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## A REVIEW ON BIO-CNG PRODUCTION

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### ABSTRACT

The World's rapidly evolving problems and waste problem is growing every day. Waste management is a major environmental issue in developed and developing countries. normally fossil fuels take million years for dead organisms to get converted into it and mainly it is a non-renewable resource considering its production of CNG and electricity production with CNG is solution for a renewable and eco friendly source. A replacement to those exhausting resources can be made by using Bio CNG. We can use many waste products like agricultural and animal residue, for preparing biogas and them petrol diesel can be replaced by Bio CNG. but using BIO CNG Directly in vehicles leads to corrosion of metal parts of engine, as the biogas may contain impurities even after refined and compressions. With the limited availability of petroleum products domestically, India is compelled to import over 75 percent of petrol products every year Bio CNG makes saving of huge import.

**Keywords:** Municipal Solid Waste, Pollution, Greenhouse Gas, Landfill Disposal, Bio Gas, Bio CNG, Compressed Biogas, Alternative Fuels.

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### I. INTRODUCTION

Bio CNG is the most well-established sustainable source and most popular source of energy worldwide based on waste cattle manure and main reason for production of non-renewable source Biogas is produced by biomass anaerobic digestion such as cow dung, vegetable waste, municipal solid waste, poultry faeces, industrial wastewater as well landfill etc. The main products of anaerobic digestion are biogas and slurry. In the formulation of biogas methane, carbon dioxide, hydrogen sulphide, nitrogen, oxygen, ammonia, chlorinated organisms, silanes, siloxane, phosphorus and other compounds combinations are available. The biggest problem with biogas is its low energy and it is difficult and expensive to dissolve. This requires biogas compression at as high a pressure as possible. Gas retention is another concern as the cylinder becomes harder and stronger at high pressures. This can increase the weight of the cylinder and therefore affect its carrying capacity.

Biogas is produced by anaerobic digestion (AD) process whose benefits include production of a renewable energy resource while the process can lead to treatment of feedstock during the treatment and also produce digestate which is a useful organic fertilizer that can substitute chemical fertilizers useful organic fertilizer that can substitute chemical fertilizers in sustainable agriculture. Biogas has a significant useful organic fertilizer that can substitute chemical fertilizer's role to play in the global energy transition because of the need to transform the global electricity systems from fossil fuel-based generation to low carbon and renewable energy-based power generation. With huge biomass to biogas conversion potential and many feasible biogases to electricity conversion technologies, biogas will play an extremely important role in the energy transition as a renewable energy fuel resource and feedstock for industrial production of chemical fuels and renewable products

#### 1.1 BENEFITS AND PURPOSE OF BIO CNG PRODUCTION

Environment

Bio CNG emits low pollution particles while combustion and preparation.

Cheap

Comparatively today's petrol and diesel prices CNG is most affordable

Production

It is produced with human and organic waste

Green fuel

Commonly referred to as green fuel because of its lead and Sulphur free character.

Safe fuel

The properties of CNG make it as safe fuel. It is stored in high gauge seamless cylinders which are certified so negligible chance of leakage

## 1.2 POTENTIAL OF BIO CNG IN BANGLORE

Any valuable biological resources can be used to produce Bio-CNG. It is estimated that India has the highest number of cattle in India. some other sources/feedstocks are very important in producing Bio-CNG that need to be tested in detail such as:

1. Piggery waste, poultry waste, etc
2. Biomass generated from agro-waste and other such sources straws, bagasse, etc.
3. Industries that can become significant contributors such as Distillery(Alcohol/Ethanol), food processing industries, etc
4. MSW, vegetable waste from Mendes and landfills

## 1.3 BIO CNG VS CNG

As per content, CNG and Bio-CNG are nearly the same except that CNG some higher alkanes Bio-CNG compares favourably with LPG in terms of the heat value Replacement of CNG is possible and compares well in terms of heat value.

## II. METHODS INVOLVE IN CNG PRODUCTION

**\*Anerobic digestion process**

**\*Turbine**

**\*Energy production with Steam**

### ANEROBIC DIGESTION PROCESS:

Biogas is a colorless combustible gas that is produced by the biological breakdown of organic matter; occurring in the absence of oxygen . The biogas comes from “biogenic materials” and it is generated from AD of biodegradable materials such as biomass, cow dung green waste and agricultural residue such as cassava, sugar cane etc. Biogas comprises a mixture of different gases, mainly methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), 1–5% other gases, including hydrogen (H<sub>2</sub>). The composition of biogas is presented. The gas is produced by bacteria that occur during the bio-degradation of organic materials under anaerobic

### TURBINE:

**Turbine**, any of various devices that convert the energy in a stream of fluid into mechanical energy. The conversion is generally accomplished by passing the fluid through a system of stationary passages or vanes that alternate with passages consisting of finlike blades attached to a rotor. By arranging the flow so that a tangential force, or torque, is exerted on the rotor blades, the rotor turns, and work is extracted.

