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Thailand

Biofuels Annual

2016

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Report Highlights:
The Thai Cabinet revised its Alternative Energy Development Plan in 2015, aiming to promote higher use of ethanol and biodiesel up to the year 2036 on a self-reliance basis. Fuel ethanol consumption in 2016 is estimated at 1.3 billion liters (average national blend rate of E12.4) and has been growing at a rate far below the pace required to meet the target of 3.3 billion liters set for 2021. Biodiesel consumption in 2016 is also estimated at 1.3 billion liters with a calculated on-road use of B5.7. This is below the current mandatory B7.

Post:
Bangkok

I. **Executive Summary**

In October 2015, the Thai Cabinet approved Thailand's revised national energy plan, consisting of 3 plans; i.e., Alternative Energy Development Plan: AEDP 2015-2036, Oil Plan 2015-2036, and Gas Plan 2015-2036. The plan revision is intended to align with the 11th National Economic and Social Development Plan. The bottom line of the revised AEDP is to promote higher use of biofuels and while remaining self-reliant in feedstock and biofuels with minimum to trade for both. The plan also aims at expediting the mandatory blending the current B7 requirement to B10 in 2018. The Government plans to subsidize the use of B20 in large trucks on a voluntary basis, beginning in 2016. However, the accomplishment of higher blends under this mandatory requirement plan may be difficult to reach or sustain given the volatile weather-driven production of palm oil, which is an only domestic biodiesel feedstock if the market remains closed to foreign feedstock and biodiesel. Thailand's campaign to utilize used cooking oil for biodiesel production exists among one or two biodiesel companies as a Corporate Social Responsibility (CRS) campaign but the use is limited to 5-6 million liters of unused cooking oil per annum. Regarding ethanol policy, the government is still promoting the ethanol use through price incentives and excise tax reduction for cars compatible with E20 and E85 gasohol.

In 2017, fuel ethanol production and consumption should continue to increase to 1.4 billion liters, supported equally through price incentives to the State Oil Fund and market incentives to retailers. The price subsidies, which are paid by the State Oil Fund, make gasohol (ethanol-blended gasoline) 20 to 40 percent cheaper than regular gasoline.

Although the government's policy is to maintain its B7 mandates in 2016 and 2017, it possibly restate a step-down in biodiesel mandates at any time following weather-vulnerable palm oil supplies. Lately in 2016, the government announced to lower B7 mandates to B5, effective on July 25, 2016 because palm oil supplies appeared to be lower than earlier estimates, and if the mandates continue, soaring palm oil prices would negatively affect household cooking palm oil consumers.

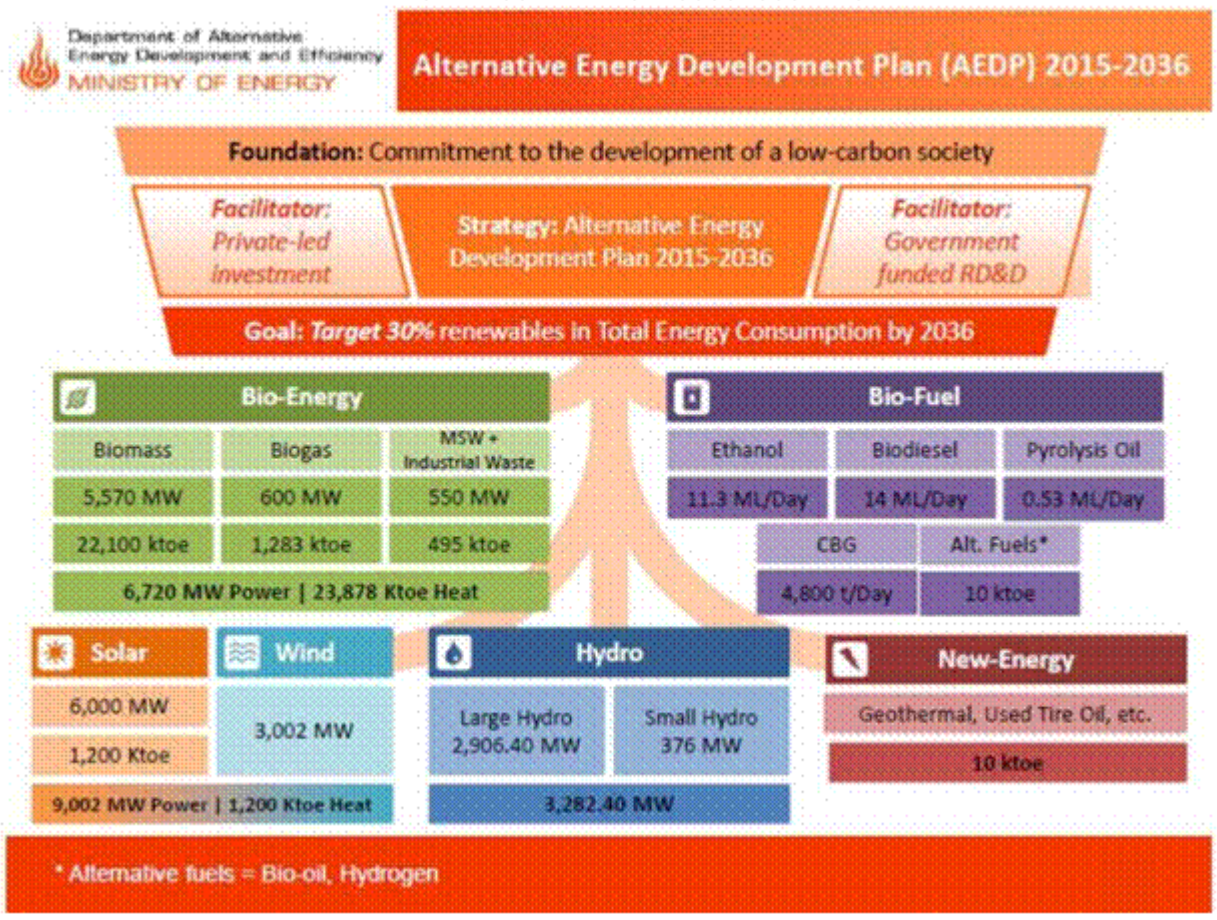
The significant decline in diesel prices in 2015 not only encouraged diesel vehicle users (mainly trucks or trailers) to switch to diesel from CNG, but it also stimulates increased use of diesel among smaller vehicles (i.e., pick-up trucks). As a result, biodiesel consumption rose by 4 percent growth to 1.23 billion liters in 2015, as compared to 1.18 billion liters in 2014. Prevailing low prices for diesel are expected to drive biodiesel consumption growth 6 percent in 2016 and 8 percent in 2017.

