



# A detailed survey of the palm and biodiesel industry landscape in Malaysia



Amir F.N. Abdul-Manan<sup>a</sup>, Azizan Baharuddin<sup>a, b</sup>, Lee Wei Chang<sup>a, b, \*</sup>

<sup>a</sup> University of Malaya, Faculty of Science, Department of Science & Technology Studies, 50603 Kuala Lumpur, Malaysia

<sup>b</sup> University of Malaya, Centre for Civilisational Dialogue, 50603 Kuala Lumpur, Malaysia

## ARTICLE INFO

### Article history:

Received 27 May 2014

Received in revised form

11 August 2014

Accepted 3 September 2014

Available online 27 September 2014

### Keywords:

Sustainable energy

Renewable energy

Biofuels

Malaysia

Palm oil

## ABSTRACT

This paper provides a critical review of the palm biodiesel landscape in Malaysia. The palm industry is a key source of revenue for the country, where in 2009 the industry was responsible for generating 8% of the gross national income per capita. The interest in palm-based biodiesel can be traced back to the early 1980s however it was only in 2006 that Malaysia officially formulated its first National Biofuel Policy as a strategic government intervention to drive development and implementation of palm biodiesel as substitute to regular fossil-based diesel. As at January 2013, the implementation of the biodiesel mandate (at 5% concentration) has been limited to the Klang Valley central region only. But there are plans for a much wider roll-out and at higher concentration blends in 2014. The policy in its current form assumes that all biofuels are sustainable and therefore fails to provide assurances that the fossil diesel will be replaced by a more sustainable energy source. Here it has been argued that a market-based policy approach would be better than a technology-forcing mechanism.

© 2014 Elsevier Ltd. All rights reserved.

## 1. Background

The oil and gas industry is at the heart of Malaysia's economy and growth, not just as a key source of revenue for the country but also to support and propel the growth of the domestic economy. Like many other countries globally, Malaysia too is very dependent on fossil energy sources. That is, an energy source that is depletable and one that leads to the worsening of the climate. It is a well established fact that a country's persistent reliance on petroleum is not a good thing from many fronts. But unfortunately, weaning the country off fossil energy is not easy and requires a lot of willpower.

The transport sector in Malaysia has been the largest consumer of energy for some years now [1] and because of this, the transport sector is the largest contributor of GHG (greenhouse gases) emitted in the country, accounting for more than 40% of the country's total GHG emissions [2]. This is not expected to change

anytime soon, in fact the trend is expected to get worse. This is especially the case as Malaysia moves up the income ladder, where affluence, like everywhere else, is characterized by, amongst others, increased vehicle ownership potential and personal mobility.

With increasing concerns on climate change, crude oil price volatility and security of energy supply, many countries globally have started formulating policies to promote the use of biofuels as substitute to fossil fuel for the transport sector, either by providing fiscal incentives in the form of tax credits [3,4] or through obligatory volume targets [5]. Likewise, Malaysia too has developed and introduced a NBP (National Biofuel Policy) in 2006. This is a first major step that the country has proactively taken to introduce alternative forms of energy to complement and partially substitute petroleum. As of now, the implementation of the policy has been limited to the central Klang Valley region only, however discussion surrounding a nation-wide roll out is already underway, where in fact there is now desire to increase the concentration of the palm-biodiesel blend from the current 5% level to 10% in 2014 [6].

A lot of studies focussing on the palm oil and biodiesel industry in Malaysia have been done in the past by various researchers, some of which are works by Refs. [7–10]. However, many of these studies, though detailed and robust, tended to focus on particular aspects of the oil palm or biodiesel complex through specific

\* Corresponding author. Centre for Civilisational Dialogue, 2nd Floor, Siswarama Building, University of Malaya, 50603 Kuala Lumpur, Malaysia. Tel.: +60 379675477; fax: +60 379675692.

E-mail addresses: [cclw86@yahoo.com](mailto:cclw86@yahoo.com), [cclw86@gmail.com](mailto:cclw86@gmail.com) (L.W. Chang).

viewpoints. Darshini et al., for example, has provided an excellent insight into the perspectives of key stakeholders within the industry, and as will be shown later is consistent with the argument presented here.

In this paper we present a critical review of the Malaysian biofuel landscape. Detailed overviews of the palm and biofuels industries are presented by tracing its historical developments up to its current state. A critical discourse on the biofuel policy is also provided with a special emphasis on sustainability and innovation. Ensuing this, we present an overview of some of the recent developments in Malaysia that may have an impact, directly or indirectly, on the biofuels landscape in Malaysia. Throughout this paper, we offer constructive suggestions for how the competitiveness of Malaysian biofuels can be improved. This paper builds on previous works by others and is a timely review of the biodiesel initiative in Malaysia before the policy is implemented on a much wider scale.

## 2. An overview of the industry

### 2.1. Oil palm cultivation in Malaysia

Oil palm was first introduced to Malaysia, back then known as Malaya, in the 1870s as ornamental crops, but later in the 1917s was commercialized, initially in Selangor, but have eventually spread throughout the country and now has become the number one plantation crop in Malaysia, contributing about 5–6% of Malaysia's GDP [11], and is currently the fourth largest contributor to the national economy accounting for about 8% of the country's GNI (gross national income) per capita [12].

