

Licensing of Modular Refineries by Government in the Niger Delta Region to Stop Artisanal Refining of Crude in the Creeks: A Review

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ABSTRACT

The main source associated with ecological airborne contaminants is particle emissions from improper combustion processes in car exhaust, tyre burning, and waste, which are mostly caused by people's over-reliance on petroleum-based products and biofuels. These activities lead to inadequate combustion of exhaust from automobiles, burning of tyres, and waste. The contaminants are carried by air and harm human health as well as the ecosystem. Nigeria is one of the continent's top producers of petroleum products but is faced with inadequate implementation of anti-pollution laws by regulatory authorities. The goal of this narrative is to review and highlight the dangers of airborne contaminants in the Niger Delta region and the necessity for the government to provide licences to modular refineries to cease the illegal production of oil in remote regions (creeks). This would lessen the threat posed by illegal "bunkers" and the ongoing contaminants in the air in the Niger Delta region. It is preferable to eliminate air pollution at its source rather than to lessen its effects as according to WHO standards, most times, smoke loads discharged into the atmosphere are generally over legally acceptable limits. The small-scale, unauthorised burning of hydrocarbons to produce the essential goods—petrol, diesel, and kerosene—needed by the general public is not efficiently exploited. These illicit artisanal refining spills into the creeks are creating another ecological hazard that results in aquatic contamination of our waterways that eventually end up in the sea. Pits excavated to hold the remaining products are typically over-floated during the wet season, which overflows into the creeks leading to environmental pollution.

Keywords- Air pollution, Environment, Government licensing, Health, Modular refinery

INTRODUCTION

Pollutants of many kinds contribute considerably to regional and global problems, including environmental air pollution. In general terms, air pollution refers to the release of physical, chemical, and biological pollutants into the atmosphere that changes the degree of naturally occurring gases [1]. The combustion of crude oil during oil and gas drilling releases a significant amount of contaminants into the environment [2]. Beyond any restrictions provided by the law. One out of six mortality globally is still caused by contaminants in the air, which causes roughly five million mortality deaths annually [3]. Amongst the issues with expanding towns in the Niger Delta is air pollution; which has gotten much worse with urbanisation, the accompanying rise in the industry, and a spike in access to transportation, all of which have led to increasing levels and heightened contaminants in the air in areas with great population density. Following World Health Organisation the majority of the ambient pollution that people breathe emanates from places in their immediate surroundings or locale, making it one of the biggest ecological issues. Our developed lifestyle produces more rubbish than ever before. Some of this garbage is thrown into the air, while others are deposited into bodies of water or the ground. the Nigerian nation has experienced significant challenges as a result of societal difficulties ever since the discovery of crude in this nation, the nation's expanding oil sector, as well as an increase of inhabitants and an absence of sustainability management, has caused significant environmental harm in Nigeria, in particular in

the Niger Delta, the nation's oil sector's hub [4].

Over a while now, contaminants in the air have emerged as a significant technological and social issue. Considering its significance, contaminants in the air remain one of the most pressing environmental issues and social concerns. Since they are no consistent estimations of air quality made by government organisations, the majority of investigations that have already been done rely on separate investigations [5]. A great deal of pollution emissions around the Niger Delta regions is caused by individuals, namely in urban and rural populations known as "creeks". Sustainability laws and guidelines aimed at safeguarding biodiversity from polluting operations are not implemented and enforced effectively. In 2019 alone, it was recorded that hypertension, cigarette use, and a poor diet were more of the risk factors causing early mortality globally than contaminants in the air [5]. Airborne contaminants rose to the fourth-ranking leading cause of death around the world.

