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Nigerian Oil and Gas Industry in an Era of Energy Transition: Analysis of TotalEnergies' Activities in Nigeria

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ABSTRACT

The oil and gas sector faces a significant quandary resulting from the need for global energy sources to move away from fossil fuels to more sustainable and environmentally friendly sources. Many International Oil Companies (IOCs) give the impression that they are transitioning to 'cleaner energy' due to environmental pollution caused by excessive carbon emissions from extracting and processing oil and gas resources by IOCs. However, literature suggests that many IOCs are welcoming these changes because we may run out of our present energy sources within the next 100 years. The study used an exploratory design approach to appraise the Nigerian oil and gas sector during a contemporary period of energy transition, with a focus on the activities of TotalEnergies. Study findings show that geopolitical machinations have long hampered the operations of IOCs in Nigeria, distorting the equitable allocation of the country's oil and gas resources. On the surface, TotalEnergies' energy transformation initiatives appear quite realistic, however, the company finds it challenging to completely achieve the goals of its energy transition agenda due to the geopolitical complexity in Nigeria. The study proposes a four-dimensional strategy for enhancing economic viability during the energy transition: Advocating for better regulatory mechanisms, enhancing host communities' development, concentrating on gas production in the transition era, and focusing on renewable energy development. The study recommends that more effort should be made by IOCs in renewable energy investment to foster sustainable energy development in the coming decades.

INTRODUCTION

The awareness that our conventional energy sources are running out makes the switch from fossil fuels to more sustainable and renewable sources imperative. Human energy use was minimal for centuries due to low technological application in many aspects of life on earth. Land transportation by humans during the Palaeolithic and Neolithic era was by foot or through the use of animals like horses, elephants or cattle. In the same vein, transportation using boats and ships involved manual paddling and rowing with oars; direction and speed of travel completely depended on wind velocity. However, all that changed dramatically during the Industrial Revolution when significant scientific advancements resulted in coal combustion to produce energy, as well as explorative mining to extract crude oil from the earth's crust. Because these 'new' energy sources originate from decomposed organic matter of millions of years, they were called 'fossil fuels' since they are made up of decomposed organic matter from fossilized materials (Balzani, 2021). Advancements in science and technology were also fundamental in the fractional distillation of crude oil to produce derivatives like diesel, kerosene, bitumen, among others. Also, technological advancements resulted in the invention of numerous engines for vehicles, ships, electricity generators, and motorcycles, among others, that combust these crude oil derivatives.

Therefore, fossil fuels, primarily crude oil, coal and natural gas, have dominated the global energy stream in the last two centuries. In 2008, global reserves of natural gas were projected to amount to over 6 quadrillion cubic feet, while those of crude oil were estimated to be around 1.4 trillion barrels (Rühl, 2008). More than 70% of the world's estimated 850 billion tons of coal reserves in 2006 came from North America, Russia, China, and India (Caillé *et al.*, 2007). Shafiee and Topal (2009) predict that the world's deposits of coal, natural gas, and crude oil will drop dramatically in less than 150 years if production and consumption trends continue to be relatively stable. Petroleum, coal, and gas accounted for more than 84% of the world's energy consumption in 2019, when there were over 8 billion people on the planet; global energy consumption at the time was close to 600 exajoules (Kober *et al.*, 2020). Hence, it is not shocking that Höök and Tang (2013) identified that annual global production of crude oil in 2010 was estimated at 85 million barrels per day, while that of natural gas and coal was put at 2900 million tonnes of oil equivalent (Mtoe) in the same year. The issue of depleting global fossil fuel reserves is further compounded by the pernicious environmental consequences caused by consistent land and water pollution, as well as persistent release of greenhouse gases (GHGs) into the atmosphere, particularly throughout the 20th century (Nwankwo, 2021). In many parts of Europe, energy data collected in 2016 and 2017 have implicated fossil fuels in the prevalence of global warming, as well as water and air pollution, which in turn has perniciously affected human and environmental health (Martins *et al.*, 2019). According to Armaroli and Balzani (2011), worldwide costs of fossil fuels' impact on the climate

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could reach $750 billion by the end of 2011; non-climatic costs on the environment and human health as a result of prolonged fossil fuel dependence were also close to $150 billion within the same period.

