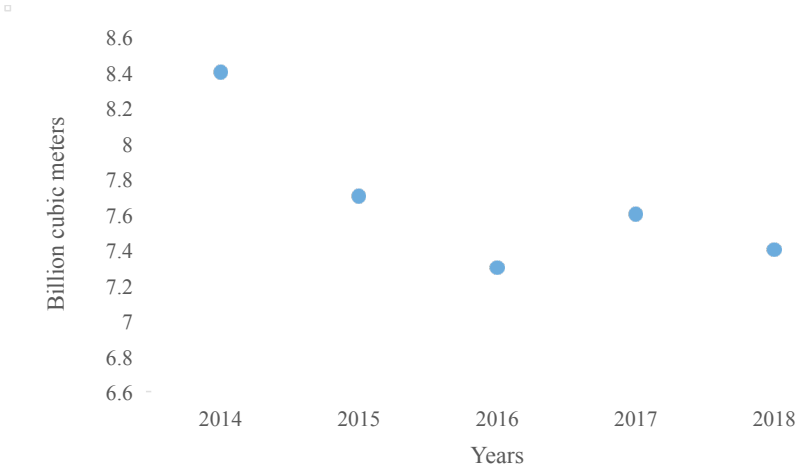

Fig. 3: Trend of Nigeria's gas flaring, 2014-2018. Source: [36]

Another source of GHG emissions in Nigeria, which is related to inefficiency borne out of disregard for international best practices is oil spillage and attendant environmental degradation. Oil spillage is prevalent in the Niger Delta region where Nigeria's crude oil and natural gas deposits are located. Oil spillage is at the epicenter of pollution, environmental degradation, loss of livelihoods and security challenges in the region [41]. Oil spills are a recurrent decimal in the region and responsible for destroying a large chunk of its mangrove and rainforest ecosystems as well as the pollution and contamination of the soil, rivers, streams and underground water with resultant health challenges among the populace and losses in crop production and fishing [42], [39].

What makes oil spills extremely dangerous to the environment is the lackadaisical attitude that both the Nigerian government and oil companies that operate in the Niger Delta region demonstrate on the issue of clean-up, remediation and restoration efforts. For instance, between 2014 and 2015, the Niger Delta region witnessed about 1,879 cases of oil spills. Out of this overwhelming number of spills, only 64 of the cases were cleaned up. A holistic picture of oil spills in the region indicated that there are over 5,000 massively polluted sites across the region with about 25 percent of such sites located in Ogoniland [41], [39].

As has already been noted, Nigeria has renewable energy resources from which the country's energy needs could be conveniently met. Fig. 4 below captures the various renewable resources available in Nigeria from which clean energy could be generated. The country has made concerted efforts in this direction to green its energy sector but with minimal results. Apart from environmental benefits, there are immense development benefits for Nigeria if it transits to green energy. Despite the abundance of renewable energy resources, they are largely underexploited. For instance, the total installed capacity of renewable resources is only 1,979.2 MW comprising 1,964.2 MW from small and large hydropower installations and 15 MW from dispersed solar PV installations [43].