Researchers have been accumulating an immense amount of information on the dangers that inhaling low-quality air brings to the well-being of people and our ecosystem during the past number of years, possibly the greatest strong proof for any ecological danger concern currently available [6]. To win this battle, the departments of well-being and the environment must work together with academic institutions and nonprofit organisations. A different kind of contaminant in the air is black carbon, that has a substance that is usually an element of the airborne particles released by combustibles, however, the volume released differs depending on the fuel being burned utilised, and the burning procedure, these are suggested optimum concentrations of particle size, including state standards of 40–60 g/m³ and WHO guidelines of 10–25 g/m³. However, it is now crucial for the Nigerian government to enact and offer cautious guidelines on the release of black carbon. Despite the controls and mitigating methods, the Niger Delta region's residents face major difficulties in their physical and mental well-being due to the tiny size and widespread distribution of the aforementioned airborne contaminants that cause air pollution. Multiple research efforts have highlighted the Niger Delta's poor air quality as the root cause of this, according to [6] is that either brief and prolonged contact with black carbon increases

the chance of acquiring either persistent or severe heart failure and pulmonary conditions, as well as lung cancer [7]. The majority of the harmful emissions in the area have been discovered to have both immediate and long-term consequences, including the creation of acidic precipitation, water contamination, soil degradation, consequences on substances and artefacts, influence on biodiversity, and lately, implications on climate change [8, 9]. Although quite a few of these assertions might prove accurate, a large number are not supported by science and are instead conjectural or rely on conjecture [10]. The National Oil Spill Detection and Response Agency (NOSDRA) Act (2006) was passed notwithstanding the Federal Government of Nigeria's Law and other sustainability laws and ordinances, It is noted in the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) and National Environment Standards and Regulation Enforcement Agency (NESREA) Act of 2007 that insufficient oversight and supervision by regulators of the energy sector have resulted in a rise in harmful emissions [11-14].

Certain writers claim currently is a broad agreement among scientists [15] that black carbon particles known as black soot smoke (BS) are created when petroleum, wood, coal, or alternative fuels and bioenergy are burned partially. It is released upon the burning of both solids as well as liquid fossil fuels. Strong change agents like black carbon receive radiation in the air, which affects the amount of rainfall which indicates that Port Harcourt and other Niger Delta towns tend to have a lot of clouds; The regulating agencies' failure to conduct regular inspections and surveillance to guarantee the application of such legislation is an additional reason for the current issue, To prevent this environmental annoyance, the issue may be partially or resolved. The tyre and latex sector recognised soot being a key contributor to skin cancer [7]. Residents of the Niger Delta regions, lawmakers across the nation, including global society as a whole now face an important ecological issue as a result of atmospheric contamination [8].

In the past couple of years, the petroleum-rich Niger Delta region has seen an increase in the stealing of petroleum products through transmission lines, which results in persons destroying conduits and diverting the oil

to unauthorised (or artisanal) distilleries set up in the dense jungle. The majority of such distilling processes happen at dark and change every day, making them difficult to forecast. Port Harcourt, Niger Delta, saw the discovery of over 40 illicit distilleries [9]. Agriculture as well as fishing have historically made up over fifty percent of all jobs in the area, making them the largest contributors to livelihood. Nevertheless, substantial pollutants that were built over decades destroyed their ecosystem and, consequently, their way of life [10]. Furthermore, several localities and indigenous peoples are engaged in protracted disputes with authorities, law enforcement agencies, and oil firms, especially concerning their entitlements to land possession and acquiring it, payments for benefits and loss of biodiversity [11]. Young People, who make up approximately 40% of the population in that area, are especially affected by joblessness and unemployed. Youth rebellion in these regions is a result of issues brought on by the region's economic hardships and the current poor environmental conditions [11].

Petrol flare-ups are just one type of airborne contaminant. Although petroleum-based businesses, in the world, regions, in urban areas, as well as worldwide, frequently flare massive amounts of pollutants on an industrial scale. Gas flares, also known as related gas, harm the land, water, and air conditions within the Niger Delta locale, particularly on the economic livelihoods of the locals. Red leaves as well as reduced growth have been seen on plantains and cassava as a few of the more general consequences of gas flares. The flare areas contained palm trees, yams, and different crops. Naturally, it may be suggested that the compressed air generated to be utilised in the turbine to generate electricity or compressed and packaged for usage in household and commercial uses. To maintain the population's necessities and provide guidance for a solid background in technology to fully utilise the nation's gas prospects, the regulation Compliance Agencies, particularly the Ministry of Petroleum and Natural Resources, ought to be proactive in implementing every applicable law on flared gas [12]. Nigeria as a whole doesn't have the technology it needs to use its gas, therefore it ignites 73% of the natural gas it produces. This condition persists since separating related gas via the oil is expensive,

