

Review of comparative study of Electrical vehicle and CNG vehicle

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Abstract: As we know a world is now going towards a green energy, every sector is trying to adopt a green energy as soon as possible. A transportation sector has a big opportunity to implement a green energy so many of countries tries to make a vehicle which operate by green energy like Electric, NG (Natural Gas) etc. But every technology has limited operating capacity and also issues which have a complex solution. In electric vehicle has some issues which have a limited solution also an availability of electric sources like charging station available everywhere and also charging time is more than gasoline vehicle consequences vehicle manufacturing companies make a CNG two vehicle which is easy to available and on spot utilise, In this paper we compare both system as per different researcher and tries to understand which system is better for future green technology.

Keywords: Introduction, Basic Principle, Availability of Fuel, Hybrid Vehicle

I. INTRODUCTION

In transportation side many research were done and also this research is endless process by finding a new types of fuel also now a days in China making a flying car for urban[1], In past time when pollutions effect gone peak level consequences it was necessary to produce a new kinds of fuel which was given a better effect in car and environment friendly so a CNG vehicle came in a market, but it was only for four wheeler, There is a one Gas kit which is fitted in Car by registered gas kit fitter. A CNG vehicle changes transportation performance and it effects a good sign in environment. But Upper class and Upper middle class can buy a car and there is huge amount of public are situated in Lower middle and lower class, and technical limitation of CNG it was not in two-wheeler and also limited availability [2]. So, there was no any commercial solution or alternative for a two-wheeler. After more research electric vehicles were came in market, it was made good contribution for good environment, many countries like China utilize more this technology. In India electric vehicle started at 1990 has Lead acid battery but when Li-Ion batteries are used in electric vehicles it gives positive effect in market as well as customers. But a cost of Li-Ion is more so it increases a cost of vehicle, now a days government gives a subsidy in purchase a new EV for students, also many technical error and availability of charging stations are limited so it affects customers satisfaction that's why a selling of EV is not more then others. So, both CNG and EV has own limitation and availabilities also limited. But this two will be the future of a green energy.

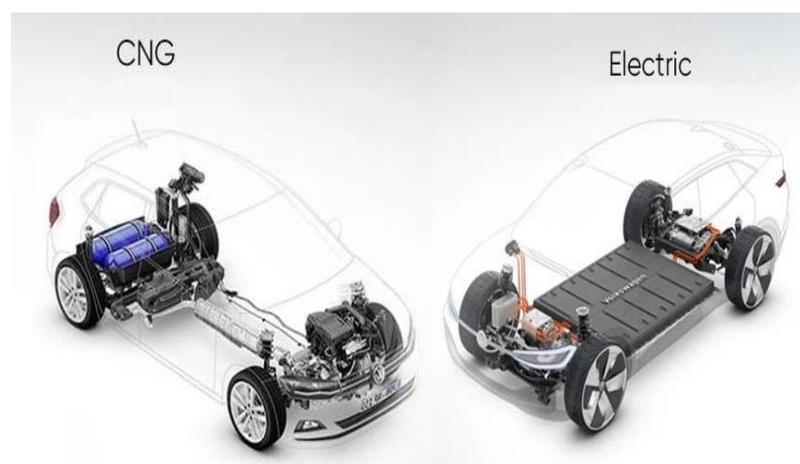


Fig 1. Arrangement of CNG and Electric Vehicles

II. BASIC PRINCIPLE

1. CNG vehicle.: CNG vehicle operates same as Petrol/Diesel vehicle with IC engine, A natural gas stored in fuel tank mounted on rear side of vehicle, A high pressure gas inject in IC engine through fuel lines. It is regulated by pressure regulator. A fuel mixture with air and undergoes compression and ignited by spark plug.[3].

