Fakhruzzama, 2021, 9:4
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

A Review on Different Models of Diesel Engines using Different Blends of Bio-Diesels

M. Tech. Scholar Fakhruzzama, Asst. Prof. Abhishek Singh Roha
Department of Mechanical Engineering,
CBS Group of Institution,
Jhajjar

Abstract- Higher concentration blends and B100 are not commonly used and other blends of high-level are not common than B20 as well as lower blends because of higher viscosity and deficient of pricing and regulatory incentives. Material used for hoses and gasket should be compatible for biodiesel so that neat biodiesel can be taken into use. This neat biodiesel or B100 is having solvent nature so it can have cleaning effect in the engine's fuel system and may release accumulation of deposits caused by the diesel fuel used previously in the system. The release of such accumulated deposits may result in the initial clogging of filters and it will initiate the requirement of fuel filter replacement on frequent basis when using with first few tanks filled higher level of blends of biodiesel.

Keywords: Biodiesel, Waste Cooking Oil, Diesel Engines, Performance, Analysis of Variance, Emission characteristics.

I. INTRODUCTION

Human race has been exploiting energy resources blindly and present scenario is an alarming situation for future energy crisis in major part of world. Finally, people across the globe have realized that excess consumption of energy is a burden on future generations and they have started making efforts to conserve energy and reduce load on our mother planet. Energy conservation initiatives are helpful in reducing the amounts of pollutants being released into the atmosphere and protect our ecosystem.

For sustainable existence of human race on planet, a balance between population needs and use of natural resource must be ensured. Since, energy is fundamental need for survival of life so energy conservation has become a realistic goal to be achieved in absolute sense.

For centuries, Human Society has been developing and evolving continuously to make human life better. Energy is the backbone of every kind of technological advancement in the society. Science is continuously making efforts to uncover and discovers new methods and technologies for harnessing energies for transformation of society.

Petroleum products have been primary sources of energy till date, on the other hand these sources are expected to exhaust one day with the population rise in the upcoming century. Combustions of these Fuels have great negative effects on the environment. After 1990, awareness regarding negative impacts of combustion of petroleum products has increased in public and science domains. Because of these issues, scientists have focused on solar energy, geothermal energy, and tidal energy, fuels derived from plants and algae and many more. A Future fuel can be ideal if it is environment friendly and competitive enough energetically with existing fuels.

Regardless of the current worldwide economic recession, The Central Statistics Office (CSO) of India has expected the GDP to grow by a rate of 6.5% in 2017-18 in comparison to 7% in 2016-17. The typical growth rate of GDP from 2014-15 till 2017- 18 is estimated to be 7.3% in comparison to the common 7.5% between 2014-15 and 2016-17 **[Economic Survey of India, 2017/18].**

Per Capita energy consumption in India is approximately 1/3rd of average global consumption; still Indian economy is predicted to have good future prospects which will drive higher energy demand in

International Journal of Science, Engineering and Technology

An Open Access Journal

deferent sectors in India. So, sufficient and consistent sources of energy must be accessible, for the most part when 25% population does not have proper access to electricity and there has been continuous growth on dependence on conventional fuels (imported as well as local). Local fossil fuels meet approximately 3/4 of energy demand in India.

II. WASTE COOKING OIL: PRESENT STATUS IN INDIA

IMRB International is basically a business consultancy firm working in the field of market research and survey having Headquarter in Mumbai.

Report **[IMRB, 2016]** presents a true picture of waste cooking oil status in India. According to policy of Indian Government there is lot of emphasis on R& D, Synthesis, blending of bio-fuels with conventional fuels and their marketing in the country but there is no policy/rule to restrict the repeated use of used oil in restaurants and other outlets.

In India, bulk users of cooking oils are

- Restaurants, Hotel and eateries
- In house Canteens of industries, educational institutions and commercial/offices areas.

Still, there are no documentations about disposal of oil produced in such eateries.What happens with waste oil, no special studies or investigations are available on it. As a result, there is a basic need to develop a proper understanding of this market structure, where used cooking oil is produced and disposed.

One of the leading firm of Europe "Munzer Bioindustrie GmbH" which is biggest bio diesel player in Austria, mainly working on conversion of Waste Cooking oil to biodiesel want to expand its horizons in India.