According to the Department of Statistics Malaysia, oil palm plantations currently occupy 14% of the total land area of the country [13]. Looking back through history, it was the government land settlement schemes, in particular the FELDA (federal land development authority) that was mainly responsible for promoting and expanding the oil palm plantations in Malaysia as part of their socio-economic responsibilities towards the rural poor and landless [14]. However, from the Sixth Malaysia Plan (1991–1995) onwards, there was a concerted effort by the government to privatize the developments of large oil palm estates, in which now large private entities own about 60% of the total area cultivated for oil palm, with the balance being managed by independent and organized smallholders, where the latter include FELDA [13,15]. Although there is a strong push for private sector-led oil palm developments, the Malaysian government is still heavily involved in the palm oil sector from multiple fronts. On the one hand the Malaysian government plays the role of a regulator, policy maker and law enforcer, but on the other hand the government is also the indirect shareholder for some of the large private entities involved in the palm oil business [14,16], thus making them the indirect owner and beneficiary of the growing industry. There is therefore also a strong incentive for the government to promote and expand the industry domestically and internationally.

At present, the Malaysian based Sime Darby Plantation is a key player of the oil palm industry, whose position was enhanced through the merger of Sime Darby Berhad, Golden Hope Plantations Berhad and Kumpulan Guthrie Berhad. These three separate entities were founded almost 200 years ago by pioneering English planters who had established rubber plantations in Malaya, but later were converted into oil palm estates. This combined heritage of more than 400 years has made Sime Darby Plantation now as one of the world's largest palm oil producers responsible for about 6% of the world's CPO (crude palm oil) output annually [17]. The Group has operations in over 20 countries and employing more than 100,000 people [18]. The conglomerate, as at June 2010, was one of the largest listed

companies on the local stock market, Bursa Malaysia, with a market capitalization of RM 48.1 billion, where the three largest shareholders as at September 2010, are AmanahRaya Trustees Berhad (i.e. Skim Amanah Saham Bumiputera), the EPF (employees provident fund) Board and PNB (permodalan nasional berhad), which accounts for a total of more than 60% of the issued capital [18].

Today, 4.56 million hectares of land in Malaysia is cultivated with oil palm, producing 17.57 million tonnes of palm oil and 0.66 million tonnes of palm kernel oil, thus making Malaysia one of the largest producers and exporters of palm oil worldwide, accounting for about 11% of the world's oils and fats production and 26% of export trade of oils and fats [19]. It is important to note that oil palm is the most efficient oilseed crop in the world, where a hectare of oil palm plantation is able to produce up to 10 times more oil than other leading oilseed crops globally which therefore provides great utility for a piece of land especially in areas that are land-scarce. Because of the aforementioned efficiency in oil palm cultivation, in 2009 oil palm was the largest source of oils and fats globally whilst at the same time occupying the smallest (~5%) total land area cultivated for oilseeds. With the extraordinarily high yield inherent to oil palm, it should be possible to mitigate a further deforestation of land for new oil palm establishments through better management practices of existing plantations and replanting schemes and via international cooperation.

### 2.2. Biofuels development in Malaysia

#### 2.2.1. Historical perspective

In many countries, a biofuels mandate or policy tends to incentivize the development and deployment of substitutes for both types of fuels, gasoline and diesel, for use in spark-ignition and compression-ignition vehicles respectively [5,4]. These policies typically aim to replace fossil fuels with non-fossil alternatives. However, the situation in Malaysia is a little different given that more emphasis has been given for substituting diesel fuels, whilst the development of alternatives for gasoline has been rather slow, if not nonexistent. To some extent this is likely to be due to the proactive development, demonstration and effective lobbying by the oil palm industry associations.

The commercial interest in biodiesel can be traced back to the early 1980s when there was a realization that the country has large potential to become a pioneer of the biodiesel industry given Malaysia's status as world's largest producer and exporter of palm oil [15]. The initial research and development were spearheaded by the Malaysian Palm Oil Board (MPOB, then known as PORIM) which had led to the construction of a palm biodiesel pilot plant and subsequently a series of laboratory, engine and road evaluations were carried out successfully and this include a large fleet trial that was conducted and had ascertained its fitness for purpose [15,16]. In 1992, MPOB managed to develop a winter-grade palm biodiesel technology [15] that is especially crucial for palm biodiesel to enter markets with temperate climates. However, despite these successes, the biodiesel industry had failed to take off and was relatively dormant for many years in the 1990s. It is not entirely clear the reasons behind this, but it can be hypothesized that the relatively low and stable oil price as well as the country's growing strength as a net oil exporter during this period had overshadowed the biodiesel industry, and moreover it wasn't until the mid 21st century that global demand for biofuels really took off (Fig. 1) as a result of mandatory blending targets that were introduced in many countries, particularly within the OECD nations [20].

#### 2.2.2. Revitalizing the biofuels industry

The biofuel industry in Malaysia was given a new lease of life when the Eight Malaysia Plan underlined the niche, but high

Download English Version:

<https://daneshyari.com/en/article/8076937>

Download Persian Version:

<https://daneshyari.com/article/8076937>

[Daneshyari.com](https://daneshyari.com)