1.5. Malaysia

Malaysia is the fourth largest economy in the region (IMF, 2017). It has a total land mass of 330,803 square kilometres and consists of 13 states and three federal territories. Malaysia's economy has been fuelled by its natural resources and rapid development across the country.

1.5.1. Current Status of Energy Supply

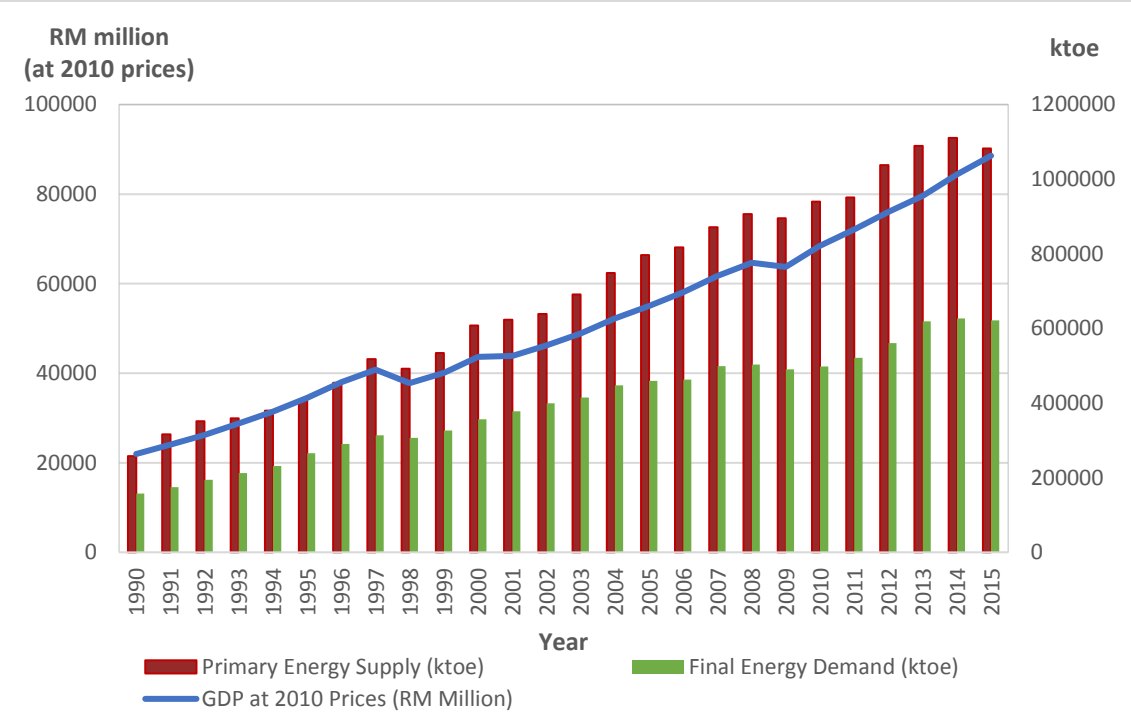
Since the Energy Commission of Malaysia has not yet released the latest information of the National Energy Balance, a summary of Malaysia's energy balance in 2015 is discussed. Fig. 2.1.5-1 shows the variation of gross domestic product (GDP), total primary energy supply, and final energy consumption from 1990 until 2015 (Energy Commission, 2017). The annual GDP growth rate in Malaysia averaged 5.7% from 1990 to 2015. In addition, according to the *World Economic Outlook* report, Malaysia's economy experienced a surge in GDP growth to 6.2% in the third quarter of 2017 as compared to 5.8% in the preceding quarter (IMF, 2017). This stronger economic growth during the third quarter of 2017 was amongst the fastest in Asia in terms of GDP growth, ahead of Singapore, Indonesia and the Republic of Korea. Favourable performances by the services, manufacturing, and construction sectors dominated the growth in GDP.

The annual growth rate of total primary energy supply for Malaysia from 1990 to 2015 was 5.9%. In 2015, the total primary energy supply showed a reduction of 2.5% with 90,187 kilotonnes of oil equivalent (ktoe) compared with 92,528 ktoe in 2014. The decline was mainly caused by lower production of natural gas, which is the primary energy source. Natural gas registered a decrease of 1.9% in 2015 to 39,364 ktoe. However, the export of crude oil and petroleum products increased in 2015, led by a decrease and subsequent reversal in commodity prices. Crude oil production increased by 9.8% in 2014 to 32,440 ktoe in 2015. In addition, the total supply of coal and coke increased by 13.3% to 17,406 ktoe in 2015. The supply of hydropower also showed an increase of 17.9% to 3,582 ktoe in 2015.