However, no such plant can be set up, until or unless there is proper documented knowledge of source of used cooking oil in the market. On the Contrary to developed countries, we in India do not have rules and regulations for restricting unauthorized re-use of waste cooking oils. Main reason of it is due to lack of awareness and knowledge about negative effects of used cooking oil on human health.

Hence, most common methods of waste cooking oil disposals in India may include:

- Disposal by throwing off without any safety.
- Selling/Giving to Waste Oil collectors
- Selling/Giving to firms of waste management
- Selling/Giving to the processors /users of waste cooking oil

Basically, Branded refined oils (cooking) in Indian market are available at a price in the range of 100 rupees per litre. But, scenario is somewhat different; during this research, it was observed that food players in unorganized sector are purchasing cooking oils in the range of 50-60 rupees per litre.

Why this oil is of lower price, because oils purchasing via such players is of least qualities standards like cheaper/ inferior seeds. Even, this oil can be processed or adulterated WCO, which enters in the food chain, once again.

Mainly, there are 3 possible ways through which, this oil may re-entering the fording market.

- Intentional purchasing of WCO via food players of industries
- Purchasing cheap open oil from unorganized markets
- Purchased of local food oil, which may be adulterated with WCO

Main reasons behind such hidden market can be listed below:

- Lack of awareness about ill effects of reuse of WCO for cooking
- Saving manufacturing cost by using WCO
- No well-defined laws/compliance about disposal of WCO

As, these matter couldn't be investigated by meaning of any-direct enquiries/survey possibility because when researcher tried to discuss matter with owners of restaurant, they were reluctant in sharing the information. A Proper and focused survey must be carried out by future researchers specifically in this unorganized market so that we can understand true picture of waste cooking oil market in India.

Even, chances can be there that waste oil managing firms might be selled waste cooked oil to the smallest players like hotels and other food outlets. However, this matter comes under the category of violating legal and moral rules, so no stakeholder will

admit it easily. That's why our efforts to collect some information in this regard could not yield any result. The path to confirm the given probability is to perform a continuous & vigilant experiment of the entire set of operations ranging from collection to aggregation and processing to sales chain.

It is a matter of 'industrialist-espionages' & therefore investigation can't be operated via the approaches of marketing survey. In the context of road-side eateries, the frying / cooking oil is not discarded at any stage and is used to the fullest.

In case of educational, commercial or industrial canteens, where large percentage of servings is north Indian cuisines like Samosa, Poori, Kachori, etc., common cooking oils used are mustard oil, palm oil, refined soyabean oil, sunflower oils. Oil usage quantities in these sections vary according to size, type and location.

On average, we can estimate oil usage for 100 people around may be in the range of 80-100 litres/month. It may go up or down depending on the fact that how frequently the cooking oil is changed. In all the cases discussed above, usage of cooking oil is to the level of fullest. In so many cases, once oil is used for frying, then it is not discarded but after cleaning and sieving, it is using for making gravy & stir-fried certain vegetable.

In some case, fresh cooking oil is mixed with used frying oil and this process is repeated again and again. In most of the cases in India, main reason for no waste oil disposal is either lack of awareness of adverse effects of reuse or tendency to save money.

III. ENERGY RESOURCES

Energy resources are mainly classified in to following 2 categories:

- Renewable Energy
- Non- Renewable Energy

1. Renewable Energy: Need of hour:

In the last one century, the non-renewable sources of energy like coal, mineral oil & natural-gas were over-tapped so they will be exhausted soon. Renewable sources of energy are those sources from which energy could be replenished continuously **[Dhingra R. et al, 2014],** for example, K.E of waves. Energy derived from flowing water/stored water is known as hydel energy. Biomass, crop residues, firewood, animal dung, municipal biodegradable are also sources of energy on burning.

[Marchenko O.V., and Solomin , S.V. 2017]. Energy derived from natural geysers, magma, hot dry rocks, hot water springs, etc. is known as geothermal energy. Energy possessed by tidal waves is termed as Ocean thermal energy. Past century has witnessed the environmental damage caused by consumption of fossil fuels; no other human activity has such gravity of environmental damage.