and certain oil firms ignite the gas right out of holes whereas other firms build burners to flare it out. In all regions of the Niger Delta, gas flares are burned to great elevated positions, frequently close to populated regions. The flares frequently produce suspended particles, primarily sulphur dioxide and nitrogen oxides, in addition to carbon dioxide, formaldehyde, radon, lead, ammonia, and methane, and can contain up to 250 distinct poisons [13]. The release of gases in the Niger Delta region has a very visible detrimental impact on the region's ecology, which is extremely evident [2].

The flare-up of gas has had a terrible influence on the socio-physical ecology of the oil-producing villages in the Niger Delta during the past 40 years. This has seriously threatened the ecosystem and the daily needs of the peasant economy, which in turn has seriously threatened the populace's basic survival and way of life. [14]. The year 2020 saw the burning of \$1.24 billion worth of energy from natural gas, which was adequate to provide electricity to 804 million Nigerians over a whole year [15].

Intending to prevent gas flare-ups, the Nigerian government launched the Nigerian Gas Flare Commercialization Programme (NGFCP) in 2016. The NGFCP's goal is to end gas flaring using practical and profitable gas utilisation initiatives created by knowledgeable outside capital. The Nigerian government passed the "Flare Gas (Prevention of Waste and Pollution) Regulations 2018" to serve as an enforceable basis for the NGFCP's application. The Oil and Gas Climate Initiative (OGCI) is a group that includes the majority of foreign oil firms doing business in Nigeria. By 2025, OGCI businesses are committing to reduce pollution to a 0.25% escape velocity, and ultimately reduce it to a 0.20% leak rate across all upstream origins. However, to promote revenues via the use and monetization of related gas, the Federal Republic of Nigeria revised the statutory structure known as "Flare gas" (prevention of waste and pollution) rules, in 2018., alongside the intention of reducing or eliminating flare. Despite loose regulations and inadequate surveillance, this endeavour seems ineffectual [16]. Listed below are the main contaminants in the locality represent a few of the potential risk concerns linked to atmospheric air contamination in the Niger Delta zones.

BLACK-SOOT

Black soot is a contaminant on an international as well as local level, and it constitutes an imminent risk to air purity due to contamination brought on by insufficient combustion over time. Aquaculture, a key vocation in the majority of populations in the Niger Delta, is particularly at risk from the black soot, which further causes significant harm to wildlife and fisheries. Although it includes a large proportion of known black carbon and typically takes in all hues of brightness, thick black soot resulting in raw combustibility generally seems to be black [17]. Although seven years, the challenging scenario continues this includes actions of several illicit oil "bunkers" and illicit conduct committed throughout the areas which have negatively impacted agricultural areas, and waterways, diminished the ambient level vision, caused an inconvenience to society, degraded assets, amenities, affected the monetary worth of possessions, and as also affected the ecosystem. The nation's statutory branch, scientists, researchers, and academics all talked on the topic of black carbon, that established quickly, but the field of science is selecting, bringing together, and discussing it at a relatively slow speed in light of the recent discoveries of black soot. Implementing laws and policies in a precise manner is important.

The establishment of modular processing facilities comprised several of the primary suggestions made in the majority of publications [18, 19] to stop the cause of soot. Nevertheless, the issue of black soot continues to exist due to an inadequate electoral determination for implementing the study into action and the nation's slow response to take action or establish rules designed to lessen it [18]. Notwithstanding this, authorities ignored the pleas and wailings of people residing in the Niger Delta regions, particularly in the city of Port Harcourt. Having an air quality score of 188, Port Harcourt City was ranked as one of the worst airborne pollutants cities in the globe in April 2018 [19]. In the same vein, Air Visual rated Port Harcourt as "very poor" for vulnerable populations of people with medical problems, with a December air index of 207.817 [8]. As stated by [18], Intense discharges seem black because black carbon takes in illumination at all frequencies. Moreover, tiny pollutants deflect brightness, producing droplets that range in

