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Biofuels Annual

2016

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Report Highlights:

Implementation of the 10 percent biodiesel blend (B10) planned for July 1, 2016 has been postponed to the end of the year, but, realistically, Post believes it will likely be implemented in the first quarter of 2017. With full implementation of B10 in 2017, consumption is expected to reach 770 million liters next year. A 15 percent blend is expected for roll-out in 2020. Over the next few years, the expected continuation of higher blending rates, coupled with further growth in the size of the diesel pool, is expected to expand biodiesel use at a rapid rate. Malaysia is a net exporter of Palm Methyl Ester Biodiesel.

Post:
Kuala Lumpur

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I. Executive Summary

After several delays, nationwide availability of a 7 percent biodiesel blend (B7) began on January 1, 2015 intended for on road transport sector. Crude palm oil (CPO) is the feed stock. In 2015, with the national B7 mandate in force, some exports and no imports, biodiesel production was 550 million liters, up from 451 million liters annually under the 5 percent blend mandate the previous year.

The introduction of B10, originally scheduled for October 1, 2015, had been delayed due to resistance from key diesel vehicle manufacturers, claiming the 10 percent blend would have adverse effects on the engine and lubrication systems. Manufacturers claimed Palm Methyl Ester biodiesel could potentially damage the diesel engine injection system if the blend exceeds 7%. Interestingly, 95% of all vehicles on the road in the United States today are approved up to B20. This forced GOM to delay implementation of B10 mandate to the end of 2016. Realistically, with GOM's unreliable implementation record, Post believes the mandate will likely be implemented in the first quarter of 2017. To ensure consumer confidence and acceptance of B10 biodiesel, there are suggestions to offer both B10 and B7 at the petrol station (rather than solely B10), as is the case with petrol that offers the option of RON95 and RON97 petrol fuels. The GOM is not in favor as it will slow their efforts in promoting B10 biodiesel and reduce end stocks of CPO.

In addition, GOM extended the biodiesel mandate to the industrial sector that used boilers in their process, but at the blend rate of 7%. The commercial roll-out for the industrial sector is expected to gradually take place in October 2016. Malaysia ended fuel subsidies on December 1, 2014. Since then, the price of fuel is based on the rolling average price of crude oil during the previous month.

Ethanol is not produced in significant commercial quantities as costs are high.

II. Policy and Programs

Under the *National Biofuel Policy* released on March, 21, 2006, the Government of Malaysia's (GOM) objectives were to use environmentally friendly and sustainable energy sources to reduce dependency on fossil fuels and to stabilize and boost palm oil prices. Under this plan, biofuels were to be produced for transport, industry, and export, and the GOM would develop home grown biofuel technology and second generation biofuels. In 2007, Parliament passed the *Biofuel Industry Act*, which included provisions for the Ministry of Plantation Industries and Commodities to implement a biodiesel blend mandate. However, this act excluded ethanol as the source of alternative fuels under the National Biofuel Policy.

Although the initial plan was to initiate B5 in 2008, it only began on June 1, 2011. Selected states in Peninsular Malaysia, Central region of Negeri Sembilan and Selangor were first to be introduced before gradually being introduced to the Southern region of Malacca and Johore on July 22, 2012, the northern region of Perak, Penang, Kedah and Perlis in October 1, 2013 and east coast states of Pahang and Kelantan on February 1, 2014. Full nationwide implementation covering both Peninsular and East Malaysia was achieved at the end of 2014. With growing CPO stocks and

declining prices, GOM was pressured to further increase CPO quantity blended for biodiesel, which led to the B7 mandate in 2015.

Full implementation of the B7 blend, boost biodiesel consumption to 525 million liters in 2015. The B10 mandate was supposed to have been implemented on July 1, 2016, for the consumer transport sector (that covers both road and sea transport) but has been delayed to the end of 2016 (no specific date or month were given for the roll-out). Road transport constitutes nearly 80% of usage while sea transport takes up the rest. To further boost demand for biofuels, GOM also promotes the use of B7 biofuel for industrial sectors mainly as source of material to heat boilers and generate electricity. The roll-out of B7 biofuel for the industrial sector is expected to gradually take place starting on October 1, 2016. Full implementation of both B10 exclusively for on road sector and B7 for the industrial sector will lead to consumption of biodiesel to increase to 770.7 million liters as reported by the Ministry of Plantation Industries and Commodities in their press statement.

