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Bio Energy from Organic Waste

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ABSTRACT: Bio gas from organic waste presently endures a number of technical ,economic, social and establishment constraints that prevents its widespread use.The introduction of suitable policies in the land planning, forestry and agricultural sectors and handling organic waste at regional national and global levels, and funding features will help to achieve a significant growth in renewable energy sector.

I. INTRODUCTION

Energy is like an essential dynamic in a nation's development to achieve its economic growth. The use of renewable energy, primarily started as an alternative support to depleting fossil fuel sources. Though, the renewable energy technologies offer a host of advantages over fossil fuel power generation, yet the technology suffer from inherent failings either in the form of cost or economic impact. It is essential to identify the myths and facts to appreciate its use. Lots of research is going on to improve the growth of renewable source.

II. BIO GAS FROM ORGANIC WASTE

Bio gas production is a clean low carbon technology for efficient management and conversion of organic waste into clean renewable bio gas energy and organic bio fertilizers .It has potential to prevent land ,air and water pollution.

In bio gas plant organic matters are converted into combustible gas and fully matured organic matter through anerobic fermentation. The fermented slurry used in agricultural field. All the feed material such as cattle dung, human waste, kitchen waste ,poultry, horse dung, straw, rice husk etc contain carbon, nitrogen and oxygen. It is found that according to the carbon to nitrogen ratio in the feed material bacterial growth varies. The use of cattle dung possesses no problem as far as C/N ratio concerned. However , if other materials are fed, proper care should be taken to adjust their proportions so that the feed mixture has a C/N ratio about 25.For example a proper mixture of poultry manure and straw can be a good feed material for bio gas generation.

When nitrogen content is very less, the bacteria fail to use all the carbon present and there is in efficient breaking down of the organic matter.O n the other hand, if the nitrogen content is large, the carbon gets used up first and the left nitrogen combines with hydrogen to form ammonia. This will kill the bacteria. Sugar cane bagasse has emerged as an alternative for the production of renewable fuels such as bio gas from anaerobic digestion.

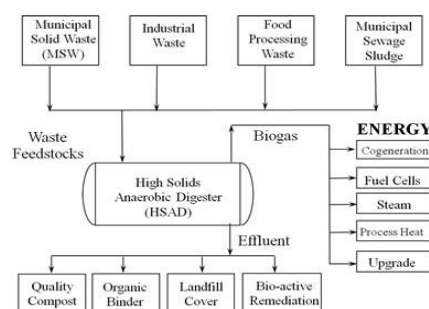


Fig 1.Produciton of biogas from organic waste

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BIO ENERGY Today the renewable energy sources are not seen as a mere alternative to fossil fuel generated energy. They are regarded as effective tools to cut down the environmental impacts to give a boost to energy security, to produce more job opportunities, and to bring down the levels of green house gas emissions. Energy from renewable sources has already joined the main stream of traditional power generation.

Bio power systems use biomass to produce electricity. The major systems that are used to generate power include direct-fired, co-firing, gasification, anaerobic digestion and pyrolysis. The direct fired system burns the biomass feedstocks directly to generate steam and run a connected turbine to produce power. In cold countries the heat generated in the process is also used to keep the buildings warm inside. The waste wood left unused is employed to manufacture paper pulp. The co-firing feature is deployed along with the normal coal – burning facilities to cut down the sulphur dioxide discharges. The gasification systems need higher level of heat to convert the biomass into gas before use. The anaerobic digestion method uses decaying biomass in landfills to generate power.

III. BIO-FUEL

Unlike wind and solar, which generate direct electricity for use, the bio fuel from biomass offers the option to use it either for electric power generation or to run vehicles. The biomass products with high level of cellulose, sugar, and starch content undergo fermentation to manufacture ethanol, a bio-fuel. Methanol another product from biomass. Either the produced fuel is directly used as an additive to bring down the carbon monoxide levels in the vehicles or mixed with gasoline to power the specially equipped vehicles.

The use of bio fuel demonstrated to offer a better eco friendly performance when compared to fossil fuel. Also the bio fuel produced using some of the source materials, such as rapeseed or sun flower oil, release 45-50% less green house gas emission when compared to fossil fuel use. Presence of less aromatic hydro carbons in bio fuel helps in such performance.