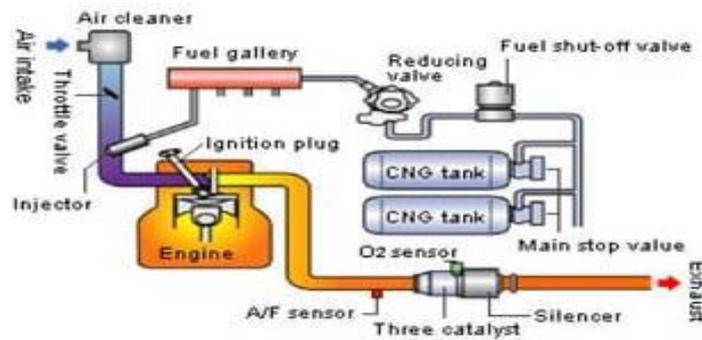
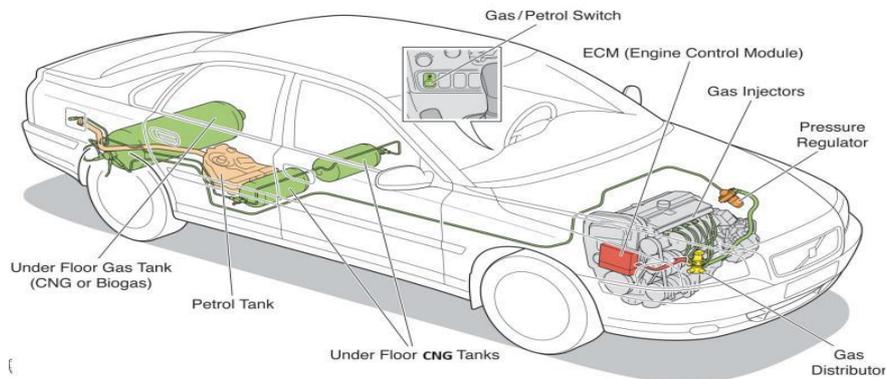


Fig 2. CNG fuel engine

2. Electric Vehicle: An electric vehicle is different of IC engine, there is no any fuel tank and engine or a spark plug to ignite a fuel. There is a Motor Driver set, a BLDC or PMSLDC motor which is controlled by a driver. A motor is operate by Li-Ion or Lead Acid battery.

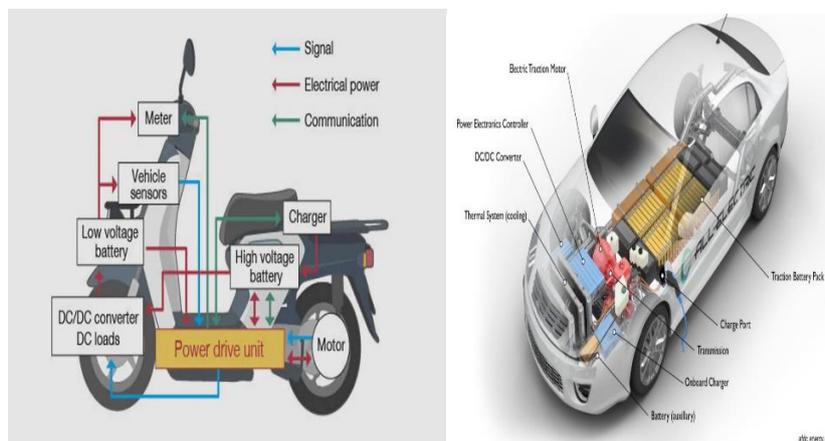


Fig 3. Electric Two wheeler and four wheeler vehicle

III. AVAILABILITY OF FUEL

1. CNG Vehicle[3]: Many gasoline station has a CNG filling station also separate CNG filling stations are available in many places. There are three types of filling station available
 1. Fast filling station
 2. Time Filling station
 3. Combine Fast and Time filling station
- Fast filling station: Mostly filling station are fast filling station design for vehicle which is arrived suddenly required refuelling. A CNG received with low pressure which is stored in vessel from local utility line, then after raise a pressure using compressor and ready for disposing. A pressure is 43300Psi to enable disposing to vehicle. This kind of filling station used for low and medium four wheeler.