Implementation of B10 exclusively for commercial on-road and sea transport sectors and B7 for the industrial sector are seen as timely by the industry players as these will strengthen the price of CPO and reduce end stock of CPO. Even so, the roll-out was delayed as the Ministry of Plantation Industries and Commodities needed to consult with relevant automotive manufacturers about acceptance of B10 and with the Federation of Malaysian Manufactures about acceptance of B7 biodiesel for industrial usage.

It was unclear from the statement issued by the Ministry of Plantation Industry and Commodity if the major automotive manufacturers had been consulted as most expressed reservations about the 10 percent blend. Leading manufacturers even issued press statements claiming the higher blend above 7% could damage engines and that the availability in Malaysia of B10 could affect warranty coverage. While GOM will need to assuage car manufacturers' concerns, they still have great hopes about the future of using CPO for biodiesel. The recently released Eleventh Malaysia Plan (2016-2020) includes a goal to have a B15 transport mandate by year 2020 for on road sector. No details on the implementation available during the press release, nevertheless automotive manufacturers are skeptical on the implementation as the usage of Palm Methyl Ester beyond 7% blending rate will cause problems to the injection system of the diesel engine.

Needless to say, distribution, quality control, safety and user education issues need to be overcome to successfully reach this level of biodiesel use in the diesel pool. The GOM needs programs to educate on the benefits of biodiesel and to dispel consumer concerns about the potential damage to the engine.

Table 1 - Planned Versus Actual/Expected Roll-out of Blending Requirements

	Transportation Sector	**Industrial Sector**

Blend	Planned Government Roll-out	Actual Roll-out	Planned Government Roll-out	Expected Roll-out
B5	2008	2011 (Central region) 2012 (Southern region) 2013 (Northern region) 2014 Nationwide	None	
B7	January 1, 2015	January 1, 2015	October 1, 2016	October 1, 2016
B10	October 1, 2015	End of 2016 (as reported) 1st quarter 2017 (realistically)	No plans	
B15	2020		No plans	

III. Gasoline and Diesel Markets

Sales of new vehicles in 2015 increased to 666,674 units, compared to 666,465 in 2014, a marginal increase of 0.03%. For 2016, the figure is forecast to drop for the first time since 2007 to 650,000 units. This was attributed to high financing cost, increased prices of new vehicles and difficulties in securing loans for new vehicles purchases. Incentives for hybrid vehicles which were introduced in 2013 and 2014 were discontinued in 2015. For Energy Efficient Vehicles (EEV), GOM has introduced a special tax incentive for locally assembled vehicles with engine capacity below 1,300 cc horse power, leading to the popularity of such small engine vehicles in Malaysia.

Gasoline powered vehicles remain the most common, accounting for 80 percent of new car sales. Diesel powered vehicles are growing slowly. Most diesel vehicles are trucks, buses, and pick-ups.

Aircraft movement in 2015 was 938,713 compared to 928,733 in 2014, a slight increase of 1.1% from 2014, partly attributed to the opening of the new low cost carrier hub while *Malaysia Airlines* downsizes its operation in the region.

Table 2 - Fuel Use History and Projections

Fuel Use History (Million Liters)											
Calendar Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Gasoline Total	10,627	9,730	11,131	11,444	11,346	12,373	10,555	11,544	16,380	16,444	16,855
Diesel Total	9,694	9,546	10,633	10,247	9,651	9,376	9,738	9,789	10,695	11,358	11,528
On-road	6,301	6,205	6,911	6,661	6,273	6,094	6,330	6,363	6,952	7,383	7,493
Agriculture	1,260	1,241	1,382	1,332	1,255	1,219	1,266	1,273	1,390	1,477	1,499
Construction & Mining	485	477	532	512	483	469	487	489	535	568	576
Shipping & Rail	1,260	1,241	1,382	1,332	1,255	1,219	1,266	1,273	1,390	1,477	1,499
Industry	388	382	425	410	386	375	390	392	428	454	461
Heating	0	0	0	0	0	0	0	0	0	0	0
Jet Fuel Total	2,771	2,435	2,518	2,649	2,616	3,018	2,789	2,922	3,673	3,779	3,857
Total Fuel Markets	23,092	21,711	24,282	24,340	23,613	24,767	23,082	24,255	30,748	31,581	32,240