II. **Policy and Program**

The 10-year Alternative Energy Development Plan (2012-2021) was approved by the Thai Cabinet and valid until it was replaced by Thailand's 20-year National Energy Plan (2015 – 2036) endorsed in October 2015 in order to align with the 11th National Economic and Social Development Plan. Like the 2012-2021 plan, the new plan includes Alternative Energy Development Plan (AEDP), Oil Plan, and Gas Plan. Under the AEDP, the share of renewable and alternative energy from biofuel is aimed to

increase from 7 percent of total fuel energy use in 2015 to 25 percent in 2036. In order to accomplish this energy use goal, the Thai government has targeted to increase ethanol consumption from 1.17 billion liters in 2015 to 4.1 billion liters by 2036, and to increase biodiesel consumption from 1.23 billion liters in 2015 to 5.1 billion liters by 2036.

The bottom line of the revised AEDP is to promote higher use of biofuels and remain self-reliant with restrictions on trade in feedstocks and biofuels. Regarding ethanol policy, the government is still promoting the use of gasohol through price incentives and excise tax reduction for cars compatible with E20 and E85 gasohol. As for biodiesel policy, on the demand side, the government continues to impose the mandatory blending of biodiesel in diesel markets which covers on-road, agriculture, industry, and etc. To meet the demand, the government has targeted oil palm acreage at 10.20 million rai (1.63 million hectares) by 2036 with the plan that only domestic palm oil will be used as a feedstock and other feedstock like animal fats and UCO will be used insignificantly.



Note: Pyrolysis oil indicated in the energy plan is mainly derived from waste plastic and old tires

2.1 Ethanol

The Thai government aims to increase ethanol consumption from 1.2 billion liters in 2015 to 3.3 billion liters by 2021 and up to 4.1 billion liters by 2036.

The government continues to promote the use of gasohol through price incentives. The price subsidies, which are paid by the State Oil Fund, make gasohol 20 to 40 percent cheaper than regular gasoline. The price subsidy rises as the blend level increases with the effect of lowering retail prices at the pump of higher blend levels. In addition, the government also increased the marketing subsidies to gasoline stations, at around 5 baht/liter (54 US cent/gallon), to entice them to expand sales of E85 gasohol (a mixture of 85 percent ethanol and 15 percent gasoline).

The government also supports the manufacturing of vehicles which are compatible with E20 and E85 gasohol. The excise tax rate for Eco-cars (less than 1,300 cc engines with fuel consumption rate of no more than 5 liters per 100 km.) is at 17 percent compared to 30 percent for E10 vehicles. Moreover, the government will give an additional 3 percent reduction in the excise tax rate for the manufacturing of Eco-cars which use E85 gasohol.