Nigeria, the most populous country in Africa with a population of over 1500 million, is also the continent's second-largest producer of crude oil, with an average of over 1 million barrels produced per day in 2023 (Sasu, 2023). Figure 1 shows a map of Nigeria and her major oil and gas fields.

Figure 1: Map of Nigeria showing its major oil and gas fields
Source: Worldview, 2013

With more than 39 billion cubic meters of natural gas produced in 2022 alone, Nigeria is the third-largest producer in Africa, making it a significant producer of natural gas (Galal, 2023). Also, research from Enerdata (2023) shows that as of the first quarter of 2023, Nigeria's proven crude oil reserves are projected to be close to 40 billion barrels. Therefore, Nigeria's huge natural gas reserves make the country an important player in the energy transition era, considering that natural gas has been determined as a vital energy source that will substitute coal and crude oil, before renewable energy systems become more affordable and widespread (Werner & Lazaro, 2023).

MATERIALS AND METHODS

The study focused on the Nigerian oil and gas industry in an era of energy transition, by analysing the activities of TotalEnergies' in Nigeria. Data collection for the study involved an exploratory research design, where secondary data from existing literature on energy transition in the oil and gas sector was analyzed. In doing this, the main themes of the study focus on the Nigerian oil and gas industry in an era of energy transition, were applied. Furthermore, the exploratory approach used was streamlined towards analyzing the activities of TotalEnergies in Nigeria.

According to Olawale *et al.* (2023), an exploratory research design is applicable when the intentions are to examine a problem that has not been well-theorized; the exploration here looks at shedding new light on the research problem for a better understanding of the issues therein. Since the dynamics in the oil and gas sector in Nigeria during an era of energy transition are not very clear, an exploratory research design adopted for the present study seems appropriate. The exploratory research approach focused on three main areas: (1) the complexities of interests during IOCs' operations in Nigeria, (2) challenges to energy transition in Nigeria's oil and gas sector, and (3) strategies for Nigerian IOCs during the energy transition. Covering about 9% of Nigeria's oil and gas sectoral goings-on, TotalEnergies EP Nigeria Limited (TEPNG) is a critical stakeholder in oil and gas exploration and marketing (Energy Focus Reports, 2021). TEPNG is a subsidiary of TotalEnergies, a French International Oil Company (IOC) originally known as Compagnie française des pétroles (CFP), founded in 1924, which was later known as Total (Sassi, 2006). The company was rebranded, and its name was changed to 'TotalEnergies' in 2021 to reflect its intention and agenda to key into the global calls to move away from fossil fuels to more renewable and environmentally-friendly energy sources.

With the rebranding programme, TotalEnergies is now focusing on three key underlying factors: mitigating carbon emissions throughout all TotalEnergies' operations by avoiding them in the first instance, modifying all TotalEnergies' operations by enhancing energy efficiency by providing more funds for research, compensating the environment for harm caused by TotalEnergies's previous operations, and promoting initiatives aimed at reducing the company's carbon footprint (TotalEnergies SE, 2022). To position itself as a significant player in the supply of renewable energy in the years to come, TotalEnergies is broadening its operations in Nigeria in line with these objectives. Even though these programs are very plausible, the actions of TotalEnergies have not demonstrated that these programs will be fully implemented. For example, the company, while showing a facade that is more interested in fostering renewable energy and investing in natural gas as a transition fuel, the company fairly recently commenced offshore crude oil extraction activities in Amenam and Ikike, both located inside Nigeria's Oil Mining Licence (OML) 99 region. According to Offshore Reports (2022), the Amenam and Ikike oil fields will produce roughly 60,000 barrels of crude oil per day. Figure 2 shows assets and oil mining fields operated by TotalEnergies as May 2023.

