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Thailand

Biofuels Annual

Annual

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Report Highlights:
Thailand's ethanol and biodiesel production increased in 2013 and is forecast to further grow as a result of government policies that promote the use of biofuels.

Post:
Bangkok

Executive Summary:

In 2013, ethanol consumption will likely double to 800 million liters or approximately 2.2 million liters per day compared to 1.1 million liters in 2012. The expected increase is attributed to an increase in E10 (a mixture of 10 percent ethanol and 90 percent gasoline) and E20 (a mixture of 20 percent ethanol and 80 percent gasoline) gasohol consumption driven by the government's decision to phase out the use of Octane 91 regular gasoline. The elimination of Octane 91 has increased the use of E10 and E20 gasohol to 20 million liters per day compared to 12.2 million liters per day in 2012.

The increase in ethanol consumption is likely to result in tighter ethanol supplies, particularly during the last quarter of 2013 when feedstock supplies of molasses are expected to be limited. Molasses accounts for 80 percent of the total feedstock used to produce ethanol. The current upward pressure on molasses prices is likely to make cassava-based ethanol production more viable. In 2014, ethanol production is expected to increase to approximately 2.7 million liters per day (about 1 billion liters for the whole year), up 7 to 8 percent from around 2.5 million liters per day in 2013. Cassava-based ethanol production is likely to account for 20 to 30 percent of total ethanol production, up from approximately 15 to 20 percent in 2013. Tight ethanol supplies will likely limit ethanol exports to 130 million liters in 2013.

B100 production is expected to grow to 1 billion liters in 2013 as a result of government policies and growing diesel consumption. 780 million liters of B100 is expected to be derived from crude palm oil (CPO) while 220 million liters is anticipated come from palm stearin. Industry sources estimate B100 production is expected to increase to 1.03 billion liters in 2014.

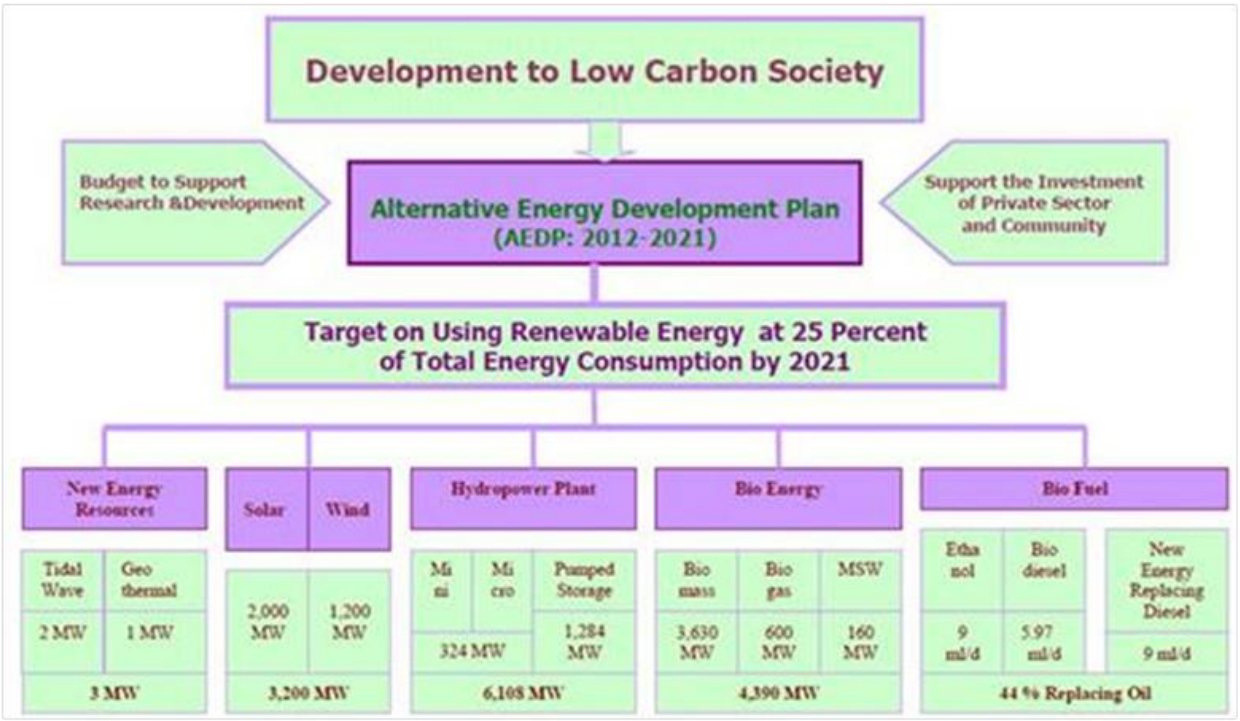
Industry sources also believe that continued increase in feedstock for unblended biodiesel or CPO should be sufficient to meet the growing demand. CPO production for 2013 is estimated to increase to 2-2.1 million metric tons (MMT) in 2013 compared to 1.89 MMT in 2012 due to increased fresh fruit bunch (FFB) production and improved CPO extraction rates. CPO production in 2014 is forecast to further increase to 2.2-2.3 MMT.