colour from blue to white. The atmosphere's efficient reflectivity grows when the fragments mix. The majority of districts in the Niger Delta, particularly Port Harcourt, Delta, Bayelsa, and Akwa-Ibom, have substantial amounts of pollutants and ongoing hazardous emissions as a result of everyday operations conducted in those regions. The primary cause of pollutants in the atmosphere in the Niger Delta is the petrochemical company, notably the sector that follows it. Approximately 76–80% of people in remote regions and 50–55% of those in urban areas do not have access to clean potable water, which is largely due to soot exposure. It is important to mention the fact that the fisheries business is thriving in this area; all coastal towns are fishing locales and rely on the sector for their means of subsistence. Due to such variables, native people experience numerous kinds of marginalisation and hardship [10]. As stated by [19], illicit bunkering and gas flare-ups are among the primary causes of soot discharge in the Niger Delta zone after extensive examinations involving atmospheric particulate, the primary driver of black soot. The removal of soot employing surfactant treatments before discharge entering the natural environment should be preferred when trying to effectively limit soot discharge. Practitioners in medicine have noted that in such a similar direction, those subjected to large doses of black carbon over a prolonged amount duration can suffer from significant toxic exposure [14]. The cardiac system (the heart, arteries and veins, and lungs) might suffer complications from exposure to black carbon, including early mortality. Various societal concerns, such as respiratory illnesses, are also connected with prolonged contact with tiny fragments (black carbon) pollution. Children, individuals with heart or lung conditions (particularly those who have asthma), seniors, and those from lower socioeconomic backgrounds are those who are especially in danger [14]. In addition to possibly avoiding many thousands of untimely demises annually, reducing black soot pollution will likely have significant positive effects on worldwide general well-being. It is feasible to identify "essential" pressures" for specific habitats in the realm of nature, i.e., tolerable accumulation rates beyond what the ecological system could be in danger of negative impacts. The problem tends to be complicated for people's well-being because certain contaminants lack known acceptable dosage limits [19] (Fig. 1).



Figure 1: Typical black carbon emissions clouding the city of Port- Harcourt at 10 am in morning.

Gas Flaring

The gas flare-up is the burning of related gas from crude oil extraction and drilling processes that takes place in processing plants, petroleum wells and drilling rigs by igniting flammable waste from those sectors. The atmospheric contamination of the air is greatly exacerbated by flare-ups of gases within oil company flow stations. Russia, Nigeria, Iran, Iraq, Algeria, and Saudi Arabia are among the nations with the highest gas flare-up rates Global Bank, 2017. Several regulations having deadlines are passed throughout the years in Nigeria, including one that prohibits gas flaring, despite which, the country continues to flare gas [20]. The 'end to gas flaring' programme of Nigeria progressively moved from the Year 2005 to Year 2010 to 2020, and subsequently to Year 2030, even though the nation is one of the leading nations that flare gas [21]. Authorities are researching ways to curtail or prevent regular flaring because it has garnered worldwide interest for decades [15]. Additionally, crucial states with frequent gas flaring, like the Niger Delta metropolis, need benchmark information as well as norms regarding air safety [22-25]. The Niger Delta regions are being completely consumed by this predicament, which is causing degraded weather conditions [26, 27]. Nigeria is a country that yearly emits liquified natural gas LNG into the atmosphere above all other countries in the world [28].

Since the Niger Delta is the centre of the nation's energy sector, pollutants in the outdoors such as PM 2.5, PM10, carbon dioxide, SO_x, and NO_x define the locale's state of the air [22]. Although the related consequences of flare-ups of gases are well known, there are currently no initial values or laws establishing measures of being exposed to appropriate quantities for such airborne contaminants [29].

