

BIOFUEL AS GREEN ENERGY SOURCE: A REVIEW

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Abstract— Bio fuel are green energy source in 22nd century whereas fossil fuel reserve are at the verge of overexploited .Mainly bio fuel are in the form ethanol, butanol, or biodiesel, e.t.c. Beside this using bio fuel source are economical in nature as they utilized less energy for production and less energy requirement for its consumption. Moreover, Bio fuel utilization is environmentally friendly as they emits less carbon and credit less carbon in global warming. Promotion of compatible machine for the utilization of bio fuel is in progress and government is planning to change in policy to promote the resource.

Index terms— Biofuel, Bioethanol, Jatropha, Algae, Myco-diesel.

I. INTRODUCTION

Biofuel is produced from biological component such as living plant, bacteria, fungi, e.t.c. Biofuel comprises of mainly three component e.g.- bioalcohol, biodiesel and biogas, these produces Biofuel and bioenergy .The sources of Biofuel are corn, soya bean, cow dung, urine, algae, fungi, Jatropha, yam, e.t.c.,

In 2010, worldwide Biofuel production reached 105 billion litre means 28 billion gallons, increased 17% from 2009[1]. Biofuel provide 2.7% of the world's fuel for road transport[2].

The environmental effect from biofuel is balance they are carbon neutralizer and the carbon dioxide they release during combustion is initially extracted from the atmosphere during biomass production, result net green house gas emissions biofuel are biodegradable and non toxic, less of a risk than fossil fuel or diesel. The economy estimates less cost give good production. The cost of Bio fuel need to be estimated not only in terms of energy derived, but also in term of how much energy resource are required for the production and distribution of Bio fuel[3].

In present time human society people development on primary source of energy such as non renewable fossil fuel like coal petroleum or gasoline, biofuel are generating cleaner of environment. In the concern of biotechnology Bio fuel supply energy through pathway of bioprocess an economic and environmental friendly[4]. In brief these all are discussed in this paper.

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II. SOURCES

Biofuel is one of the most developing environmental supportive future generation fuel. The category of biofuel divided on the basis of utilisation of fuel. Biofuel is divided into three type.

A. Biodiesel

In Europe, biodiesel is most common, produced from oils or fats using transesterification and is a liquid similar in composition to fossil fuel/mineral diesel. Biodiesel can be used in diesel car when mixed with mineral diesel. Biodiesel is also safe to handle to transport because it is a biodegradable. It is alone –tenth as toxic as table salt and has high boiling point about 300° F (148°C). Compared to petroleum diesel fuel, which has a boiling point of 125° f (52 °C) [5].

B. Bioalcohol or Bioethanol

Bioalcohol is most common type of Bio fuel found and used around the world, which is result of the fermentation distillation drying and enzyme digestion are some other method of producing ethanol, used for automobiles as well as for warming at home[6]. Presently corn-to- ethanol production method in the USA, considering the total energy consumed by farm equipment, cultivation, herbicides and irrigation system, harvesting, transport of feedstock to processing plants[7].

C. Biogas

The anaerobic digestion process involve anaerobic bacteria which work on substrate in the absence of oxygen[8]. Like wood and paper as a substrate or anaerobic digestion[9]. The source of Biofuel are corn and soya bean. The oil extracted can be convert into ethanol or biodiesel.

Bio fuel are divide into four categories-

- i. First generation Biofuel are made from sugars tarches, oil and animal fats that are converted into fuel. These fuel includes biodiesel, bioalcohol, ethanol and biogases.
- ii. Second generation Bio fuel are made from agricultural waste, especially lignocellulosic, biomass, or wood chips.

Many of the Biofuel are currently supplied have been criticised for their impact on the natural environment, food and land use known as sustainable Bio fuel [10,11].

The challenge is to implicate Biofuel development including the development of new cellulosic technology. Responsible commercialization prospect in Africa, Latin America and Asia [10,11,12].

- iii. Third generation Bio fuel are algae or other fast growing biomass sources.
- iv. Fourth generation Bio fuel are made from specially engineered plant or biomass that have higher energy yield or lower barrier to cellulosic breakdown are able to be grown on non – agricultural land or bodies of water.