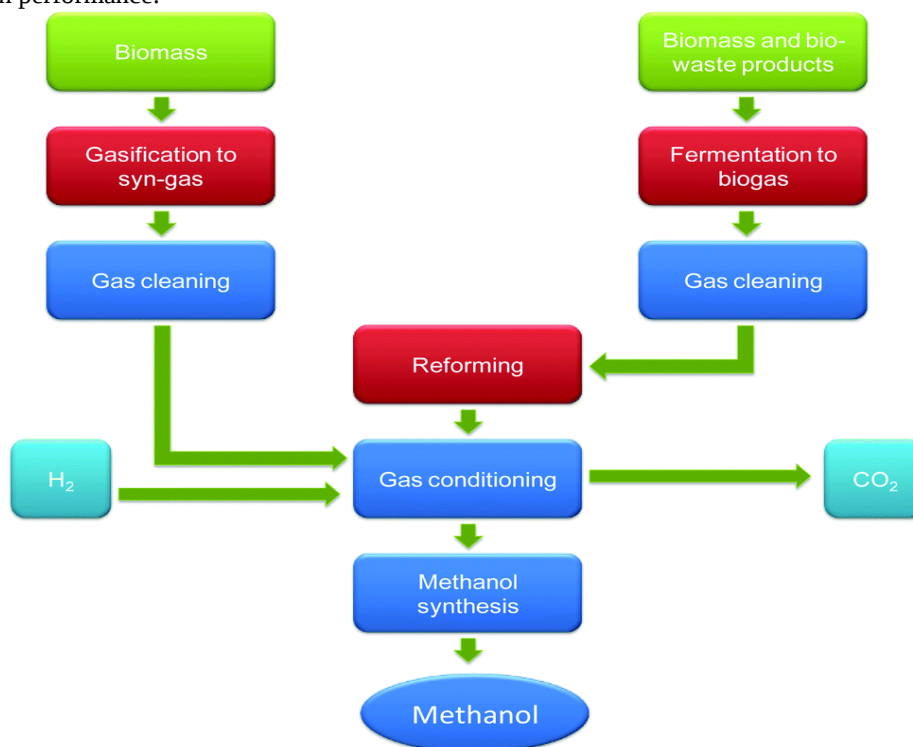


Fig 2. Production of Methanol

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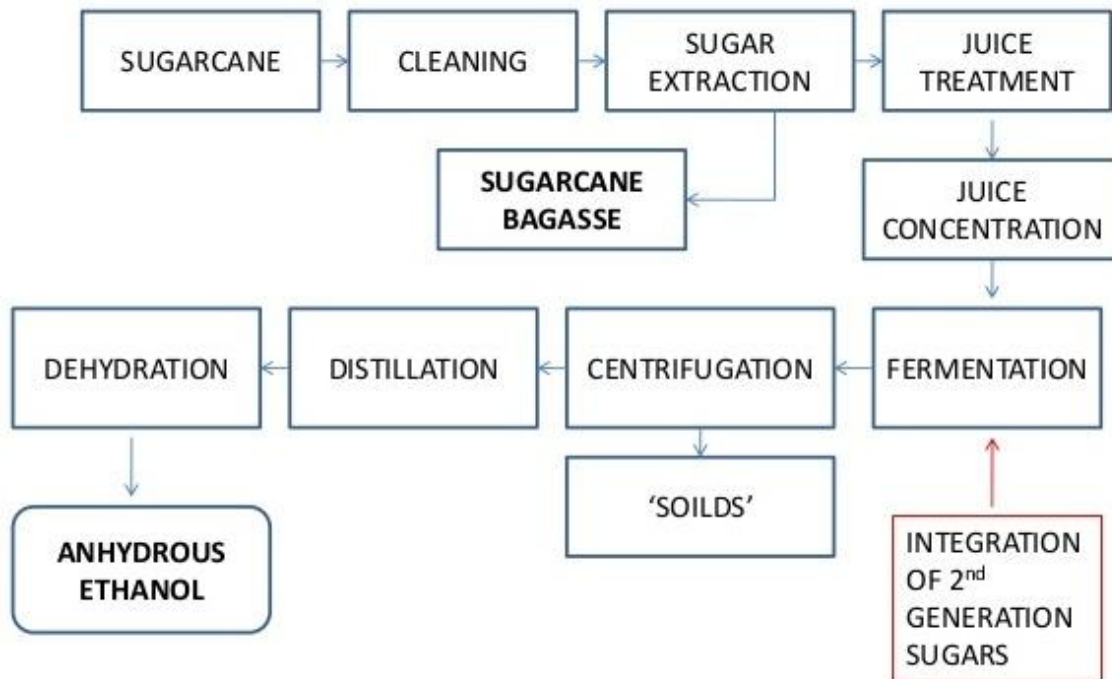


Fig 3. Production of Ethanol

IV. BIO-DIESEL

Unlike bio fuel that uses biomass , the bio diesel is manufactured using plant or animal fats. A chemical process known as transesterification converts the vegetable oil and animal fats into biodegradable fuel known as bio diesel. The bio diesel performs the same way as fossil fuel diesel, but release nearly 75% less carbondioxide than fossil fuel diesel. While bio fuel ethanol need to be mixed with gas or petrol for use, the bio-diesel can be used as it is.