There has been no change in the government's biofuel policy from the previous annual report. Thailand currently promotes biomass energy for heat and power generation through the issuance of licenses to approved private companies that sell electricity to the Electricity Generating Authority of Thailand (EGAT). The government also supports second-generation molasses-based ethanol production using cane bagasse.

1. Policy and Programs

Table 1.1 Fuel Use Projections (Million Liters)									
Calendar Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Gasoline Total	8,760	9,020	9,290	9,570	9,860	10,160	10,470	10,780	11,100
Diesel Total	22,100	22,610	23,170	23,770	24,470	25,270	26,100	26,900	27,440
On-road 1/	17,700	18,000	18,500	19,000	19,600	20,200	20,900	21,500	21,900
Agriculture									
Construction/mining									
Shipping/rail									
Industry									
Heating									
Jet Fuel Total									
Total Fuel Markets	30,860	31,630	32,460	33,340	34,330	35,430	36,570	37,680	38,540
Note: 1/ The use of diesel in Thailand has not been broken down into use by industry									
Post's estimates for the on-road use is based on sales of high speed diesel.									

The 10-year Alternative Energy Development Plan (2012 – 2021), which was approved by the Thai Cabinet in 2011, remains unchanged. The objective of the plan is to increase the share of renewable and alternative energy from the existing 9.4 percent of total energy consumption to 25 percent by 2021. The objective is mainly to reduce the country's dependency on fossil fuels. The plan also aims to strengthen domestic energy security, promote integrated green energy utilization in communities, enhance the development of alternative energy industries, and increase research and develop renewable energy technology for competitiveness in the global market.



1.1 Ethanol

The Thai Government continues to implement its new 10-year Alternative Energy Development Plan (2012 – 2021), which is set to increase ethanol consumption to 9 million liters per day by 2021. The plan is well on track as the government terminated the sale of Octane 91 regular gasoline in January 2013. As a result, ethanol production increased to 2.6 million liters per day between January – April 2013 compared to 1.8 million liters per day during the same period in 2012. The average ethanol consumption increased significantly to 2.2 million liters a day between January - April 2013 compared to an average of 1.1 million liters per day during the same period in 2012. In addition, the government has promoted the use of E20 gasohol consumption by setting prices 8 to 14 percent cheaper than E10 gasoline. These price subsidies are paid by the State Oil Fund. The government has also provided gasoline stations marketing subsidies totaling 0.5 bath/liter (6 US cent/gallon) and 6 baht/liter (76 US cent/gallon) to entice them to expand sales of E20 and E85 gasohol. The government also continues to support the manufacturing of Eco-cars (E20 vehicles) and flex-fuel vehicles (FFV) by reducing the excise taxes automobile manufacturers have to pay. Currently, the government provides manufacturers a tax reduction totaling 50,000 baht/vehicle (US$ 1,587/vehicle) for FFV and 30,000 baht/vehicle (US$ 952/vehicle) for Eco-cars. Moreover, the government has gradually liberalized the ethanol laws and regulations. In February 2013, the Thai Cabinet approved an excise tax exemption on industrial-grade ethanol for exports to support domestic ethanol manufacturers. The plan also supports a research budget which will look into ways older vehicles and motorcycles can use ethanol. As for feedstocks, the plan still focuses on improving existing feedstock supplies of molasses and cassava. The target is to increase average sugarcane yields to more than 15 metric tons per rai (93.8 tons/hectare) compared to the current average yield of 12 metric tons per rai (75 tons/hectare). The plan also aims to increase the average cassava yield to more than above 5 tons per rai (31.3 tons/hectare) with total production of 35 million tons per year.

