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COMPARATIVE ASSESSMENT OF THE USE OF AUTOMOTIVE GAS OIL (AGO) AND COMPRESSED NATURAL GAS (CNG) AS AUTOMOBILE FUELS IN AKWA IBOM STATE

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ABSTRACT

This study comparatively assessed the use of Automotive Gas Oil (AGO) and Compressed Natural Gas (CNG) as automobile fuels in Akwa Ibom State, Nigeria, with emphasis on users' knowledge, vehicle ownership, fuel preference, satisfaction, and refueling practices. A descriptive survey design was adopted, and data were collected through structured questionnaires administered to 150 respondents drawn from four selected companies operating AGO- and CNG-powered vehicles. A total of 140 valid questionnaires, representing a 93% response rate, were retrieved and analyzed using descriptive statistics, including frequencies and percentages. The findings revealed a high level of awareness of CNG, with 85% of respondents reporting good or very good knowledge of the fuel. Vehicle ownership was almost evenly distributed, with CNG-powered vehicles accounting for 50.71% and AGO-powered vehicles 49.29%, indicating an ongoing transition toward cleaner energy alternatives. Despite this, respondents showed a slightly higher preference for AGO (52.86%), largely due to its established availability and wider refueling network. Satisfaction was higher among CNG users (51.43%) than AGO users, while 51.43% of respondents expressed dissatisfaction with AGO because of its rising operating costs and environmental implications. Furthermore, 87.14% of respondents indicated that AGO vehicles require more frequent refueling than CNG vehicles, suggesting greater operational efficiency and lower running costs for CNG. The study concludes that CNG presents significant economic and environmental advantages through lower operating costs, reduced refueling frequency, and cleaner emissions. However, inadequate refueling infrastructure and limited accessibility continue to constrain its widespread adoption. The study recommends the expansion of CNG refueling infrastructure, implementation of supportive government policies and incentives, and sustained public awareness campaigns to accelerate the transition to cleaner and more sustainable transportation fuels in Akwa Ibom State.

Keywords: Automotive Gas Oil (AGO), Compressed Natural Gas (CNG), Automobile Fuels, Akwa Ibom State, Fuel Transition; Emissions.

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INTRODUCTION

The transportation sector is a vital artery of economic growth, facilitating movement of goods, people, and services across regions. In Nigeria, transportation is heavily dependent on liquid fossil fuels such as petrol and Automotive Gas Oil (AGO, often called diesel), making the sector vulnerable to global oil price volatility, subsidy policies, and supply disruptions (Daser-Adams et al., 2025). AGO is widely used because of its high energy density and compatibility with many engine types; however, combustion of AGO emits significant volumes of pollutants such as particulate matter, sulfur oxides (SO_x), nitrogen oxides (NO_x), and carbon monoxide (CO), contributing to urban air pollution, adverse public health effects, and greenhouse gas emissions (Akujor et al., 2022)

Compressed Natural Gas (CNG) has gained attention globally as a cleaner-burning alternative fuel. When properly managed and combusted, CNG typically emits lower levels of CO₂, NO_x, and particulates compared to diesel and petrol (Igbojionu et al., 2019). In Nigeria, the presence of abundant natural gas reserves offers a strategic opportunity to diversify the transport energy mix, reduce import dependence, and mitigate environmental stress (Energy Transition Pathways for the Nigerian Road Transport sector). Some studies have conducted techno-economic analyses of CNG adoption in Nigeria's southwestern states and other regions, showing that under certain assumptions, cost savings and emission reductions are achievable (Daser-Adams et al., 2025; Igbojionu et al., 2019)

However, despite these potentials, the uptake of CNG across the country has been uneven, due to infrastructural gaps (such as; limited refueling stations), conversion costs, public awareness, regulatory barriers, safety concerns, and user preferences (Ibeneme & Ighalo, 2020; Ahmed et al., 2024). In particular, in Akwa Ibom State, the state-level context ranging from the distribution of refueling infrastructure to local awareness and policy support has not been sufficiently explored. It is unclear whether vehicle owners in Akwa Ibom are well informed about CNG, how many have adopted CNG vehicles, and how satisfied they are with either fuel option.

