

Biofuel: an Alternative Fuel in the Malaysian Scenario

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INTRODUCTION

The research in biofuels, in particular palm diesel, has reached a point where implementation of the national alternative energy policy is now feasible. Biofuels are politically desirable worldwide in view of serious concerns over the rising levels of greenhouse gas CO₂, global warming and dwindling reserves of fossil fuels. In particular, biodiesel use has become mandatory in several European Union (EU) countries and already is being implemented in several states in US and Canada. Rapeseed oil, being abundant in EU countries, is among the vegetable oils most used, followed by sunflower, soyabean and other oils including palm oil. Recently, even developing countries have had energy policies which include the use of locally available biofuels.

TECHNICAL FEASIBILITY OF PALM BIOFUELS

Direct use of crude palm oil (CPO) has been shown feasible in the Elsbett engine. However, a problem was clogging of the filter by impurities and hence, the need to warm the fuel before combustion. However, the use of processed liquid palm oil (PLPO) directly or in blends can overcome the problem, even in normal diesel engines. Palm diesel prepared as methyl esters of PLPO has many better fuel characteristics than petroleum diesel, with a cetane value of 63 versus 40 for petroleum diesel (winter grade). The emission gases are notably free from the major pollutant sulphur. Palm

diesel could be used directly or in blends with petroleum diesel when experimented on diesel engines, including Mercedes Benz engines over 300 000 km. Even PLPO can be used in 5% to 10% blends with petroleum diesel at tropical temperatures, this bearing in mind that the present engines are designed for petroleum diesel even though Rudolph Diesel had vegetable oil in mind when he invented the diesel engine a century ago.

Palm oil can, of course, be burnt directly for energy, but for industrial burners or boilers used in the generation of electricity, CPO needs to be blended with medium fuel oil. This was actually practised some time ago when the price of CPO was hovering close to its production cost. In fact, this has shown that in times of high supply and low demand, the supply overhang can be minimized so that a minimum

price of about RM 1000 can be achieved. One of the earlier objectives of research in palm biofuels was to provide a safety net during cyclical low prices for palm oil although this was not put into practice because petroleum prices were then low and transportation fuels still subsidized.

ECONOMIC AND SOCIAL CONCERNS

All factors seem to point to the inevitable use of biofuels. Biofuel is a renewable energy resource, it safeguards the environment, it provides net zero CO₂ emission, it can contribute to carbon credits, it provides energy security from an over dependence on fossil fuels in the future and it can probably stabilize the price of palm oil. It will create a whole new industry with tremendous potential with trickle down benefits to further provide new industries in nutraceuticals (vitamin supplements), detergents, glycerine and fine oleochemicals. In the Malaysian scenario, the main constraint is the fuel subsidy, but with rising petroleum prices, new strategies will have to emerge which will have possible social consequences. There may have to be practical and economic solutions, with inevitable use of biofuels through a joint effort involving the government, industry and

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consumers.

On economic considerations, one can learn from the experiences of other countries which have used biofuels. In developed EU countries, differential taxes are imposed to provide an advantage to biofuels, e.g. petroleum diesel highly taxed but biodiesel exempted. But legislation is still needed to make it mandatory to use biofuel blends. The EU countries used 1.4 million tonnes of biodiesel in 2003 which is expected to rise to 3.1 million tonnes in 2005, and a mandatory 1% blending will come into effect in 2009. In the US, the state of Minnesota in 2002 made 2% biofuels mandatory while the US Energy Act 2003 requires the use of 3.15 billion gallons of biofuel by 2005. However, all the above has to take cognizance of the ability to provide sustainable supplies. A good example to follow is that of Brazil (24%-26% mandatory ethanol) which managed a sustained supply for its biofuel programme.

In Malaysia, the subsidized price of petroleum diesel for the transportation sector is currently RM 1.28 litre⁻¹ compared to the imported price of RM 1.67 litre⁻¹ and market price for the industrial sector (unsubsidised) of RM 1.87 litre⁻¹. There is, therefore, a RM 0.59 litre⁻¹ subsidy. Even with these considerations and the relative low price of palm oil vis-à-vis soya oil, the cost of palm biodiesel production is estimated at RM 1.6 litre⁻¹ (at the PLPO price of RM 1510 t⁻¹ as at 29 July 2005), which means that it is still not competitive with the present constraints. Nevertheless, it is possible to envisage a new scenario without any fuel subsidy with market forces allowed to set the new (probably higher) prices.

IMPLEMENTATION OF BIOFUELS IN MALAYSIA

Historically, Malaysia has to bear the burden of maintaining palm oil stocks but with increasing overproduction locally and in neighbouring countries, stocks have remained high leading to relatively low prices. Palm oil has traditionally been traded below the soya oil price despite its technical and nutritional advantages. From statistical data, it is also known that falling stocks result in an inverse correlation with prices, the removal of 0.5 million tonnes resulting in a theoretical increase of RM 300 t⁻¹ for CPO. With an export of 10 million tonnes, there will be an extra profit of RM 3 billion. This will mean an extra corporate tax revenue (at 28%) for the government estimated at RM 1 billion. If RM 0.5 billion of this were to be returned to plantations as tax credit based on an estimated RM 1000 t⁻¹ differential to the market price of CPO, then compulsory sales to blend palm oil diesel can be made. If this scenario works out in the market place, it can be seen that the government stands to have the following estimated gains: RM 0.3 billion from the subsidy of not having to import 0.5 million tonnes of diesel, RM 0.5 billion in new corporate tax and other additional taxes (not given above) which will filter down from consumer spending arising from the additional RM 3 billion corporate profits from anticipated price increase of CPO.

In view of the National Energy Policy on energy security which emphasizes a fifth source of renewable supply and the global acceptance of biofuels, it is timely that a Malaysian Biofuel Act 2005 be proposed. The use of CPO for biodiesel will in fact bring about an important industry leap in

which immense amounts of CPO can be utilized and, at the same time, give rise to new by-product industries based on esters, glycerine, vitamins and supplements. Fractionated winter biodiesel from palm oil will find new markets while palm diesel technologies are being exported to Turkey and in time also to Korea, Hong Kong, Colombia and others. For implementation in Malaysia, it is possible to anticipate a Stage 1 of Pre-Legislation where supply and pumps are made available to government and some private fuel depots. A Stage 2 Post legislation period will allow for implementation in the Klang Valley followed by in other major towns in the whole country. Stage 3 will showcase the model to Indonesia with collaboration in ASEAN. A self-sustaining mechanism requiring no further government support is anticipated when the tax credits system may become dominant and the cess system remain for other aspects of R&D.

Apart from joining the rest of the world in overcoming issues on the environment and subsidies, there are several critical success factors to be noted. These can only be brought about by collaboration between the government (legislation), petroleum companies (blending and pumps), engine manufacturers (diesel and B5 engines) and MPOB/PETRONAS (technical support and commercialization). Technical feasibility is already ensured as low pour point palm diesel plants are exported in containers to be set up in a few countries. As the demand for biodiesel is expected to rise and as the prospect is for higher prices of petroleum diesel at a time of depleting resources, it is imperative that the biodiesel initiative which is already in place be implemented.