The bio diesel fuel has only 0.88g/cm density, which is less than water. The fluid enjoys high level boiling point with reduced level of vapour pressure . The biodiesel's flash point is higher than that of fossil fuel diesel. The estimated calorific value of bio diesel is 32.27MJ/L around 9% less than the fossil fuel diesel. The absence of sulphur content in 100% bio diesel stretches the lifespan of catalytic converters.

BIODIESEL PREPARATION FROM RICE BRAN OIL

500ml of refined rice bran oil is taken in round bottom flask of 500cm³ of batch reactor. By the use of magnetic stirrer and hot plate the oil sample is heated between the temperature 50-55°C. Add methanol 125ml and catalyst (NaOH) pellets (5% wt of oil sample) to the preheated oil. The mixture is heated to 1hr constant stirring at a constant temperature of 50-55 °C. After 1hr the mixture was poured into a separating funnel for glycerol to settle down. After 2-3hrs settled down glycerol is separated and removed. Remaining is methyl ester(biodiesel) of rice bran oil(yield 96%) which is Further purified through washing and drying for removal of excess NaOH, methanol and water. For drying the biodiesel is filtered by using sodium sulphate.

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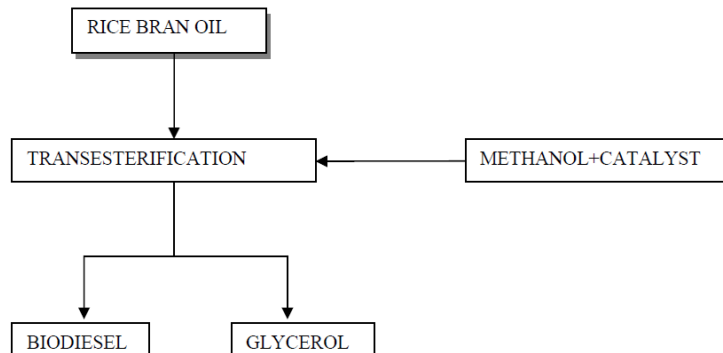


Fig 4. Heating of Rice Bran Oil



Fig 5. Heating of Rice Bran Oil

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BI-PRODUCTS

The bi products include artificial sweeteners, adhesives, plastics, tooth paste gel, and antifreeze plastics. Also, phenol a by-product produced from pyrolysis of oil, a product generated from biomass, is used in the manufacture of foam insulation, moulded plastics and wood adhesives. The ability of bio energy to get stored in the foam of biomass resource, gas, and liquid fuel gives it an edge over wind and solar power generation. The bio energy comes as an effective step gap arrangement to balance any shortage in wind and solar power generation to ensure a steady supply of power.

BIO- ENERGY GENERATION

The carbon foot print of bio mass is continued to be a major issue of discussion. Attempts are continuing to assess the green house gas discharges, related to the direct and indirect land use for growing bio mass, exclusively for bio energy generation. But the usage of solid biomass, such as wood pellets in coal using power plants, wood chips in residential heating systems, and saw dust are used.

V. CONCLUSION

Bio energy presently endures a number of technical, economic, social and establishment constraints that prevents its widespread use. The introduction of suitable policies in the land planning, forestry and agricultural sectors at regional national and global levels and improving the funding features will help the bio energy segment to achieve a significant growth to contribute to the renewable energy sector.

The use of bio energy reduces land degradation, bio diversity worries and acid rain contaminants. The use of bio energy comes as a boon to the world that has abundance of biomass but suffer from lack of right technologies to use such research.

Industrialization has caused global warming and induced drastic changes in global climate. It warns the of the failure limit the raise in temperature levels with in 2°C and allowing it to go beyond 4°C. This will lead to drastic consequences in global food production. The report cautions about extreme climatic conditions, such as rise in sea level, powerful storms, heavy rain falls, drought and severe heat events. It further suggests for a rapid shift to increase the renewable energy use and advocates for significant changes in the global energy mix.

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