Under this same plan, the government expects molasses-based ethanol, which accounts for around 70 percent of total ethanol production in 2015, to dominate Thailand's overall ethanol production through 2026 with molasses-based ethanol production reaching 1.8 billion liters. This is based on the Ministry of Agriculture and Cooperatives' estimate that Thai sugarcane production will reach the highest potential at 182 million metric tons with molasses production of 8.56 million metric tons in 2026. Meanwhile, the Ministry of Agriculture and Cooperatives foresees the increase in demand for ethanol from 2026 onward will be filled by cassava as molasses-based ethanol facilities will not be able to expand any further due to limited sugarcane acreage. The cassava-based ethanol production is expected to increase to 2.4 billion liters by 2036 as cassava production is expected to increase to 17 million metric tons in 2036, compared to 10 million metric tons in 2015. This will account for around 60 percent of total ethanol consumption of 4.1 billion liters in 2036. Meanwhile, molasses-based ethanol will account for around 40 percent of total ethanol production by 2036.

2.2 Biodiesel

The Thai Government has set a biodiesel consumption target at 5.1 billion liters by 2036. The plan focuses on both supply and demand.

On the demand side, the government continues to impose the mandatory blending of biodiesel in diesel for any purpose. The plan also aims at expediting the mandatory blend rate from currently B7 to B10 and B20. The Government plans to subsidize the use of B20 in large trucks on a voluntary basis, beginning in 2016, and to commence the B10 mandatory requirement in 2018. However, the accomplishment of mandatory biodiesel requirement plan may not be attained given the weather-driven volatility of palm oil production, the only feedstock used for biodiesel in Thailand, driven by weather conditions.

On the supply side, the government has targeted oil palm acreage at 10.20 million rai (1.63 million hectares) by 2036. Production of palm fresh fruit bunch (FFB) is expected to reach 29.46 million metric tons (MMT). Out of this FFB production, 4.24 MMT of FFB would be processed as biodiesel in 2036.

III. **Gasoline and Diesel**

Fuel Use History (Million Liters)											
Calendar Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gasoline Total	7,595	7,215	7,337	7,121	7,524	7,418	7,331	7,705	8,233	8,567	9,714
Diesel Total	19,588	18,367	18,677	17,634	18,465	18,480	19,192	20,565	20,892	21,071	21,921
On-road	11,752	11,020	11,208	10,580	11,080	11,100	11,510	12,340	12,500	12,640	13,153
Agriculture	3,915	3,673	3,735	3,527	3,691	3,670	3,840	4,113	4,160	4,214	4,384
Construction & Mining	156	147	152	155	157	154	160	165	167	169	174
Shipping & Rail	435	405	427	375	413	415	420	451	513	466	484
Industry	3,330	3,122	3,155	2,997	3,124	3,141	3,262	3,496	3,552	3,582	3,726
Heating	0	0	0	0	0	0	0	0	0	0	0
Jet Fuel Total	4,185	4,427	4,832	4,538	4,317	4,609	4,976	4,992	5,466	5,421	5,936
Total Fuel Markets	31,368	30,009	30,846	29,293	30,306	30,507	31,499	33,262	34,591	35,059	37,571

Fuel Use Projections (Million Liters)											
Calendar Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Gasoline Total	10,500	11,100	11,655	12,240	12,855	13,500	14,175	14,885	15,630	16,410	17,230
Diesel Total	22,800	23,250	23,710	24,180	24,670	25,160	25,670	26,190	26,710	27,240	27,780
On-road	13,680	13,950	14,230	14,500	14,800	15,100	15,400	15,710	16,030	16,340	16,670
Agriculture	4,560	4,650	4,740	4,840	4,930	5,030	5,130	5,240	5,340	5,450	5,550
Construction & Mining	182	187	192	198	202	208	215	220	226	235	242
Shipping & Rail	502	511	518	532	548	542	565	570	574	585	598
Industry	3,876	3,952	4,030	4,110	4,190	4,280	4,360	4,450	4,540	4,630	4,720
Heating	0	0	0	0	0	0	0	0	0	0	0
Jet Fuel Total	6,170	6,340	6,400	6,590	6,790	7,000	7,200	7,400	7,700	8,000	8,300
Total Fuel Markets	39,470	40,690	41,765	43,010	44,315	45,660	47,045	48,475	50,040	51,650	53,310

