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# Indonesia Palm Oil

Tight Supply to Help Prices



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## Tight Supply to Help Prices

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# Executive Summary

Running out of land – limited room for output expansion...

**W**e see a long-term upside risk to our forecast for crude palm oil (CPO) prices, given the tighter-than-expected inventory from 2020 onwards, on the back of growing demand but limited structural output expansion potential. The long-term productivity performance of trees needs to meet growing global demand for CPO; and the ageing process and the lack of tree regeneration means we could potentially see diminishing palm oil output in the long-term if there are no serious efforts to mitigate this risk in the face of rising demand.

Planters can capitalise on this opportunity by strengthening their upstream divisions. Maximising the yield-per-hectare performance is the key strategy in sustaining growth in light of the lack of new planting over the last five years. Mechanisation and adopting technologies to intensify yield may make planting more precise and effective as well as improve productivity-per-hectare.

The challenge to grow and stay profitable may lead to industry consolidation. Malaysian planters have started to consider acquiring Indonesian estates, given the value-unlocking potential; meanwhile, Indonesian estates are also searching for estates that are available for sale. Plantations with strong balance sheets and cash flow may emerge as winners in the industry in the next several years.

...while demand will grow steadily

On the demand side, we think that replacing CPO demand in the consumer staples product line is a huge challenge, given CPO's affordability and availability. Its special characteristics with regard to balanced fat composition, carotenoid and Vitamin E mean that CPO is actually a lot better relative to the negative perception that some people may have today. There may be further upside risk when Indonesia's biodiesel project kicks in, as – at the current crude oil price level – we estimate no additional incentives are required to boost biodiesel production.

Other edible oil supply and demand also will remain steady going forward, on the back of a muted outlook for acreage and yield expansion, and growing food-based demand.

One could address the issue of demand growth by looking at global sustainable issues such as Roundtable on Sustainable Palm oil (RSPO) compliance and joint efforts by both Indonesia and Malaysia to fight the smear campaign against palm oil.

Scenario analysis: Downside risk limited by biofuel consumption

Our scenario analysis also reveals that downside risks for the CPO price are minimal in the long-term, given the tight supply-demand conditions. Our worst-case scenario puts the CPO price at RM2,000 (US\$550) per metric tonne (MT), assuming a crude oil price average of US\$50 per barrel (bbl). Any potential oversupply in our worst-case scenario would also not pull the CPO price below US\$2,200 due to the remote possibility of CPO yields going beyond six tonnes per hectare, coupled with the fact that we are running out of land.

### DBS edible oil supply and demand assumption

	CPO price (US\$/MT) FOB	Ending Stocks (k MT)	Global demand (k MT)	Global supply (k MT)	Stock/usage ratio (%)	Soybean oil price (US\$/MT) FOB
2016	640	9,890	62,341	58,875	15.9%	696
2017	645	14,232	63,599	67,941	22.4%	753
2018F	575	18,098	65,160	69,026	27.8%	706
2019F	610	16,411	69,950	68,263	23.5%	706
2020F	611	16,694	69,950	70,234	23.9%	717
2021F	618	15,239	72,282	70,827	21.1%	738
2022F	620	14,881	72,282	71,923	20.6%	742
2023F	648	14,506	72,944	72,568	19.9%	744
2024F	666	15,067	74,489	75,051	20.2%	807
2025F	682	16,397	77,491	78,821	21.2%	821
2026F	687	18,635	79,261	81,498	23.5%	821
2027F	687	19,388	82,714	83,467	23.4%	821
2028F	687	19,673	84,664	84,949	23.2%	821
2029F	687	19,542	86,518	86,387	22.6%	821
2030F	687	20,051	86,873	87,381	23.1%	821

### DBS soybean supply and demand assumption

	Price of soybeans (US\$/MT) (FOB)	Ending Stocks (k MT)	Global demand (k MT)	Global supply (k MT)	Stock/usage ratio (%)	Crude oil price (US\$/bbl)
2016	360	80,480	315,180	311,680	25.5%	42.5
2017	352	88,280	329,580	337,380	26.8%	51.6
2018F	330	96,420	342,297	350,437	28.2%	56.7
2019F	330	97,603	355,091	356,274	27.5%	60.4
2020F	335	97,040	367,613	367,051	26.4%	73.0
2021F	345	99,103	379,833	381,896	26.1%	78.0
2022F	347	101,552	391,676	394,125	25.9%	73.1
2023F	348	104,893	403,137	406,478	26.0%	77.9
2024F	377	111,023	413,933	420,063	26.8%	82.6
2025F	384	118,100	424,316	431,394	27.8%	83.0
2026F	384	124,721	431,674	438,295	28.9%	65.0
2027F	384	131,107	439,057	445,442	29.9%	65.0
2028F	384	137,690	446,189	452,773	30.9%	65.0
2029F	384	143,804	453,989	460,102	31.7%	65.0
2030F	384	149,281	461,924	467,402	32.3%	65.0

Source: Bloomberg Finance L.P, DBSVI

Best stock plays to ride  
on long-term CPO price  
theme

Moreover, we find that the current demand projection is heavily reliant on food consumption, not biodiesel demand. If crude oil prices stay above US\$65/bbl, we believe that CPO prices could average above RM2,700 per MT if Indonesia and Malaysia biodiesel demand kicks in.

Our CPO price forecast implies a sequential recovery for the rest of 2018 and staying buoyant thereafter. We believe our CPO price forecast is conservative, accounting for our conservative stance over biodiesel demand absorption and a steady outlook for supply and demand with regard to other edible oils.

We believe the palm oil price will continue to be strong on the back of tight supply-demand conditions, given the limited land for new planting expansion and steady food-based demand.

Positioning for the theme of strong CPO prices in the long-term, we like CPO planters that can capitalise on buoyant CPO prices and have robust growth potential, both organically or inorganically. We like CPO planters that have a young tree profile, which can provide organic output growth and yield expansion, thus potentially keeping the cash cost per tonne low.

Undemanding  
valuation

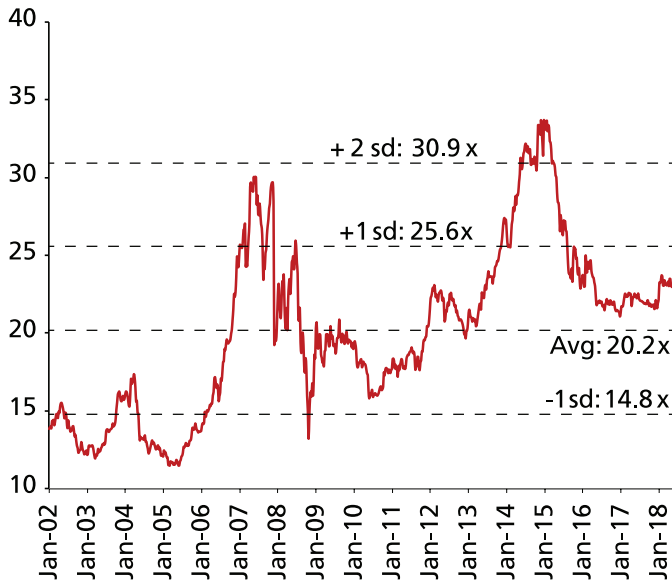
CPO stocks have underperformed each respective country's index since last year. The CPO price remains a key factor that can determine sentiment toward the sector – keeping in mind that issues like India's import tax hike and EU countries' attempts to curb CPO-based biodiesel can also impact CPO price and inventory.