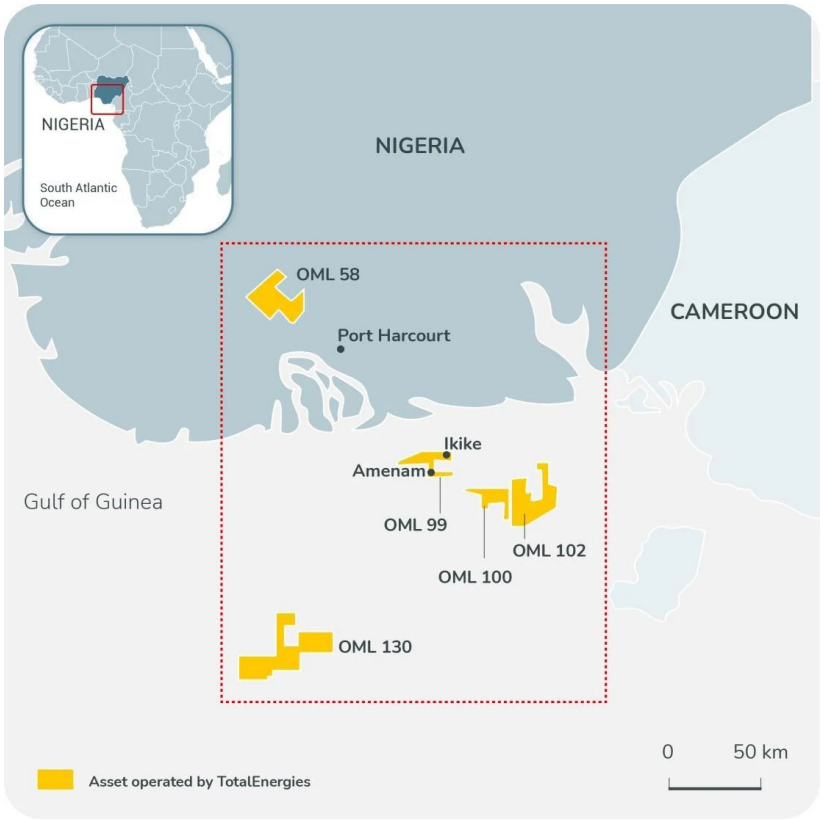

Figure 2: Assets and Oil fields operated by TotalEnergies in Nigeria
Source: World Oil, 2023

RESULTS AND DISCUSSION

Nigeria's oil and gas exploration efforts have been marked by a great deal of estrangement between host communities in the Niger-Delta oil-rich region and other all other parties involved, particularly IOCs and members of the country's political elite. Years of disregard and widespread nepotism in Nigeria's oil and gas industry have left the indigenous people of the host towns mentally and environmentally degraded. Agbonifo (2022) claims that oil and gas operations in the Niger Delta have exacerbated ethical decline to the point where poverty, prostitution, drug addiction, kidnappings, armed robberies, high unemployment, agitation among young people, and poverty are widespread. Some oil and gas producing communities are plagued with perennial oil spills and gas leaks, which cause significant environmental pollution and degradation. For instance, decades of oil and gas exploration destroyed farmlands, waterbodies, fish stocks, and forest resources in Ogoniland in Rivers state, which rendered many residents and indigenes of the area jobless and impoverished (Sam & Zabbey, 2018). Given that oil and gas exploration activities are known for requiring low manpower, the conditions of people living in oil and gas producing communities are worsened by environmental pollution, which significantly debilitates their chances of making a decent living. In addition, alternative livelihood opportunities to cushion the negative economic effects of oil and gas exploration on the affected populace have not been adequately provided by government authorities and other stakeholders. To make matters worse, efforts made towards remediating these polluted sites have been ineffective. According to Nwoma and Anyika (2024),

remediation activities aimed at mitigating oil-polluted domains in Ogoniland have been slow, with only 10 polluted sites successfully remediated out of over 300 acres of polluted land identified by the United Nations Environment Program (UNEP) report on environmental pollution in Ogoni. Furthermore, IOCs and the federal government have not provided the required funds despite launching a cleanup exercise since June 2016. In light of this, Omeje (2013) reports that a large number of locals who struggle to make ends meet due to the actions of IOCs such as TotalEnergies have moved to cities to avoid the difficulties they encounter in their hometowns.