Source: Department of Alternative Energy Development and Efficiency

IV. **Ethanol**

4.1 Production

Table 4.1: Ethanol Used as Fuel and Other Industrial Chemicals

Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)										
Calendar Year	2008	2009	2010	2011	2012	2013	2014	2015	2016 E	2017 F
Beginning Stocks	70	63	44	48	63	22	42	40	37	43
Fuel Begin Stocks	68	62	24	22	58	20	21	26	21	26
Production	410	467	521	613	790	1,048	1,070	1,190	1,325	1,410
Fuel Production	336	419	451	486	471	950	1,058	1,174	1,305	1,395
Imports	6	6	7	6	6	5	11	11	10	10
Fuel Imports	0	0	0	0	0	0	0	0	0	0
Exports	66	16	48	139	304	64	5	0	0	0
Fuel Exports	0	0	0	0	0	0	0	0	0	0
Consumption	357	476	476	465	533	967	1,078	1,204	1,329	1,425
Fuel Consumption	342	457	453	450	509	949	1,053	1,179	1,300	1,400
Ending Stocks	63	44	48	63	22	42	40	37	43	38
Fuel Ending Stocks	62	24	22	58	20	21	26	21	26	21
Total BalanceCheck	0	0	0	0	0	2	0	0	0	0
Fuel BalanceCheck	0	0	0	0	0	0	0	0	0	0
Production Capacity for Fuel Ethanol										
Number of Refineries	11	11	19	19	19	21	21	21	21	21
Nameplate Capacity	548	581	977	977	977	1,307	1,472	1,472	1,472	1,472
Capacity Use (%)	75%	80%	53%	63%	81%	80%	73%	81%	90%	96%
Feedstock Use for Fuel (1,000 MT)										
Sugarcane	60	160	194	486	654	760	882	915	1,000	1,000
Molasses	1,414	1,541	1,452	1,981	2,218	2,655	2,895	3,166	3,565	3,840
Cassava	197	557	925	768	1,311	2,231	1,864	2,166	2,350	2,500
Market Penetration (Million Liters)										
Fuel Ethanol	342	457	453	450	509	949	1,053	1,179	1,300	1,400
Gasoline	7,121	7,524	7,418	7,331	7,705	8,233	8,567	9,714	10,500	11,100
Blend Rate (%)	4.8%	6.1%	6.1%	6.1%	6.6%	11.5%	12.3%	12.1%	12.4%	12.6%
Note: - Beverage ethanol is not included in this table.										
- Cassava-based ethanol production mainly uses fresh cassav root as feedstock. The convesion rate is: 1 MT = 153 liters.										
- 2016 and 2017 figures are FAS's estimate.										
Source: Department of Alternative Energy Development and Efficiency, Ministry of Energy (Fuel Ethanol Production Data)										
Department of Energy of Business, Ministry of Energy (Fuel Ethanol Consumption Data).										
Liquor Distillery Organization, Excise Department, Ministry of Finance (Industrial Ethanol Production and Consumption Data)										
The Customs Department, Ministry of Finance (Ethanol Export and Import Data)										

In 2017, fuel ethanol production is forecast to increase to 1.4 billion liters, up around 7 percent from 2016. Molasses-based ethanol still dominates Thailand's overall ethanol production, accounting for around 70 percent of fuel ethanol. The demand for molasses is expected to increase to 3.8 million metric tons, up 8 percent from 2016.

Presently, there are 21 fuel ethanol plants with production capacity of 1.5 billion liters per year. Production capacity of molasses-based ethanol is currently around 0.9 billion liters per year. Other producers use cassava and sugarcane as inputs with production capacity of 0.5 and 0.1 billion liters, respectively.

In 2016, fuel ethanol production is expected to increase to around 1.3 billion liters, up 11 percent from the 2015's level. The increase is driven by growing domestic consumption of gasohol. Molasses is the primary feedstock for the increased ethanol production. The demand for molasses is expected to increase to 3.6 million metric tons, up around 13 percent from 3.2 million metric tons in 2015. Demand for cassava increases to an estimated 2.4 million metric tons, up 8 percent from the previous year. The government's plan to use its own rice stocks for ethanol production to substitute for cassava is not

viable as rice prices are far above cassava prices. The sole sugarcane-base ethanol plant is expected to operate at full capacity of around 76 million liters per year using around 1 million metric tons of sugarcane.

The production of non-fuel ethanol is controlled by the government. The Liquor Distillery Organization, which is under the authority of the Excise Department of the Ministry of Finance, has a monopoly on the production of industrial grade ethanol in Thailand with a production capacity of 20 million liters per year. Meanwhile, domestic demand for industrial grade ethanol, particularly for medical, pharmacy, paints and cosmetics uses, is around 18 million liters per year. The primary feedstock for industrial ethanol production is molasses and cassava.