The nation holds the tenth most important gas resource in the world, with an estimated 182 trillion cubic feet (CF) of reserves [23]. According to estimates, the country produces 5.78 mcf of liquified natural gas, LNG per day, meaning that up to 80% is flared up, 12% is reinjected, and only 8% is used for meagre consumption, primarily for generating electricity for household, manufacturing facilities, and international consumption in 2008. According to the present estimates, the country is responsible for around 28% of the overall quantity of gas released worldwide. The amount of LNG flared globally reaches 120 billion cubic metres (m³). (Global Bank, 2017). NNPC estimates that 40% of the nation's petroleum output is lost by flare-ups, an amount that is equal to about 12% of all average worldwide flare-ups (NNPC, 2017). This results in an annual monetary loss of \$2.5 billion due to flared gas [24]. Several researchers' writings [12, 28, 29] stated since contaminants are generally experienced within their release location, nationwide efforts of establishing and

proper optimal restriction enforcement ought to be tolerable. There hasn't been a thorough investigation into the effects of flare-ups of gas on the well-being of people, despite the previous head of the World Bank, Jim Yong Kim, urging nations that are still using it to utilise it to productive use by using it in places without power [24].

Gas flare-ups in the Niger Delta discharge pollutants that deteriorate the atmosphere, raising the chance of developing tumours and other diseases that impair the nervous system, the reproductive system, or the growth of children [25] indicated that petroleum-based goods from gas flare-ups were to blame for several medical and ecological issues as well as certain adverse effects of gas flaring, such as increasing temperatures, changing the climate, harmful emissions, cattle losses, and breathing issues. Regrettably, it appears that these oil firms' primary emphasis is on oil and neglects the possibility of leveraging gas as combustibility and also fails to concentrate on the adverse consequences of igniting the gas. Investigations show that individuals near energy-related drilling operations are suffering from detrimental impacts connected to the release of pollutants. Reviewing penalties as well as costs levied in Nigeria for flared gas reveals that the penalties are affordable yet paying them is cheaper than investing in making use of generated gas, in particular. If there are no facilities for bringing it to the stock market. By way of example, the Related Gas Re-injection Act of 1979 imposes a price of 0.50 Naira per million cubic feet (mcf) of gas flared. However, such a fine was raised to 10 Naira per mcf in 1998.²¹ For every 1,000 cubic feet of gas discharged, the fine was increased to \$3.5022 in 2009. Nevertheless, the suggested fine of \$3.50 per 1,000 cubic feet of gas released is inadequate and won't dissuade the firms, according to previous Senate President David Mark [26]. Energy firms that seek to harvest oil at a low cost will find this to be a deterrent [11].

LNG is capable of being utilised as fuel instead of being flared; in the United States, energy firms transform and utilize petroleum products or re-inject gas into the earth's crust, while just about 1% of gas is flared, whereas, in Nigeria, a significant amount of natural gas obtained from drilling sites in the Niger delta is instantly flared into the surroundings at a rate in the range of 70 million/m³ per day, which is

close to 40% of African energy use and is the primary cause of greenhouse gases [27]. The country still flares gas, contributing its sad portion to global warming that is primarily due to more than 50 years of extensive oil drilling and extraction operations as well as to a growing populace [28-29]. The flares destroy flora, scorch the surrounding area, alter the pH of the substrate, and cover the surrounding area in soot [30]. According to reports, gas flare-ups in the Niger Delta contribute to acid rain, and residents of Nigeria depend on rainfall for household needs like washing clothes, preparing food and consuming (for individuals and livestock).

Consuming acidic rainfall is linked to gastrointestinal inflammation, lesions, epidermal malignancies, and eroding of the digestive lining' mucous membranes [28]. Based on the work done by [30], who compared the levels of airborne contaminants in Port Harcourt and Lagos State, accordingly, concludes that the Niger Delta holds the greatest quantity of harmful substances and contends that some greenhouse emissions (like methane and carbon dioxide) released at locations of flares significantly play a role in climate change. The majority of the aforementioned flare-up locations are in the Niger Delta regions, making them susceptible to various types of ecological contamination, such as contaminants in the air, which many city dwellers are forced to deal with each day as a consequence of the extensive manufacturing. and social-economic growth based in the majority of the Niger Delta regions' urban centres.