Most of the Electricity was generated from coal and crude oil which has resulted in higher emissions of harmful gases in the environment. Consequently, modern day problems like ozone layer depletion, acid rain and global warming as emerged in picture. Vehicular pollution has become a very serious problem.

Therefore, in today's world alternative sources of energy are very much relevant & important **[Petersen E.L., 2017]** Local availability and less emission make them a hot choice.

To reduce, radioactive, chemical and thermal pollution, we should increase the use of renewable sources of energy because they can stand out as a feasible source of inexhaustible and clean energies. These sources of energy are also termed as non-conventional sources.

The majorities of the renewable sources are reasonably non-polluting & clean in nature except biomass which is renewable source, still a chief indoors polluter. Subsequently, researchers are now working to tap alternative sources of energy such like wind, bio-fuels, solar and the ocean, etc. Figure- 4 gives a clear picture of various energy sources of world being used now-a-days. In the present scenario for sustainable development of a country like India, a sustainable energy system in is the need of the hour.

There is Inequality in energy-distribution, hence renewable sources of energies has the potential to become the fundamental pillar for the future energy needs **[Dhingra R. et al, 2014]**.
Growth of renewable energy in Future will require development of new technologies, favorable

government policies backed with a backup of innovative financing.

IV. NEED OF BIODIESEL: ECONOMIC ASPECTS

Oil plays a vital role in economy of nation; it was illustrated by the recent rise in the crude oil prices, which has attracted attention of several researchers. It is a well-known fact that crude oil is one the commodities of great thrust across the world and developing countries like India are spending a heavy amount in terms of foreign exchange on purchase of crude oil and other petroleum products.

Indian economy has witnessed a significant impact on it due to global elevation in the crude oil price of Indian economy. Crude oil does not only fulfill the need as a source-of-energy but it is also a basic and fundamental raw-material for number of industrial units. In last few decades, there has been no major discovery to beat the fluctuations and rise in price of petroleum products.

In addition to this, sinking tax revenues and other unconnected variables may further weaken the capital budgets. Because of the monetary crisis in Europe, wherever the capital budgets have upset, there exists massive imbalance among savings and investments. Such imbalances may also continue to worsen due to rise in crude oil prices, which can endanger the economy into severe crisis. If a country can have a fixed exchange nominal rate and there may be an output gap, rise in crude oil prices can lead to further rise in general goods price levels.

Kaushik Bhattacharya et al. (2005) have investigated the relationship bet^{n} the effects of fluctuation oil prices & inflation. Their main focus was to understand the market dynamics in India with rise in petroleum products and how other commodities are influenced by it. If we look back, then we can find mainly 4 oil disasters in last 3 decades.

Despite this, in developed countries lower inflation rate has been acting as cushioning bed to mitigate the dangers associated with such oil disasters. On the contradictory to this, developing nations are severely affected by such shocks because they do not have modern and better technology for oil conserves. Use of indigenous biodiesel will mitigate the effects of this serious economic problem.

Promoting Use of alternate fuels like Biodiesel can address the following problems to a greater extent

- It can reduce burden on the economy of a developing country like India.
- It can generate employment for farmers and other stake holders like distributors.
- It will open up an entirely new market for promoters, entrepreneurs, distributors and oil companies. Since, it is a green source of fuel, so problem of environmental pollution can be minimized.\
- It will also be profitable for oil companies and Central/State governments.
- Safe and proper disposal of waste cooking oil can be ensured.

V. CONCLUSION

In this paper, we investigated by meaning of any-direct enquiries/survey possibility because when researcher tried to discuss matter with owners of restaurant, they were reluctant in sharing the information.

A Proper and focused survey must be carried out by future researchers specifically in this unorganized market so that we can understand true picture of waste cooking oil market in India. Even, chances can be there that waste oil managing firms might be selled waste cooked oil to the smallest players like hotels and other food outlets.

However, this matter comes under the category of violating legal and moral rules, so no stakeholder will admit it easily. That's why our efforts to collect some information in this regard could not yield any result. The path to confirm the given probability is to perform a continuous & vigilant experiment of the entire set of operations ranging from collection to aggregation and processing to sales chain.

