

BIOFUELS: CURRENT SCENARIO AND FUTURE

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ABSTRACT: At present for automobile most of countries primarily depends on petroleum products which are non renewable energy source thus have a limited life. Taking all potentials in consideration, the world cannot fulfill all its energy demands for more than 200 years depending upon petroleum products. Somehow if we meet the fuel crises than also the environmental considerations does not allow to use petroleum products which degrade quality of air, land, water and other resources. Thus currently research focus is shifting to renewable sources of energy and this paper deals with current scenario and future of bio fuels. The paper explains how bio fuels can be considered as renewable, present development in this field and gives the comprehensive idea for development of bio fuels on very scale which includes the analysis of environmental factors, cost challenges and finally it provides the summary for the scope of bio fuels as renewable energy for future.

Keywords: Bio fuels, renewable energy source, biodiesel, ethanol

INTRODUCTION

Bio fuels are mostly used as a transport fuel. Global production of bio fuels has been growing steadily over the last decade from 16 billion litres in 2000 to around 110 billion litres in 2013. Bio fuels provide around 3.5% of total road transport fuel globally. Higher shares are achieved in certain countries, like Brazil, where bio fuels provide around 25% of road transport fuel demand today[12]. Today fossil fuels take up 80% of the primary energy consumed in the world, of which 58% alone is consumed by the transport sector[10]. There are approximately 500000 air vehicles and almost 750 million ground vehicles on earth and this number is to be doubled by 2050[1]. With such a large number of vehicles on earth there is a great demand of energy of about 29 TW [2012]. And a great emission of various pollutants which are continuously increasing environmental concerns. Thus in order to control demand and pollution various solutions are put forward which altogether is concerned about using renewable forms of energy such as solar, wind, tides etc. with maximum efficiency and minimum possible emissions. One of the solutions is the use of renewable energy using photosynthesis i.e. harvesting biomass and then converts it to bio fuel. The bio fuel policy aims to promote the use in transport of fuels made from biomass, as well as other renewable fuels. [11]

BIOMASS

In ecology biomass refers to the entire mass of all living things in a given area or ecosystem at any one time. But recently bio fuel industry use "biomass" to indicate living organisms in a particular area and this because of the possibility of converting them to bio fuel. Biomass undergoes various thermal, chemical and biological processes in order to be converted into fuel.

Generations of bio fuel: There are three generations of bio fuel which are

1. First generation bio fuels - First-generation bio fuels are made from food crops such as sugar, starch, vegetable oil, or animal fats using conventional technology. Common first-generation bio fuels include Bioalcohols, Biodiesel, Vegetable oil, Bioethers, Biogas.
2. Second generation bio uels - These are produced from non-food crops, such as non edible plants, grasses and waste biomass (stalks of wheat and corn, and wood). Examples include advanced bio fuels like biohydrogen, biomethanol.
3. Third generation biofuels - These are produced from micro-organisms like algae.

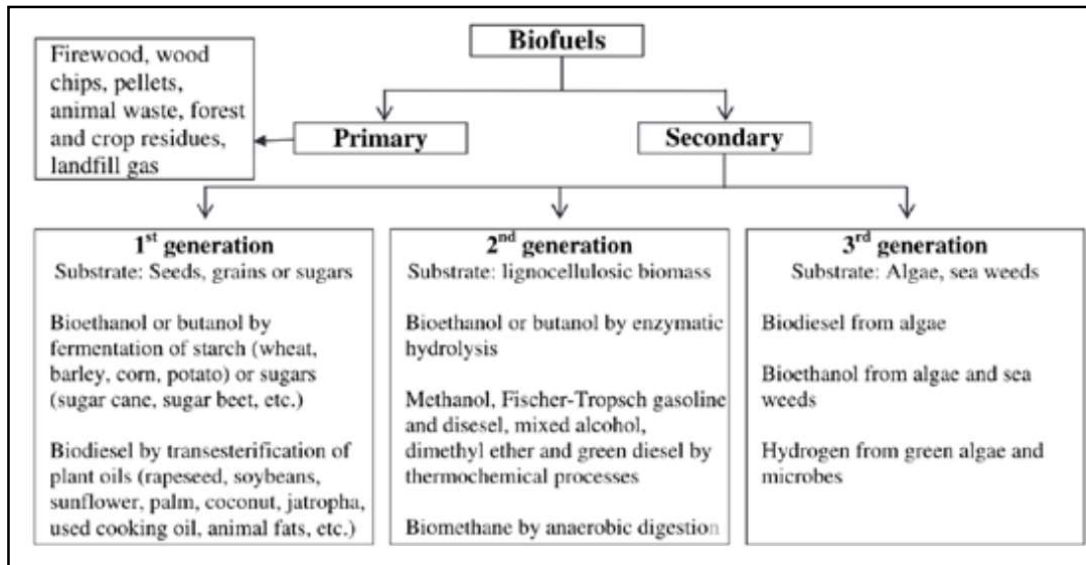


Fig 1 Classification of Bio fuels[10]