However, in this report, we highlight that changing structural demand is not going to be easy, given the affordability and availability of CPO. On the other hand, output expansion will also be challenging. This scenario provides a positive picture for supply and demand dynamics with regard to CPO prices.

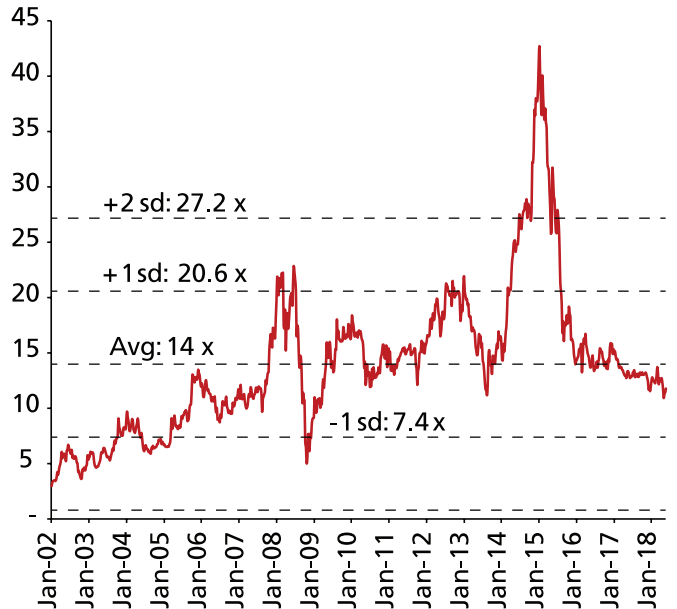
We also believe the market is currently underappreciating palm oil planters, as evidenced by the inexpensive price-to-earnings (PE) valuation for these stocks, which is below the five-year average. The market's scepticism is well understood and this is attributable to the planters' muted 2018 earnings performance, which is at the bottom range of our forecast due to a lower CPO price trend, coupled with soft output expansion. ❌

*We believe the palm oil price will continue to be strong on the back of tight supply-demand conditions, given the limited land for new planting expansion and steady food-based demand*