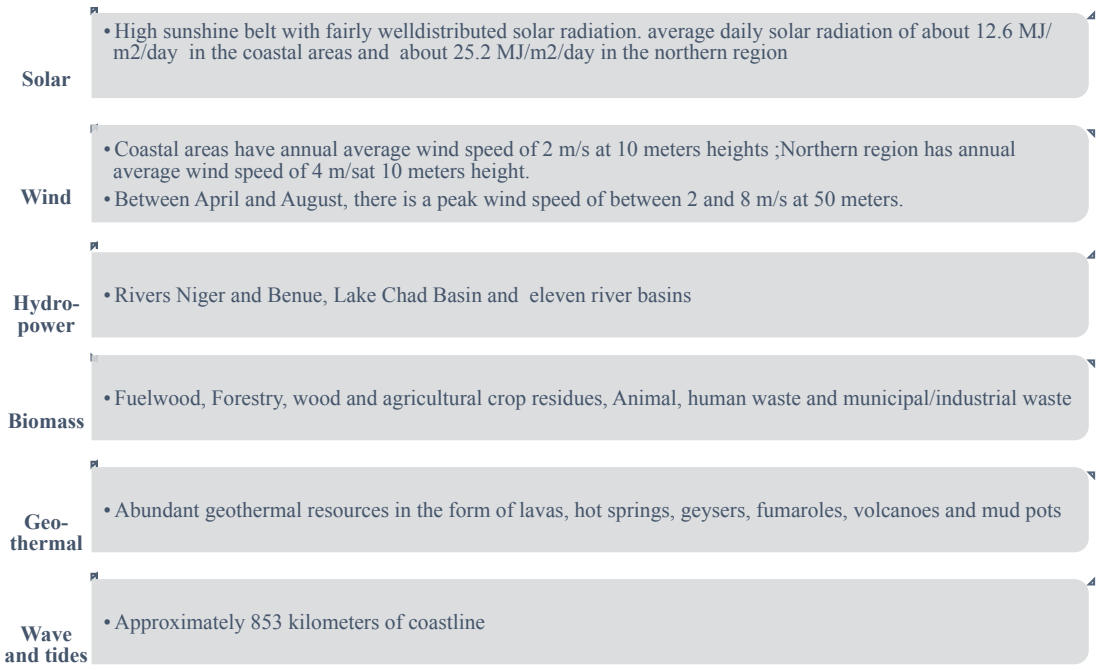

Fig. 4: Major renewable resources in Nigeria

Nigeria's electricity profile leaves much to be desired. The country's abandoned Vision 20:2020 (an ambitious development plan for Nigeria to be among the world's top 20 largest economies by 2020) recognized the imperative of sustainable electricity supply in order to meet the key targets of the Vision. Thus, it projected an ambitious expansion in electricity generation and distribution from 4,000 megawatts (MW) in 2007 to 40,000 MW in 2020. Considering Nigeria's population growth rate of 3.1 percent, the projected 40,000 MW were expected to cater for 75 percent of the population [4], [44]. Nigeria's Renewable Energy Master Plan projected that by 2020, the country would require at least 45,490 MW to be in a position to guarantee steady electric power supply [45]. In 2020, these projections have turned out to be a mirage.

Nigeria's current total installed electricity capacity is 12,522 MW, which is a far cry from the projection of what is actually needed for uninterrupted electricity supply. The sources of electricity outputs consist of 10,142 MW and 2,380 MW from thermal and hydropower sources respectively [34]. However, the actual output in terms of power generation and distribution usually fluctuates between 3,000 and 4,000 MW, and on several occasions much lesser than the aforementioned range. As a result, less than 40 percent of Nigerian households have access to electricity, and on most occasions, under severe conditions of regular power outages [34].

This inability of Nigeria's electricity sector to meet the growing energy demands of the populace has promoted self-generation of power through various sources, namely fuelwood, private household and industrial generating sets and solar inverters. It is estimated that between 22 million and 60 million generating sets are used by households and industrial outlets in Nigeria to generate their own electricity at enormous costs to the economy [46-47, [4].

As already noted, global emphasis on green reform is traceable to the Kyoto protocol. In other words, green reform constitutes one of the fundamental elements of the Kyoto Protocol. Ever since ratifying the Kyoto protocol, Nigeria has developed several policies in its quest to integrate renewable energy in its energy mix. The key vision of Nigeria's energy policy is to harness the various renewable energy resources to beef up the country's energy holdings. Apart from the envisaged boost to the country's overall energy holdings, renewable energy sources are also expected to yield direct benefits in terms of reducing Nigeria's GHG emissions. Interestingly, Nigeria's Renewable Master Plan (REMP) and other supporting policies and initiatives on renewable energy set up very ambitious projections and targets for electricity and non-electricity sub-sectors, which have been under constant ambitious adjustments.

