

BIOFUELS AND RENEWABLE ENERGIES

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INTRODUCTION

Biofuels are gaining widespread popularity in 21st century as an alternative source of energy. Increasing global warming shows us that now growing population requires sources of energy which contributes towards better quality of life. Now day's people are considering biofuels as an alternative & best suitable option for energy sources. When biofuels are burned they produce carbon – neutral carbon dioxide. Carbon dioxide is released when combustion of biofuels takes place which in turn plants absorb it. This cycle signifies that carbon from atmosphere is removed by plants, and atmosphere gets back carbon when plants are burned. So this balance which is maintained makes the biomass carbon neutral. Main aim to encourage biofuels are they are obtained from renewable sources such as biological materials (crop residues, animal wastes), can give supply for infinite period of time, emission of greenhouse gases is reduced ,ecologically friendly , additional source of income for agriculture sector. Lastly it is a “green” fuel.

Major Biofuels are: -biodiesel,bioethanol, bio-methanol.

STATUS & DEVELOPMENT OF BIOFUELS IN INDIA:-

India mainly focus on non-edible vegetable oils like jatropha, mahua, karanja, neem for its biofuel production. Among them jatropha is considered most suitable oil seed plant for the production of biodiesel.

BIOFUELS TYPES: -

•**Primary biofuels**- Directly obtained from firewood, wood chips, animal waste, forest and crop residues and landfill gas.

•**Secondary biofuels**- Directly obtained from plants and microorganisms. Further classified into 3 categories:-

•**First Generation** biofuels are produced from food crops with the help of conventional technologies. Sources- sugar, starch, vegetable oil, animal fat.

•**Second Generation** (advanced biofuels) are produced from non-food crops or from non- edible parts of food crop. Sources- jatropha, cassava.

•**Third Generation** (advanced biofuels) biofuels are produced from algae. Microalgae, cyanobacteria are considered potential for biofuel generation. Biofuelsextracted from algae are hundred times lighter comparatively from other biofuels. Microalgae can produce large amounts of biodiesel compared to higher plants. Bioethanol is obtained from seaweeds and hydrogen from green microalgae and microbes. Algal species used are: -Spirulina maxima, Porphyridium cruentum, Schizochytrium species are used to derive energy.

TESTING OF BIOFUELS:-

ASTM D6866 testing is done to calculate percentage of fuel that came from plants (renewable sources) by measuring amount of Carbon 14 present in it. Thus it acts like a testing tool because traces of carbon 14 is not present in fossil fuels.

RENEWABLE ALTERNATIVE FUELS- BIODIESELS AND BIOBLEND:-

Biodiesel is a biofuel and it is a biodegradable

liquid is obtained from animal fat, vegetable oils, or from restaurant greases. Biodiesels are non-toxic and releases less harmful gases on its combustion. The U.S. Department of Energy states that there is enough source and supply of recycled oil to produce biodiesel in the country. Esterification is the process of biodiesel production and glycerin is the by-product of the process.

Bioblends are mixture of biodiesel and petroleum- based diesels and produces less greenhouse gases on combustion. Examples of bioblends are B100, B20 and B5. Among them most popular one is B20.

JET FUELS – THE FUTURE OF AVIATION:-

Plant extracts which are rich in energy are now treated as biofuels and are considered

next alternative source of energy for aviation industry and are termed as “jet fuels”. Plants whose extracts are considered as jet fuels include jatropha, camelina, soy, canola and algae. Carbon dioxide from combustion of these extract will not add to global warming because product is carbon-neutral carbon dioxide.

Growing algae in polluted water bodies may not be a problem but process of extracting oil from jatropha and algae is a complex process.

Japan Airlines used a mixture of camelina, jatropha and algae for a test flight.

HYDROGENATION – DERIVED RENEWABLE DIESEL (HDRD):-

Another name for hydrogenation – Derived Renewable Diesel is “green diesel”. Green diesel is produced from vegetable oil in a hydrotreating process. Key advantage is that green diesel



can be produced from existing refining technology. High combustion quality which can improve performance and life span of the vehicle. Environment friendly fuel.

ALTERNATIVES OF DIESEL: - BIODIESEL AND BIOMASS –BASED DIESEL:-

Biodiesel and biomass – based diesel are completely different from each other. Biomass- based diesel “fuel substitute obtained from non- petroleum renewable resources”. Includes fuels derived from animal and poultry wastes, fuels derived from municipal wastes, sludges and from oils derived during waste water treatment. On the other hand biodiesel is defined as “the mono alkyl esters of long chain fatty acids derived from plant and animal matter. Different color labels are assigned by FTC for these substitutes- blue color is used for biodiesel and orange color is used for biomass-based diesel.

BIO-ETHANOL:-

Ethanol is produced annually at a very large scale both from renewable and petroleum resources. It is mainly produced from fermentation of sugar. Basically energy crops like corn, maize, wheat, willow trees, artichoke and sorghum plants are used for the production of ethanol. It is a renewable

source of energy, emission of greenhouse gas is less. Basically ethanol is used with gasoline like a blending agent to increase octane and reduce carbon monoxide emission. Brazil successfully reduced its dependency on petrol by introducing modified version of vehicles which can use bioethanol as a fuel.

Other biofuels include methane gas and biogas which are produced by the process of decomposition of wastes in the absence of oxygen.

CONCLUSION:-

Currently consumption of fossil fuels is at peak neither sustainable also. Energy crises in future will drastically impact our social and economic

growth if we don't change our selection for fuels. Hence hunt for another fuel is very necessary is very important. It is very important to make biofuels cost- effective and sustainable so that they can overcome fossil fuels. It is stated that vehicle engines for petrol and diesel is not suitable for biofuels for longer span of time so little modifications is required so that engines can also support biofuels. Brazil launched flexi –fuel vehicles for the utilization of bioethanol in a successful manner. Thus humans should understand that it is high time to understand and to protect mother earth by adopting methods which is making environment healthy and leading humans towards a better life.