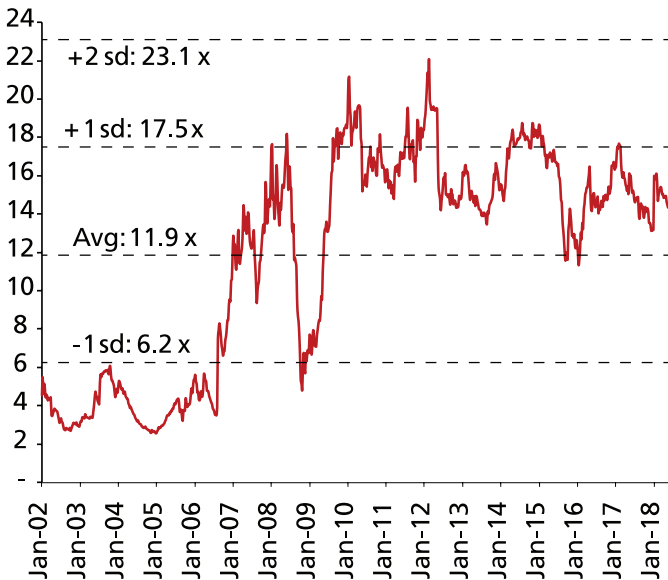
**Malaysia forward P/E band**



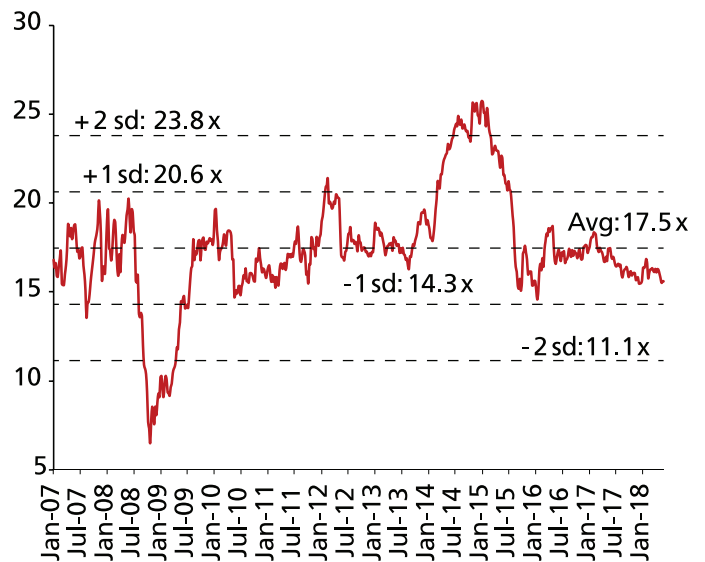
**Indonesia forward P/E band**



**Singapore forward P/E band**

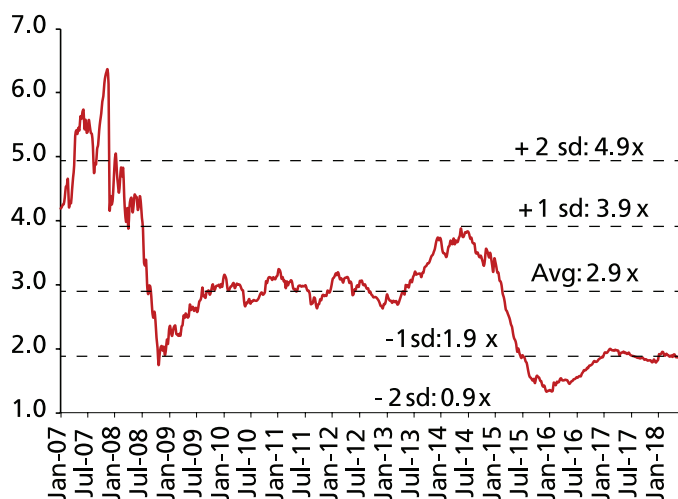


**Regional forward P/E band**

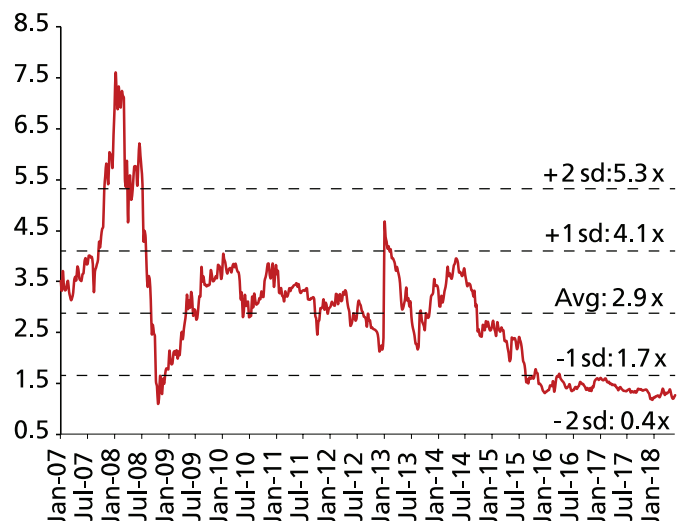


Source: Bloomberg Finance L.P., DBSVI, DBS Bank

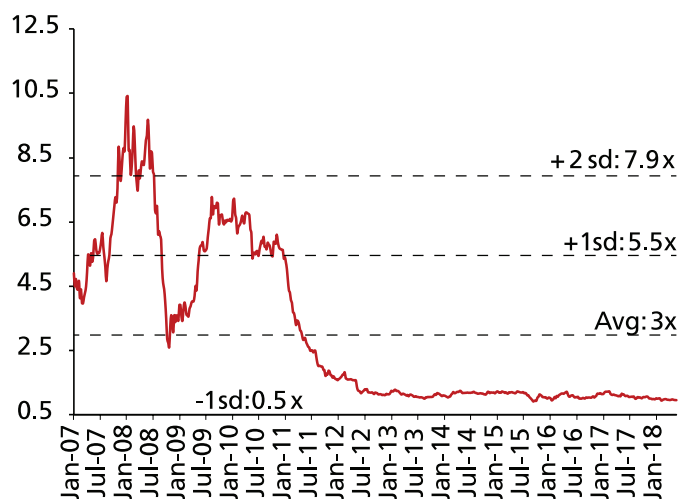
### Malaysia forward P/B band



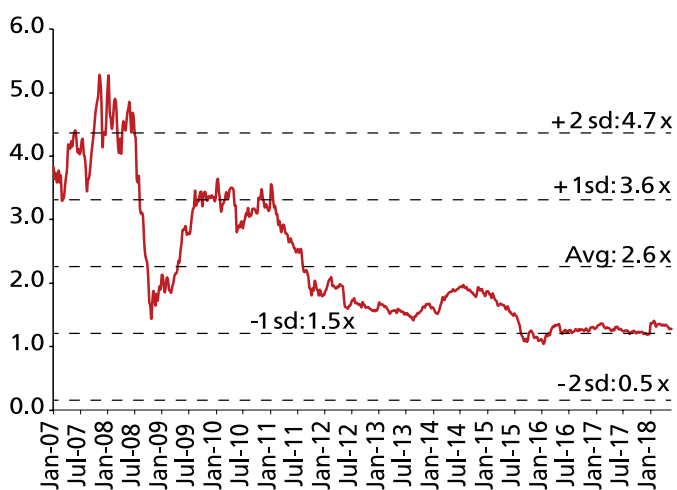
### Indonesia forward P/B band



### Singapore forward P/B band



### Regional forward P/B band



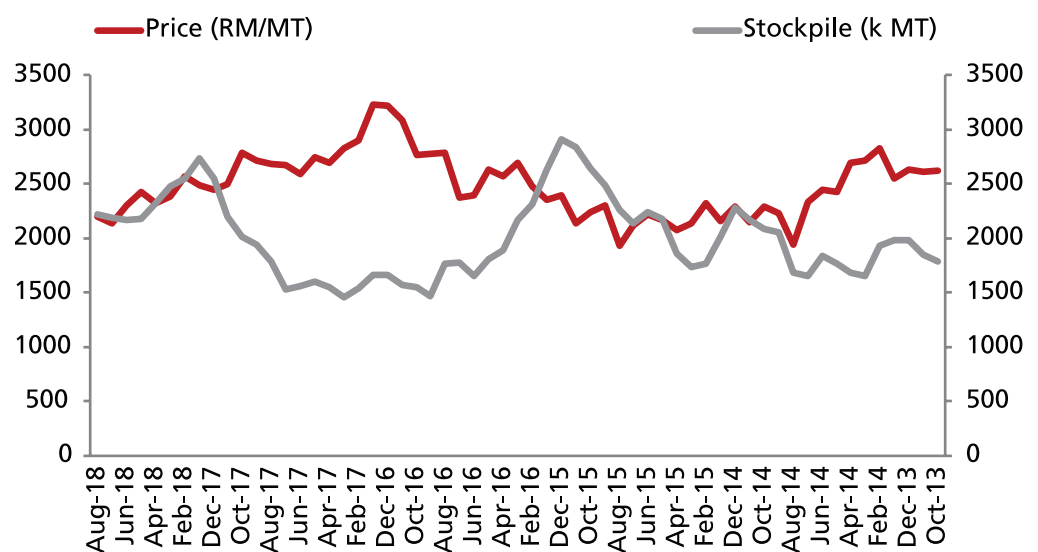
Source: Bloomberg Finance L.P., DBSVI, DBS Bank



# Crude Palm Oil Long-Term Supply at Risk

In the short-term, sentiment on CPO prices may be driven by the monthly inventory in both Malaysia and Indonesia, as they are the main CPO producers. Consensus is bearish on CPO prices in 2018 and 2019, given the fact that estates historically produce more fruit in the second half of the year.

## Malaysia's monthly CPO price vs. the stockpile



Source: Bloomberg Finance L.P., DBSVI

Moreover, beyond the outlook for higher CPO output by both Malaysian and Indonesian estates, the market generally sees limited positive catalysts for the CPO price in the short-term, amid lack of strong demand. Estates are also entering the seasonally high production cycle but, so far, global biodiesel demand hasn't reached the tipping point because oil prices are still low.

However, on the other hand, we see that the market is ignoring the issue of long-term structural supply surrounding both Indonesian and Malaysian palm oil estates, which we also think is an upside risk to our forecast for CPO prices.