Despite the abundant renewable resources and policy/regulatory framework for their utilization, the contribution of renewable energy sources to Nigeria's overall energy basket is next to nothing. In Nigeria's 2015 Intended Nationally Determined Contribution (INDC)

submitted to the COP, it had outlined key policy directions to potentially reduce national emissions by around 45 per cent by 2030. The INDC indicated that the reduction potentials identified to be implemented in the country have zero net cost and confer direct economic benefits to the country in addition to the targeted climate benefits [8].

Many Nigerian households are still not connected to the national grid. There is no new estimate to suggest a change in the 40 percent threshold of households connected to national grid and thus have access to electricity. Thus, the scenario is that the bulk of the households connected to the national grid are in urban centers. The households in rural areas have marginal access to electricity as only about 10 percent are connected to the national grid [34]. What that implies is that majority of households generate their own energy through diverse ways, especially through fuelwood, small household generators and solar inverters.

The target of the Nigerian government is to make renewable energy an important part of the country's energy holdings both in the short and long runs. The country's major aspiration is to make electricity available and reliable as well as expand its access from 40 percent to 75 percent of the population by 2020. This expansion would also mean the improvement of the contributions of renewable energy to the country's energy mix [48]. Babatunde Fashola, Nigeria's Minister for Power, averred that the ultimate aspiration of the government consists of: achieving a minimum generation of 30,000 MW by 2030; mainstreaming renewable energy such that it accounts for 30 percent of the electricity mix; and adopting a three-pronged strategy of incremental, stable and uninterruptible power supply [48].

The key question is whether Nigeria can achieve transition to green energy by 2030. Indeed, whether Nigeria is on track to exploiting its abundant renewable energy resources to increase its energy holdings. Notwithstanding Nigeria's projections to leverage on its great potentials to introduce climate smart initiatives that would foster low-carbon, green economy and climate resilient state, nothing closer to the targets has been achieved in terms of transiting to green energy. Nigeria's energy pool is still dependent on its thermal and hydropower stations without any contributions from other renewable energy sources as targeted in the various policy documents. What it means is that Nigeria is not walking the talk in the renewable energy subsector. One of the key observable challenges of Nigeria's renewable energy policy is the lack of uniformity, if not contradictory benchmarks and targets, in the various policy documents.

The failure of Nigeria's quest to transit to clean, low carbon energy alternatives is reflective of its poor policy tradition, which is embedded in disjointed incrementalism. Several reasons have been adduced for this disconnect between policy projections and actualization. These include, corruption, incapacity and incapability of the local private sector to spearhead and execute medium or large-scale renewable energy projects, regulatory uncertainty with respect to off-grid projects, lack of guarantees with regard to access to land for project constructions, financial constraints considering the capital-intensive nature of renewable energy projects and long payback periods [43], [49]. In addition is the uncertainty that surrounds the energy sector and weak incentives to attract sustainable foreign direct investment.

5. Conclusion

Nigeria's energy transition policy is essentially designed to achieve three interrelated objectives, first, to incrementally mainstream renewable energy into Nigeria's energy mix thereby reducing the negative impacts of fossil fuels on the environment. Second, expand sources of energy generation as a way to bridge the gap of energy poverty in the country and increase the country's capacity to meet its domestic energy needs. Third and lastly, to meet the country's commitment to reduce its share of GHG emissions. One of the major challenges to Nigeria's renewable energy development is the uncertainty surrounding the various benchmarks. There is a serious lack of consistency and uniformity in the data used for projections and setting targets. But beyond this constraint, there is apparent disjointedness in the various policies to drive Nigeria's renewable energy program. For instance, there is no specific coordinating government agency to oversee the renewable energy subsector. The result is the discordance in the management and implementation of the various targets. Undoubtedly, renewable energy development appears to be stagnant as the projected contributions from the subsector to the national energy grid are yet to materialize. What this implies is that Nigeria is not on track to meeting its renewable energy targets. What needs to be done is for the government to walk the talk on renewable energy development by providing the infrastructure and necessary operating environment. The relevance of renewable energy in the face of Nigeria's energy challenges cannot be overemphasized.

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