Presently, fuel ethanol production capacity is at 81 percent of full capacity. Production capacity is expected to reach 96 percent by 2017. Ethanol producers reportedly have received approval from the government to expand their production capacities. However, their investment has been delayed due to the concern about an economic instability.

4.2 Consumption

In 2017, ethanol consumption is forecast to increase to 1.4 billion liters, up around 8 percent from 1.3 billion liters used in 2016. This is mainly due to growing demand for E20and E85. The demand for E20 and E85 will be driven by government's price subsidies and the expansion of E20 gasohol stations. Total gasohol (gasoline with ethanol blends of all levels) consumption is forecast to increase to around 11 billion liters in 2017, up around 7 percent from an estimated 10.3 billion liters in 2016. The average ethanol blending rate is expected to increase from 12.1 percent in 2015 to 12.6 percent in 2017.

During January – May 2016, ethanol consumption totaled 568 million liters, up around 8 percent from the same period last year. This is due to an increase in gasohol consumption to 4,142 million liters, up 13 percent from the same period last year (Table 2.2). Consumption of gasohol accounted for 95 percent of total gasoline consumption. E20 gasohol consumption also continued to increase, accounting for 17 percent of total gasohol consumption due to the government price subsidies. Presently, E10 and E20 retail prices are 25 to 30 percent cheaper than regular gasoline. E20 retail prices are also approximately 10 percent cheaper than E10 gasohol. The number gasohol stations continued to increase nationwide to 3,105 stations for E20 and 867 stations for E85, compared to 2,836 and 678 stations in May 2015, respectively.

Table4.2: Thailand's Gasoline and Gasohol Consumption (Unit: Million Liters)

Type of Gasoline	2010	2011	2012	2013	2014	2015	Jan. - May 2015	Jan. - May 2016	% Change 2016/2015
Gasoline	**3,035**	**3,119**	**3,250**	**763**	**559**	**583**	**239**	**239**	**-0.2**
Regular (octane 91)	2,958	3,077	3,208	147	61	81	31	38	21.0
Premium (octane 95)	77	42	42	616	498	502	208	201	-3.4
Gasohol	**4,383**	**4,213**	**4,455**	**7,470**	**8,008**	**9,130**	**3,673**	**4,142**	**12.8**
- Gasohol E10 Octane 91	1,552	1,860	2,121	3,337	3,595	4,019	1,651	1,709	3.5
- Gasohol E10 Octane 95	2,692	2,122	1,932	3,030	2,735	3,283	1,282	1,585	23.6
- Gasohol E20	137	222	367	963	1,344	1,511	606	720	18.8
- Gasohol E85	2.11	9.10	36	141	334	318	134	128	-4.8
Total	**7,418**	**7,332**	**7,705**	**8,233**	**8,567**	**9,714**	**3,913**	**4,381**	**12.0**

Source: Department of Energy Business, Ministry of Energy

Table 4.3: Price Structure of Petroleum Product in Bangkok (as of Jun 17, 2016)

	Premium gasoline (octane 95)	Gasohol			
		E10 Octane 95	E10 Octane 91	E20	E85
Ex-Refinery Factory Price	13.7778	14.7904	14.5486	15.7945	20.5295
Excise Tax	6.0000	5.4000	5.4000	4.8000	0.9000
Municipal Tax	0.6000	0.5400	0.5400	0.4800	0.0900
State Oil Fund	6.3100	0.2540	0.2090	-2.7520	-9.2960
Conservation Fund	0.2500	0.2500	0.2500	0.2500	0.2500
Wholesale Price (WS)	26.9378	21.2344	20.9476	18.5725	12.4735
Value Added Tax (VAT)	1.8856	1.4864	1.4663	1.3001	0.8731
WS+VAT	28.8234	22.7208	22.4139	19.8726	13.3466
Marketing Margin	2.6510	1.8497	1.7440	2.1191	4.7135
VAT	0.1856	0.1295	0.1221	0.1483	0.3299
Retail Price	31.66	24.70	24.28	22.14	18.39

Note: Exchange rate = 35.5 baht/$

Source: Petroleum Division, Enery Policy and Planning Office, Ministry of Energy

4.3. Trade

According to the Thai Department of Customs, fuel ethanol is a controlled import/export product (HS22072011 and HS22072019). Traders must have import/export permits which will be considered by the Ministry of Industry (MOI). To date, the MOI has never approved any imports of fuel ethanol into Thailand as there are sufficient domestic supplies. Also, sources report that ethanol producers normally export only ethanol for industrial uses as their facilities were originally designed to produce fuel ethanol for the domestic market and they do not have the storage facilities to cover fuel export business.