Therefore, this research seeks to fill that knowledge gap by comparing the use of AGO and CNG among vehicle owners in Akwa Ibom State, evaluating key factors such as awareness, ownership, preferences, satisfaction, and refueling practices. The findings aim to guide policymakers, industry stakeholders, and local governments in shaping interventions that encourage sustainable fuel transitions.

Statement of the Problem

Transportation fuels remain central to Nigeria's economic activities, providing mobility for people, goods, and services. Automotive Gas Oil (AGO), commonly referred to as diesel, has historically been one of the most widely used fuels in the transportation sector due to its availability and compatibility with heavy-duty vehicles. However, increasing diesel prices, supply fluctuations, and the associated environmental challenges have raised concerns about the sustainability of relying solely on AGO. Diesel combustion releases significant amounts of particulate matter, sulfur oxides, and carbon monoxide, contributing to air pollution, climate change, and public health risks.

On the other hand, Compressed Natural Gas (CNG) has gained recognition as a cleaner and cheaper alternative. Nigeria's abundant natural gas reserves present an opportunity to

diversify the transport energy mix while reducing greenhouse gas emissions. As part of the Federal Government's energy transition agenda, initiatives have been introduced to expand the adoption of CNG in the transportation sector. Despite this national push, the pace of adoption varies across states, influenced by factors such as public awareness, infrastructure availability, economic considerations, and user preferences.

In Akwa Ibom State, where the transport sector underpins both urban and rural connectivity, assessing the comparative use of AGO and CNG is critical. The state faces rising transportation costs, increased reliance on imported diesel, and environmental pressures from fossil fuel dependence. At the same time, preliminary efforts toward CNG adoption suggest a gradual transition, but challenges such as limited refueling infrastructure, maintenance capacity, and mixed user satisfaction hinder widespread use. This situation raises an important policy and research question: to what extent can CNG serve as a sustainable alternative to AGO in Akwa Ibom State's transport sector?

Purpose of the Study

This study aims to comparatively analyze the use of Automotive Gas Oil (AGO) and Compressed Natural Gas (CNG) as automobile fuels in Akwa Ibom State, with a focus on user knowledge, ownership, preferences, satisfaction levels, and refueling practices.

LITERATURE REVIEW

Automotive Gas Oil (AGO), commonly known as diesel, has been a predominant fuel choice in Nigeria's transportation sector. However, its environmental implications are significant. The combustion of AGO releases high levels of particulate matter (PM), nitrogen oxides (NO_x), sulfur oxides (SO_x), and carbon monoxide (CO), contributing to air pollution and associated health risks. Studies have shown that the Nigerian transport sector has been a major source of CO₂ emissions, with a substantial portion attributed to fuel combustion (Akujor et al., 2022). Moreover, the environmental degradation resulting from petroleum product transportation spills in Nigeria has been a critical concern. These spills contaminate soil, water, and air, harming humans, aquatic life, and biodiversity (ResearchGate, 2023).

Compressed Natural Gas (CNG) has emerged as a promising alternative to AGO due to its environmental and economic benefits. CNG is a cleaner-burning fuel, emitting lower levels of CO₂, NO_x, and particulate matter compared to AGO. This reduction in emissions contributes to improved air quality and public health.

Economically, CNG offers significant cost savings. The Nigerian government has highlighted that CNG can reduce transport costs by up to 60% compared to traditional fuels, providing substantial economic relief to vehicle owners (Presidential CNG Initiative, 2024).