1.2 Biodiesel

The Thai Government's Biodiesel Development Plan remains unchanged from the 2012 update. The government has maintained its B100 consumption target at 5.97 million liters per day by 2021. The plan focuses on both supply and demand. On the supply side, the government will promote the expansion of oil palm acreage to a targeted 5.5 million rai (880,000 hectares) with a total oil palm harvested area of 5.3 million rai (848,000 hectares) by 2021. Average yields are expected to reach 3.2 MT/rai (30 MT/hectare) in 2021 while crude palm oil crushing rates should be above 18 percent. On the demand side, the government anticipates balancing its compulsory production of biodiesel with domestic palm oil supplies. The plan also introduces pilot projects for B10 or B20 blend use in fleet trucks and fishery boats.

The government also intends to support the research and development plan called the "Future New Fuel for Diesel Substitution," which encourages cultivation of new energy crops (jatropha and micro algae), diesohol (blending ethanol with diesel), and oil conversion technology (Bio Hydrofined Diesel: BHD, and Biomass to Liquid: BTL) between 2014-2017. The target for new commercial production capacity is 2 million liters per day in 2018 and up to 25 million liters per day by 2021.

2. Ethanol

2.1 Production

Table 2.1: Ethanol Plants in Thailand

Ethanol Plants by Feed Stocks	Registered Plants		Under-Construction Plants[1/]		On-line Plants[1/]	
	Number of Plants	Capacity (Million Liters/Day)	Number of Plants	Capacity (Million Liters/Day)	Number of Plants	Capacity (Million Liters/Day)
1. Sugarcane	1	0.20	-	-	1	0.20
2. Molasses	15	2.69	-	-	5	0.78
3. Cassava	24	8.39	4	1.37	6	1.28
4. Multi Feed Stocks [2/]	8	1.23	-	-	9	1.63
Total	**48**	12.51	**4**	**1.37**	**21**	**3.89**

Note: 1/ As of February 2013

2/ Molasses is the main feed stocks

Source: Department of Alternative Energy Development and Efficiency, Ministry of Energy

Table 2.2 Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)

Calendar Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Beginning Stocks	47	69	87	49	45	50	60	22	22
Fuel Begin Stocks	45	68	86	48	42	48	58	20	20
Production	153	206	351	416	439	533	670	943	1,013
Fuel Production	135	192	336	401	426	520	655	930	1,000
Imports	1	2	4	7	5	6	7	7	7
Fuel Imports	0	0	0	0	0	0	0	0	0
Exports	0	15	66	16	48	139	304	130	170
Fuel Exports	0	0	66	0	0	0	0	0	0
Consumption	132	176	326	411	392	391	410	820	850
Fuel Consumption	116	159	309	390	372	370	389	800	830
Ending Stocks	69	87	49	45	50	60	22	22	23
Fuel Ending Stocks	68	86	48	42	48	58	20	20	21
Production Capacity (Million Liters/Day)									
Number of Refineries	5	7	11	11	19	19	19	21	22
Nameplate Capacity	0.78	0.96	1.6	1.7	2.9	2.9	3.2	3.9	4.2
Capacity Use (%)	54%	59%	60%	67%	41%	50%	57%	66%	66%
Co-product Production (1,000 MT)									
Co-product A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Co-product B	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Feedstock Use (1,000 MT)									
Sugarcane	25	57	60	160	194	486	654	660	700
Molasses	441	614	1,216	1,202	1,054	1,591	2,218	2,906	2,927
Cassava	164	240	197	557	925	768	468	1,077	1,512
Market Penetration (Million Liters)									
Fuel Ethanol	116	159	309	390	372	370	389	800	830
Gasoline	7,214	7,337	7,121	7,524	7,418	7,331	7,705	8,197	8,500
Blend Rate (%)	1.6%	2.2%	4.3%	5.2%	5.0%	5.0%	5.0%	9.8%	9.8%

In 2013, the number of operating ethanol plants increased to 21 with total production capacity of approximately 3.9 million liters per day, up from 19 plants and a production capacity of 3.2 million liters

per day in 2012 (Table 2.1). The new ethanol plants are cassava-based plants with production capacity of 0.7 million liters per day.