Non-fuel, industrial ethanol exports are likely to be minimal to zero in 2016 and 2017 due mainly to growing domestic demand for ethanol. In 2015 there were no exports of fuel ethanol. Also, exports of industrial-grade ethanol were marginal at around 0.1 million liters. Meanwhile, non-fuel, industrial ethanol imports were steady at around 11 million liters, mainly for use in pharmaceutical and cosmetic industries. This accounted for less than 1 percent of total ethanol production. The Thai government imposes a 2.5 baht/liters duty on ethanol imports (27 US cents/gallon, based on 35.5 baht/US$, as of June 30, 2016).

4.4. Stocks

Ethanol stocks are expected to decline to around 20 million liters in 2017 in anticipation of growing demand for gasohol consumption. Most fuel ethanol producers mainly supply their ethanol to domestic refineries for gasohol production. Consequently, their total storage capacities are limited to only around one month of domestic use.

V. **Biodiesel**

5.1 Production

Table 5.1 Biodiesel Production and Use in Thailand

Biodiesel (Million Liters)										
Calendar Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Beginning Stocks	6	7	8	22	12	33	20	18	17	48
Production	448	610	660	630	910	1,080	1,170	1,230	1,330	1,420
Imports	0	0	0	0	5	6	12	2	5	5
Exports	0	0	0	0	4	49	4	3	4	4
Consumption	447	609	646	640	890	1,050	1,180	1,230	1,300	1,410
Ending Stocks	7	8	22	12	33	20	18	17	48	59
BalanceCheck	0	0	0	0	0	0	0	0	0	0
Production Capacity										
Number of Biorefineries	9	13	13	13	10	10	10	12	12	12
Nameplate Capacity	920	2,170	2,170	2,170	1,600	1,600	1,600	2,060	2,060	2,060
Capacity Use (%)	48.7%	28.1%	30.4%	29.0%	56.9%	67.5%	73.1%	59.7%	64.6%	68.9%
Feedstock Use for Fuel (1,000 MT)										
REDPO/CPO	300	400	445	390	630	775	825	845	885	945
Stearin	125	170	180	190	200	210	235	245	280	300
FFA of Palm Oil	0	0	0	20	20	25	55	85	95	105
Market Penetration (Million Liters)										
Biodiesel, on-road use	265	366	389	380	540	650	707	763	780	850
Diesel, on-road use	10,580	11,080	11,100	11,150	12,340	12,500	12,640	13,153	13,680	13,950
Blend Rate (%)	2.5%	3.3%	3.5%	3.4%	4.4%	5.2%	5.6%	5.8%	5.7%	6.1%
Diesel, total use	17,634	18,465	18,480	19,192	20,565	20,892	21,071	21,921	22,800	23,250

Note:
All PSD data are B100 or B100-equivalent (see statistical info section of Reporting Instructions).

Source: Department of Energy Business, Department of Alternative Energy Development and Efficiency
Department of Customs, and FAS/Bangkok's estimates

B100 or biodiesel in Thailand is currently produced from palm oil derived feedstock such as crude palm

oil (CPO), refined bleached deodorized (RBD) palm oil, palm stearin, and free fatty acids of palm oil (FFA). Thailand's campaign to utilize used cooking oil for biodiesel production exists among one or two biodiesel companies as a Corporate Social Responsibility (CRS) campaign but the use is limited to 5-6 million liters of unused cooking oil per annum. Biodiesel production is solely driven by government mandates, mainly aimed to help palm farmers. All palm oil feedstocks used for biodiesel are domestic since the Government strictly controls the imports of palm oil. Meanwhile, the blending of biodiesel among petroleum refineries is strictly controlled and monitored to comply with the mandatory requirements. The mandatory blending of biodiesel in diesel markets covers all purposes of use including on-road, agriculture, industry, and etc.

Biodiesel production is forecast to grow 7 percent to 1.42 billion liters in 2017 in line with an increase in diesel consumption and an estimated increase in the blending rates of biodiesel in diesel total use. It is estimated that about 70 percent of B100 is derived from RBDPO or CPO, 22 percent from palm stearin, and 8 percent from FFA. Given the very limited role of trade, biodiesel production in 2016 is forecast to grow by 12 percent from the previous year to 1.38 billion liters due to a sharp increase in diesel demand driven by continued prevailing low petroleum prices against compressed natural gas (CNG).

Crude palm oil supply available for domestic food, feed and industrial use plus exports is forecast to 2.3 million metric tons (MMT) in MY 2016/17. CPO production is estimated to only marginally grow to 2.1 MMT in 2015/16 from 2.07 MMT in 2014/15 due mainly to lower palm yields caused by dry weather conditions in 2014 and 2015.

