

Bio-fuels to substitute biologically formed “Fossil-fuels”

The most current problem the country is facing is the fuel crisis, which is likely to have extremely undesirable repercussions. A large sum of money is spent on importing petroleum to Sri Lanka. As a result it is likely that our annual fuel bill in 2006 was more than Rs.200 billion. This constitutes almost about 25% of the value of our imports and is about 30% of our total exports which is Rs.600 billion. The total annual export earnings from tea, rubber and coconut are only around Rs.90 billion. Thus, our annual fuel bill is even more than what we earn annually by exporting these crop products.



Fig 1. Biofuel pumping station

poisonous exhaust emissions and is harmless for the environment. Ethanol can be made from molasses which is a crude extract of sugarcane. Ethanol can also be made by fermenting and then distilling starch obtained from crops such as maize, sorghum, potatoes, wheat, even cornstalks, fruit and vegetable waste.

Henry Ford designed the famed Model T Ford to run on alcohol — he said it was “the fuel of the future”.

Ethanol is a much cleaner fuel than petrol (gasoline):

- ◆ It is a renewable fuel made from plants
- ◆ It is not a fossil-fuel: manufacturing it and burning it does not increase the greenhouse effect
- ◆ It provides high octane at low cost as an alternative to harmful fuel additives
- ◆ Ethanol blends can be used in all petrol engines without modifications
- ◆ Ethanol is biodegradable without harmful accumulative effects on the environment
- ◆ It significantly reduces harmful exhaust emissions
- ◆ Ethanol's high oxygen content reduces carbon monoxide levels more than any other oxygenate: by 25-30%, according to the US Environment Protection Agency (EPA)
- ◆ Ethanol blends dramatically reduce emissions of hydrocarbons, a major contributor to the depletion of the ozone layer

A high expenditure on petroleum or fossil fuels will have many undesirable effects on the country's economy. In view of the high costs involved in importing crude oil, it is extremely important that we start producing and using alternatives to petroleum. Among these are the bio fuels which can be made in Sri Lanka. Bio-fuels have a biological origin, and live organisms like plants or bacteria are involved in the production. Although, petroleum or fossil fuels also have a biological origin because fossils have plant and animal origin, we do not consider petroleum as a bio-fuel.

Ethanol

This is one of the common bio fuel which can be used as an alternative for fossil fuels.

Ethanol or ethyl alcohol, is a clear, colourless liquid with a characteristic, odour and taste. This is main active component of alcoholic drinks such as beer, wine and other spirits while abuse of these become harmful for the man. Ethanol is also a high-performance motor fuel that cuts



Fig 2. Sugarcane plantation

Many countries are either producing or using ethanol in large quantities or are providing incentives to expand ethanol production and use. Prompted by the increase in oil prices in the 1970s, Brazil introduced a program to produce ethanol for use in automobiles to reduce oil imports. Brazilian ethanol is made mainly from sugar cane. Pure ethanol (100% ethanol) is used in approximately 40 percent of the cars in Brazil. The remaining vehicles use gasohol blends of 24 percent ethanol with 76 percent gasoline. Brazil consumes nearly 4 billion gallons of ethanol annually. In addition to this industrial consumption, Brazil

also exports ethanol to other countries. Some Canadian provinces promote ethanol use as a fuel by offering subsidies. India is initiating the use of ethanol as an automotive fuel. In France, ethanol is produced from grapes that are of insufficient quality for wine production.

Sweden has used ethanol as a fuel substitute and as a result, Sweden's crude oil consumption has been cut by almost half since 1980. Ethanol-blended gasoline is being considered as a viable alternative to further lower emission levels. The US now uses more than 15 billion gallons of cleaner, ethanol-blended petrol a year, totaling 12% of fuel sales in the US. Most of it is a 10% blend, but 85% and even 95% blends are now being tested. Ethanol blends are also increasingly used in South Africa and a number of other countries. Use of ethanol tends to reduce environment pollution caused by oxygenates such as tetraethyl lead, MTBE and ETBE used in petrol.

Production of ethanol in Sri Lanka

Ethanol is produced in Sri Lanka from sugarcane molasses. At present, around 10 million liters of ethanol are produced annually in the country. This amount would increase considerably, to as much as 30 million liters if Hingurana and Kantale

sugarcane factories operate at full capacity. As indicated earlier, ethanol can also be made by fermenting and then distilling starch/sugar obtained from crops such as Manihot, maize, sorghum etc. which are cultivated in Sri Lanka.

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Bio Diesel

Diesel is another fuel made from fossil oils, and is used in many automobiles and engines. A number of oils of plant origin can be used as alternatives to diesel. Among these oils are sun-flower, coconut and soybean oil. *Jatropha* (*Weta Endaru*) is a plant which produces oil in seeds, which can be used to run vehicle engines. This plant grows well in the dry zone and has a considerable potential as a source of a biofuel as a substitute for diesel.

Biomass

Biomass from crops such as glyricidia can be used to generate electricity. Urban wastes are also a good source of electricity. In Sri Lanka, a large amount of solid organic wastes, amounting to few hundred tons is collected daily in Colombo and the other major cities. These can be used to generate bio-gas which can be used as a fuel to generate electricity. Efficient electricity storage cells/batteries have been developed to use in motor vehicles with "hybrid" engine systems in developed countries.

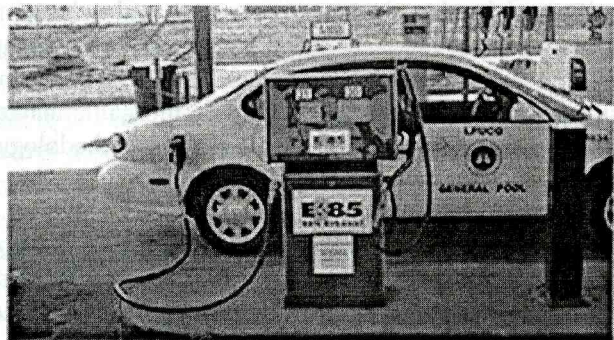


Fig 3. Auto-pumping of E:85 bio-fuel

Bio-enzymes for fuel efficiency

Bio-enzymes for bio-catalysts are currently used with fossil fuels to improve the energy release by replacing environment damaging synthetic additives. These bio-enzymes are also sold in Sri Lanka. Minute amount of bio-enzyme is required and such enzymes will also be used with bio-fuels.

Dr C.S. Weeraratna
Chairman - Sugarcane Research Institute
Uda-Walawe