III. METHODOLOGY FOR PRODUCTION

The fuel extracted from biological component. Some source are follow :-

A. Algae

From the US NREL experiment by using algae as a Bio fuel source in the “Aquatic Species Program”[13]. The algae can be used to extract the lipid for production of Biofuel [14,15]. Prof. Rodirigo E. Teixeria from the university of Alabama in Hunsvitte demonstrated the extraction of Bio fuel lipid from wet algae using a simple and economical reaction in ionic liquids [16]. In the biofuel, extraction process, the algae is crushed and treated with methanol and chloroform, by centrifugation lipid is obtained which on heating at certain temperature and pressure get converted into biodiesel.

B. Animal Gut Bacteria

Microbial gastrointestinal flora in a variety of animals have potential for the production of Bio fuel. Recent research has shown that Tu 103, a strain of clostridium bacteria found in zebra faces, can convert nearly any form of cellulosic into butane fuel[17].

Microbes in panda waste are being investigated for their use in creating Bio fuel from bamboo and other plant material[18]. Cow dung is also used for the production of methane gas which is used for as a cooking fuel, produced in biogas plant.

C. Jatropha

Jatropha Curcus, a poisonous shrub like tree that produces seeds considered by many as a source of Bio fuel, feedstock oil[19]. S G Bio fuel, a San Diego based Jatropha developer has used molecular breeding and biotechnology to produce elite hybrid seeds [20]. The centre for sustainable energy forming (CFSEF) is at Los Angeles based on null profit research organisation dedicated to jatropha research, in the area of plant science agronomy, and horticulture successful exploration of these discipline is projected to increase jatropha from production in 200 – 300% in the next 10 year [21].

D. Fungi

A group of the Russian academy of science in Mosco, in 2008 paper, stated that they had isolated large amount of lipid from single celled fungi and turned into Biofuel. Most research on

this fungal species “Cunninghamella japonica” is a pair in the future[22]. The recent discovery of a variant of the fungus “Gliocladium roscum” point for the production of myco diesel from cellulose [23].

IV. ECONOMICS

Bio fuel production cost one time investment, and gives good yield production. As algae for harvesting oil for bio fuel, fisability study have been conduct to arrive at yield estimate. In addition to its projected high yield algal culture- unlike crop based bio fuel does not affected in a decreased food production. Since it requires neither farm land nor fresh water. Many companies are perusing algal bio-reactor for various purpose including scanning of bio fuels production. To commercial level [24,25].

On jatropha research focuses on improving the overall per acre oil yield on jatropha through advancement in genetics, soil science and horticulture practices. Plant research international, a department of the Wageningen University and research centre in the Netherland, maintain an on going jatropha evaluation project that examines the possibility of large scale jatropha cultivation through field and lab experiment [26]. Fungi, isolated large amount of lipid from single cell and converted into Biofuel on it is economically efficient for bio fuel [22].

V. ENVIRONMENTAL BENEFITS

Environmental production are from biological material low in carbon content and contain low carbon emission in production as well consumption process.

Bio fuel resultant from waste lignocellulosic material. Besides thus it may be produced from algae which does not require extra land which is also environmentally friendly as other source require cultivation on land add carbon emission in atmosphere.

VI. FUTURE SCOPE

The future of Bio fuel is brighter in comparison with other fuels because it renewable resource.

Bio fuel currently make up 3.1%[27] of the total road transport fuel in the U.K. or 1,440 million litre. By 2010, 10% of the energy used in U.K. road and rail transport must come from renewable resources. This is the equivalent to replace 4.3 million tonnes of fossil oil each year. Conventional Bio fuel are likely to produce between 3.7 and 6.6% of the energy needed in road and rail transport, while advanced befool could meet up to 4.3% the U.K.’s renewable transport fuel target by 2020[28]. Jatropha farm production yields by 200-300% in the next year.

VII. CONSTRAINTS

It has been found that Bio fuel have less output as compare to fossil fuel of the same quantity. The burning of Bio fuel may not be living significant carbon footprint but the process of making the whole setup to produce biofuel can

release a good amount of carbon dioxide into the atmosphere. The initial setup cost of any biofuel production until will require a large amount investment there may also be chance of a big hike in the price of stable food crops since, more has to produced for the production of biofuel is very high and releasing up to the mark to meet the demands.

VIII. CONCLUSION

Biofuel is better and ecofriendly fuel as compared to other fuel. In this paper, it is briefly discussed about importance, production types and different sources along with requirement of bio fuel.

Different bio fuels are economical and renewable source of energy in 22nd century. New sincere effort and work can increases the production rate which can solve the huge fuel crisis of the future.

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