In the first four months of 2013, ethanol plants operated at an average of 2.6 million liters per day, up 33 percent from an average of 1.9 million liters compared to the same period last year. The increase is due to higher gasohol consumption fueled by the government's decision to phase out the use of Octane 91 gasoline. Molasses-based ethanol still dominates ethanol production accounting for around 73 percent of total ethanol production. Molasses-based ethanol plants are operating near full capacity at approximately 2.4 million liters per day. The sole sugarcane-based ethanol plant is operating at close to full capacity at about 0.2 million liters per day. Meanwhile, cassava-based ethanol plants are running at around 0.5 million liters per day, which is well below the total capacity of 1.3 million liters per day. The high cassava prices caused by the government's Cassava Pledging Program, have slowed the use of cassava feedstock. Under the program, cassava intervention prices are set at 2.60 – 2.75 baht per kilogram ($87-92/MT) and are 23-32 percent above market prices. Cassava-based ethanol production accounted for approximately 20 percent of total ethanol production. Presently, cassava-based ethanol prices are 2-3 baht/liter (25-38 US cent/gallon) or 14 percent above molasses-based ethanol prices, which are approximately 24 baht/liters ($3/gallon) higher.

In 2013, total ethanol production will likely increase significantly to 930 million liters or approximately 2.5 to 2.6 million liters per day, up approximately 40 percent from an average of 1.8 million liters per day compared to last year. The demand for molasses feed stocks is likely to increase to around 3 million metric tons, up 32 percent from 2.2 million metric tons in the previous year. This will put upward pressure on domestic molasses prices. In 2013, molasses production is expected to increase to 4.5 million metric tons due to the bumper sugarcane crop of approximately 100 million metric tons (see TH3037, "Sugar Annual 2013"). Approximately, 1.5 million metric tons of molasses are expected to be used in the domestic food, feed, and beverage industries.

In 2014, ethanol production is expected to increase to approximately 1 billion liters or 2.7 million liters per day, up 7 to 8 percent from the previous year, in anticipation of growing demand for gasohol. The higher demand for ethanol is likely to be filled by cassava-based ethanol plants due to tighter supplies of molasses. Presently, there are three new cassava-based ethanol plants due for completion by the end of 2013 with production capacity of 1.4 million liters per day. In addition, the government is encouraging refineries to use cassava-based ethanol for their gasohol production through price subsidies and discounted sales of government-owned cassava stocks. This policy is expected to make cassava-based ethanol prices more competitive with molasses-based ethanol. By May 2013, the government sold 1.6 million tons of cassava from its intervention stocks of 10 million tons. The stocks were sold at a discount (2.65 baht per kilogram ($88/MT) to support cassava-based ethanol producers. The sales of cassava stocks are expected to increase supplies of cassava-based ethanol, particularly during the last quarter of 2013 when supplies of molasses-based ethanol will possibly be tighter. As a result, some refineries reportedly increased their purchases of cassava-based ethanol. Thus, the market share of cassava-based production is likely to increase to approximately 20 to 30 percent of total ethanol production in 2014, up from around 20 percent market share in 2013. Meanwhile, molasses-based ethanol is expected to decline to around 60 percent of total ethanol production in anticipation of tighter molasses supplies and limited sugarcane crop expansion caused by current downward pressure on world sugar prices.

Unlike fuel ethanol, production of non-fuel ethanol is controlled by the government. The Liquor Distillery Organization (LDO), 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 approximately 60,000 liters per day. The LDO plans to invest in new facilities that will triple the capacity to meet the growing domestic demand for industrial grade ethanol, particularly for medical/pharmacy paints, and cosmetics uses. Presently, domestic demand for industrial grade ethanol is approximately 50,000 liters per day.

2.2 Consumption

In 2013, ethanol consumption is likely to double to 800 million liters or approximately 2.2 million liters per day compared to 1.1 million liters in 2012, due to an increase in E10 and E20 gasohol consumption. In the first four months of this year, gasohol consumption increased significantly to 2.4 billion liters or 20 million liters per day compared to 12.2 million liters per day in 2012. This accounted for nearly 90 percent of total gasoline consumption, up from 60 percent in 2012 (Table 2.3). The increase in gasohol consumption is due to the government's decision to phase out the use of Octane 91 regular gasoline. The elimination of the Octane 91 regular gasoline has increased E10 use to 18 million liters per day, up from 11 million liters per day in 2012. In addition, E20 gasohol consumption increased to 2 million liters per day, compared to 1 million liters per day in 2012. Furthermore, gasohol consumption has been fueled by government price subsidies. Currently, the retail prices for gasohol are approximately 15-50 percent cheaper than Octane 95 gasoline, (Table 2.4). The number of E20 gasohol stations has also nearly doubled to 1,622 stations in 2013 compared to 885 stations in the same period last year.