It is a matter of 'industrialist-espionages' & therefore investigation can't be operated via the approaches of marketing survey. In the context of road-side eateries, the frying / cooking oil is not discarded at any stage and is used to the fullest.

International Journal of Science, Engineering and Technology

An Open Access Journal

REFERENCE

[1] Ghaly, A.E., Dave, D., Brooks, M.S., and Budge S. "Production of Biodiesel by Enzymatic Transesterification: Review", American Journal of Biochemistry and Biotechnology, 2010, vol.6 (2), pp. 54-76.

[2] Ghazi, T.I., Gunam Resul MFM, Idris A. Production of an Improved Biobased Lubricant from Jatropha curcas as Renewable Source. Proceedings of Third International Symposium on Energy from Biomass and Waste, by CISA, Environmental Sanitary Engineering Centre (Venice) Italy. 2010

[3] Giovanilton F. Silva, Fernando L. Camargo, Andrea L.O. Ferreira, Application of response surface methodology for optimization of biodiesel production by transesterification of soybean oil with ethanol, Fuel Processing Technology, 2011, Vol.92 pp. 407–413

[4] Haruna Ibrahim, Idris M Bugaje. T, Limitations of Jatropha Curcas Seed Oil for Biodiesel Processing in Nigeria. Recent Adv Petrochem Sci. 2018, Vol. 5(3), pp.1-6

[5] Hathurusingha, S., Ashwath, N., Midmore, D., "Provenance variations in seedrelated characters and oil content of Calophylluminophyllum L. in northern Australia and Sri Lanka", New Forests, 2011, vol.41(1), pp.89–94

[6] Hu, Q., Sommerfeld, M., Jarvis, E., Ghirardi, M., Posewitz, M., Seibert, M., et al. "Microalgal triacylglycerols as feedstocks for biofuels production", The Plant Journal, 2008, vol.54, pp. 621–39. Indian Biofuel Annuals, 2017

[7] Jacobson K., Gopinath R., Meher L.C., Dalai A.K., Solid acid catalyzed biodiesel production from waste cooking oil, Applied Catalysis B: Environmental, 2008, Vol. 85 pp. 86–91.

[8] Janaun, J., Ellis, N., "Perspectives on biodiesel as a sustainable fuel", Renew Sustain Energy Rev, 2010, vol.14 (4), pp. 1312–20.

[9] Kafuku, G., Mbarawa, M., "Biodiesel production from Croton megalocarpus oil and its process optimization", Fuel, 2011, vol.89, pp. 2556–60.

[10] Kafuku, G., Mbarawa, M., "Biodiesel production from Croton megalocarpus oil and its process optimization", Fuel, 2011, vol.89, pp. 2556–60.

[11] Karmakar, A., Karmakar, S., Mukherjee, S., "Properties of various plants and animals feedstock's for biodiesel production", Bioresour Technol, 2010, vol.101 (19), pp. 7201–10.

[12] Kibazohi, O., Sangwan, R.S., "Vegetable oil production potential from Jatropha curcas, Croton megalocarpus, Aleuritesmoluccana, Moringa oleifera and Pachira glabra: assessment of renewable energy resources for bio-energy production in Africa", Biomass Bioenergy, 2011, vol.35 (3), pp. 1352–6.

[13] Krishna Murthy T P, Monisha J, Harish A, Sushma R, Blessy B Mathew, Ananda S, Int. Journal of Engineering Research and Applications, 2013, Vol. 3(6), pp.01-05

[14] Kumar, A., Sharma, S., "Potential non-edible oil resources as biodiesel feedstock: an Indian perspective", Renew Sustain Energy Rev, 2011, vol. 15, pp.1791–1800.

[15] Kumar, B. P., Pohit, S., Kumar, R., "Biodiesel from jatropha: Can India meet the 20% blending target?", Energy Policy, 2010, vol.38(3), pp.1477–84.

[16] Kumar, S.B., Sushma, U.S., Chandrasagar, L., Bheema Raju, V. and Devi, V. Use of Waste Frying Oil as C.I. Engine Fuel—A Review. Open Access Library Journal, 2017, pp. 1-37.