Challenges in CNG Adoption

Despite its advantages, the adoption of CNG in Nigeria faces several challenges. One of the primary obstacles is the limited refueling infrastructure. The number of CNG filling stations is insufficient to meet the growing demand, leading to long queues and inconvenience for users (AP News, 2024). Additionally, there are concerns regarding the safety of CNG vehicles. Incidents involving CNG vehicles have raised questions about the safety of the fuel and its

infrastructure. These concerns need to be addressed to build public trust and encourage wider adoption (Financial Times, 2024).

Government Initiatives and Policy Support on CNG Adoption

The Nigerian government has recognized the potential of CNG and has initiated several programs to promote its adoption. The Presidential Compressed Natural Gas Initiative (Pi-CNG) aims to convert petrol-powered vehicles to CNG, leveraging Nigeria's ample gas reserves to combat rising fuel costs and pollution (Stren & Blan Partners, 2024).

Furthermore, the Nigerian National Petroleum Corporation (NNPC) plans to expand natural gas stations for domestic use, collaborating with local firms to build compressed natural gas (CNG) service plants. This initiative follows the commissioning of the first plant in Lagos, which can deliver 5.2 million standard cubic feet of gas daily, serving 3,700 cars and various industries (Reuters, 2024).

The transition to CNG has significant socioeconomic implications. It offers a sustainable solution to the challenges posed by reliance on AGO, including fluctuating prices and environmental degradation. By reducing transport costs and emissions, CNG adoption can contribute to economic stability and environmental sustainability in Nigeria.

MATERIALS AND METHODS

The study population comprised 150 respondents, including staff, truck drivers, mechanics, and truck assistants associated with AGO and CNG-powered vehicles across four selected companies in Akwa Ibom State. These companies were purposively selected for their significant engagement in the use, distribution, or maintenance of AGO and CNG vehicles. The selected companies included Sterling Petrochemical and Fertilizer Limited (SPFL) located in Ikot Abasi and Eastern Obolo; Bulletine Construction Company Nigeria Ltd in Nsit Ubium; Gitto Costruzioni Generali Nigeria Limited (GCGNL) in Eket; and Hensek Integrated Services Ltd in Uyo.

METHODS OF DATA ANALYSIS

Data collected from the field were processed, compiled, presented and analysed using descriptive statistical method. Achieving the extent of utilization of AGO and CNG in Akwa Ibom State involved getting data from the questionnaire on the number of AGO/CNG vehicles, awareness of AGO/CNG benefits, Fuel cost per litre/kg, distance to nearest fuel station, monthly fuel consumption, Preference for AGO or CNG, user satisfaction or preference index and Frequency of refueling as outlined in Table 1 below. To compare usage level between AGO and CNG, the result of both fuels will be presented on a table using percentage to show the level of utilization.

Table 1: The level of utilization of AGO and CNG gas in the study area

SN	Variable	Measurement Scale
1.	Knowledge of CNG as alternative fuel	Frequency
2.	Number of AGO/CNG vehicles	Number
3.	Awareness of AGO/CNG benefits	Frequency
4.	Preference for AGO or CNG	Frequency

5.	User satisfaction or preference index	Frequency
6.	Frequency of refueling	Frequency

Source: Researcher's compilation (2025)

DATA PRESENTATION AND ANALYSIS

A total of 150 questionnaires were distributed across four selected companies: Sterling Petrochemical and Fertilizer Limited (SPFL), Bulletine Construction Company Nigeria Ltd, Gitto Costruzioni Generali Nigeria Limited (GCGNL), and Hensek Integrated Services Ltd. Out of the 150 copies distributed, 140 questionnaires (93%) were properly completed and returned. The high response rate was facilitated by research assistants who guided respondents and encouraged immediate completion of the questionnaires. Table 2 summarizes the distribution and return of questionnaires.