### ENERGY PRODUCTION WITH STEAM:

Electrical energy generation using steam turbines involves three energy conversions, extracting thermal energy from the fuel and using it to raise steam, converting the thermal energy of the steam into kinetic energy in the turbine and using a rotary generator to convert the turbine's mechanical energy into electrical energy.

### 2.1 PLANT DISCREPTION;

- Pre-digester for Efficient aerobic degradation of organic waste
- Wide range of organic waste can be processed
- Low Retention Time (Low HRT)
- No Clogging of reactors
- Better quality & yield of Biogas
- Best Quality of organic fertilizers

- Excellent strength to retain high pressure of Gas
- Quick Installation because of Modular Tanks
- Suitable for land with any type of geographical features
- Available in both Civil & Modular tanks
- Available Capacities: 50 Kg to 5000 Kg per day

## **2.2 OUTLOOK AND CHALLENGES OF BIO CNG TECHNOLOGY**

Clearly the use of bio-CNG as a vehicle petrol provides significant economic benefits, in terms of emissions, and the concept of engine performance. But they are not successful the implementation of this technology in a developing country Like is a big challenge. The need for self-sufficiency the number of supplies, equipment upgrades and cost, importance of technical capacity, and fuel consumption Infrastructure is considered a major obstacle to Transmission of bio-CNG.

- The cost of installing Bio-CNG is expensive. Eg. producing 400 kg / day of Bio-CNG requires a significant investment of Rs. 1.65 crores while 5000 kg / day requires Rs. 16 crores.
- Initial processes such as collection, transportation, and segregation can also reduce maintenance.
- It can only be installed where bulk waste is produced. It is a challenge to verify the waste sources of Bio-CNG production and it will not be compatible.
- The production process requires skilled professionals.
- There are no specific standards in India for the installation, operation and maintenance of these plants.

## **2.3 DEVELOPMENT METHOD;**

- location;
- grantor;
- recording date;
- sale price;
- units of comparison;
- plot dimensions;
- configuration and size;
- physical and topographical characteristics;
- zoning, utilities; and
- environmental influences.

# **III. FACTORS INFLUENCING DIGESTER'S EFFICIENCY AND PERFORMANCE**

## **3.1 TEMPRATURE**

The application of heat to reactions normally accelerates the process within acceptable limits. This applies to biogas production processes too. The microorganisms in anaerobic digestion are thermophiles which undergo thermophilic and mesophilic digestion. The thermophiles operate efficiently at a temperature range of 45-80°C while mesophilic bacteria work well at a temperature range of 25-40°C .

## **3.2 DIGESTER INSTRUMENTATION**

It is important to constantly measure the production level and parameters in any anaerobic digester to identify biomass quantity, any abnormalities, and the well-being of microorganisms for efficient and optimum process control and hence output

## **3.3 TOXICANTS**

Toxicants include antibiotics and other residues which inhibit methanogenesis, hence reducing methane production and instead increasing the concentration of volatile acids. A high nitrogen-to-carbon ratio is more likely to lead to toxic conditions for the bacteria and so should be avoided

### 3.4 LOADING TIME

The loading rate is the amount of volatile solids fed to the digester per day per unit volume of the digester. High loading rates are desirable for higher methane production.

## IV. CONCLUSION

One of the most important environmental problems the world faces is waste management. The current-day emphasis is on reducing waste and revenue from product acquisition. It is challenging to create a national market for home-produced Bio CNG in our country, with a limited national grid of gas. Therefore with the above benefits mentioned in BIOCNG it can be considered as a suitable substitute for current fuel such as petrol and diesel. More than a country like India which is one of the most polluted countries after China, USA and European countries there is an urgent need for this type of fuel conversion recently launched BIOCNG plant in the Indian city of Mahindra Chennai. There is a great need for this type of development not only in India but also globally this type of work contributes to the living life of humanity. In addition, it is necessary to take steps to build a bio-CNG distribution network now and to encourage government agencies for the creation of bio-CNG plants.

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