Numerous origins of airborne pollutants are being identified by investigations as being present in the Niger Delta zones. Shell stated in its report on environmental issues from 2006 the company would stop regular gas flare-ups all around the world in 2008, except for the Niger Delta locale. This was done since the places were difficult to reach and since the elimination of flares could result in particular regions stopping production, as is the case in Delta State. Energy corporations choose to incur fines instead of halt flaring emissions, making it impossible to punish them for doing so after the deadline has passed. Petroleum firms haven't done much to reduce or manage how the activities they conduct exert a direct effect on the ecosystem. In the Niger Delta region, it is not uncommon to see a big number of red flames burning continuously (Fig. 2).



Figure 2: Picture of an actual flaring site in Delta State.

Artisanal Refineries

Facilities known as artisanal distilleries are constructed using indigenous metal resources and metallic storage tanks. The unprocessed fuel is typically looted, vandalised, or transported via conduits to the locations or facilities where it is processed over a certain range of temperatures to create substandard petroleum-based goods. Facilities known as artisanal distilleries are constructed using metals that are manufactured on local-level metallic tankers. All of these small-scale processing facilities provide the Premium Motor Spirit (PMS), also known as Petrol (PMS), Automotive Gas Oil (AGO), and Dual-Purpose kerosene (DPK), and these products are in frequent use by the locals, particularly for the fast motorboats that travel the creeks as well as the location of the escrow. Following due to their often high capital requirements, operators usually hold large sites of artisanal refineries. According to conduct studies, the local market is valued at about \$28 million each month, or \$336 million annually. The monetary value of processing is much greater than the revenues levied by local authorities on the affected towns. The process is comparatively unorganised, fails to conform to global standards and criteria for processing crude oil, and makes a significant difference to atmospheric nuisance and discharge since the fume levels emitted into the surroundings are frequently beyond allowed permitted levels. It's essential for government licencing of modular processing facilities in the Niger Delta regions. In place of a government solution to regularly destroying local refining facilities utilities,

situated in the Niger Delta regions, is necessary to stop the unlawful processing of petroleum products. For several years now, issues connected with airborne pollutants generated by the combustion of petroleum product via unlawful artisanal processing facilities within the Niger Delta region has been a significant issue. Frequently, such events damage the ecosystem and cause water and air contamination. The Joint Military Taskforce (JTF) was established by the federal government to keep an eye on these illicit operators' conduct to control the ecological scenario. Now, practically every coastal community in the Niger Delta zone has an illicit refinery.

On July 11, 2014, the Vanguard Newspaper revealed JTF had dismantled 110 illicit distilleries. This exempts 3,872 surface tanks utilised through artisanal refinery owners, 191 barges, 13,129 drums, 785 wooden cargo boats, and 13,343 Jerry cans owned by illicit oil producers, as stated by JTF. What's intriguing about this is the fact operators immediately install new obstructions when they cause one. The situation at hand hence is to build, demolish, and then rebuild. A continuous stream of black smoke is released into the environment as long as the aforementioned circle continues to exist. Additional research on these studies confirms the existence of known "black carbon" can lead to detrimental contamination of the air and healthcare management issues. The primary goal of this evaluation is to persuade the Nigerian government to expedite the research and development of solutions that, once combined alongside the existing accessible industrial possibilities, will offer a full range of

possibilities for businesses looking for ways to profit from flared-up gas quantities of virtually any size and at any point in time. This could reduce the threat posed by illicit bunkery; within the period of heavy rainfall, the holes used for keeping discarded materials are typically

overtaken by devastation, It represents a further ecologically issue brought by artisanal distilling that is unlawful and runs down our creeks, resulting in marine contamination of the creeks and rivers which finally end up in the sea as well (Fig. 3, 4 and 5).



Figure 3: Artisanal refinery in Delta State, Nigeria creates excessive air pollution, negatively affecting human health and the local environment.



Figure 4: Actual size of an artisanal refinery in Delta State, Nigeria.



Figure 5: Actual size of artisanal refinery waste storage pit in Delta State, Nigeria.