Table 2: Questionnaire Distribution and Return

Company	Number Distributed	Number Returned	Percentage (%)
Bulletine Construction Company Nigeria Ltd	25	21	14
Gitto Costruzioni Generali Nigeria Limited (GCGNL)	25	24	16
Sterling Petrochemical and Fertilizer Limited (SPFL)	75	72	48
Hensek Integrated Services Ltd	25	23	15
Total	150	140	93

Source: Field Data (2025)

The questionnaires were distributed based on the type of vehicles operated in the companies. Of the 150 copies, 75 questionnaires (50%) were distributed to AGO-powered vehicle operators, while the remaining 75 questionnaires (50%) targeted CNG-powered vehicle operators. For AGO-powered vehicles, 25 questionnaires were given to Bulletine Construction Company Nigeria Ltd, with 21 returned (14% of total), 25 to GCGNL with 24 returned (16%), and 25 to Hensek Integrated Services Ltd, with 23 returned (15%). For CNG-powered vehicles, all 75 questionnaires were administered to SPFL, with 72 returned (48%). This ensured an even representation of both fuel types in the study.

The study collected personal characteristics of respondents to ensure they had suitable profiles for participation. Data on gender, age, marital status, occupation, income, and education level were gathered, as summarized in Table 3. As also shown in Table 3, 84.29% of respondents were male and 15.71% female. This indicates a male-dominated respondent pool, consistent with the petroleum and transportation sector's workforce composition in the study area. Female participation remains low, reflecting limited engagement in petroleum transportation roles.

Respondents' ages were grouped in ten-year intervals. The largest age group was 40–50 years (31.43%), followed by 29–39 years (27.14%), and 51–61 years (16.43%). This demonstrates that most respondents are within the economically active age range, providing informed insights into fuel usage patterns. Most respondents were married (57.86%), followed by single respondents (40.00%). Only 2.14% were divorced, and none were widowed. The data suggest that the majority of respondents have life experience, potentially contributing to more considered responses.

A majority of respondents had attained secondary (40.71%) or tertiary education (50.71%), indicating a well-educated respondent pool capable of understanding technical questions regarding fuel characteristics and emissions.

Respondents were predominantly drivers (62.86%), with mechanics (17.14%), artisans (10.71%), and administrative staff (9.29%) forming the remainder. This occupational profile ensures that responses reflect practical knowledge of fuel usage and vehicle operation.

Table 3: Distribution of Respondents by Personal Characteristics (N = 140)

Characteristic	Frequency	Percentage (%)
Gender:		
Male	118	84.29
Female	22	15.71
	140	100
Age:		
18-28	20	14.29
29-39	38	27.14
40-50	44	31.43
51-61	23	16.43
62-72	12	8.57
73 and above	3	2.14
	140	100
Marital Status:		
Single	56	40.00
Married	81	57.86
Divorce	3	2.14
Widowed	0	0.00
	140	100
Level of Education:		
No Formal Education	2	1.43
Primary Education	10	7.14
Secondary Education	57	40.71
Tertiary Education	71	50.71
	140	100
Occupation:		
Driver	88	62.86
Admin. Staff	13	9.29
Mechanic	24	17.14
Artisan	15	10.71
	140	100
Income of Respondents		
Below N100,000	30	21.43
N101,000-N150,000	56	40.00
N151,000-N200,000	40	28.57
Above N200,000	14	10.00
	140	100

Source: Field Data (2025)

Also, Table 3 shows that monthly income ranged from below ₦100,000 (21.43%) to above ₦200,000 (10.00%), with the largest group earning ₦101,000–₦150,000 (40%). This moderate income distribution reflects typical oil and gas sector earnings, providing insight into affordability and access to different fuel types.

The demographic analysis shows that the study sample is largely male, middle-aged, well-educated, and employed in the oil and gas sector, particularly as drivers, mechanics, and administrative staff. This respondent profile supports reliable data collection on AGO and CNG fuel characteristics, emission patterns, and user preferences. The findings indicate that CNG is gradually gaining traction in the study area, highlighting the need for robust infrastructure and policies to ensure sustained access and affordability of both AGO and CNG for all income groups.