In the same vein, geopolitical machinations have long hampered the operations of IOCs like TotalEnergies in Nigeria, which in turn, distorts the equitability in sharing revenue from the country's oil and gas activities. Nonetheless, Nigeria maintains a centralized structure of governance where a few individuals hold power and decide the economic future of the country. Omeje (2013) contends that the federal government of Nigeria regulates the operations of IOCs through a joint venture arrangement in which the government owns 60% of the share and IOCs take the remaining 40%. Yet, because of widespread corruption and despotism, oil and gas revenue which the Nigerian government is supposed to apply in meeting the socio-economic, as well as environmental needs of oil and gas host communities, has not been allotted appropriately. The table shows that Nigeria has made over 900 billion Naira (about 582 million US Dollars in 2025) as profit with the timeframe.

Table 1: Revenue from oil and gas resource extraction in Nigeria (2022 - 2023)

Description	**2022**	**2023**	**Total**
Domestic crude oil receipts	329.3 billion	58.4 billion	387.7 billion
Revenue from crude oil exports	-	23.05 billion	23.05 billion
Federation crude oil profits	-	94.9 billion	94.9 billion
NNPCL Dividend	-	407 billion	407 billion
Revenue from gas exports	-	6.2 billion	6.2 billion
Total	**329.3 billion**	**589.6 billion**	**918.9 billion**

Source: NEITI Report, 2024

The 2024 report of the Nigeria extractive industry transparency initiative (NEITI) indicate that over 480 million barrels of crude oil were lifted in Nigeria in 2023, with about 7.5 million barrels of crude stolen within the same period, while more than 22 billion dollars was realized as revenue from oil and gas sales in 2023 alone (Ochonu, 2024). Despite huge annual revenue from the oil and gas industry, Nigeria's economy is still facing a lot of hurdles concerning poverty reduction and employment creation. On the side of government, millions of Nigerian children are not in school while existing schools are not well-equipped; healthcare provision even at the primary level is below standard. IOCs operating in Nigeria are also complicit in the corrupt practices prevalent in the oil and gas sector. According to Akoji and Adetunji (2024), allegations have been made on bribes paid to government officials by parties representing the interests of some IOCs, to favour their purchase or renewal of 'juicy' oil prospecting and mining licences in different locations in the Niger delta region of Nigeria. To make matters worse, many IOCs are perceived as subservient to government agents by collaborating with them in either under-reporting oil and gas extraction volumes or outrightly making away with huge quantities of extracted resources, a scenario generally termed as 'oil thief' (Ejiogu *et al.*, 2019). Moreover, IOCs like TotalEnergies that operate within the Nigerian territory are owned by western countries who have been accused of perpetrating and benefitting from the 'resource curse' paradox in African countries, hence they may not have the interest of the host communities at heart (Oduyemi *et al.*, 2021). Moreover, military coups in three former French colonies (Mali, Niger and Burkina Faso) within the last three years have created a negative perception of French companies like TotalEnergies by many people in the West African region, who may perceive France as a neocolonial agent who is only here to perpetrate her economic and geopolitical interests in the region. According to Kohnert (2022), France has continued to exert economic control over Francophone countries in West Africa through monetary policy and central banking for these countries in Paris. Therefore, French IOCs like TotalEnergies may be seen as an agent positioned to implement the economic preponderance of France over the West African sub-continent. According to Onuoha and Elegbede (2018), price mechanisms for accruable revenue from Nigeria's oil and gas are completely out of the country's control, a clear demonstration of the problem of proprietary interests, especially concerning price determination. Consequently, regulating the price of oil and gas resources is advantageous for Western countries that own the majority of IOCs. The problem of petrol-rich countries like Nigeria not being in full control of oil and gas prices is made worse by the US Dollar being the base currency for determining oil and gas prices in the international market (Muhammad *et al.*, 2024). This, in turn, denigrates local currencies and may prevent the local economy from reaping the full financial rewards of oil and gas exports (Shang & Hamori, 2021).