Effects of Illegal Bunkery on Human Health and the Environment

Airborne pollutants are an important risk component for an array of illnesses caused by pollution and medical disorders. Amid various medical issues, breathing-related illnesses, long-term bronchitis, heart illness, COPD, stroke, lung cancer, skin growths, breathing problems, acute bronchitis, a lack of oxygen ischemia, and a heart condition, discomfort, abortions, and child malformation are a few of the conditions that have been found, based on continuously breathing in the present amount of airborne contaminants from human-generated sources causes some ailments. It includes widespread evidence from science that persistent breathing in poor oxygen levels worsens respiratory and heart diseases, dramatically lowering the lifespan, and increasing hospitalisations and fatalities. It is well-recognised that older people and people who already have breathing disorders are prone to the negative effects of pollutants in the atmosphere on their physical well-being. When polluted air travels over great distances, it can have an impact on the ecosystem directly, especially the air in the Niger Delta region. The research contends that several illnesses that the residents of the Niger Delta encounter have several real cause factors, including the locale's populace being exposed to a bombardment of chemicals and polluting events. No level has been demonstrated by laboratory tests within which the pollutant is not affected. Reinforcing the present environmental regulations is necessary to safeguard the ecosystem and the well-being of people. The authorities must immediately begin spreading the word about the dangers of particulate exposure along with the detrimental effects of manufacturing black soot through illicit operations. the country's National Environmental (Air Quality Control) Statutes, 2014 are anticipated to regulate the atmosphere there. The goal behind these laws, following the authorities, is to increase surveillance of the nation's atmospheric conditions to a degree that will increase the preservation of biodiversity, farmland, trees and shrubs, woodlands, individuals, as well as additional assets impacted by deteriorating air quality. The reason Port Harcourt is turning into an ecological disaster is due to the absence of electoral determination to enact the laws. Governmental efforts to cut pollution have inspired an alliance of non-

governmental organisations (CSOs) among residents of the Niger Delta, Trust Africa, Stakeholders Democracy Network (SDN), CEHRD, Environmental Rights Action (ERA), and Citizens Information and Development Initiative (CIDI), as well as the National Oil Spill Detection and Response Agency (NOSDRA) and the National Environmental Standards and Regulations Enforcement Agency (NESREA), have questioned the viability of the present regulatory structure on ensuring air quality long-term viability.

Toxicity from the air is causing birth abnormalities, infertility, and sickness in animals, according to research on how they affect the ecosystem. Continually present hazardous airborne contaminants (the ones that degrade gradually in the ecosystem) are especially important to marine environments. These contaminants can bio-magnify in the muscles of animals at the peak of the food chain to levels that are far greater compared to the water or air as they aggregate in the soil.

Limitation of Legislation and Recommendation

His Excellency, Mr Good Luck, established in addition unveiled the "7 big wins" plan of action for his immediate and intermediate targets in support of the scheme for restructuring the Nigerian oil and gas industry. The goals of the plan of action are to create a conducive and secure oil and gas environment with optimised accountability, productivity, an investor-friendly atmosphere, and adequately safeguarded conditions. In October 2016, Ebele Jonathan. The goal of this roadmap's fourth responsibility, "Refineries and Locally Manufacturing Capacity," is to transition Nigeria to become a contingent country to one that exports higher-quality crude oil than it imports. Consequently, the mid-downstream industry is now providing enormous investment prospects, which will boost the GDP and lead to a generation of jobs. The government envisions, towards other things, an approach that includes a private-sector headed collaboration that involves shareholders regarding the legislature or its governing bodies, participated regional authorities organisations, alongside the incorporation of the locale refinery beneficiaries, with the private investor bringing the largest share of capital and operating the Joint Venture

as a subsidiary. All refining establishments must follow the requirements. subsequently, the construction of a modular refinery. Modular refineries must have an intended production rate of no greater than 30,000 barrels per day (BPD). The plant must be transformed into a complete standard refinery once its production rate hits 30,000 BPD. Land-for-equity transactions or shares that have been paid off could be used as the State Government's commitment. To complete its modular refinery project, the federal government is looking for reliable shareholders to join it. The process for choosing interested parties is open to scrutiny and environmentally friendly, while it must take into account the Refinery development strategy's goals and current regulations. According to the Department of Petroleum Resources (DPR) recommendations for the building of Modular refinery distillation facilities in Nigeria, the licencing procedures are divided into three stages, including

- License to Establish (LTE).
- Authority to Construct (ATC).
- License to Operate (LTO).