Table2.3: Thailand's Gasoline Consumption (Unit: Million Liters)

Type of Gasoline	2008	2009	2010	2011	2012	Jan. - Apr. 2012	Jan. - Apr. 2013	% change 2013/2012
Gasoline	**3,729**	**3,054**	**3,035**	**3,119**	**3,250**	**1,131**	**303**	**-73.2**
Regular (octane 91)	3,388	2,877	2,958	3,077	3,208	1,115	109	-90.2
Premium (octane 95)	341	177	77	42	42	16	194	1113.1
Gasohol	**3,392**	**4,470**	**4,383**	**4,213**	**4,455**	**1,364**	**2,395**	**75.6**
- Gasohol E10 Octane 91	924	1,415	1,552	1,860	2,121	660	1057	60.2
- Gasohol E10 Octane 95	2,439	2,972	2,692	2,122	1,932	607	1041	71.4
- Gasohol E20	29	83	137	222	367	90	269	199.2
- Gasohol E85	0.02	0.25	2.11	9.10	36	6.9	28	305.8
Total	**7,120**	**7,524**	**7,418**	**7,332**	**7,705**	**2,495**	**2,698**	**8.1**

Source: Department of Energy Business, Ministry of Energy

In 2014, ethanol consumption is likely to trend upward to 830 million liters or approximately 2.3 million liters per day, up 3 to 4 percent from the previous year due to growing E20 and E85 consumption. Furthermore, large gasoline stations plan to sell more E20 gasohol in 2015.

Table 2.4: Price Structure of Petroleum Product in Bangkok (as of June 21, 2013)

	Premium gasoline (octane 95)	Regular gasoline (Octane 91)	Gasohol			
			E10 Octane 95	E10 Octane 91	E20	E85
Ex-Refinery Factory Price	24.0947	22.4423	24.2214	24.0033	24.2619	23.6742
Excise Tax	7.0000	7.0000	6.3000	6.3000	5.6000	1.0500
Municipal Tax	0.7000	0.7000	0.6300	0.6300	0.5600	0.1050
State Oil Fund	9.7000	5.9000	3.5000	1.4000	-0.9000	-11.4000
Conservation Fund	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Wholesale Price (WS)	41.7447	36.2923	34.9014	32.5833	29.7719	13.6792
Value Added Tax (VAT)	2.9221	2.5405	2.4431	2.2808	2.0840	0.9575
WS+VAT	44.6668	38.8328	37.3445	34.8642	31.8560	14.6367
Marketing Margin	1.5731	1.7918	1.6687	1.6970	2.1720	7.7974
VAT	0.1101	0.1254	0.1168	0.1188	0.1520	0.5458
Retail Price	46.35	40.75	39.13	36.68	34.18	22.98

Note: Exchange rate = 31.3 baht/$

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

2.3 Trade

In 2013, ethanol exports (HS2207.10.00) will likely decline significantly to 130 million liters, due to strong domestic demand for ethanol. In the first four months of 2013, ethanol exports declined significantly to 64 million liters compared to 138 million liters during the same period last year (Table 2.5). Ethanol is primarily exported to the Philippines where domestic ethanol supplies remain insufficient due to its mandatory sales of gasohol. Most ethanol exports are industrial grade ethanol. Meanwhile, there will be no imports of ethanol for gasohol production in 2013 due to sufficient domestic supplies. The Thai Government also imposes a 2.5 baht/liter (32 US cents/gallon) on ethanol imports.

In 2014, ethanol exports are expected to increase slightly to 170 million liters in anticipation of larger exportable supplies from new ethanol plants. In addition, the export-oriented cassava-based ethanol plant, which started its operation in 2013, is expected to expand its capacity in 2014. Ethanol demand from the Philippines and China is also likely to remain strong.