Instead of fulfilling the promises made on repackaging their operations to focus more on renewable energy systems, TotalEnergies appears to be strategically and

intentionally increasing its crude oil output. Despite TotalEnergies' statements that they will focus on the production of biogas energy [which can help reduce Nigeria's electricity deficit] from organic waste in Nigeria, the company has not yet started the process. Furthermore, plans for integrating its activities in Nigeria into this plan for the transition to clean energy sources have not moved forward significantly. However, TotalEnergies have also made some impact in reducing Greenhouse gas emissions, though not in Nigeria. For instance, the company's participation in tree planting initiatives such as the Batéké Plateaux project in the Congo Republic, where more than 30 million trees are to be planted, is commendable. This is because these trees have the potential to absorb more than 450,000 tons of carbon dioxide, thereby reducing atmospheric GHGs (TotalEnergies SE, 2022). In keeping with her goal and the company's energy transition plan of becoming one of the top five renewable energy companies in the world, TotalEnergies is hoping to invest about $60 billion in several renewable energy projects across Nigeria within the next decade (Tena, 2021). In addition, the company plans to install solar systems in all 540 TotalEnergies' service stations across Nigeria, with about 77 of them already solarised (Asowata, 2021). However, only time will tell if these laudable renewable energy programmes can be achieved and are not mere rhetoric.

Challenges to Energy Transition in Nigeria's Oil and Gas Sector

Initiatives instituted by TotalEnergies to transform from GHGs to more renewable energy systems appear quite realistic; however, the company finds it challenging to completely achieve this goal for obvious reasons. Host communities in Nigerian oil-producing regions primarily rely on royalties from the government and projects from the Corporate Social Responsibilities (CSR) of IOCs. Also, Nwankwo (2021) posits that because oil and gas operations utilize a minimal labour force, unlike other extractive industrial setups, residents might not be able to find fulfilling jobs in the industry. Low manpower requirement in the oil and gas industry is a serious issue that affects the welfare of communities in oil and gas-producing areas. Unlike agriculture, food processing, and manufacturing, among other sectors that require a lot of workforce to create products, oil and gas exploration and extraction need fewer hands. According to Okwelum (2022), unemployment in Nigeria has remained as high as 33 percent, with the oil and gas industry accounting for less than 2 percent of the Nigerian workforce. Also, the IOCs have not prioritised technological transfer for Nigerian employees despite efforts made by the Nigerian government to improve local content in the oil and gas sector. Currently, Nigeria has the Petroleum Technology Development Fund (PTDF) and the Nigerian Content Development and Monitoring Board (NCDMB), which were established to protect local interest, particularly concerning manpower development. However, there are no modalities to ensure that individuals trained under the PTDF are directly transferred to man strategic positions in the local operations of IOCs like TotalEnergies in Nigeria. Etuk (2023) posits that many IOCs are reluctant to transfer technological know-how to Nigerian operators due to copyright issues and the protection of intellectual property laws in their country of origin. Also, some IOCs may feel that transferring technology to local manpower will negatively affect their relevance and profit margins from their Nigerian operations. These issues are further compounded by deficiencies in the work environment, which can lower overall manpower productivity in the oil and gas sector. Taiwo (2010), in evaluating how work environment affects productivity in the Nigerian oil and gas sector, identified that many oil and gas workers in Lagos, Nigeria, are not satisfied with the level of conduciveness of their work environment and feel that improved welfare and remuneration will significantly enhance their productivity in the workplace. Even though many stakeholders are aware of the dynamics in the global energy market, with respect to calls for energy transition from fossil fuels to renewables, there is still confusion as regards not only what needs to be done, but also the timeline needed for such a transition in Nigeria. According to Oruwari *et al.* (2024a), even though the global energy market is gradually divesting towards sustainable energy systems, Nigeria's oil and gas is still in a quandary due to a lack of cohesion among policymakers, investors and key energy players in deciding the best approach for Nigeria's energy transition.