Fuel Use Projections (Million Liters)											
Calendar Year	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Gasoline Total	17,276	17,708	18,151	18,605	19,070	19,547	20,035	20,536	21,050	21,576	22,115
Diesel Total	11,701	11,877	12,055	12,236	12,419	12,606	12,795	12,987	13,181	13,379	13,580
On-road	7,606	7,720	7,836	7,953	8,073	8,194	8,317	8,441	8,568	8,696	8,827
Agriculture	1,521	1,544	1,567	1,591	1,615	1,639	1,663	1,688	1,714	1,739	1,765
Construction & Mining	585	594	603	612	621	630	640	649	659	669	679
Shipping & Rail	1,521	1,544	1,567	1,591	1,615	1,639	1,663	1,688	1,714	1,739	1,765
Industry	468	475	482	489	497	504	512	519	527	535	543
Heating	0	0	0	0	0	0	0	0	0	0	0
Jet Fuel Total	3,939	4,017	4,100	4,185	4,272	4,360	4,450	4,543	4,637	4,733	4,832
Total Fuel Markets	32,917	33,602	34,306	35,026	35,761	36,512	37,280	38,066	38,868	39,688	40,527

IV. Ethanol

There is no significant production of ethanol in Malaysia using biomass. Although there are initiatives to produce ethanol from palm oil mill effluent (POME), lack of advanced technology and high capital investment make it infeasible. In addition, difficulties in sourcing a constant supply of feedstock pose significant challenges. As such, ethanol is not used as a source for fuel, other industrial chemicals and even as beverages.

V. Biodiesel

Table 3 - Biodiesel supply and demand

Biodiesel (Million Liters)										
Calendar Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Beginning Stocks	15	3	3	33	141	255	390	376	206	299
Production	186	247	127	188	271	513	451	550	833	960
Imports	0	0	0	0	0	0	0	0	0	0
Exports	198	247	97	54	32	190	95	195	210	250
Consumption	0	0	0	26	125	188	370	525	530	770
Ending Stocks	3	3	33	141	255	390	376	206	299	239
Balance Check	0	0	0	0	0	0	0	0	0	0
Production Capacity										
Number of Biorefineries	20	20	20	20	20	20	20	20	20	20
Nameplate Capacity	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880
Capacity Use (%)	6.5%	8.6%	4.4%	6.5%	9.4%	17.8%	15.7%	19.1%	28.9%	33.3%
Feedstock Use for Fuel (1,000 MT)										
Crude Palm Oil	195	222	95	96	103	329	263	361	341	379
Market Penetration (Million Liters)										
Biodiesel, on-road use	0	0	0	85	125	188	370	525	530	770
Diesel, on-road use	6,661	6,273	6,094	6,330	6,363	6,952	7,383	7,493	7,606	7,720
Blend Rate (%)	0.0%	0.0%	0.0%	1.3%	2.0%	2.7%	5.0%	7.0%	7.0%*	10.0%
Diesel, total use	10,247	9,651	9,376	9,738	9,789	10,695	11,358	11,528	11,701	11,877

* For 2016 the B10 mandate reportedly expected to start at the end of 2016, but realistically Post believes it will only happen during the 1st quarter of 2017. As such, the B7 mandate is expected to last until the end of calendar year 2016.

Production

Production of biodiesel in Malaysia is still far below full capacity. Introduction of the B10 mandate accounted for the utilization rate at 33% which is way below industry full capacity.

Due to industry overcapacity and GOM's freezing issuances of new licenses for biofuel processing plant, Post foresees there will be no expansion in biofuel blending plant capacity in Malaysia, both in

the short and medium terms. Some of the plants even converted to produce other olio-chemical products. Based on observation by Post and interviews with industry stakeholders, most of the biofuel plants in Malaysia operate below capacity. Nearly three-quarters of those biofuel plants registered do not produce biodiesel (Palm Methyl Ester), instead producing other oleo-chemical products such as fatty acids, fatty alcohol, soap noodles and glycerine. (See plant listing in **Appendix A.)**

As for the implementation of the B15 transport mandate by year 2020, the utilization rate of biofuel production capacity will still fall below 65% unless plants are decommissioned; plants are converted to the production of other products; or there is further growth in net trade surplus.