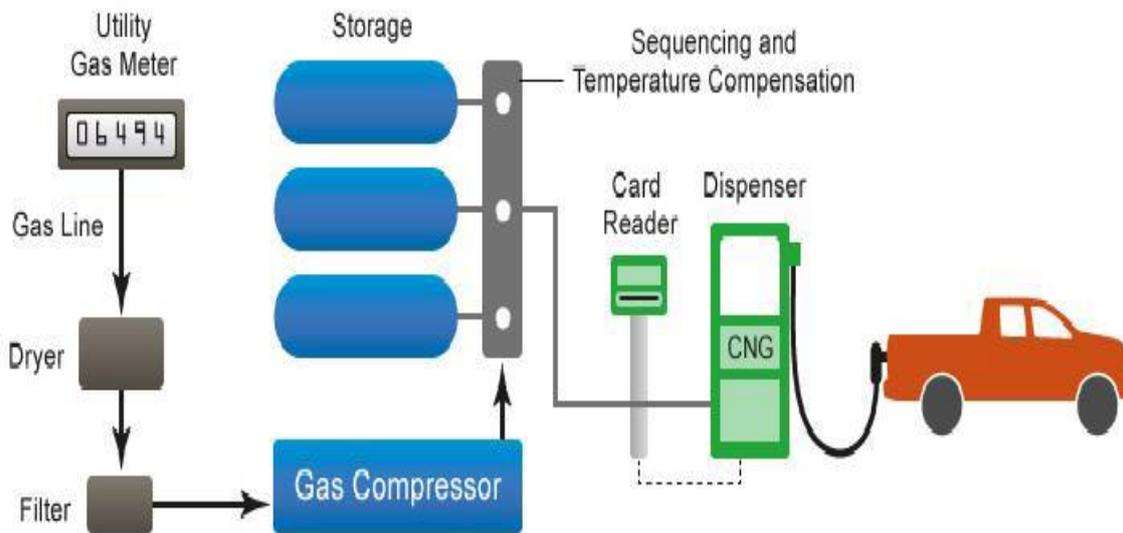


Fig 4 Fast filling station

- Time filling station: Time filling station required only for large tank vehicle; in time filling station a gas is delivered at low pressure from local utility line but a CNG directly filled in vehicle via compressor. In fact, one storage tank is there which prevent unnecessary cycling of compressor, consequence it conserves electricity and reduce wear.

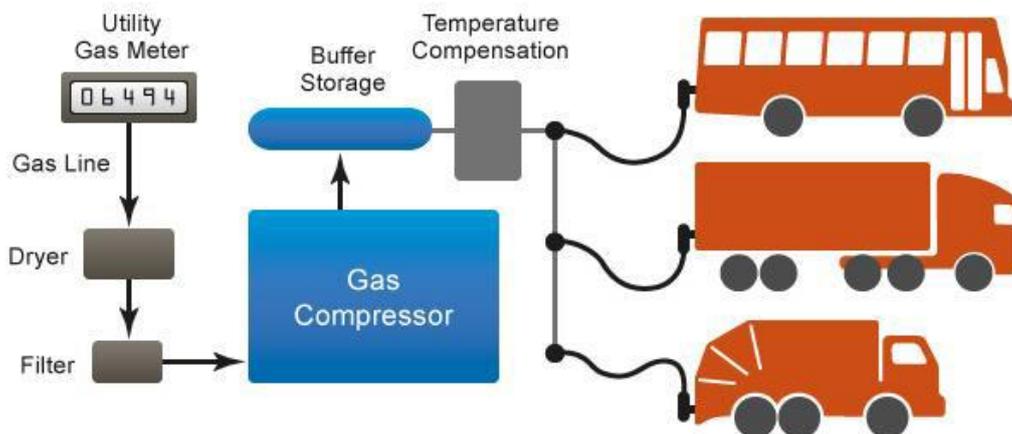


Fig 5 Time filling station

- Combine Fast and time filling: Combine fast and time filling station is construct depending upon requirement. It has higher cost compared to both time and fast filling station.

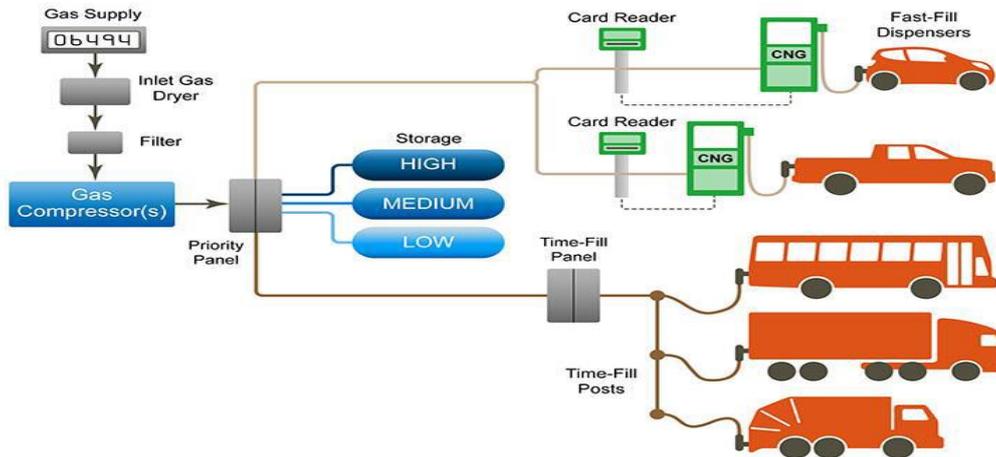


Fig 6 Combine Fast and time filling station

2. Electric Vehicle:[4] For Electric vehicle a battery can charged by charger. There are different kinds of charger available in market in fact charger is based on capacity and types of battery. Following charging station commonly available

