

Biofuels and Their Needs in Future

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ARTICLE ID: 07

Introduction

Energy requirements of a country fall in two categories: primary and secondary. Primary energy needs of the country imply power requirements to run its industries, and light its houses and offices, while secondary needs imply energy requirements for all the transportation it requires – of its people and goods India's primary energy requirements are 250 GW, while its secondary energy requirements are 150 GW in gig watt equivalents. It is also interesting that a portion of the overall combined need—nearly 40%—is satisfied by disorganised renewable resources like burning wood for cooking and heating.. Bulk of India's primary energy needs is met through coal-based thermal power generation, while Petro-crude import is required to meet more than 80% of transport fuel requirements. The country's requirement for transportation fuel reflects its dependence on imports and energy insecurity. On the other hand, use of both, coal and Petro-oil add to increasing carbon imbalance that the world today struggles to contain. [Arvind Lali]

USA and Brazil are today the leading countries where renewable fuel programs have been successful, while Southeast Asia has emerged as a major supplier of palm oil for biodiesel production for use in Europe. Environmentalists and agricultural economists, however, warn that biofuel consumers will need to shift from first generation (1G) biofuels to second generation (2G) advanced biofuels. 2G-Biofuels are defined as those derived from wastes that do not impact the human and animal food chains, and result in more than 60% reduction in fuel carbon emissions compared to equivalent Petro-fuel use. India now may brag about having enough food to feed its expanding, young mega population. Substantial and underutilized non-fodder surplus agricultural wastes and piling municipal solid waste (MSW) in A-grade to C-grade cities put together have the potential to fully replace petroleum fuel requirements of the country. Rice straw in Punjab and Haryana; cotton and castor stalk in Gujarat and Maharashtra; bagasse and sugar cane trash in Uttar Pradesh, Punjab, Tamil Nadu, and Maharashtra; empty fruit bunch in Andhra Pradesh; and bamboo in Assam, Bengal and

Odisha all together amount to more than 250 million tons of surplus Agri-residues. With collection logistics in place, these have the potential to produce more than 75 million tons of biofuel equivalent to more than three times the entire petrol consumption of the country. More than 150 million tons of MSW already the collected in large to small cities also has the potential to produce more than forty million tons of biofuel.

Benefits from the use of biofuels in India.

Ethanol and biodiesel are both oxygenated compounds containing no sulfur. These fuels do not produce sulfur oxides, which lead to acid rain formation. Sulphur is removed from petrol and diesel by a process called hydrodesulphurization. The hydro-desulfurization of diesel causes a loss in lubricity, which must be rectified by introducing an additive. Due to the natural lubricity of biodiesel, no lubricity-enhancing additive is necessary. [K Biswas]

The amount of carbon monoxide (CO) and unburned hydrocarbons in the exhaust is decreased since ethanol and biodiesel include oxygen. With the introduction of ethanol in Brazil, CO emission from automobiles decreased from 50 g/km in 1980 to 5.8 g/km in 1995. Nitrogen oxides (NOx) emissions from biofuels are slightly higher than those from petroleum, but this issue can be solved by employing de-NOx catalysts, which are effective with biofuels because they don't include sulfur.. [Joseph B. Gonsalves]

Biodiesel:

Vegetable oils from food (first generation) and non-food (second generation) sources, such as Jatropha and Karanja can be converted to biodiesel. The main conversion is through transesterification where the oil is mixed with alcohol and an alkaline catalyst to produce a fatty acid methyl-ester which has properties like fossil fuel diesel. India's policy is to use second generation plus waste vegetable oil (WVO). WVO is 2-3 times cheaper as a feedstock and can yield a quality biodiesel with a lower pollution potential. [S C Bhattacharya]

Problems cited by farmers in Jatropha cultivation

The following problems have been cited by farmers regarding Jatropha cultivation:

1. Lack of faith in farmers as a result of the government's biodiesel policy's tardy notification, publicity, and explanation.
2. No minimum support price.
3. In the absence of long-term purchase contracts, there are no buy-back arrangements or purchase center's for Jatropha plantations.

4. Lack of availability certified seeds of higher yield containing higher oil content.
5. No announcement of incentives/subsidy and other benefits proposed to be provided to farmers.
6. Limitations of biofuel

Food security and rural development

Food prices have risen sharply in recent years, mainly as a result of increased demand for cereal and oil seeds for biofuels, low global food stocks, high oil and fertilizer prices and market speculation. After four decades of mainly declining or flat trends, real food prices increased 64% by early 2008 from their 2002 levels (FAO 2008).

Deforestation

The expansion of crop cultivation is a major contributor to deforestation. Forests, which play an important role in both the conservation of biodiversity and in mitigating global climate change, account for 30% of the world's land area. During the past decade, more forests were cleared than replanted (OFID/IIASA 2009). The FAO estimates the rate of global deforestation, in the 1990s and beginning of this century, at 8 – 9 Mha hectares per year (OFID/IIASA 2009) and the risk of this process accelerating increases with increased demand for food and energy crops. [Claude Mandil 2010]

Biodiversity

Biodiversity provides and maintains essential ecosystem services to agriculture, including nutrient cycling, regulation of pests and diseases, maintenance of soil fertility and water retention. Increased biofuel production could have negative impacts on biodiversity through habitat loss following land conversions, agrochemical pollution and the dispersion of invasive species. The degree of impact depends on the extent of associated land use changes and conversion, as well as the type of biofuel stocks (SCOPE 2009, FAO 2008).

Conclusion

Undoubtedly, biofuel plays an important role in the future, as it is a viable replacement for fossil fuel in current use. Apart from energy security, it is important in minimizing environmental pollution by reducing the production and emission of GHGs, which are a direct cause of global warming. Moreover, as biofuels can be produced directly or indirectly from natural resources, such as animal waste and plants, large quantities of raw materials would need to be planted as energy fuel to implement large-scale biofuel

production. [Zentou, Hamid] This will serve to create job. On another hand, Biofuel production requires a long term commitment in order to get the benefits, and its minimum-level profits make it challenging for cultivators, farmers and rural residents to fulfil their daily living expenses. Moreover, as the cultivation of biofuel crops requires large tracts of land, this will eventually reduce the availability of grazing land, which is a food source for livestock, and will lower the production of opportunities for villages and rural communities, which indirectly helps in the growth of the country's economy. [Rosli, Nurul Shafiqah]

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