Palm Methyl Ester 100% concentration before it is blended with diesel and sold at petrol stations in Malaysia.
(Source: FAS Kuala Lumpur)

Malaysian palm plantation, source of crude palm oil used to produce Palm Methyl Ester (Biodiesel).
(Source: FAS Kuala Lumpur)

Consumption

The average national blend of biodiesel in Malaysia's transport diesel pool has steadily increased since 2011. From 1.3% in 2011 (where biofuel was only available in the central region of Negeri Sembilan and Selangor states), it increased to 2.0% in 2012 when biofuel was available in the Southern region of Malacca and Johore states. When the government fully committed to implement B5 program in 2014, it increased to 5% (nationwide implementation). After many delays, GOM introduced the B7 mandate in 2015, thus increased the national blend rate to 7%.

The delayed introduction of B10 mandate from July 1, 2016, to the end of 2016, but probably sometime during the first quarter of 2017 means that for calendar year 2016, Malaysia's national blend rate is at 7.0% with consumption of 530 million liters. For 2017, the average blend rate is forecast at 10% with consumption forecasted at 770 million liters.

Although the government committed to implement B15 transport mandate in 2020, it is hard to judge if this goal will be reached because the government has not met past deadlines. For example, as previously noted, B10 blending which was supposed to occur on July 1, 2016, was reportedly postponed to end of 2016 due to objections by industry stakeholders. Realistically, Post believes it will only happen on the first quarter of 2017. Key to meeting higher targets is the availability of CPO at competitive prices (domestic and imported), and the readiness to import biodiesel during periods of feedstock scarcity. Also key is a stronger program to address distribution, quality control, safety and user education.

The delay in the implementation of B10 mandate from initially October 2015, to the end of 2016, was due, as stated, to concerns from vehicle suppliers about the alleged adverse impact of biodiesel on diesel engine performance. Several major vehicle suppliers issued press statements with scientific research. Although vehicle suppliers were against the 10% blend rate, GOM, nevertheless, proceeded with the B10 mandate, and it is uncertain who will take responsibility for any potential vehicle engine problems.

To ensure a successful transition to higher blending, the government needs to supply consistently high-quality fuels and educate consumers on the use of higher blends. Transparency in research finding and active engagement with industry players, mainly vehicle manufactures, biodiesel producers, fuel distributors and fleet managers, is the best way to ensure success.

Trade

Exports of biodiesel in 2015 increased to 195 million liters from 95 million liters in 2014. The increase was partly due to the Indonesian government's increased biodiesel consumption in 2015, hence, reduced Indonesian exports of biodiesel. In addition, there was a drastic drop in value of Malaysian currency relative to major trading currencies in 2015, making exports of biodiesel competitive and cheaper in terms of U.S. dollar. Thus, increased the quantity of biodiesel exported by Malaysia.

In 2015, Malaysia exported 65 % of biodiesel to Spain, 19% to the Netherlands and 11% to Switzerland. Exports for the first 5 months of the calendar year was 35 million liters which was slightly lower than 44.14 million liters recorded during the same period of 2015 (January thru May). These were due to strengthening of the Malaysian currency value and increase in price of CPO in recent months, compared to CPO prices recorded in 2015.

COUNTRY	2014 Quantity (Tons)	2014 Quantity (Mill Liters)
European Union	79,750	86.8
China P.R	1,598	1.7
Japan	1,021	1.1
India	1,010	1.1
Hong Kong	101	0.1
South Korea	81	0.1
Singapore**	3,794	4.13
TOTAL	87,355	95

COUNTRY	2015 Quantity (Tons)	2015 Quantity (Mill Liters)
Spain	116,960	127.4
Netherlands	34,768	37.9
Germany	691	0.7
Bulgaria	21	0
Switzerland	19,552	21.4
China P.R	1,741	1.9
Japan	2,662	2.9
India	203	0.2
USA	167	0.1
Singapore **	2,177	2.4
TOTAL	**178,942**	**195**

(Source*: Malaysian Palm Oil Board (MPOB))*
**Mainly for re-export

Stocks

There are no significant changes in stock. Stocks are calculated by balancing the production with exports and consumption to reflect current blending rate of the year.