Moreover, the annual growth rate of final energy consumption from 1990 to 2015 was 5.6%. Final energy consumption in 2015 decreased by 0.8% to register 51,806 ktoe in 2015. The decline was led by the performance of the transportation sector, which was affected by the economic slowdown during the year. The transportation sector is the largest energy consumer with a 45.2% share of total energy consumption. The sector's energy consumption decreased by 3.7% to 23,435 ktoe in 2015. The decline was a result of the lower consumption of petroleum products (i.e. diesel, aviation turbine fuel, and aviation gasoline fuel). The industrial sector, as the second largest energy consumer with a 27.0% share, increased consumption by 6.3% compared to the preceding year. The positive growth in the industrial sector was mainly supported by construction activities and infrastructure projects. This was followed by the residential and commercial sector, with its share of 14.6% of the total energy consumption, which increased consumption by 1.3% compared to the previous year. This rise was mainly attributed to growth in electricity and liquefied petroleum gas supply. The non-energy use is the use of the products resulting from the transformation process for non-energy purposes.

The use of energy products, with its share of 11.4%, showed a slight decrease of 4.7%, or a total of 5,928 ktoe. The agriculture sector consumed the least energy and recorded a negative growth of 14.4% at 895 ktoe, which was caused by lower crude palm oil output.

Figure 2.1.5-1: Variation of GDP, Total Primary Energy Supply, and Final Energy Consumption in Malaysia, 1990–2015



GDP = gross domestic product, ktoe = kilotonne of oil equivalent, RM = Malaysian ringgit.
Source: Energy Commission of Malaysia (2017).

1.5.2. Current Status of Transportation Fuel Supply

Malaysia has spent heavily on refining activities by gearing up its capacity to become a net oil product exporter. To date, Malaysia has six refineries with a combined capacity of about 584,000 barrels per day (bbl/d). In addition, it is currently developing Pengerang Integrated Petroleum Complex in Johor as a part of Malaysia's goal to compete with the oil refinery and storage hub in Singapore. The refinery plants and their capacity are listed in Table 2.1.5-1.

Table 2.1.5-1. Official Refineries in Malaysia and Their Capacity

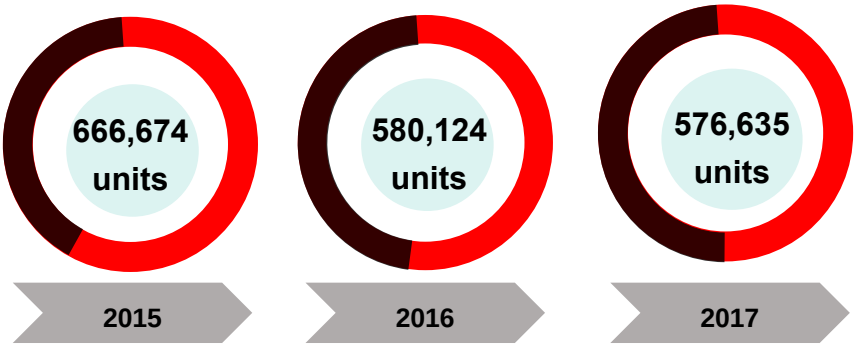
Refinery Plant	Refinery Capacity (bbl/d)
Melaka II Refinery (Petronas and ConocoPhillips)	170,000
Hengyuan Port Dickson Refinery (Hengyuan Refining Company)	156,000
Melaka I Refinery (Petronas)	100,000
Petron Port Dickson Refinery (Petron)	88,000
Kertih Refinery (Petronas)	40,000
Kemaman Bitumen Refinery (TIPCO)	30,000
Pengerang Integrated Petroleum Complex (Petronas and Saudi Aramco) – in progress	300,000 (expected)
Total	**884,000**

bbl/d = barrel per day.

Source: Export fov (2018).

Figure 2.1.5-2 shows the sales of new vehicles in the Malaysian market from 2015 to 2017 (Lim, 2018). Sales of new vehicles dropped from 666,674 units in 2015 to 580,124 units in 2016 and further to 576,635 units in 2017. This decline was due to depreciation of the Malaysian ringgit, high living cost, higher prices of new vehicles, and difficulties to secure vehicle loans. Amongst the new vehicles purchased, those with gasoline-powered engines accounted for about 80% of the market. These are the most common vehicles in Malaysia. Meanwhile, sales of diesel-powered vehicles such as trucks, buses, and pickups are growing slowly.