The Thai Government recently turned to promote the use of lower-cost H-FAME biodiesel in preparation for B10 and above mandates. H-FAME is a process, developed by a Japanese research team, to upgrade the quality of conventional biodiesel or fatty acid methyl ester (FAME) through partial hydrogenation. Trade sources reported that Global Green Chemical, a current large biodiesel producer in Thailand, may construct an H-FAME processing plant and launch it commercially once the B10 mandate is imposed.

Table 5.2 Thailand's Production, Supply and Demand for CPO[1/]

Oil, Palm	2014/2015		2015/2016		2016/2017	
Market Begin Year	Jan 2015		Jan 2016		Jan 2017	
Thailand	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted	0	0	0	0	0	0
Area Harvested	690	710	710	735	0	750
Trees	0	0	0	0	0	0
Beginning Stocks	78	78	52	228	0	228
Production	1800	2070	2200	2100	0	2300
MY Imports	75	75	20	30	0	20
MY Imp. from U.S.	0	0	0	0	0	0
MY Imp. from EU	0	0	0	0	0	0
Total Supply	1953	2223	2272	2358	0	2548
MY Exports	51	95	150	120	0	160
MY Exp. to EU	0	0	0	0	0	0
Industrial Dom. Cons.	1280	1280	1350	1350	0	1450
Food Use Dom. Cons.	500	550	570	580	0	600
Feed Waste Dom. Cons.	70	70	70	80	0	100
Total Dom. Cons.	1850	1900	1990	2010	0	2150
Ending Stocks	52	228	132	228	0	238
Total Distribution	1953	2223	2272	2358	0	2548
(1000 HA) ,(1000 TREES) ,(1000 MT)						

Due to fierce competition between Thailand's biodiesel processors, newcomers have been reluctant to enter the market since 2010. Two establishments which suspended their biodiesel production during 2012-2014, revived their operations in 2015. As a result, all 12 producers as listed by Department of Energy Business, are currently operating with an estimated total production capacity of 2.06 billion liters per annum. In 2015, three of the largest B100 processors in Thailand; i.e., the Global Green Chemical Company (previously named Thai Oleochemicals), New Biodiesel Company, and the Bangchak Biofuel Company increased their production capacities by (460 million liters per annum).

Table 5.3 List of Operating B100 Producers in Thailand

	Company	Capacity (Million liters per annum)	Feedstock Type
1	Bangchak Petroleum	16	CPO, RBDPO
2	Pure Energy	264	Palm Stearin, CPO
3	Patum Vegetable Oil	462	CPO, RBDPO, Stearin
4	B. Grimm Green Power	66	CPO, RBDPO, Stearin
5	A.I. Energy	165	Palm Stearin
6	Veera Suwan	66	Palm Stearin, RBDPO
7	Global Green Chemical *y*	330	CPO, RBDPO
8	New Biodiesel	330	CPO, RBDPO, Stearin, FFA
9	Absolute Power P	99	CPO, RBDPO, Stearin
10	Bangchak Biofuel	264	CPO, Stearin
	Total	2,062	
y	Originalled called Thai Oleochemicals Co.		

Source: Department of Energy Business and FAS Estimates

5.2 Consumption

In term of the mandate administration, these mandates in the past were effective since they are applied to all types of diesel use as fuel and the blending of biodiesel among petroleum refineries is strictly controlled and monitored. In general, the main markets for diesel use in Thailand are on-road, accounting for about 60 percent of total diesel consumption, followed by agriculture at 20 percent, industry 17 percent, and others 3 percent, respectively. However, due to weather irregularities leading to inadequate palm oil feedstocks and with controls on imports, the Government is forced to reduce the mandatory blending rates from time to time. For example, the reduced CPO supplies and skyrocketing prices in early 2015 prompted decision-makers to temporarily lower the mandatory vegetable oil content requirement in biodiesel by 50 percent to B3.5 from B7 in January 2015, and then reinstated B7 mandates in April 2015. Due to this development, the actual blending rates of biodiesel in diesel total use were 5.8 percent, a level below intentional 7 percent if the B7 mandates were fully accomplished.

Although the government's policy is to maintain its B7 mandates in 2016 and 2017, in addition to its plan to subsidize the use of B20 in large trucks on a voluntary basis, beginning in 2016, the blending rates of biodiesel in diesel total use are estimated at around 5.7 percent in 2016 and 6.14 percent in 2017, given the possible reoccurrences of a step-down in biodiesel mandates at any time following weather-vulnerable palm oil supplies. Lately in 2016, the government announced to lower B7 mandates to B5, effective on July 25, 2016 because palm oil supplies appeared to be lower than earlier estimates, and if the mandates continue, soaring palm oil prices would negatively affect household cooking palm oil consumers.