The long-term productivity performance of trees needs to meet growing global demand for CPO; and the ageing process and the lack of tree regeneration means we could potentially

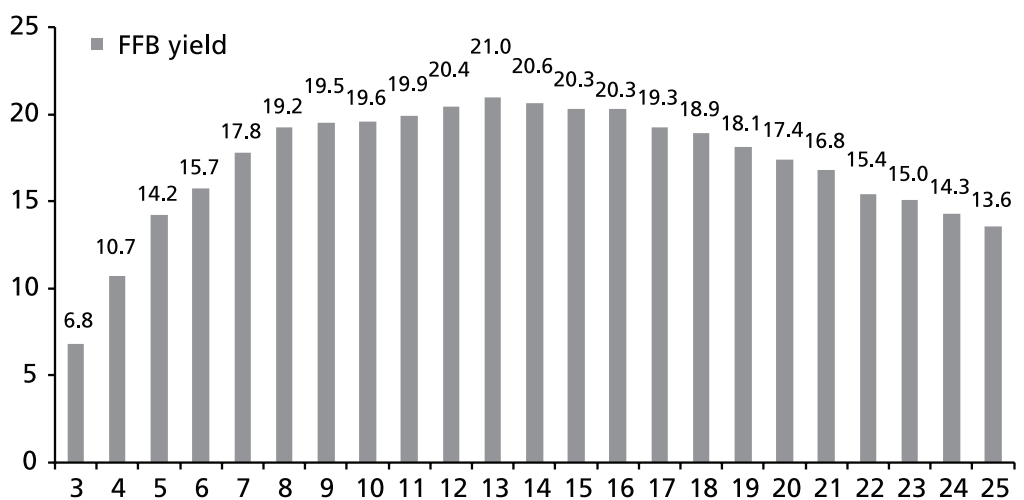
see diminishing palm oil output in the long-term if there are no serious efforts to mitigate this risk in the face of rising demand.

The reality check above shows us that we are unaware that the production potential of existing palm oil trees may not as strong as we currently expect. While trees bear fruit continuously, they bear less fruit as they age. This means that yield may not as good as when the trees are at their prime, aged between 11 and 17 years old; the diminishing output of trees coupled with growing demand may put CPO availability in the market at risk.

**Delayed replanting**

The average ages of Indonesian and Malaysian palm oil trees are 16 years and 20 years, respectively. Though these ages are still considered prime, they are nearing the phase of diminishing production. Palm trees’ productivity drops when they turn 23-25 years old; this implies that a CPO supply crisis will happen in this decade.

**Yield pattern of CPO trees**

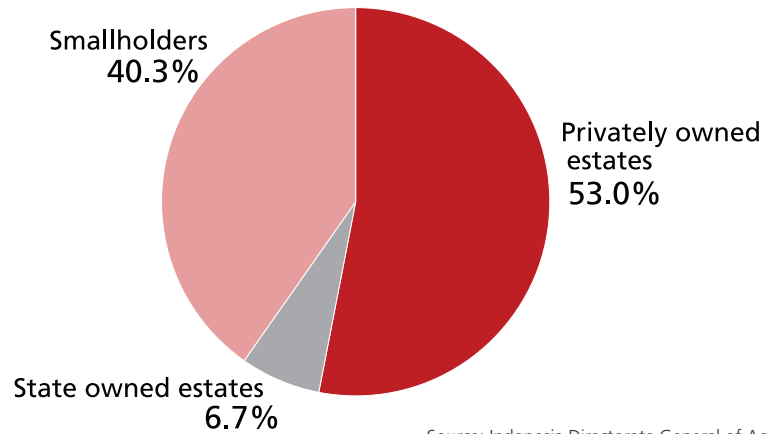


Source: Companies, DBSVI

Malaysian estates are currently facing the challenge of slow tree regeneration; and we will soon see the same in Indonesia – where planters, which consist predominantly of smallholders and plasma farmers, will face a tree-ageing crisis, given the lack of tree regeneration efforts over the past decade, due to limited availability of capital and limited awareness of declining production.

The results of replanting efforts by smallholder CPO planters and state-owned estates via PT Perusahaan Perkebunan Negara (PT PTPN) are currently also still unclear, given the lack of implementation procedures and incentives for the programmes, even though the plasma trees in Indonesia will enter a phase of fading production in the next two years.

**Half of Indonesia's estates are facing an ageing crisis**



**Absence of new planting over the past five years**

Planters' new planting efforts have been stagnating over the last five years. The low CPO price environment has created challenging conditions, which have resulted in the scaling back of capital spending and efficiency initiatives over the last five years.

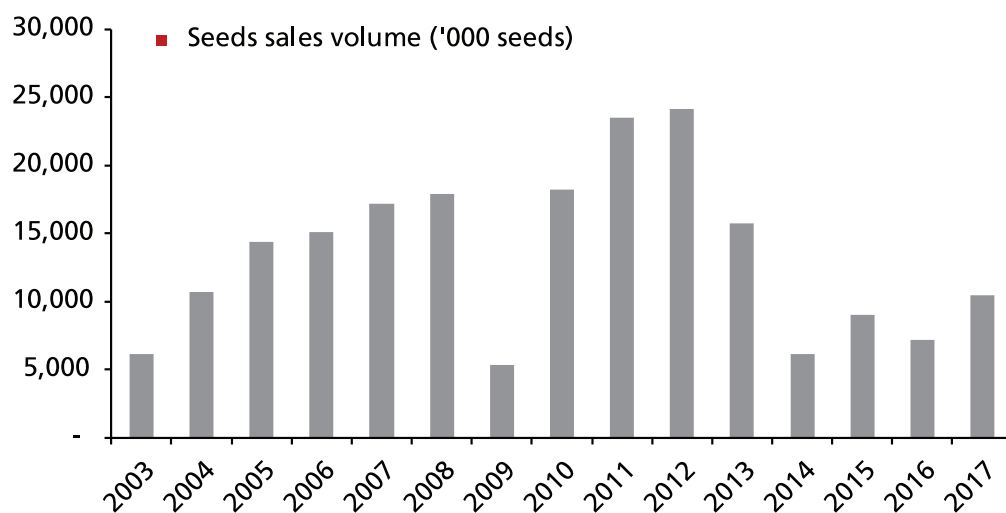
The last big new planting took place in 2005 to 2007, when the CPO price rallied and peaked at above RM3,000 per MT. Since then, the new planting trend has been weakening, reflected in London Sumatra's seed sales volume (see chart below). Currently, the 2005-2007 trees are entering their prime age, before starting to peak in 2019-2020, according to our estimate. Since 2006-2007, especially from 2013 onward, we have seen new planting decline.

The listed plantation companies, in general, also do not allocate meaningful capital for new planting programmes going forward, given that they generally own relatively younger trees which will support their growth over the next decade.

Indonesia's decision to extend its peatland moratorium policy this year also hinders new entrants to the CPO plantation industry, and we will not see any sizable new CPO planters in the next five years. Not only are new entrants barred from developing peatland, existing CPO planters also have limited plantable land going forward.

We estimate that existing planters' ratio of land bank reserves-to-planted area is only 11%, so even with an aggressive new planting scenario, total potential CPO output growth is modest and there is no potential of oversupply in sight.