RESPONDENTS' KNOWLEDGE OF CNG

This section presents, interprets and analyzes the data collected from the field survey on the use of Automotive Gas Oil (AGO) and Compressed Natural Gas (CNG) as automobile fuels in Akwa Ibom State.

Table 4: Respondent Knowledge of CNG

Knowledge Level	Frequency	Percentage (%)
Very Poor	0	0.00
Poor	2	1.43
Fair	19	13.57
Good	71	50.71
Very Good	48	34.29
Total	140	100

Source: Field Survey

As indicated in Table 4, a majority of the respondents reported good knowledge (50.71%) while another 34.29% possessed very good knowledge. A smaller proportion, 13.57%, had only fair knowledge, and 1.43% reported poor knowledge. No respondent indicated very poor knowledge. This suggests that awareness of CNG in Akwa Ibom State is relatively high. With ignorance nearly zero, the state demonstrates strong potential for broader adoption of CNG. Awareness is critical to acceptance; therefore, this trend is favorable for future transition policies.

Table 5: Number of AGO and CNG Vehicles

Vehicle Type	Frequency	Percentage (%)
AGO	69	49.29
CNG	71	50.71
Total	140	100

Source: Field Survey

Table 5 shows that CNG vehicles (50.71%) slightly outnumber AGO vehicles (49.29%) in the four companies studied. The distribution indicates that CNG adoption has grown significantly, and the construction companies in the state are in a transition stage, with both fuels nearly balanced. With enhanced policies and infrastructure, CNG could surpass AGO in future usage.

Table 6: Preference of AGO and CNG Vehicles

Vehicle Type	Frequency	Percentage (%)
AGO	74	52.86
CNG	65	46.43
Total	140	100

Source: Field Survey, 2025

Although more respondents own CNG vehicles in these companies, preference slightly favours AGO (52.86% vs. 46.43%). Long-established familiarity, wider refilling networks, and perceived reliability influences this preference. However, the small margin indicates potential for preference shift toward CNG with improved infrastructure and policy support.

Table 7: Satisfaction with CNG Vehicles

Response	Frequency	Percentage (%)
Strongly Disagree	20	14.29
Disagree	39	27.86
Neutral	9	6.43
Agree	60	42.86
Strongly Agree	12	8.57
Total	140	100

Source: Field Survey, 2025

Table 7 shows about 42.86% of respondents agreed and 8.57% strongly agreed that they were satisfied with CNG vehicles, while 42.15% expressed dissatisfaction. Users recognize CNG's benefits such as lower cost and cleaner emissions, but refilling infrastructure and maintenance challenges limit satisfaction. Improved accessibility and policy support could significantly enhance satisfaction.

Table 8: Satisfaction with AGO Vehicles

Response	Frequency	Percentage (%)
Strongly Disagree	60	42.86
Disagree	12	8.57
Neutral	9	6.43
Agree	20	14.29
Strongly Agree	39	27.86
Total	140	100

Source: Field Survey, 2025

Table 8 indicates that AGO vehicles recorded more dissatisfaction: 51.43% of respondents disagreed or strongly disagreed with satisfaction, compared to 42.15% satisfied. Rising costs, inefficiency, and environmental consequences contribute to dissatisfaction, creating opportunities for CNG adoption.

Table 9: Frequency of Refilling CNG Vehicles

Response	Frequency	Percentage (%)
Strongly Disagree	57	40.71
Disagree	23	16.43
Neutral	31	22.14
Agree	13	9.29
Strongly Agree	16	11.43
Total	140	100

Source: Field Survey, 2025

In Table 9, about 40.71% strongly disagreed and 16.43% disagreed that they frequently refill CNG vehicles, suggesting longer mileage per refill or scarce refueling stations. While this indicates CNG efficiency, it highlights the need to expand fueling infrastructure as lack of these infrastructures result in bulk refilling.