Table 2.5: Thailand's Exports of Ethanol [1/]

Unit: Million Liters

	2009	2010	2011	2012	Jan. - Apr.		
					2012	2013	% change
Philippines	-	5.5	61.3	142.3	53.9	46.2	-14.3
Singapore	3.1	19.3	68.5	76.8	39.2	-	-100.0
Japan	7.4	20.0	16.5	24.9	14.6	8.8	-39.7
Australia	0.0	-	2.1	-	-	-	-
Taiwan	3.1	1.2	3.2	1.5	1.5	-	-100.0
Indonesia	-	-	-	1.5	1.5	-	-100.0
Europe	-	-	-	9.3	-	-	-
South Korea	-	2.1	12.8	45.5	25.4	-	-100.0
Other	2.0	-	2.6	2.1	2.1	8.8	319.0
Total	**15.6**	**48.2**	**167.0**	**303.9**	**138.2**	**63.8**	**-53.8**

Note: 1/ Based on 19 on-line ethanol plants exporting 95% purity ethanol

Source: Department of Alternative Energy Development and Efficiency, Ministry of Energy

2.4 Stocks

Ethanol stocks declined significantly to around 22 million liters in 2012 due to strong export demand compared to around 40 to 60 million liters over the last couple of years. In 2013 and 2014, ethanol stocks are likely to remain low at approximately 22 to 23 million liters in anticipation of tighter ethanol supplies and growing domestic demand for gasohol.

3. Biodiesel

3.1 Production

Table 3.1 Biodiesel Production and Use in Thailand

Biodiesel (1,000 Lites)									
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Beginning Stocks		0	6	7	8	22	12	22	32
Production	2	68	448	610	660	630	900	1,010	1,240
Imports	0	0	0	0	0	0	0	0	0
Exports	0	0	0	0	0	0	0	0	0
Consumption	2	62	447	609	646	640	890	1,000	1,240
Ending Stocks	0	6	7	8	22	12	22	32	32
Production Capacity									
Number of Biorefineries	3	5	9	14	13	13	10	10	10
Nameplate Capacity	219	475	840	1,970	1,970	1,970	1,280	1,280	1,280
Capacity Use (%)	0.9%	14.3%	53.3%	31.0%	33.5%	32.0%	70.3%	78.9%	96.9%
Feedstock Use (1,000 MT)									
Crude Palm Oil (CPO)	2	48	270	390	425	390	630	680	880
Stearin	0	11	120	140	150	160	150	200	200
Feedstock C									
Feedstock D									
Market Penetration (1,000 Liters)									
Biodiesel, on-road use	2	68	448	610	660	630	900	1,010	1,240
Diesel, on-road use	18,371	18,710	17,643	18,465	18,480	18,762	19,967	21,090	21,600
Blend Rate (%)	0.0%	0.4%	2.5%	3.3%	3.6%	3.4%	4.5%	4.8%	5.7%
Diesel, total use	18,371	18,710	17,643	18,465	18,480	18,762	19,967	21,090	21,600

B100 or unblended biodiesel in Thailand is currently produced from palm oil derived feedstock such as CPO, refined bleached deodorized (RBD) palm oil, palm stearin, and free fatty acids of palm oil (FFA). B100 production is solely driven by government mandates. Thailand does not import or export B100, however, it does export CPO.

The Thai Government's biodiesel policy is mainly aimed to help palm farmers. Currently the government has required fuel producers to blend palm oil with diesel fuel and has recently announced new mandates that will increase blending requirements to B7 (7 percent blend by volume of biodiesel in diesel fuel) in 2014.

B100 production is expected to grow to 1 billion liters in 2013 as a result of government policies and growing diesel consumption. 780 million liters of B100 is expected to be derived from CPO while 220 million liters is anticipated come from palm stearin. Industry sources estimate B100 production is expected to increase to 1.03 billion liters in 2014.

As indicated in the CPO production, supply and demand table (Table 3.2), feedstock for unblended biodiesel or crude palm oil is estimated to increase to 2.0-2.1 million metric tons (MMT) in 2013 compared to 1.89 MMT in 2012. The higher feedstock is due to increased fresh fruit bunch (FFB) production and improved CPO extraction rates. The increase in FFB production is attributed to higher average yields caused by favorable weather conditions in 2012 and an increase in the number of mature

palm trees used in palm oil production. In addition, industry sources report that the CPO extraction rates in 2013 should increase by an average of 17 percent in 2013 compared to 16.5 percent in 2012, due mainly to favorable weather conditions in 2012 and early 2013. CPO production in 2014 is forecast to further increase to 2.2-2.3 MMT reflecting an increase in both harvested area and a larger number of mature trees.

CPO supplies for B100 production in 2013 and 2014 is expected to reach 680,000 MT and 880,000 MT, respectively.