VI. Advanced Biofuels

Although research of second generation renewable fuels from palm biomass and biogas has been ongoing since 2002, product development has been hindered by lack of investment. In addition, the high cost of transporting the feedstock, and alternative usage of the feedstock for other high value items,

such as pharmaceutical grade sugar, has so far, limited interest in advanced biofuels.

VII. Statistical Notes

Sources of information:

1. Malaysian Palm Oil Board – www.mpob.gov.my (for export data)

2. MPOB – Economics and Industry Development Division - http://bepi.mpob.gov.my/ (for export data)

3. Energy Commission of Malaysia - The Malaysia Energy Information Hub - http://meih.st.gov.my/home (for diesel on-road data)

4. Malaysian Biodiesel Association - http://www.mybiodiesel.org.my/index.php (for updates)

5. Post used MPOB data as it reflects actual quantity produced at source, i.e., from the plants rather than from Department of Statistics Malaysia data which rely on Bill of Landing information that may reflect incorrect HS Codes. Furthermore, most commodities analyst and research institutions use MPOB data instead of GTA data as MPOB data more accurately reflects actual data of palm oil production in Malaysia.

Appendix A.

Table 4 - Biodiesel plants registered in Malaysia. (However, only a few are operating).		
1	AJ Oleo Industries Sdn. Bhd.	Segamat, Johor
2	AM Biofuel Sdn. Bhd.	Pasir Gudang, Johor
3	CarotinoSdn.Bhd.	Pasir Gudang, Johor
4	YPJ Palm International Sdn. Bhd.	Pasir Gudang, Johor
5	Malaysia Vegetable Oil Refinery Sdn. Bhd.	Pasir Gudang, Johor
6	Nexsol (Malaysia) Sdn. Bhd.	Pasir Gudang, Johor
7	PGEO BioproductsSdn. Bhd.	Pasir Gudang, Johor
8	PZ Bioenery Sdn Bhd	Pasir Gudang, Johor
9	Supervitamins Sdn Bhd	Pasir Gudang, Johor
10	Vance Bioenergy Sdn. Bhd.	Pasir Gudang, Johor
11	Mission Biofuels Sdn. Bhd / Felda	Kuantan, Pahang
12	Mission Biotechnologies Sdn. Bhd / Felda	Kuantan, Pahang
13	Plant Biofuels Corporation Sdn. Bhd.	Kuantan, Pahang
14	CarotechBerhad (Chemor Plant)	Chemor, Perak
15	CarotechBerhad (Lumut Plant)	Setiawan, Perak
16	Lereno Sdn. Bhd.	Setiawan, Perak
17	KL-Kepong OleomasSdn. Bhd.	Port Klang, Selangor
18	Man Jang Bio Sdn. Bhd.	Port Klang, Selangor
19	Intrack Technology (M) Sdn. Bhd.	Rawang, Selangor
20	Sime Darby Biodiesel Sdn. Bhd.-Carey Island	Pulau Carey, Selangor
21	Sime Darby Biodiesel Sdn. Bhd.-Panglima Garang	Teluk Panglima Garang, Selangor
22	Artistic Support Sdn Bhd (FIMA Biodiesel S/B)	Port Klang, Selangor
23	Weschem Technologies Sdn. Bhd.	Batang Kali, Selangor
24	KLK Bioenergy Sdn. Bhd. (ZoopSdn. Bhd.)	Shah Alam, Selangor
25	Future Prelude Sdn. Bhd.	Port Klang, Selangor
26	Kris Biofuels Sdn Bhd	Port Klang, Selangor
27	Gomedic Sdn Bhd	Port Klang, Selangor
28	Innovans Bio Fuel Sdn. Bhd.	Port Klang, Selangor
29	Greentech Chemical Sdn Bhd (Completed)	Port Klang, Selangor
30	Global Bio-Diesel Sdn. Bhd.	Lahad Datu, Sabah
31	Green Edible Oil Sdn. Bhd. (Green Biofuels)	Sandakan, Sabah
32	SPC Bio-diesel Sdn. Bhd.	Lahad Datu, Sabah
33	Platinum Greens Chemical (Platinum Biofuels)	Seremban, Negeri Sembilan
34	Senari Biofuels Sdn. Bhd. (Global Bonanza)	Kuching, Sarawak

(Sources: *MPOB*: Biodiesel plants in operation in Malaysia)