

# Enlight — Series —

**Nextier**

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## Adoption of Compressed Natural Gas Vehicles (CNGVs) in Nigeria

### Introduction

The mobility of people, goods, and information have been a fundamental component of human societies as transportation increases human satisfaction by changing the geographical position or location of goods and people. Vis-à-vis road transportation, different types of vehicular fuels are used, namely conventional and alternative vehicle fuels (AVFs). Conventional fuels are burned within the engine and utilize fossil fuels (such as Premium Motor Spirit (PMS), Diesel etc.) for combustion. Conversely, AVFs are used for internal combustion engines derived partly or wholly from a source other than petroleum and are less damaging to the environment than traditional fuels. Examples are Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG), Liquefied Petroleum Gas (LPG), Electricity, High Pour Fuel Oil (HPFO), Ethanol, Hybrid and Solar etc.

### Background

Gasconnect defines CNG as natural gas compressed to very high pressure (200 – 300 bars) and about 1% of its volume at standard atmospheric conditions. It is composed mainly of methane (CH<sub>4</sub>) and can be stored in cylinders or rigid tubes for transportation over short/medium-range distances (10km to 100km on average). CNG can be utilized in cars, vans, trucks, motorcycles, buses, trains and ships. There are ongoing efforts to apply this fuel to aircraft.

The use of CNG as a fuel in Nigeria started a few years ago in Edo, and Lagos states. Recently, it has begun to spread to other cities across the country. Further, there has been a recent surge in the adoption of CNG as a fuel due to the high cost of diesel and the recent removal of fuel subsidies in Nigeria, which has also caused an astronomical increase in PMS prices. Unfortunately, the rate of adoption is still low. Compressed Natural Gas Vehicles (CNGVs) can be retrofitted or Original Manufacturer Equipment (OEM). OEM implies that they are designed and built to run on CNG by the manufacturer. However, if converted to NG on the aftermarket, they are retrofits. Most CNGVs in Nigeria are retrofits and were converted at conversion workshops nationwide.

### Analysis

The following predictors have slowed the adoption of CNGVs in Nigeria over the past years:

#### ✚ High Rate of Vehicle Engine Knockdown

Many early adopters of CNG as a vehicular fuel have had to switch their vehicles back to conventional fuels or abandon them altogether due to this problem. Retrofitting conventionally powered vehicles to run on CNG affects and reduces the life span of vehicle engines. Most retrofits are configured to run simultaneously on PMS and CNG. This is a glitch, as the suitable CNG technology for cars is the bi-fuel technology, not the dual-fuel technology, which may be the probable cause for this negative occurrence. This anomaly in the configuration of the CNG kit is also responsible for reducing the speed abilities of affected vehicles, especially those used to travel long distances. This has hampered the CNG revolution, as word-of-mouth is a significant means of disseminating information about new ideas and technologies by early adopters.



#### ✚ Loss of Luggage Space

CNG tanks are installed in vehicles' trunks to store CNG fuel. These tanks are big, bulky, and consume much space, leaving little or no room for keeping other things in the trunks, especially spare tires. The conversion plants cannot forecast the demand for future customer vehicle types. In other climes, the tanks are installed under the seats. Therefore, the conversion plants install the tanks in the trunks as a rule of thumb.

#### ✚ High Conversion Costs

The high cost of vehicle conversion to run on CNG has also hampered the adoption of CNGVs. Before now, it used to cost between N200,000–N300,000 to convert vehicles to run on CNG. For carbureted cars, installation of the CNG kits on the vehicle costs N200,000, but sequential vehicles (injectors) with four plugs and six plugs are retrofitted for N250,000 and N300,000, respectively. Many car owners attracted by the future benefits of conversion are discouraged by the conversion cost. To encourage conversion, an instalment system was put in place where adopters were required to initially pay a deposit of N50,000 and pay the balance in instalments as they fuel their vehicles. The fuel price of CNG was N90 per SCM, but debtors had to pay N115 per SCM when buying CNG at the fueling stations. The markup of N25 per SCM is used to offset their CNGV installation kit costs. Currently, it costs between N450,000–N600,000 to retrofit vehicles to run on CNG.

#### ✚ Proneness to Explosions

Many car owners are concerned about safety and fear that the CNGVs could explode due to the reckless attitudes of drivers and lousy road networks across the country. They perceive that the CNG tanks rupture easily, especially in ghastly motor accidents.

#### ✚ Unavailability of CNG Stations and CNG Fuel

PMS stations are scattered all over the country and across inter-state boundaries. For CNG, the stations are sparsely distributed across state lines across the federation, with many states needing CNG stations. This has discouraged

The adoption of CNG fuel, especially for drivers driving long distances and interstate transportation. In some cases, CNG is unavailable for purchase in some CNG stations. This has caused potential adopters to fear that CNG fuel is not readily available as diesel or PMS.

### Recommendations

To encourage the adoption of CNGVs in Nigeria, it is imperative to implement some of the following:

- Quality Control/Assurance mechanisms must be implemented in the conversion plants. Technicians involved in vehicle conversion must be trained and re-trained by experts in this technology, like the NGV Institute in the United States of America.
- Conversion plants should import different types of CNG tanks for installation in suitable vehicle parts (under the seats, on the roof and close to the exhaust pipes etc.) as done in other climes.
- More enlightenment should be done to alert the public on the personal and environmental benefits of using CNGVs. Emphasis should be placed on the safety of the CNG tanks in meeting international safety standards, as it will sway many potential customers' decisions in favour of conversion.
- High conversion costs should be reduced to the least probable amount, and incentives such as free servicing for a time period should be adopted to encourage CNGV acceptance in Nigeria. Government intervention in the form of rebates and subsidies will further encourage CNGV acceptance in Nigeria.
- Setting up more CNG stations across Nigeria.

### Conclusion

The factors inhibiting the adoption of CNGVs in Nigeria must be considered. To encourage mass CNGV adoption, there is a need for the government, with support from other sector stakeholders, to ponder on these identified factors whilst exploring and implementing targeted approaches to provide long-lasting solutions to the factors affecting its adoption.

Author: Alexander Akolo, Energy Consultant  
Column Editor: Alexander Akolo, Energy Consultant