Table 3.2 Thailand: PS&D Crude Palm Oil 2012-

Unit: (1,000 Hectares) (1,000 Metric Tons)

	2012 1/	2013 1/ 2/	2014 2/
Planted Area	718	755	765
Harvested Area	636	658	690
Fresh Fruit Bunch (FFB) Productior	11110	10810	12850
Beginning Stocks	300	360	370
Production	1890	2050	2250
MY Imports	40	0	0
TOTAL SUPPLY	2230	2410	2620
MY Exports	310	400	400
Food Use Dom. Consumption	930	960	980
Biodiesel Use Dom. Consumption	630	680	880
TOTAL Dom. Consumption	1560	1640	1860
Ending Stocks	360	370	360
TOTAL DISTRIBUTION	2230	2410	2620

Note: 1/ Ministry of Commerce and Ministry of Energy
2/ FAS/Bangkok

Due to its unprofitability, there have been no newcomers in Thailand's B100 processing industry since 2010. Some establishments have already suspended their operations. As a result, only 10 producers currently have active operations with an estimated total production capacity of 4.3 million liters per day or 1,280 million liters per annum.

3.2 Consumption

B100 consumption is expected to further increase in 2013 by 12 percent to 1 billion liters from 890 million liters in 2012, mainly due to the government's B5 mandate and an estimated growth of 6 percent in total diesel consumption. B100 consumption in 2014 should grow by an estimated 20-30 percent as the government recently approved a B7 mandate which is scheduled to take effect on January 1, 2014.

According to industry sources, B100 production is unprofitable in Thailand, simply because there are too few refineries. Although B100 prices are set by the government, the limited number of palm oil

refineries enables them to influence prices below the established reference prices. For example, the reference prices announced on June10-16, 2013 were 28.75 baht/liter ($3.51/gallon) for B100 derived from CPO and 25.47 baht/liter ($3.11/gallon). However, trade sources reported that the actual prices received by B100 producers were 3.0-5.0 baht/liter (37-61 US cents/gallon) below the reference prices. This is a primary reason why there are no new entrants in the B100 market.

The government implemented B5 biodiesel blending requirements in 2011. Below is historical implementation of mandatory use for specific biodiesel since 2007:

- June 2007 Implement mandatory use of B2 and voluntary use of B5
- June 2010 Implement mandatory use of B3 and voluntary use of B5
- March 2011 Implement mandatory use of B2 and voluntary use of B5
- May 2011 Implement mandatory use of B3-B5
- July 2011 Implement mandatory use of B4
- January 2012 Implement mandatory use of B5
- July 19, 2012 Implement mandatory use of B3.5
- November 1, 2012 Implement mandatory use of B5
- April 2013 The Cabinet agreed to implement mandatory use of B7, commencing on January 1, 2014

Below is the composition of B5 biodiesel retail prices.

Table 3.3: A Breakdown of Retail Prices for B5 Biodiesel As of June 20, 2013

	B5 Biodiesel (Baht/lit
Ex-Refinery Prices	24.7279
Excise Tax	0.0050
Municipal Tax	0.0005
Oil Fund Fee	2.1000
Conservation Fund Fee	0.2500
Wholesale Prices	27.0834
Value Added Tax	1.8958
Wholesale Prices + VAT	28.9792
Marketing Margin	0.9446
Value Added Tax	0.0661
Retail Prices	**29.9900**
Source: Ministry of Energy	

3.3 Trade/Policy

The Thai Government restricts the import of biodiesel to protect domestic palm growers. In addition, a lack of global demand for biodiesel has decreased Thailand's B100 exports in recent years.

3.4 Ending Stocks

B100 production is driven solely by contracts between palm growers and refineries. As a result, the country's B100 stocks, held by either B100 producers or petroleum oil refineries, are quite low somewhere around 20-30 million liters or about ten days of utilization.

4. Advance Biofuels

A molasses-based ethanol plant recently opened a second production line using cane bagasse. This second generation biofuel pilot project has been established between the Thai Roong Ruang Group, one of the largest sugar mills in Thailand, the Japanese government, and the Thai Government. The operation remains in the experimental stage with a production capacity of 10,000 liters/day.

The Thai Ministry of Energy has also started a pilot project using hydrogenated vegetable oil (HVO) for biodiesel production. The project is expected to take several years before it turns into a viable commercial production.