Due to the plethora of issues affecting the operations of Nigerian OICs, providing the required modalities to realise energy transition from fossil fuels to renewables in Nigeria is not readily available and implemented. To make matters worse, the Nigerian government has not provided the needed direction for IOCs like TotalEnergies to follow, in terms of transitioning from fossil fuels to renewable energy systems. Whereas IOCs like TotalEnergies have a lot of possibilities in the energy transition age to offer sustainable energy options, their integrity and sense of purpose is weak because they are more focused on increasing the revenue they make from oil and gas. To illustrate this stance, TotalEnergies' increased intensification towards oil and gas exploration in Nigeria's coastal waters, as opposed to diversifying to renewable energy (Oredola, 2021). In addition, many IOCs are more concerned with profit-making to satisfy shareholders, as opposed to making the necessary sacrifices needed for a successful energy transition in Nigeria. Even though TotalEnergies has been making promises about ending routine gas flaring in its oil platform for years, it is yet to do so, though it hopes to stop gas flaring by the end of 2023 (Chukwu, 2023). Also, Nigerian government hopes to end gas flaring by 2035 through commercialisation of gas flaring sites in more than 40 locations in the Niger Delta, by auctioning them to preferred bidders (Enerdata, 2023a).

Since the vast majority of the local population is employed as farmers, hunters, and fishermen, decades of ongoing

oil and gas exploration by IOCs have severely degraded delicate ecosystems in Nigeria's Niger Delta region by destroying arable land, contaminating streams and rivers, and annihilating plants and animals (Okotie *et al.*, 2018). Additionally, because they do not directly benefit from these resources—which many view as a resource curse, endemic nepotism and dishonesty within Nigeria's oil and sector have severely undermined moral values among indigenous people of oil and gas producing communities in the Niger Delta. According to Babatunde *et al.* (2018), many Niger Delta youths involve in illegal petroleum refining, kidnapping, and vandalism of oil and gas facilities because they have lost most reliable sources of livelihood, as a result of the resource curse from petroleum resource extraction. According to Felix (2024), ineffective policy direction for an energy transition era, prevalence of oil spills and gas flaring, which cause environmental pollution, are the major challenges currently bedevilling Nigeria's oil and gas sector. Therefore, it is not surprising that Nigeria's inadequacy in natural gas storage infrastructure and limited penetration of the local natural gas market are fundamental setbacks to Nigeria achieving a low-carbon future and transition to using mostly renewable energy systems (Oruwari *et al.*, 2024b). In a similar spirit, IOCs would be reluctant to commit the necessary funds to switch Nigeria's energy source from fossil fuels to clean energy sources. This could be due to overbearingness of Nigerian security agents in the oil-rich Niger Delta area, which dissuades foreign investment essential for achieving Nigeria's energy transition (Akomolafe, 2024).

Strategies for Nigerian IOCs during an era of Energy Transition

IOCs must implement a workable plan that will enable them to sustain their economic sustainability and commercial relevance in the twenty-first century, considering the significance of the energy transition to sustainable energy availability in the future. Therefore, Figure 1 outlines the suggested tactics that can be used. The essence of these strategies is to provide a clear approach to the energy transition process without causing significant economic drawbacks on the Nigerian oil and gas sector.