A sharp reduction in global petroleum prices also generated changes in consumer demand for products such as diesel and gasoline versus the highly subsidized products like liquid petroleum gas (LPG) and compressed natural gas (CNG). Not only did low diesel prices encouraged diesel vehicle users (mainly

trucks or trailers) to switch to diesel (which contains biodiesel) from CNG, but it also stimulated increased use of diesel among smaller vehicles (i.e., pick-up trucks). Lower prices for diesel (which contains biodiesel) also led diesel use for other sectors (agriculture, construction, and manufacturing industries) to increase in 2015. Total diesel sales were officially reported as increasing by 4 percent in 2015 to 21.9 billion liters. Prevailing low prices are expected to drive biodiesel consumption up 4 percent in 2016 and 2 percent in 2017.

Based on this diesel market development and the fact that the mandate of biodiesel blending in diesel is applied to all types of diesel use, biodiesel consumption rose to 1.230 billion liters in 2015, and should continue to grow to 1,3 billion liters in 2016 and 1,42 billion liters 2017, respectively.

Below is the historical implementation of mandatory use for specific biodiesel since 2007:

June 2007	Mandatory use of B2 and voluntary use of B5
June 2010	Mandatory use of B3 and voluntary use of B5
March 2011	Mandatory use of B2 and voluntary use of B5
May 2011	Mandatory use of B3-B5
July 2011	Mandatory use of B4
January 2012	Mandatory use of B5
July 19, 2012	Mandatory use of B3.5
November 1, 2012	Mandatory use of B5
January 1, 2014	Mandatory use of B7
February 17, 2014	Adjust mandatory use from B7 to B3.5
May 14, 2014	Return implementing mandatory use of B7
January 22, 2015	Adjust mandatory use from B7 to B3.5
April 17, 2015	Return implementing mandatory use of B7
July 25, 2016	Adjust mandatory use from B7 to B5

Below is the composition of B7 biodiesel retail prices.

Table 5.4 Breakdown of B7 Biodiesel Retail Prices, Baht/liter

	B7 Biodiesel (Baht/liter) as of June 16, 2015	B7 Biodiesel (Baht/liter) as of June 16, 2016
Ex-Refinery Prices	17.4455	15.0542
Excise Tax	4.2500	5.3500
Municipal Tax	0.4250	0.5350
Oil Fund Fee	0.0500	0.1400
Conservation Fund Fee	0.2500	0.2500
Wholesale Prices	22.4205	21.3292
Value Added Tax	1.5694	1.4930
Wholesale Prices + VAT	23.9900	22.8222
Marketing Margin	1.8692	1.9325
Value Added Tax	0.1308	0.1353
Retail Prices	**25.9900**	**24.8900**
Source: Ministry of Energy		

5.3 Trade

The Thai Government restricts the import of biodiesel to protect domestic palm growers. Thailand's biodiesel imports and exports are minimal and mostly belong to petroleum oils containing up to 30 percent biodiesel (HTS Chapter 27). Exports of biodiesel (B100 equivalent) were 3.12 million liters in 2015, as compared to 3.86 million liters in 2014. Imports of biodiesel products (B100 equivalent) totaled 2.13 million liters, as compared to 11.57 million liters in 2014.

5.4 Ending Stocks

Biodiesel production is driven solely by contracts between palm growers and refineries. As a result, the country's B100 stocks, held by either biodiesel producers or petroleum oil refineries, are quite low somewhere around 20-50 million liters or about 10-15 days of utilization.

VI. Advance Biofuels

There has been no progress in promoting advance biofuels, and the potential for progress is further dimmed due to sharply weaker global prices for petroleum products. A molasses-based ethanol plant using cane bagasse for cellulosic ethanol has stalled due to a lack of commercial feasibility. The production of Hydrogenated Vegetable Oil (HVO), a type of renewable drop-in diesel, is no longer commercialized due to its high production cost without the additional subsidy from the Government.

VII. Statistical Information

While ethanol is harmonized under 220710 and 220720, Post's estimate of ethanol imports and exports in the Ethanol PS&D (Table 4.1) is based on HS22072011 and HS22072019 reported by the Thai

Customs Department. These harmonized codes represent ethanol for fuel and industrial uses. Meanwhile, other import and export figures of ethanol under HS220710 and HS220720 will be beverage ethanol which is not include in the PS&D.

Post's estimates of biodiesel imports and exports is based on HS271020, described as petroleum oils containing up to 30 percent biodiesel, and HS382600, described as biodiesel, both reported by Thai Customs Department.