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Electricity Generation Using Biogas

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Abstract - *Rising global challenges of Energy generation, sustainability, cost, environmental enterprises among others have touched off immense exploration on indispensable energy sources and technologies in the recent once times. Similar former workshop includes exploration into use of biogas as cover Energy in petrol machines. This Paper focusses on how biogas is generated from bacteria and cow soil and other uses, is used for electrical energy is generated from biogas and petrol, using binary Energy (DF) Creator. DF operations are considered to lower cost of operating machine machines and power creators.*

This paper focuses on reviewing indispensable energies and ways fastening on bio-gas parcels and original eventuality, also on how to run internal combustion machines on biogas energy, former operations, their vacuity and cost.

The paper also illustrates styles for revision of ordinary machine to run on binary energy, considering their operations, performance and cost recrimination. The findings of this work are of great significance in developing an original medium that uses petrol as an airman energy and biogas as substitute energy. The findings also will help in identification of an applicable energy regulation tool and conforming the generation factory for a salutary use. This is to give affordable indispensable source of electrical power to institutions, cosmopolises or in remote pastoral points.

Key Words: **Animal waste, biogas, diesel machine, electricity generation, non-conventional energy sources, petrol machines, clean energy.**

1.INTRODUCTION

Now current energy situation throughout the world and the fact that main resources of energy, such as crude oil, natural gas, coal and nuclear fuel are not renewable give importance to other sources of energy, like hydro energy, solar energy, wind energy and biogas energy. Mentioned sources of energy are all renewable, but biogas is particularly significant because of possibility of use in internal combustion engines (petrol engine), which are the main power source for transport vehicles and also commonly used for powering of generators of electrical energy.

India is largest cattle breeding country; there is abundance of raw material for producing biogas. Also municipal sewage & kitchen wastes can be used for this purpose. The use of methane separated from biogas as a fuel will substantially reduce harmful engine emission and will help to keep the environment net and clean. Biogas consists of approximately 50-70 % methane. It is economical and slurry can be used as organic manure. Biogas is a intermixture of gases, primarily conforming of methane, carbon dioxide and hydrogen sulphide, produced from raw stuff similar as farming waste, dung, external waste, mill material, sewage, green waste, wastewater, and food waste.

1.1 Problem Defination

In India biogas request size was valued at USD1.40 billion in 2021. But The growth of this sector is directly dependent on population's mindfulness of environmental protection, and the desire for renewable energy sources grows. As per the stated data of ICAR (The Indian Council of Agricultural Research), every time, India produces over 350 million tons of agrarian waste that can induce further than,000 mw of power each time and green toxin for agrarian use. MNRE states that India generates around0.1 million tons of external solid waste/ day. But presently India biogas product is lower than its eventuality, between 29 and 48 billion m3/ time.

Hence, it's demanded to produce a mindfulness and a technology or system from which we can prize the biogas from waste effectively and with low cost.

1.2 Objective

- To create low cost household biogas digester.
- Finding a way to extract maximum biogas from feedstock.
- To find the alternative for traditional biogas extraction methods.

2. MAIN COMPONENTS

2.1 Fixed Drum/Digester Tank
2.2 Floating Drum/Gas Collector

2.3 Pneumatic Flow Control Valve & Pneumatic Pipe
2.4 162.7cc 4 Stroke Petrol Engine
2.5 Dynamo Motor

2.1 Fixed Drum/Digester Tank

Digester tank is basically a container for the manure from livestock, green waste from agriculture, food waste etc. The overall digestion process is carried out in this digester in the absence of oxygen. Size of these digesters are depending upon application. In above picture it is a simplest design of biogas digester which having single tank which is loaded with biomass.

2.2 Floating Drum/Gas Collector

Floating drum or gas collector consist a cylindrical shaped moving or floating gas holder or drum. The drum in which the biogas collects has an internal and/or external guide frame that provides stability and keeps the drum upright. it used to collect the generated.

2.3 Pneumatic Flow Control Valve & Pipe

Pneumatic valves are used to control the flow of generated biogas. It helps to maintain the air tight seal in floating drum to store the biogas and flow control mechanism allows to control the flow of biogas when its required.

Pneumatic pipe is required to transfer the generated gas to the required locations.