Basic fundamental and technical requirements need to be met by prospective shareholders to be eligible and advance through the phases. The magnitude of the fundraising framework will have a considerable impact on how prospective investors are categorised and chosen. The potential stakeholders shall be divided into the following groups:

- Private Investor with financial and technical capacity, preferably with an established Nigerian presence or partnership
- Public-Private Partnership with credible participation from relevant stakeholders such as foreign technical partners, State Government, MDAs, Local Govt. Council, organized private organizations, cooperative societies, community equity contribution etc.
- Regional refinery stakeholders are involved in artisanal activities with a focus on converting the vocationally acquired skills to cognitive technical skills.

Alongside technical and monetary collaborators, they will be considered for shares partnerships. This initiative's government backing for the construction of independently funded Greenfield plus modular refineries for domestic petroleum-based sufficient quantity, which will promote

commodity shipping, is a major element. The government wants the refineries to be variable and situated in refinery districts for efficient operations and little environmental impact.

Key Objectives of the Modular Refinery Initiative

- To promote the availability of petroleum products in the country.
- To conserve foreign exchange utilization for the importation of Petroleum Products.
- To promote socio-economic development to stop restiveness, criminal and illegal refinery activities thereby sustaining peaceful coexistence in the Niger Delta Region.
- To mitigate and eliminate environmental degradation associated with illegal refinery activities, crude oil theft and pipeline vandalism.

Legal Framework

The Department of Petroleum Resources (DPR) in Nigeria controls the establishment of petroleum refineries by laws and ordinances issued by the Ministry of Petroleum Resources and the Minister of Petroleum Resources, respectively. Acts (2) and (3) of the Petroleum Refining Regulations (PRR) of 1974, enacted according to Section 9 of the Petroleum Act 1969, set down the regulatory approach. Additionally, following Directive 47 of the PRR, the head of the Department of Petroleum Resources can occasionally issue directives regarding how to comply with any requirement outlined in the PRR guidelines. In light of this, DPR has completed its investigation of the regulations that will be applicable for the creation of petroleum-based production facilities and has also released a follow-up document titled "Supplementary Standards for the Development, Setting up and Management of Modular (mini) Refinery Plants in Nigeria" that contains information on the necessary specifications, steps, and practises that will make conformity much easier.

The Minister of Petroleum Resources must be contacted (through the DPR) to apply for a licence to build or maintain a modular refinery. The application must be in Form A of the PRR Schedule, and the licence could be awarded following any requirements that the Minister might establish.

CONCLUSION

Because the Niger Delta region is experiencing a spike in environmental airborne contaminants, there is a dire requirement for high-quality air in the Niger Delta zone since the petroleum and gas sector in Nigeria is at the core of the country's economy, and the requirement for an expedient solution. The process of integrating the regional community stakeholders into the scheme shall involve various activities to be anchored by the relevant State Government or its agencies Supplementary guidelines for the Design, Construction and Operation of Modular (mini) -Refinery Plants in Nigeria. A modified modular refinery—to mitigate the harmful emissions brought on by artisanal processing facilities that have been set up internally throughout the Niger Delta regions. Government also recognizes that there would be a limit on the carrying - capacity in each of the oil-producing states, consequently, establishments would be based on the acceptable carrying capacity indices of each state which would be determined by the production capacity, access to infrastructure and limit of the environmental degradation on the environment. To protect public well-being and the ecosystem, the federal government must give licenses to eligible participants with evidence of CAC registration for Nigerian entities, and foreign companies reference by Home Country's agency. For consortium partnership, foreign and local companies must meet standard criteria and present legal documents of partnership, certified true copies of the Memorandum and Article of Association, Evidence of joint venture/partnership Agreement, and Company Profile for all Operators and Developers, to control modular petroleum refineries, and establish regulated permitted discharge levels.

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