### London Sumatra's seed sales trend



Source: Company, DBSVI

### New planting (excluding replanting activities)

Indonesia	2014	2015	2016	2017	2018	2019	2020	2021
Astra Agro Lestari	10,337	1,000	0	0	0	0	0	0
London Sumatra	2,107	934	625	800	800	800	800	0

Malaysia	2014	2015	2016	2017	2018	2019	2020	2021
Felda Global V.	0	0	0	0	0	0	0	0
Genting Plant.	3,229	4,547	1,111	500	2,000	2,500	2,500	2,000
IOI Corporation	0	0	0	0	0	0	0	0
KL Kepong*	11,650	4,600	0	0	0	0	0	0
Sime Darby*	0	0	0	0	0	0	0	0
TSH Resources	2,800	1,717	200	500	2,500	2,500	1,000	838

Singapore	2014	2015	2016	2017	2018	2019	2020	2021
Bumitama Agri	511	2,802	909	2,500	2,367	2,100	2,615	0
First Resources	17,209	2,606	1,600	2,400	2,400	2,400	2,400	0
Golden Agri Resources*	849	0	0	0	0	0	0	0
Indofood Agri	6,350	1,641	1,083	850	823	813	810	0
<b>Total</b>	<b>55,042</b>	<b>19,847</b>	<b>5,528</b>	<b>7,550</b>	<b>10,890</b>	<b>11,113</b>	<b>10,125</b>	<b>2,838</b>

\*excluding Liberia  
Source: Company, DBSVI

### Palm oil hectareage forecasts

Oil palm planted area ('000 hectares)

	2017A	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Mature	5,110.7	5,306.4	5,463.7	5,531.4	5,579.5	5,613.5	5,638.3	5,655.8	5,667.2	5,674.1	5,677.6	5,678.5	5,677.5	5,675.0
Immature	700.4	559.6	443.5	406.7	381.7	365.0	353.2	345.5	341.4	340.0	340.7	342.8	346.2	350.4
New planting	73.2	54.9	41.2	30.9	23.1	17.4	13.0	9.8	7.3	5.5	4.1	3.1	2.3	1.7
<b>Malaysia</b>	<b>5,811.1</b>	<b>5,866.0</b>	<b>5,907.2</b>	<b>5,938.0</b>	<b>5,961.2</b>	<b>5,978.5</b>	<b>5,991.6</b>	<b>6,001.3</b>	<b>6,008.7</b>	<b>6,014.1</b>	<b>6,018.3</b>	<b>6,021.4</b>	<b>6,023.7</b>	<b>6,025.4</b>

Mature	9,327.4	9,539.5	9,751.6	9,784.2	9,755.9	9,688.7	9,621.8	9,565.1	9,502.7	9,437.0	9,369.7	9,301.8	9,234.0	9,166.5
Immature	2,438.1	2,316.7	2,154.6	2,149.4	2,192.8	2,268.3	2,339.8	2,399.0	2,462.8	2,529.2	2,597.0	2,665.1	2,733.0	2,800.6
New planting	165.0	90.8	49.9	27.5	15.1	8.3	4.6	2.5	1.4	0.8	0.4	0.2	0.1	0.1
<b>Indonesia</b>	<b>11,765.5</b>	<b>11,856.2</b>	<b>11,906.2</b>	<b>11,933.6</b>	<b>11,948.7</b>	<b>11,957.0</b>	<b>11,961.6</b>	<b>11,964.1</b>	<b>11,965.5</b>	<b>11,966.2</b>	<b>11,966.7</b>	<b>11,966.9</b>	<b>11,967.0</b>	<b>11,967.1</b>

Mature	14,438.1	14,845.9	15,215.2	15,315.6	15,335.4	15,302.2	15,260.1	15,220.9	15,169.9	15,111.2	15,047.3	14,980.3	14,911.5	14,841.5
Immature	3,138.5	2,876.4	2,598.1	2,556.1	2,574.5	2,633.3	2,693.0	2,744.6	2,804.2	2,869.2	2,937.6	3,007.9	3,079.2	3,151.0
New planting	238.2	145.6	91.1	58.3	38.2	25.7	17.6	12.3	8.7	6.3	4.5	3.3	2.4	1.8
<b>Total</b>	<b>17,576.6</b>	<b>17,722.3</b>	<b>17,813.3</b>	<b>17,871.6</b>	<b>17,909.9</b>	<b>17,935.6</b>	<b>17,953.2</b>	<b>17,965.4</b>	<b>17,974.1</b>	<b>17,980.4</b>	<b>17,984.9</b>	<b>17,988.3</b>	<b>17,990.7</b>	<b>17,992.5</b>
% growth	1.4	0.8	0.5	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