2.4 4 Stroke Petrol Engine/Generator

Switching to biogas as vehicle fuel can reduce greenhouse gas emissions. It requires to convert the gas energy into mechanical energy which is require to generate the electricity

2.5 Dynamo Motor

Dynamo is the device which generates the direct current. It basically converts the mechanical rotation into pulsing direct current.

3. METHODOLOGY

Biogas is a combustible gas mixture produced during the anaerobic digestion of organic matter in an anaerobic biogas reactor (e.g. small-scale digester, biogas settler, digestion of organic waste etc. During anaerobic digestion, wastes are treated and degraded and biogas is produced.

Biogas consists mostly of methane (CH4, around 65-70%) carbon dioxide (CO2, around 25-30%) and varying quantities of water (H2O) and hydrogen sulphide (H2S) and some trace amounts of other compounds, which can be found, especially in waste dump biogas (e.g. ammonia, NH3, hydrogen H2, nitrogen N2, and carbon monoxide, CO).

3.1 Converting Technology

The principle of conversion is, the chemical energy of the combustible gases is converted to mechanical energy in a controlled combustion system by a heat engine. υ This mechanical energy then activates a generator to produce electrical power. The most common heat engines used in

for biogas energy conversion are gas turbines and combustion engines.

The inlet of the biogas digester is start with the mixing tank. In this mixing tank, the waste is mixed with the Bacteria solution to form a slurry. A slurry is a composition of the bacteria solution and the cow dung or waste (biomass). Then, this mixed slurry enters into digester. The microorganisms which are generated in the digester decompose the biomass and breakdown the complex substance into basic gases like methane, hydrogen, carbon dioxide, hydrogen sulfide this gas is stored in the floating drum and we can taken out as when its required.

3.2. Our Methodology

This project is not been made by us for the first time the change that we made is the bacteria solution which requires for the fermentation of biomass.

We have made some certain changes in the bacterial solution. we where using a bacterial solution in which we used to mix jaggery and water and then the solution is kept for some days to get degrade after getting degrade there are micro organisms created in the solution which is the pure bacteria which we are going to need to produce the methane from the biomass. later we had prepared two different samples to testing the different parameters like time required, purity of biogas etc.

3.2.1 Sample no :- 1

Rui leaves (Calotropis gigantea) + bacteria (water + jaggery) are mixed in a container In the ratio of 3:4 where 30 percent is grinded Rui leaves in a form of slurry and 40 percent is bacteria added to dilute it properly.

3.2.2 Sample no :- 2

Bhamburdi leaves (Physalis peruviana L.) + Bacteria (water + jaggery) are mixed in container in the ratio of 3:4 where 30 percent is grinded bhamburdi leaves in a form of slurry and 40 percent is bacteria added to dilute it properly.

This whole solution is kept in an air tight container and kept for hours so gas is evolved and it is trapped in the container. There is a flow valve connection attached to the container which controls the flow of the gas trapped in the container.

4 . Observations

After 24 hours we found that the container is been filled with biogas which is then trapped in the another container for further usage or further compression to store.

As per the recent test we have found that the gas which has been created in the container is pure biogas with Methane content in it and it's properly flammable.

5. FUTURE SCOPE

1. To find a technology that can be help to purify the methane.
2. To create an awareness in rural areas.
3. To produce a biogas unit in large scale to minimise the initial cost.

6. APPLICATIONS

6.1. As a Fuel For Vehicles: we run an 4 stroke engine on generated biogas on atmospheric pressure, if biogas compressed it can be used effectively as fuel in vehicles.

6.2 As Replacement of Natural Gas : biogas has large contain of methen which enables its uses in heating and cooking application.

6.3 In Electricity Generation: biogas is the green energy source which can help to create an electricity with the help of generator. It has less emission of greenhouse gases.

6.4 By-Product Utilization: by-product in generation of biogas is to be used as fertilizer in farm. This by-product of digestate has large ammout of nitrogen and high carbon content which helps to improve the water holding capacity of soil.

5. CONCLUSIONS

A different methodology and use for extraction of biogas from waste is proposed here. Deeply observing those methods and uses we feel that we need to develop this technology for clean and efficient energy source.

We have successfully run a 4 stroke engine on generated biogas using above mentioned methods. From our work we conclude that electricity generation using biogas has a great scope in future because it's available in nature itself in free of cost.

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