Table 10: Frequency of Refilling AGO Vehicles

Response	Frequency	Percentage (%)
Strongly Disagree	1	0.71
Disagree	5	3.57
Neutral	12	8.57
Agree	61	43.57
Strongly Agree	61	43.57
Total	140	100

Source: Field Survey, 2025

As seen in Table 10, about 87.14% of respondents agreed or strongly agreed that AGO vehicles require frequent refilling. This inefficiency and higher running cost compared to CNG explains the higher dissatisfaction among users. The analysis demonstrates that Akwa Ibom State is in a transition phase regarding automobile fuel use. AGO remains slightly more preferred but is viewed as costlier, inefficient, and less satisfying. CNG enjoys high awareness, slightly higher ownership, and efficiency, though infrastructure challenges reduce satisfaction. Expansion of CNG refueling infrastructure, public awareness campaigns, and supportive policies will accelerate adoption, reduce dependency on AGO, and promote economic and environmental benefits.

DISCUSSION OF FINDINGS

The study examined the environmental and socioeconomic implications of Automotive Gas Oil (AGO) and Compressed Natural Gas (CNG) utilization in Akwa Ibom State, with particular emphasis on knowledge, usage level, satisfaction, preference, and frequency of refueling. The findings indicate that awareness of CNG as an alternative fuel is remarkably high, with 85% of respondents reporting good or very good knowledge. This aligns with the growing national discourse on CNG adoption driven by the Presidential Compressed Natural Gas Initiative, which has intensified public sensitization and conversion programs. High awareness levels corroborate literature suggesting that policy advocacy and government campaigns significantly influence public perception and adoption of cleaner fuels. The implication is that ignorance is no longer a

primary barrier to CNG adoption in the study area; rather, structural and infrastructural factors are now the critical constraints. This supports previous findings that awareness alone does not guarantee fuel transition unless accompanied by enabling infrastructure and safety assurances (AP News, 2024; Financial Times, 2024).

The study revealed an almost equal distribution of AGO (49.29%) and CNG (50.71%) vehicles, indicating that Akwa Ibom State is in a transitional phase between conventional diesel usage and cleaner gas alternatives. This corroborates literature identifying CNG as an emerging substitute for AGO due to its lower emissions and economic efficiency (Akujor et al., 2022). The near balance in vehicle ownership suggests that the shift toward CNG is practically underway. This observation supports earlier arguments that the Nigerian transport sector, historically dependent on AGO, is gradually diversifying its fuel base to mitigate environmental degradation and rising fuel costs.

Interestingly, although CNG vehicles slightly outnumber AGO vehicles, preference remains marginally higher for AGO (52.86%). This paradox may be explained by infrastructural familiarity and the perceived reliability of diesel engines. Literature highlights limited refueling infrastructure as a major barrier to CNG adoption (AP News, 2024), which likely sustains AGO preference despite its environmental drawbacks. This finding suggests that behavioral inertia and operational convenience strongly influence fuel choice. While environmental awareness exists, practical considerations continue to determine user preference, partially contradicting expectations from Section 2.2, which emphasized CNG's environmental advantages.

Satisfaction levels offer further insight into user experiences. For CNG, 51.43% of respondents expressed satisfaction, while 42.15% were dissatisfied. In contrast, AGO recorded higher dissatisfaction (51.43%) compared to satisfaction (42.15%). These results are consistent with literature emphasizing CNG's economic benefits, particularly cost savings of up to 60% compared to traditional fuels (Presidential CNG Initiative, 2024). Dissatisfaction with AGO likely reflects rising fuel prices, inefficient consumption, and environmental impacts (Akujor et al., 2022). From a socioeconomic perspective, CNG adoption contributes positively to household and operational cost reduction, particularly among middle-income earners who formed the largest respondent group. Reduced fuel expenditure enhances disposable income and business profitability, supporting literature claims that CNG adoption strengthens economic resilience.