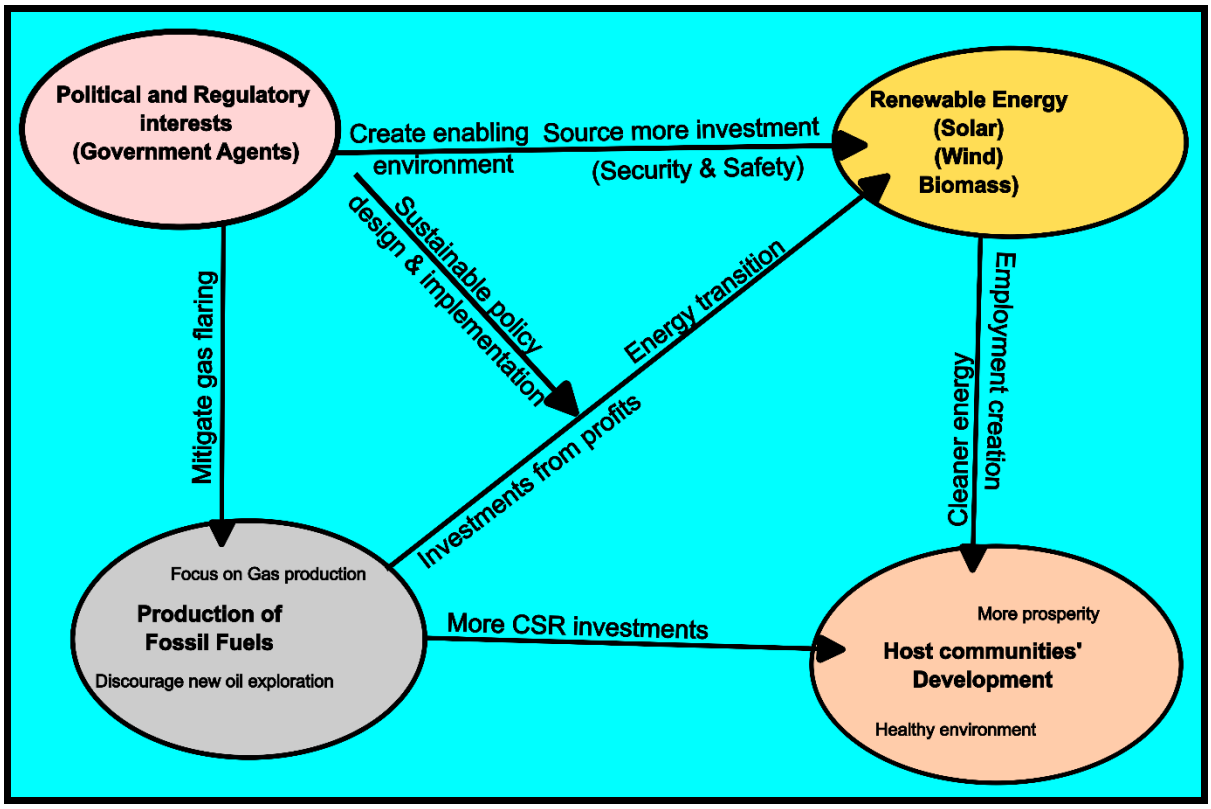

Figure 3: Strategies for economic practicality during an era of energy transition

In order to improve economic viability during the energy transition, four strategies have been recommended. In accordance with the vested interests of all stakeholders affected by oil and gas activities, IOCS need to succeed in the energy transition era. All over the world, the use of a 'transition fuel' like natural gas, with less pollution potential, has been introduced to bridge the gap, pending increased commercialisation of renewable energy systems. In terms of energy transition in Brazil, the government is pursuing a decarbonisation policy where more investments in renewable energy in the oil and gas sector, as well as the electricity sector (Werner & Lazaro, 2023). According to Ume *et al.* (2024), the Nigerian government offers incentives such as renewable energy investment tax credits for investors in renewable energy projects, the Renewable Energy Development Fund (REDF), and concessionary import duty rates for renewable energy equipment for importers. These