Figure 2.1.5-2: Sales of New Vehicles in the Malaysian Market, 2015–2017

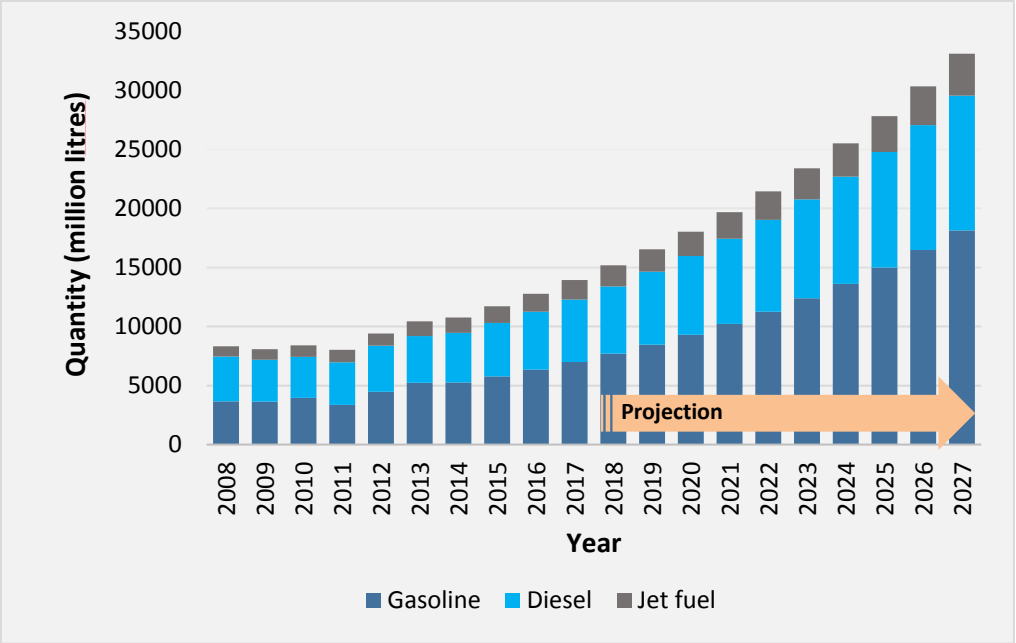


Source: Lim (2018).

In addition, there are two common types of gasoline available in Malaysia: RON95 and RON97. However, high-grade fuels with higher octane ratings, such as Blaze 100 Euro 4M (Petron Malaysia) and V-Power Racing (Shell Malaysia), have officially been marketed in selected pump stations in Malaysia. As for diesel fuel, there are two types available in the market as options to consumers: B7 biodiesel blend and Euro 5 diesel. However, use of Euro 5 diesel as road diesel

has been lower due to its higher price compared with B7. Figure 2.1.5-3 presents the fuel use history and projected use in the country. Fuel consumption steadily increased from 2008 to 2017 and is forecasted to increase further for the next 10 years. Amongst the fuel types, gasoline fuel accounts for about 50% of the total fuel use.

Figure 2.1.5-3: History and Projections of Fuel Use in Malaysia



Source: Wahab (2017).

1.5.3. Current Status of Biofuel Supply in the Transportation Sector

Biodiesel produced in Malaysia is derived from crude palm oil, which is abundant and low cost. Meanwhile, ethanol is produced from palm oil mill effluent, but the production is not significant due to high capital investment and production costs as well as lack of advanced technology. However, ethanol is excluded as an alternative fuel under the Malaysian Biofuel Industry Act.