Level 1- Charging: This simplest form of charging uses a 120V AC connection to a standard residential/commercial electrical outlet capable of supplying 15-20 amps of current, for a power draw usually around 1.4 kW when charging. EVs come equipped from the manufacturers with portable Level 1 chargers. AEVs with 60-80 miles of range will require 10-14 hours for a full charge using Level 1 EVSE.

Level 2- Charging: Level 2 charging requires a 240V AC power connection and significantly reduces charging time. Home users commonly use 240 V power for electric clothes dryer appliances and many commercial customers have 3 phase electric service with 208 V power. Either voltage works well for “Level 2” charging. This charging level used by most EVs can theoretically provide up to 80 amps of current (19.2 kW), although most vehicles presently available only use up to 30 amps for 3.3 to 6.6 kW6 charging. AEVs with 60-80 miles of range will usually require 3-7 hours for a full charge using Level 2 equipment, depending on the capacity of the EVSE and the vehicle charging system. EVs with smaller batteries, such as a PHEV with 10 miles of range (e.g. Toyota Prius Plug-in) may require less than an hour to reach a full charge.

DC Fast Charging: Sometimes referred to as Level 3, DC fast charging equipment delivers high power directly into an EV’s battery system, enabling rapid charging. Typically, an 80% charge can be provided in 30 minutes or less for many all-electric vehicles. DC fast charging does not same J1772 plug connectors as Level 2.

Level 1 and Level 2 Residential Charging	Level 2 Work and Public place Charging	Level 3 DC Fast Charging
<p>Electric vehicles are charged via an AC power supply at a normal (Level1) or semi fast charging rate: Voltage 120V 1-Phase AC Amps 12-16 Amps Charging Loads 1.4 to 1.9 KW Charging Time 3-5 Miles of range per hour Price per Mile 2c-6c mile</p>	<p>Electric vehicles are charged via an AC power supply at semi fast (Level2) charging rate: Voltage 208V or 240V 1-Phase AC Amps 12-80 Amps (Typ 32 Amps) Charging Loads 2.5 to 19.2KW (Type 7KW) Charging Time 10-20 Miles of range per hour Price per Mile 2c-6c mile</p>	<p>Electric vehicles are charged via an DC power supply at a fast (Level3) charging rate: Voltage 208V or 480V 3-Phase AC Amps <125 Amps (Typ 60 Amps) Charging Loads <90KW (Type 50KW) Charging Time 80% Charge in 20-32 minutes Price per Mile 12c-25c per mile</p>

Fig 7 Different Charging station

IV. HYBRID VEHICLE [5]

1. CNG + Petrol: In CNG + Petrol vehicle has common IC engine but both fuels can be used one by one, generally user start engine by petrol and run using CNG. There is a CNG tank which stores high pressure CNG around 250 bars. A one button which can change a fuel either CNG or petrol. Using these techniques and utilization of petrol is less compared to pure petrol car.
Advantages:
 1. Cost wise CNG cheaper than petrol
 2. CNG has low emission
 3. Easy to available
 4. CNG + petrol is lighter than air and in case of leakage it disperses quickly.Disadvantages:
 1. Required heavy and high-pressure cylinder
 2. It covers some area of car like rear side so sometime less space available.
 3. Speed of CNG vehicle is less then pure petrol vehicle.
2. Electric + Petrol: Now a days Electric + Petrol vehicle is popular in market, in this vehicle one electric motor and battery pack like Li-Ion and petrol engine both are installed in car. the petrol engine and electric motor work together to optimize fuel efficiency and reduce emissions. The system automatically switches between electric mode, petrol mode, or a combination of both, depending on driving conditions.
Advantages:
 1. Higher fuel efficiency and lower emissions, especially in urban driving.
 2. Regenerative breaking recovers energy.
 3. High speed can be achieved.Disadvantages:
 1. This system has higher cost
 2. Limited range

V. CONCLUSION

From the above topics we concluded that both technologies has own advantages and dis-advantages but this all are a future green technology, If we make a hybrid vehicle which has both CNG and electric then It will effectively design for future car technologies.

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