### Palm oil supply forecasts

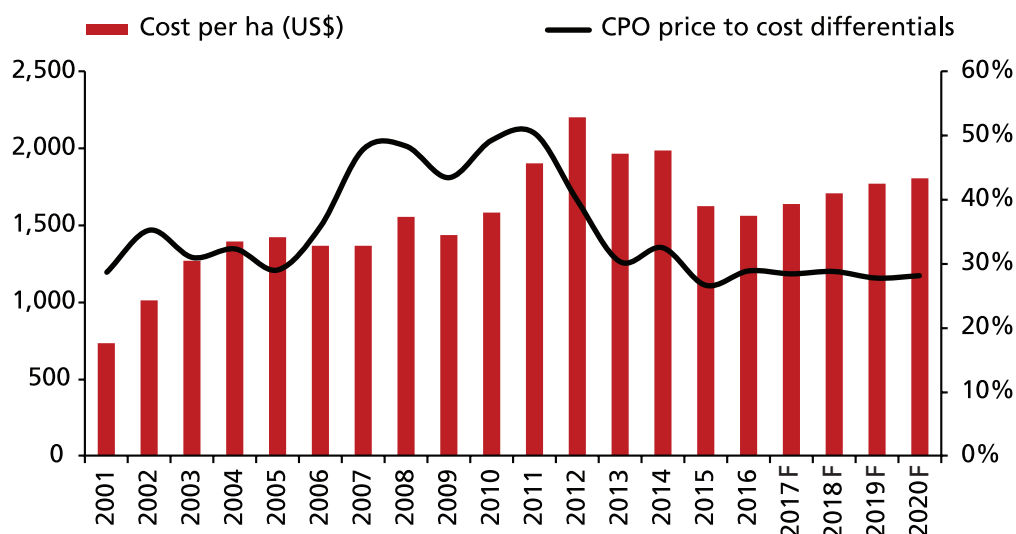
	2017A	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
<b>Malaysia</b>	<b>19,919</b>	<b>21,307</b>	<b>22,323</b>	<b>23,323</b>	<b>24,142</b>	<b>24,894</b>	<b>25,549</b>	<b>26,581</b>	<b>27,611</b>	<b>28,618</b>	<b>29,564</b>	<b>30,195</b>	<b>30,779</b>	<b>31,331</b>
vol. growth	2.6	1.4	1.0	1.0	0.8	0.8	0.7	1.0	1.0	1.0	0.9	0.6	0.6	0.6
% growth	15.0	7.0	4.8	4.5	3.5	3.1	2.6	4.0	3.9	3.6	3.3	2.1	1.9	1.8
<b>Indonesia</b>	<b>36,004</b>	<b>38,158</b>	<b>36,455</b>	<b>37,122</b>	<b>36,783</b>	<b>36,943</b>	<b>36,812</b>	<b>37,881</b>	<b>40,054</b>	<b>41,311</b>	<b>42,020</b>	<b>42,623</b>	<b>43,234</b>	<b>43,496</b>
vol. growth	3.9	2.2	-1.7	0.7	-0.3	0.2	-0.1	1.1	2.2	1.3	0.7	0.6	0.6	0.3
% growth	12.2	6.0	-4.5	1.8	-0.9	0.4	-0.4	2.9	5.7	3.1	1.7	1.4	1.4	0.6
<b>Others</b>	<b>8,959</b>	<b>9,561</b>	<b>9,485</b>	<b>9,789</b>	<b>9,902</b>	<b>10,086</b>	<b>10,208</b>	<b>10,589</b>	<b>11,155</b>	<b>11,569</b>	<b>11,884</b>	<b>12,132</b>	<b>12,374</b>	<b>12,554</b>
vol. growth	-0.5	0.6	-0.1	0.3	0.1	0.2	0.1	0.4	0.6	0.4	0.3	0.2	0.2	0.2
% growth	-5.3	6.7	-0.8	3.2	1.2	1.9	1.2	3.7	5.3	3.7	2.7	2.1	2.0	1.5
<b>Total</b>	<b>64,883</b>	<b>69,026</b>	<b>68,263</b>	<b>70,234</b>	<b>70,827</b>	<b>71,923</b>	<b>72,568</b>	<b>75,051</b>	<b>78,821</b>	<b>81,498</b>	<b>83,467</b>	<b>84,949</b>	<b>86,387</b>	<b>87,381</b>
vol. growth	6.0	4.1	-0.8	2.0	0.6	1.1	0.6	2.5	3.8	2.7	2.0	1.5	1.4	1.0
% growth	10.2	6.4	-1.1	2.9	0.8	1.5	0.9	3.4	5.0	3.4	2.4	1.8	1.7	1.2

Source: Oil World, MPOB, Ministry of Agriculture of Indonesia, DBS Bank estimates

## Rising Costs, Ageing Trees

**Rising costs** Maintaining strong productivity is one of the ways to fight rising costs, such as for wages and fertiliser. After the commodities boom in 2008, stagnant yield – resulting from the absence of a rally in CPO prices – has been the key driver of shrinking margins over the last decade.

### CPO planters' cost per hectare and margins



Source: Company, DBSVI

While we do not expect any CPO price rally in the near-term, we still believe there is room to improve CPO profitability, and that this depends on planters' ability to grow their output to capture rising prices over the next decade.

The key challenge for palm oil companies is how they can capitalise on the long-term upside on CPO prices as we discussed in the first section, even as they try to sustain growth and profitability going forward. Malaysian CPO planters' 35/25 plan – a target to achieve 35 tonnes per hectare and a 25% oil extraction rate (OER) by 2020 – will fall behind schedule, but we do not think it is advisable to delay it further.

Moreover, Indonesia's government has targeted domestic palm oil production to reach 42m MT by 2020 and, according to local media, this target is achievable without significant new planting ahead. Yield expansion is one of the key strategies for Indonesian estates to explore going forward. However, the main challenge is that ageing trees are mainly owned by smallholders and government-owned estates.

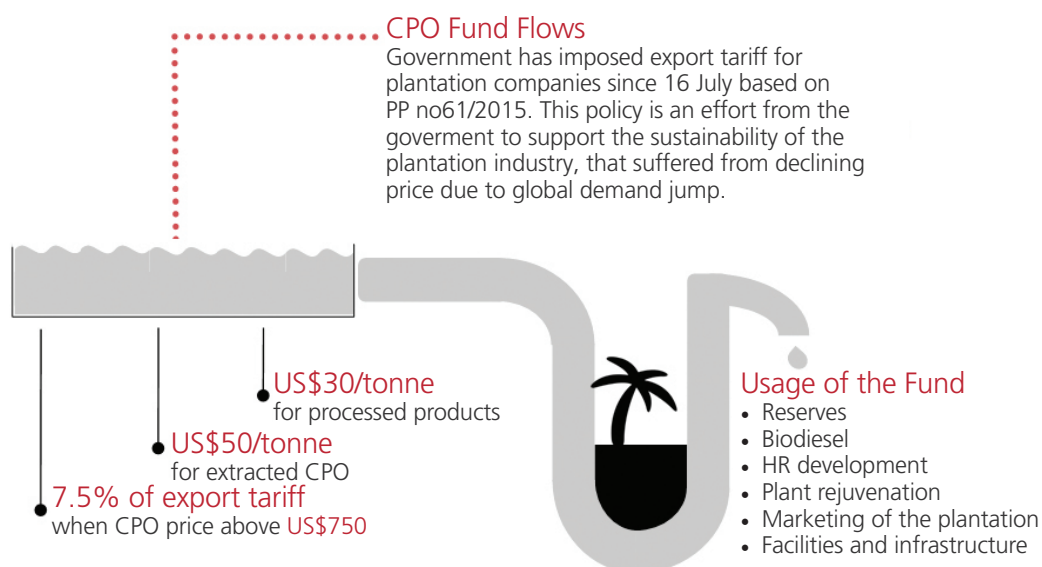
The limited room to expand to new land will remain the main challenge, given the stricter regulation – the government has stopped issuing planting licenses for planters to open new CPO estates on peatland due to the peatland moratorium – and the limited availability of a sizable land bank, even in Indonesia. Moreover, the current replanting effort will not

translate into meaningful company value and earnings growth for the next three years, given that the trees are still immature.

## CPO Fund Has Not Taken Off Yet

The government may also assist smallholders via the Indonesian Oil Palm Estate Fund (BPDP-KS), an endowment fund managed by investment managers. This special public service agency uses export levies from palm oil products to finance its operations, including paying for biodiesel incentives, replanting and R&D for oil palm farmers to boost their production, according to Presidential Regulation No 61 2015.

### The mechanism behind Indonesia's CPO Fund



Source: Company, katadata.co.id, DBSVI

The CPO Fund's cross-subsidy scheme can potentially collect and disburse between Rp10t and Rp13t annually, which can cover the financial requirements of replanting 1m hectares of land, mainly for smallholder estates with trees that are 20-35 years old.