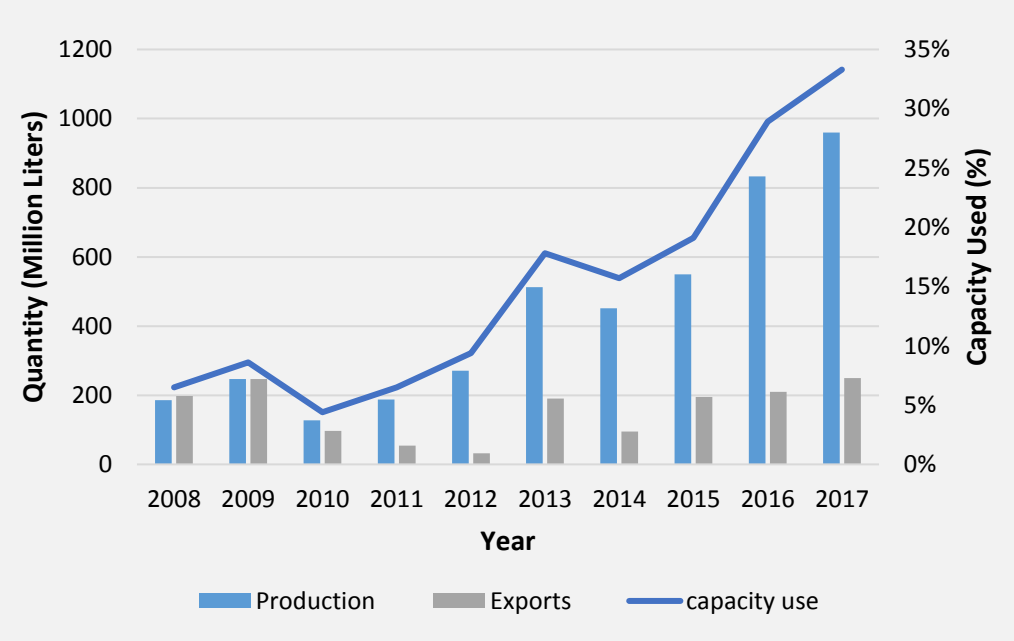
As of 2017, there were 17 biodiesel plants operating in Malaysia, as listed in Table 2.1.5-2. The production of biodiesel in the country has steadily increased since 2014 from 451 million litres to 960 million litres in 2017 (Figure 2.1.5-4). In fact, this is far from the nameplate production capacity of 2.5 billion litres. The biodiesel production does not meet the demand, even though it has the potential to do so. Biorefineries in Malaysia only use about a third of the total capacity. Biodiesel is also produced for export. Due to underutilisation of operations, the Government of Malaysia has not issued new licences for biofuel processing plants. Instead, some of the plants produce other oleochemical products, such as fatty acids, soaps, noodles, glycerine, and so on.

Table 2.1.5-2. Biodiesel Plants in Malaysia

Biodiesel Plant	Location
Carotech Berhad (Chemor Plant)	Chemor, Perak
Carotech Berhad (Lumut Plant)	Lumut, Perak
Carotino Sdn. Bhd.	Pasir Gudang, Johor
Felda Global Ventures Downstream Sdn. Bhd.	Kuantan, Pahang
Future Prelude Sdn. Bhd.	Port Klang, Selangor
Global Bio-Diesel Sdn. Bhd.	Lahad Datu, Sabah
KL – Kepong Oleomas Sdn. Bhd.	Port Klang, Selangor
Malaysia Vegetable Oil Refinery Sdn. Bhd.	Pasir Gudang, Johor
Nexsol (Malaysia) Sdn. Bhd.	Pasir Gudang, Johor
PGEO Bioproducts Sdn. Bhd.	Pasir Gudang, Johor
Senari Biofuels Sdn. Bhd. (Global Bonanza)	Kuching, Sarawak
Sime Darby Biodiesel Sdn. Bhd. (Carey Island)	Pulau Carey, Selangor
Sime Darby Biodiesel Sdn. Bhd. (Panglima Garang)	Teluk Panglima Garang, Selangor
SPC Bio-Diesel Sdn. Bhd.	Lahad Datu, Sabah
Vance Bioenergy Sdn. Bhd.	Pasir Gudang, Johor
YPJ Palm International Sdn. Bhd.	Pasir Gudang, Johor

Source: Wahab (2017).