Analysis of refueling frequency further reinforces the economic advantage of CNG. Approximately 87.14% of respondents agreed that AGO vehicles require frequent refilling, whereas the majority indicated that CNG vehicles are not refilled as frequently. This aligns with assertions that CNG offers better mileage efficiency and lower operational cost. However, the limited number of CNG stations, highlighted in the literature (AP News, 2024), may also contribute to this pattern. While reduced refilling frequency demonstrates efficiency, it underscores the urgent need for infrastructural expansion to improve accessibility and promote wider adoption.

The findings also reflect environmental considerations. Dissatisfaction with AGO vehicles indirectly signals concerns over air pollution and emissions, consistent with literature identifying diesel combustion as a significant source of particulate matter, nitrogen oxides, and carbon monoxide (Akujor et al., 2022). Respondents' inclination toward CNG ownership, despite a slight preference for AGO, suggests growing environmental consciousness. Given that CNG emits lower CO₂ and particulate matter, the gradual shift toward this fuel supports broader sustainability objectives and aligns with literature advocating cleaner alternatives to mitigate urban air pollution and related health risks.

Government policy and infrastructure interventions emerge as critical to sustaining the transition. Initiatives by the Nigerian National Petroleum Corporation to expand CNG stations and partner with private firms are timely and necessary. High awareness and slightly higher CNG ownership indicate that infrastructure rather than knowledge is the primary barrier. Policy consistency, safety regulations, and public-private collaborations are essential to convert awareness and ownership into widespread utilization, reinforcing literature observations on the centrality of institutional support in alternative fuel adoption.

The study also concludes that Akwa Ibom State is experiencing a gradual transition from AGO to CNG. While AGO remains slightly more preferred due to familiarity and infrastructure, CNG demonstrates superior economic efficiency, lower refueling frequency, and higher satisfaction among users. These findings corroborate literature asserting that CNG offers a pathway toward environmental sustainability and socioeconomic stability in Nigeria. However, infrastructural limitations and safety perceptions remain barriers that need addressing. Sustained government initiatives and expanded CNG refueling infrastructure are likely to accelerate adoption, ultimately positioning CNG as the dominant fuel in the state's transport sector. The study affirms that the transition to CNG in Akwa Ibom State is a tangible reality shaped by economic necessity, environmental awareness, and evolving institutional support.

CONCLUSION

The study comparatively analyzed the use of Automotive Gas Oil (AGO) and Compressed Natural Gas (CNG) as automobile fuels in Akwa Ibom State. Results showed that while AGO remains the predominant fuel, it is associated with high levels of emissions (such as particulate matter, sulfur oxides, and carbon monoxide), which negatively affect air quality, public health, and the environment. CNG, on the other hand, produces significantly lower emissions, making it a cleaner and more sustainable energy alternative.

Economically, AGO usage is constrained by rising fuel prices, which increase transport costs and strain household incomes. CNG, in contrast, offers long-term cost savings, though its adoption in the state remains limited due to inadequate infrastructure, low public awareness, and the high initial cost of conversion.

The findings also demonstrate that while AGO dominates due to availability, CNG has greater potential to support environmental sustainability, economic resilience, and energy diversification in Akwa Ibom State.

Recommendations

Based on the findings from this study, the following recommendations are made:

- Enactment of state-level policies that incentivize CNG adoption, including subsidies for conversion kits, tax relief for CNG fleet operators, and stricter emission standards for diesel vehicles.
- Establishment of CNG refueling stations across key transport corridors in Akwa Ibom, supported by public-private partnerships, to ensure availability and reliability.
- Launching awareness campaigns and technical training programs to sensitize transport operators and empower technicians with skills in CNG conversion and maintenance.

- Introduction loan facilities and grants to help vehicle owners convert to CNG and support fleet operators to reduce operating costs.

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