However, so far, we have not seen any meaningful impact of the CPO Fund on Indonesia's biodiesel industry and replanting effort for smallholders. However, given the fact that the CPO Fund has been established for only two years, it may not be able to cope with the demand for the biodiesel subsidy and the sizable palm oil estates in need of immediate replanting efforts.

Accelerating the national CPO Fund allocation to subsidise the refiners to enhance domestic biodiesel demand and blending performance is a crucial success factor for Indonesia biodiesel programme. The government and producers are working on a key demand enhancement

programme, which will have a clearer scope of subsidies for biodiesel, and regulations that address current issues in the industry. The domestic demand enhancement also is crucial in anticipating the US biodiesel antidumping policy, which will reduce the competitiveness of Indonesia-produced biodiesel.

## Unlocking Estates' Performance, Capitalising on Opportunity

We assess three key themes for CPO planters' growth besides the availability of land: Intensification, mergers & acquisitions (M&A), and the replanting programme. We will discuss the growth strategy without putting a strong emphasis on new planting, given the scarcity of land and the land moratorium issue, particularly in Indonesia. In this section, we will try to give the reader an insight into how to unlock the performance of palm oil estates in the currently challenging environment of, as discussed before, slow tree regeneration and rising costs.

### Land bank optimisation: Currently applied in Indonesia

To cope with rising labour wages and fertiliser costs, planters need to maximise the yield of their trees. Palm oil planters with younger estates may not need to worry too much about this issue, given that their trees are still growing and there is scope for yields to expand, providing a natural hedge against rising costs.

However, for planters with maturing trees, the limited new planting in the last five years means there will not be a significant number of new mature trees ahead. In other words, existing yield will naturally decline as trees age and lower yields will persist, given the lack of meaningful tree regeneration. Planters in this situation can carefully increase the estates' productivity by collecting leftover fruit and implementing smart mechanisation.

#### 1) Increasing land-use efficiency: Boosting yield

We may call this the yield enhancement programme. Indonesia's tree yield of 4.5 tonnes per hectare is still below Malaysian planters' 5.3 tonnes per hectare. Indonesia's mechanisation programme covers merely 20% of total planted area, compared to 60% of land in Malaysia. Increasing mechanisation provides room for higher yield, beyond the age advantage (Malaysian palm trees are older than Indonesian ones).

Mechanisation reduces the time needed for harvesting, fresh fruit bunch (FFB) evacuation, loose fruit collection, fertiliser application, field upkeep, and pesticide application, resulting in cost-production control. About 87% of the process of harvesting involves using manual labour to pick fruit, and this has not changed in decades. The application of Cantas, or mechanised harvesting tools, could halve the labour contribution. For example, the mini tractor is five times as effective as manual human labour, and the mechanical loader, which requires fewer workers to operate, translates into savings of 41% on labour costs.

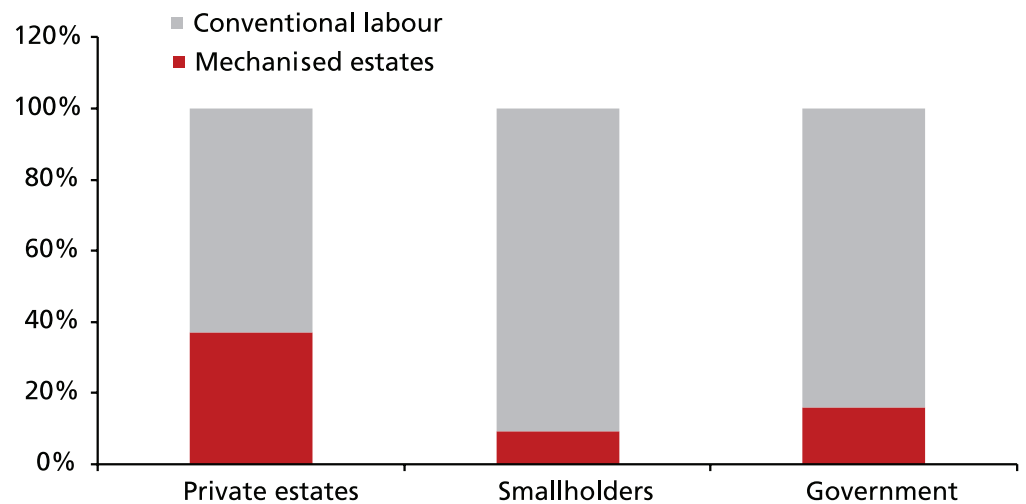


The value of loose fruit is neglected, and its collection can also be made more efficient through the use of a loose fruit collector, which operates just like a vacuum cleaner. A study by the Malaysian Palm Oil Board (MPOB) states that the loose fruit collector could collect, per hour, 100-250kg – a quantity that would require a whole day if relying on manual labour.

Indonesia’s plantations can accelerate their mechanisation efforts, given the topographical advantage of Kalimantan estates, which consist of plateau land. Given the availability of workers across Indonesia, Indonesia has been slow to mechanise estate management. The still-conventional planting practice is also supported by profitability and overall productivity as seen in robust planters’ yield-per-hectare performance.

We see mechanisation accelerating in the next few years, starting from privately owned companies and moving through to smallholders and state-owned companies, as they anticipate challenges before they hurt their financial performance. Early mechanisation will reward companies over the long-term, in our view, by protecting them from any potential labour shortage, lack of new generations of farmers, and cost escalation.

**Mechanisation has been slow in Indonesia**



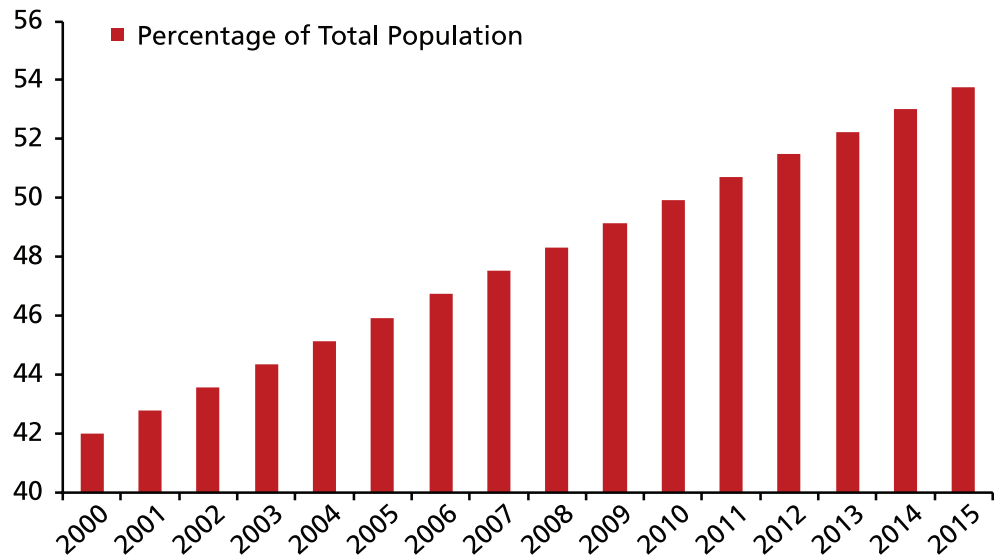
Source: Company, DBSVI

Indonesia currently has a more abundant labour supply than Malaysia. However, given rates of youth migration to larger cities, such as Jakarta and Surabaya, for better education and careers, there will be a lack of workers in regions such as Kalimantan and Sumatera. The chart below shows that young people have been favouring moving to the Java area over the past decade.