Figure 2.1.5-4: Production of Biodiesel in Malaysia

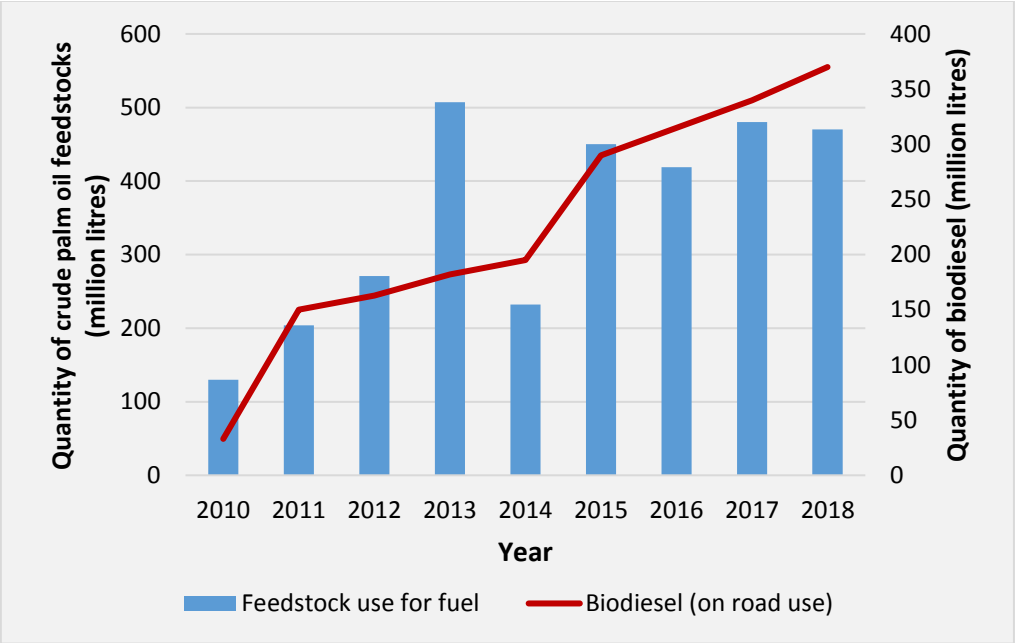


Source: Malaysian Palm Oil Board.

B5 biodiesel was first introduced in 2011 in the state of Negeri Sembilan, Selangor, Kuala Lumpur, Putrajaya, and Malacca, followed by Johor in 2013. Nationwide implementation, both

in Peninsular Malaysia and East Malaysia, was achieved at the end of 2014. Figure 2.1.5-5 shows that the consumption of biodiesel for transportation in Malaysia significantly increased to 290 million tonnes in 2015 from 195 million tonnes in 2014. In 2015, the B7 mandate was fully implemented throughout the country to replace B5 blend, causing the consumption of biodiesel for transportation fuel to drastically increase. However, the delay of the B10 mandate in 2016 reduced the forecasted consumption of biodiesel. The total biodiesel consumption in 2016 was about 315 million litres and the crude palm oil feedstock use for biodiesel production was about 369 million tonnes. The forecast of the consumption of biodiesel was 340 million litres in 2017 and 370 million litres in 2018.

Figure 2.1.5-5: Consumption of Biodiesel in Malaysia



Source: Malaysian Palm Oil Board.

1.5.4. Fuel Demand and Biofuel Supply Outlook Based on National Plan

The Government of Malaysia launched the Eleventh Malaysia Plan (2016–2020) to support the palm oil industry in Malaysia. Under this plan, the B15 mandate will be implemented nationwide by 2020 for the road sector, though details are lacking. To date, the government has continuously postponed the implementation of the B10 mandate due to protests from the automobile manufacturers over engine warranties and high palm oil prices in 2016.

Malaysia's biodiesel production is projected to remain flat in 2018 due to delays of the B10 mandate for transportation and the B7 blend for industry in 2017. According to projections in the Global Agricultural Information Network (GAIN) Report (Wahab, 2017), with the average blend rate in 2018 forecasted at 7%, the total consumption of biodiesel will be 370 million litres

and the total production of biodiesel will be 470 million litres, equivalent to 414,000 tonnes of crude palm oil feedstock. At the 28th Global Palm and Lauric Oils Conference 2017 in Kuala Lumpur, it was estimated that Malaysia will produce about 900,000 tonnes of biodiesel in 2017, which was an increase of up to 80% from half a million tonnes the previous year's estimate (MBA, 2017). The biodiesel plants in Malaysia are currently working at below 25% of their utilisation capacity.

1.5.5. Current National Plans for Reduction of Energy Consumption

To promote efficient use of energy in Malaysia, Prime Minister Najib Razak launched the National Green Technology Policy on 24 July 2009. The policy is based on four pillars (energy, environment, economy, and social) and aims to accelerate the national economy and promote sustainable development. Malaysia is committed to reducing greenhouse gas emissions intensity (per unit GDP) by 35% by 2030 relative to the emissions intensity in 2005, as part of its commitment under the Kyoto Protocol and the Paris Agreement. Focusing on the transportation sector in Malaysia, the following are initiatives to reduce energy consumption and emissions of harmful gases:

