

## Compressed Natural Gas (CNG) as Efficient Fuel Source: A Recent Perspective

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### Perspective

A great deal of emphasis is being laid on the energy saving and environmental safety in fuel general, transportation, and consumption. Reduction of the energy intensity of the civil or industrial building heating systems is given much priority. However the production of the thermal energy is associated with the impact on the environment. In case of autonomous heat supply the yield of combustion products is substantially less and are safer than the emissions from the heat and power plants in addition to increasing the thermal energy production output. The demand for housing and utilities is extremely energy intensive and a major impediment to the implementation of the energy efficiency policies. In this context, development of environmentally friendly and resource efficient consumption of the compressed natural gas for the production of the thermal energy is highly relevant. A recent study demonstrated technical solution for deriving thermal energy from CNG that enables generation of the thermal energy from the pressure drop between the high and medium gas pipeline in addition to medium and low pressure natural gas. This also concomitantly reduces the energy cost. The study derived the analytical expression involving the temperature, condensate and evaporative heat and mass transfer to predict the coolant parameters [1].

CNG is being increasingly used as a reliable source of fuel combustion in engines for reducing the carbon dioxide emission thus reducing the negative impact on the environment and profitable for the economy. The NGC share is very less below two percent in the total vehicle fleet worldwide mainly due to the lack of the refueling infrastructure. A recent study was performed to analysis the operational cost of the CNG home fast refueling in relation to the demand, and the energy consumption. This included the safety test for leakage, fill pressure change, interrupted gas supply, and the temperature based on single stage hydraulic compressor. The study suggested that home refueling could potentially become a solution for filling the gap in CNG refueling infrastructure [1].

The transportation demand is growing day by day due to increasing urbanization and industrialization. Several vehicles are being concentrated in the metropolitan and the urban cities. Due to environmental damage, stringent emission regulations are being formulated and therefore the natural gas is gaining interest as the source of the transportation fuel. There are more than 19 million vehicles that run on the natural gas. Compressed natural gas is being preferred due to environmental and economic benefits. A recent study evaluated the technical aspects of compressed natural gas including the storage, safety, engine performance, efficiency, emissions and the adaptation of the natural gas vehicles [2]. It was found that CNG has several benefits over diesel and gasoline fuel particularly due to the emission and the cost reduction. The use of the CNG enables the reduction of the air pollution and addresses the challenges that are poised by the climate change. Several forms of transportation vehicles are now available that can run on the CNG. One of the main concerns is the storage of the CNG in the highly compressed and high pressure storage particularly in small vehicles.

Compressed natural gas is the most preferred form of the fuel to meet the strict engine emission regulations in several countries. The development of the lightweight high pressure storage cylinders has provided sufficient advantage as the transportation fuel. In addition to this, superior engine conversion technology and conversion equipment are also available readily. Spark ignition engines have two options of bi-fuel conversion. However certain problems need to be resolved for natural gas engines such as setting the point for best emission and fuel economy and optimizing the air-fuel ratio changes with the operating conditions [3].

The consumption of the compressed natural gas is going to increase in the next two decades. LNG is effective for transportation for long distances but requires large investment and is economically viable for long distances. Compressed natural gas is effective for short distance travel. CNG is easier for the deployment with comparatively lesser requirement for infrastructure. One of the studies has demonstrated that CNG can be transported for up to distances of 2500 miles at lesser cost than the LNG. However the cost of transportation of CNG becomes higher for long distances particularly due to disparity in the volume of the gas [4].

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