incentives are among others. In order to make these incentives work, there is a need for a paradigm shift aimed at overhauling economic, social, environmental, cultural, political, and technological regulations, so as to sustain a viable energy transition in Nigeria. Consequently, the government's strategies to reduce habitual gas flaring should be meticulously followed, so as to significantly reduce how it affects environmental health. In addition, the interests of all stakeholders need to establish a supportive environment, develop and implement environmentally friendly guidelines, and secure additional funding for the growth of sustainable energy systems like solar and wind power. Production of fossil fuels is the responsibility of IOCs like TotalEnergies, who are expected to discourage new oil exploration activities but focus more on gas production, given that natural gas is fundamental in the global energy transition (Galal, 2023). According to Oruwari *et al.* (2024b), natural gas is an important transition fuel, which Nigeria currently has over 200 trillion cubic feet of gas deposits; realizing the potentials of natural gas as a transition fuel depends on provision of adequate infrastructure and funding that not only improves local gas demand and supply, but all reduces Nigeria's carbon footprint, thereby mitigating climate change. Also, IOCs are expected to make more investments in fulfilling their responsibilities towards improving development in host communities. According to Nigeria's energy transition plan, it is also anticipated that IOCs will use their earnings to fund renewable energy projects (ETP Nigeria, 2022). Because sustainable energy systems require a lot of labor and maintenance staff, it is anticipated that environmental pollution will be greatly reduced as they gradually replace fossil fuels as the world's energy sources (Martins *et al.*, 2019). Additionally, more job opportunities will be created. In a similar vein, it is anticipated that more job generation, the affordability of cleaner energy systems, and increased social responsibility programs will go a long way in promoting a better quality of life for Nigerians in general and Niger Deltans in particular.

CONCLUSION

Nigeria has an essential part to play in the energy transition era because of her enormous reserves of natural gas and crude oil. The world is calling for a shift away from Greenhouse gas-producing fossil fuels to more sustainable and cleaner energy sources because we are steadily running out of fossil fuel deposits due to the exponential growth in human population. We are also facing serious negative environmental and human health effects, such as pollution, climate change, and the prevalence of diseases and ailments linked to pollution, all of which have a significant financial cost to the global economy. An important participant in Nigeria's oil and gas industry, TotalEnergies is a significant IOC. Although TotalEnergies changed its name to diversify their activities to reduce their carbon footprint by focusing on sustainable energy systems per the global energy transition strategy, they have not invested heavily in renewable energy in Nigeria. Instead, the business has increased its pursuit of petroleum deposits, which is a major contributor to GHGs. Therefore, it is clear that there is a disparity between host communities and other oil and gas industry participants. This has sustained geopolitical issues, as regards how the energy transition era will be affected by petroleum prices [especially natural gas] going forward. Injustice, cronyism, failure to fulfil social responsibility commitments, ongoing regular gas flaring, kidnappings and general insecurity have made it difficult for IOCs to live up to the demanding standards set by the energy transition phase. Thus, it has been suggested that a four-pronged strategy be used, with political and regulatory actors fulfilling their responsibilities, IOCs concentrating on natural gas production instead of crude oil, all stakeholders increasing their investments in sustainable energy sources, and ultimately bringing prosperity and sustainability to host communities.

In light of this, it is advised that IOCs put in greater effort to implement the renewable energy investment plan within the allotted period. This will significantly increase the likelihood that sustainable energy systems will be given due consideration during an era of global energy transition. Additionally, to reduce environmental contamination and enhance general environmental health, host communities' concerns should be taken into account during all decision-making processes. Also, the government should create an enabling environment that will encourage more investors to come into Nigeria's gas sector. These investments can focus on gas liquefaction to reduce gas flaring and building more gas pipeline infrastructure across Nigeria. Furthermore, more regulatory mechanisms should be instituted that mandate IOCs to compulsorily transfer modern technological know-how to Nigerian employees. This can be achieved by reviewing the joint venture agreements Nigeria has signed with IOCs and ensuring that local regulators like PTDF and NCDMB effectively enforce these regulatory directives.

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