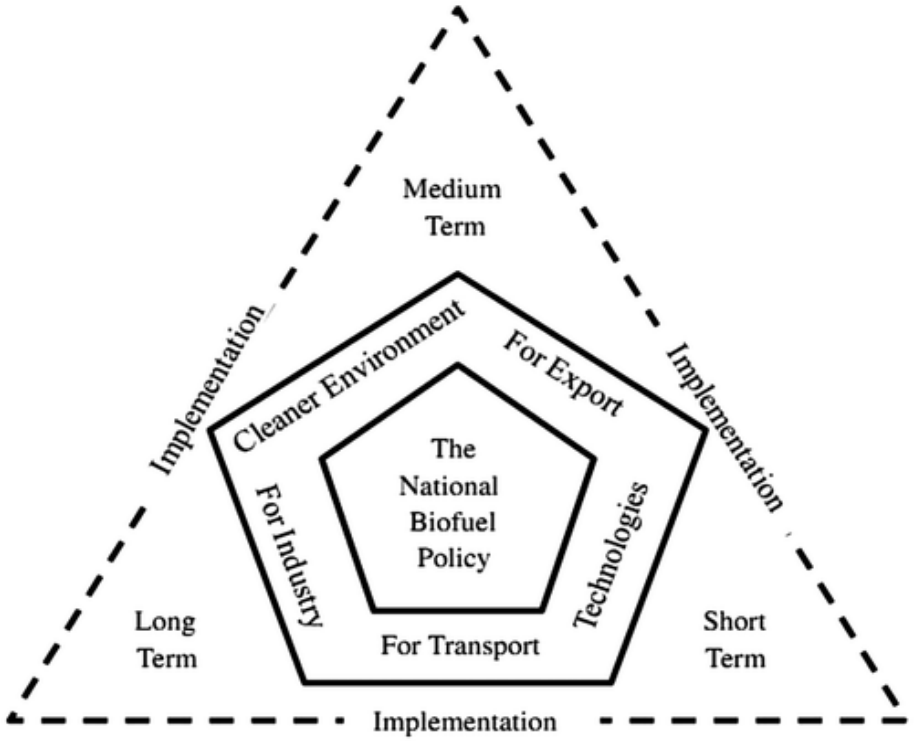
1. Encourage people to mix and match their transport modes. Commuters should be encouraged to use public transport to reduce congestion within the cities and minimise pollution.
2. Adopt energy-efficient vehicles, especially for public transport such as buses and taxis. Such vehicles can reduce dependency on fossil fuel and fuel wastage as well as minimise the environmental effects of harmful gases and black smoke.
3. Improve and add public transport in cities. This includes mass rapid, light rail, and bus rapid transit.
4. Encourage sustainable energy use for transportation such as EURO 4M, EURO 5 standards for clean fuel, and B15 rollout by 2020.
5. Add refining capacity of petroleum products installed in Pengerang, Johor.
6. Establish liquefied natural gas technology to improve energy efficiency and reduce fuel import.
7. Improve industrial technology and efficiency by contributing to research and development, thus translating innovation to wealth.
8. Adopt green-based development and practices by providing relevant policy and institutional frameworks for green growth.

1.5.6. Current National Plans for Alternative Fuel Introduction

The need to develop an alternative, cheaper, sustainable, and locally available fuel supply is a priority for the country. Since 1982, the government has invested in research and development of biodiesel technology conducted by the Malaysian Palm Oil Board, the Standards and

Industrial Research Institute of Malaysia, and local universities. The government has introduced a range of policies in order to improve biofuel policies. The National Biofuel Policy was launched in 2006 to strengthen the palm oil industry and reduce dependency on fossil fuels. Figure 2.1.5-6 shows the strategic dimensions and implementation of the policy (Rahyla, Radin Firdaus, and Purwaningrum, 2017). Subsequently, the Malaysian Biofuel Industry Act, which is aligned with the objective the National Biofuel Policy, was enacted by the Malaysian Parliament in 2017 to provide a mandatory regulation to implement the biodiesel blend mandate and licensing of activities related to the biofuel industry.

Figure 2.1.5-6: Strategic Dimensions and Implementation of the National Biofuel Policy in Malaysia



Source: Rahyla, Radin Firdaus, and Purwaningrum (2017).

As discussed in the previous section, the Government of Malaysia is working to increase the palm oil biodiesel blending requirements through the B15 mandate by 2020, which is highlighted in the Eleventh Malaysia Plan. Thus far, the phased implementation of the B10 biodiesel programme for the transportation sector has been indefinitely postponed. The government is making efforts to convince stakeholders of the compatibility of the B10 blend, including by providing tax exemptions to petrol stations.

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