

Bio-Gas (CBG) Purification and Bottling.

India has a huge population of humans and cattle. One fifth of the population of earth as well as millions of cattle reside in India. So bio-logical waste is available in abundance.

Unfortunately no conscientious effort, except the traditional use of animal waste as manure, has been made to some extent. No effort has been made to use this waste for the purpose of production of energy to run power plants, vehicles etc. Several years back a half hearted effort was made to use this Bio - Gas as a source of cooking with the help of bio-digesters. This was done by marginal farmers/cattle breeders having one or two cattle. Obviously it did not bring any worthwhile response. Due to the small size of the plant and improper handling the output of the gas was limited and irregular. It has always been considered only as a stand by alternative arrangement.

At no time in the past, an all out effort to utilize the potentiality of large cattle breeders, Gaushallas and Panjrapols has even been considered.



By an approximate formula, 100 cows will give/day 1000/Kg of cow dung, this in a bio digester will yield about 40 M3 of Gobar gas. After removing impurities such as CO₂, Sulphur, Moisture etc will yield about 20M³ or 17Kg of pure methane gas.

It is only now that, a Technology has been developed by us, enabling the use of this gas from Bio digester. Gobar gas is purified of all impurities and moisture. Pure Methane gas is than Compressed. This Compressed Bio - Gas is capable of running Power plants & Vehicles.

Biogas is an excellent fuel for both petrol and diesel engines. Petrol engines can be run on a low percent biogas. In diesel engines, a little diesel fuel is required to ignite the gas mixture for the normal running of the engine. The percentage of saving of diesel fuel is 75 to 80.

Dual fuel engines require about 0.6 to 0.7 Cu.M. Biogas per hour per Kilowatt. The engines adopted to run on biogas can be utilized for pumping irrigation water, generating electricity etc. The gas can be efficiently used to produce electricity. To generate 1 KWH electricity, about 0.7 Cu.M. gas is required, this would be sufficient for 16 or 17 electric bulbs each of 60 Watts to burn for one hour.

Brief description & operation of the plant is as under This Project is designed for

- Bottling Biogas
- Generating power using non-conventional energy
- Driving conventional vehicles using non-conventional energy

The Project has two part:

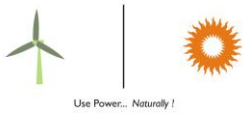
1st part Deals in separating impurities such as moisture, Carbon dioxide and Hydrogen sulfide and generating pure Methane from Biogas.

2nd part Deals in Filtering, compressing and filling Methane in a Gas Bottle i.e. a CNG Dispenser making it suitable as an IC Engine fuel.

1st part : Biogas is an economical, renewable and an eco-friendly fuel. Biogas is produced in an anaerobic digester i.e. a Gobar gas plant. Biogas in its natural self consists of Moisture, Carbon dioxide, Hydrogen sulfide and Methane gas. Methane has a high calorific value in its pure stage. Due to the presence of impurities Biogas becomes a very low calorific value fuel and hence finds a very limited application even though it is cheap and easily available.

We have to extract pure and high calorific value fuel methane from low calorific fuel Biogas to make it an IC Engine suitable fuel. Once pure Methane is available in suitable quality and quantity it finds a wide range of applications from running an oil engine, driving a Motor car Engine to operating a Gas Turbine for rural power generation.

Biogas generated from the digester is allowed to flow through moisture traps. This process drains out the Moisture present in the gas. The gas is than allowed to counter flow in a specially designed Sulfide extractor. This filter drains out Balance Moisture along with the present sulfides.



Treated gas is pressurized with the help of a primary compressor. The filters mounted drain out any present moisture and Oil present post compression. The pressurized clean gas is then passed through a Physical Separation Device. The Physical Separation Device is a specially designed modern high pressure combined directional flow device for cleaning Biogas of its high impurities. A measuring device is fitted after the filters to gauge the quantum of clean Methane gas collected in the collecting tank.

2nd part: This part of our system now deals in bottling this clean Methane gas into a standard CNG bottle. Gaseous Fuel generates maximum efficiency when it is injected into any CNG converted Internal combustion Engine with the desired constant pressure.

The cleaned Methane gas is then taken into a 3-Stage high-pressure compressor.

The compressor compresses the gas from

- a) Atmospheric to 10Kg/cm² in stage I
- b) 10Kg/cm² to 60Kg/cm² in stage II
- c) 60Kg/cm² to 250Kg/cm² in stage III

This pressure is considered suitable to fill up a CNG bottle rack. This CNG Bottle Rack can then be connected to a standard CNG Dispenser unit. Now this purified Gobar gas is ready to be used as Fuel in a motor car, or run a Gas Turbine or any CNG converted Internal combustion engine connected to an alternator to produce electricity.

We have renamed this Purified Biogas as CBG - COMPRESSED BIOGAS. The whole System from Input of Biogas into the Machine till Filling CBG into a Vehicle or Bottles consumes less than 5Kva of Power for a system designed to treat 200 M³. of gobar-gas.

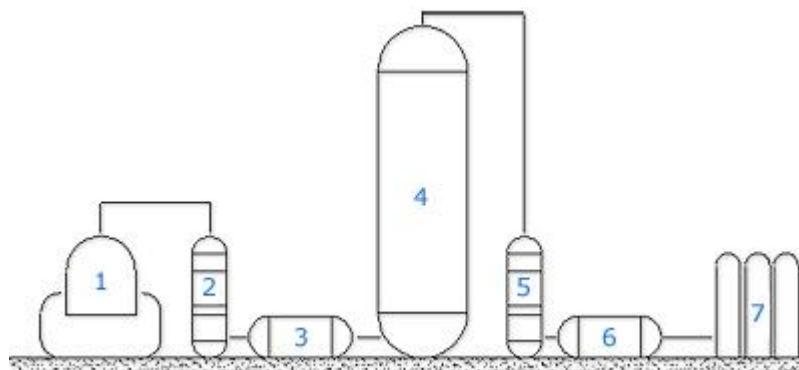
Our system aims on reducing Capital cost, Operational costs and space requirements. The system can safely be operated by our rural citizens with minimum training. Our system has been designed keeping Indian rural conditions in mind. It is so flexible that it can be mounted on a Tractor Trolley (if required), the most common utility vehicle in all rural areas.

Due to this, mobile CBG unit, can cater to more than one Biogas plant in a rural area, as some times due to local conditions, it may not be possible to have all the Bio-waste Digesters in one area. The Trolley mounted machine with the help of a tractor can be transported to the Bio Digester which is filled up with the unrefined gas. The machine after refining the CBG can fill up the bottles which can be stored or transported to the required place with ease, causing an uninterrupted supply of high calorific value CBG gas.

A properly coordinated movement could result in complete conversion of Vehicles from fossil-based fuel to abundantly available Methane. This movement would change the face of Indian economy forever. The size & cost of the plant depends upon the total quantum of Gobar available.

A line diagram explaining the entire process is attached.

BIO GAS PURIFICATION AND BOTTLING UNIT LAYOUT DRAWING



- 1. GOBAR GAS PLANT
- 2. 1ST STAGE PURIFICATION
- 3. PRIMARY COMPRESSION

- 4. PHYSICAL SEPERATION
- 5. 3RD STAGE PURIFICATION
- 6. SECONDARY COMPRESSION

- 7. BOTTLING RACK