World energy demand and reserves distribution

Total world proved oil reserves reached 1700.1 billion barrels at the end of 2014, sufficient to meet 52.5 years of global production. The largest addition to reserves came from Saudi Arabia, adding 1.1 billion barrels. The largest decline came from Russia, where reserves fell by 1.9 billion barrels. OPEC countries continue to hold the majority of the world’s reserves, accounting for 71.6% of the global total. South & Central America continues to hold the highest R/P ratio, more than 100 years. Over the past decade, global proved reserves have increased by 24%, or more than 330 billion barrels. [2]

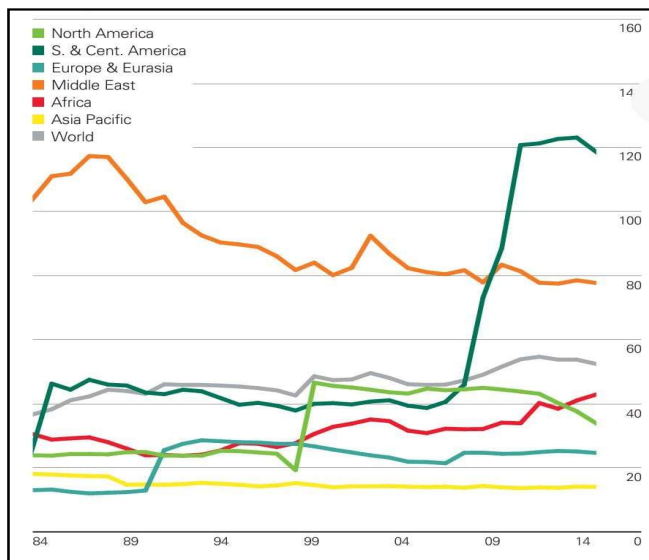


Fig2. Reserves to Production Ratios of Various Countries

CURRENT BIO FUEL SCENARIO

Transport is one of the main energy consuming sectors. It is assumed that biodiesel is used as a petroleum diesel replacement and that ethanol is used as a gasoline replacement.

The EU production of bio fuels amounted to around 2.9 billion liters in 2004, with ethanol totalling 620 million litres and biodiesel the remaining 2.3 billion litres [11]

At present a significant amount of energy is obtained from bio fuel.

Table1. Bio fuel production scenario

Region	Fuel Production[Liters]	Major Feedstock
Europe	10 billion	Corn/ Soyabean
North America	40 billion	Corn/ Soyabean
South America	25 billion	Corn/ Sugarcane
Africa	2 billion	Animal dung/ Jatropha
Australia/Asia	4 billion	Palm oil

Table2. Biodiesel production scenario

Region	Fuel Production[Liters]	Major Feedstock
Europe	7 billion	Corn/ Soyabean/ barley
North America	3 billion	Soyabean
South America	4 billion	Caster/ Sunflower
Africa	Limited	Limited
Australia/Asia	1 billion	Palm oil/ Soyabean/ Jatropha

Table3. Ethanol production scenario

Country	Ethanol Production[litres]	Major Feedstock
United States	40 billion	Corn/ Wheat
Brazil	25	Sugarcane
China	3	Corn/Rice/Cassava
Canada	2	Corn/ Wheat
India	1	Sugarcane/molasses
France	1	Wheat/ Sugarcane
Germany	750	Wheat/ Sugarcane
Australia	500	Sugarcane

The above tables elaborate the current scenario of bio fuels uses in the world. From above data it can be concluded that there is a vast increase in rate of production of bio fuels in order to have cheap, clean and reliable source of energy [12].

FUTURE OF BIO FUELS

With the increasing trends of bio fuels researches are being carried out in this field and there are some concerns. These are:

- Bio fuels produce more CO₂ than actually consumed by crops from its production stage to final product.

- These crops require large amount of fertilizers which causes pollution and water requirement is also very high in cases such as algae production.
- Set up cost for production plants is a concern and cannot be accomplished without government support. According to studies engine modification for more than 20% blend for road vehicles but in actual practice only for 3% blend all type of engines are safe and for more than this amount older engines are not compatible.
- Bio fuels if produced on very large scale becomes costlier and will ruin our economy.

CONCLUSION

Based on the facts and discussion following conclusions can be drawn:

Only bio fuels are not sufficient enough to fulfill our energy requirements. Using bio fuels directly requires engine modifications which are cost and time consuming thus blends is preferred over replacement of conventional fuel. Using municipal waste and food crops after utilizing its food content is a good option because it solves the disposal problem and produces valuable fuel. Bio fuels can work as a bridging gap between fossil fuels and other energy forms such as solar, wind etc.

Usage of bio fuels is seen to have good impact on economy and environmental conditions in some countries such as Brazil, US, European Unions upto an extent when limited production is considered. Considering India there are not much options available of bio fuels due to various constraints thus we should focus our concern on other energy forms. Although only 28% of the total energy usage in the U.S. is attributed to transportation, bio fuels are an attractive option for increasing sustainability in this sector ("Annual Energy Review 2011"). However, the limits on current technology will play a pivotal role in what type of biofuel would make the most sense as a major candidate for replacing gasoline.

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