The demographic advantage enjoyed by Indonesia means that there will be more young people chasing new opportunities, such as joining start-ups, instead of working as

conventional farmers. As such, it is not too far-fetched for countries like Indonesia to start anticipating a shrinking in the labour pool willing to work at farms.

### Urbanisation of Java island (%)



Source: Indonesia Statistics Bureau (BPS), DBSVI

## 2) Going high-tech: Drones

Increasing land efficiencies also can be achieved via precise planting. Businesses with labour-intensive operations and wide coverage over multiple sites, like CPO plantations, need strong operational supervision and precision for better treatment of trees. It is also necessary to actively monitor daily operations, such as fertilisation and water levels, in the estates in the most efficient way. A precise planting programme will also reduce operational inefficiencies and leakage during critical periods such as during harvesting and transportation, which may harm productivity and financial performance.

The trend of adopting drones as part of farming may also be used in plantations to monitor operations in real time, which we believe will make planting more efficient. Drones can address the industry's inefficiencies, given that the labour-intensive business model has not really changed over the past 30 years despite the adoption of mechanisation. Drones also may provide real-time information and area imaging, beyond existing GPS mapping.

Workers can identify ripening fruit and increase the effectiveness of harvesting, monitor tree-pollination activity and enhance supervision of fertilisation. Drones may help the current practice of harvesting planning, which requires workers to walk around the estates to look at the colour of fruits carefully, before deciding on harvesting. Inexperienced workers may make mistakes, which may harm estates' productivity.

The use of drones will also strengthen planters' estate database – increasingly the starting point of estate mapping and big-data application in the plantation industry – which is currently done using only GPS and conventional data collection. Drones also have the potential to reshape the industry to be reactive to changes such as weather patterns.

### 3) Accelerating the tree-regeneration programme

Replanting programmes must be implemented using the most advanced seeds and best planting practices, to ensure a smooth transition without affecting the companies' performance, particularly revenue growth and profitability. Newly developed seeds can maximise tree-per-hectare – up to 157 trees per hectare compared to 132 trees per hectare with older seeds; a higher tree-per-hectare measure means a better yield. New trees, which are also shorter and narrower in leaf span, take up less space and harvesting effort despite their higher yield.

Unlike in Malaysia, where only 15% of the estates are owned by independent smallholders, we have not seen any meaningful replanting effort by state-owned plantations and smallholders in Indonesia, despite the fact that any replanting blueprint must be set up at least two years before the programme materialises. Smallholders' replanting efforts are crucial in sustaining healthy profitability among planters, given that the planters will purchase the fruit from the smallholders; declining yield among smallholders may affect the utilisation rate of mills, the consolidated oil extraction rate and yield performance.

Indonesia currently has no regulation concerning a blueprint for a smallholders' replanting programme. This lack of clarity over a replanting programme may result in lacklustre production among smallholders. The current replanting effort may take many years, given the capital and financial performance considerations. As Sinarmas have noted in the media, if CPO planters are the ones that need to initiate the programme, it may take ten years (up to 2027) for Sinarmas to accomplish an entire tree regeneration initiative on its Riau estates, as the replanting effort needs careful execution, without sacrificing the company's revenue.

According to the smallholders' initial farming blueprint, they will need to set aside funds for replanting trees that are 17 to 18 years old. However, we have found that there is minimal awareness and preparation for replanting among smallholder farmers.

Privately-owned estates must provide assistance and technology transfer to plasma CPO planters, since the private planters will be the direct FFB purchasers; so at the end of the day performance of plasma plantations will impact the overall consolidated productivity performance of the privately-owned planters. In our view, the private estates must recognise the value of plasma estates (smallholders), beyond only compliance with regulation, as we see opportunities and value in developing the plasma programme.

#### 4) Bolt-on acquisition

M&As may seem like strategic opportunities that don't come by every day. However, with current regulations and the limited availability of land, Indonesia will be a challenge for early-stage planters. Meanwhile, existing well-established players may experience declining productivity due to ageing of existing productive trees and limited regeneration efforts so far. We believe that consolidation in the sector may happen eventually.

In both Indonesia and Malaysia, planters are seeking the right M&A partners to sustain their growth amid the lack of new plantings. According to our estimate, existing CPO producers' tree yield expansion will stagnate because of ageing trees; meanwhile, the stock of immature estates may be very limited, resulting in flat CPO output growth in 2020.

We have not seen much M&A activity over the past decade, especially in Indonesia, given still-ample opportunity for organic growth and young palm oil estates. However, considering that existing listed, regional well-established planters have only five years, on average, of immature plantation reserves left, along with the limited availability of unplanted land bank, we believe M&A activity will emerge to answer the long-term growth challenge.

We are starting to see some corporate action in 2017, mainly involving Malaysia-listed planters. The latest M&A themes are still around upstream plays and finding growth by investing in Indonesian estates, signalling that planters are positioning themselves to capitalise on rising CPO prices.

The most recent transactions involved Malaysian planters that are seeking growth in Indonesia and portfolio alignment, i.e. aiming for the more profitable upstream division. Pricing is one of the success factors, but finding the right partner and acquisition target to fulfil growth ambitions is another big consideration.

#### **Replanting effort is the key thing to watch**

In deriving our CPO price assumption, we assume that replanting efforts may take off. However, we see upside risks to our forecast for long-term CPO prices if new planting and replanting efforts fail to result in sustained palm oil output. Meanwhile, we see a smaller risk to our demand forecast, as we have been conservative in our assumptions for global biodiesel demand, given recent oil prices.

In order to compete with other oils over the longer term, palm oil will need to be priced accordingly. The rising cost over the last decade, coupled with contracting profitability because of stagnant yield, are the key challenges planters face as they seek to capitalise on the opportunity we present above.

## Land is also an issue for other edible oils

Other edible oils also face limited land expansion, but this is less of a concern given their annual yield crop characteristics, hence some land acreage may be available by substituting from other crops such as corn.

We do not explicitly forecast the acreage expansion of all edible oils but, in our view, at some point it will be impossible to catch up with the growing demand for edible oils without acreage expansion.

Yield expansion will be a key factor to monitor, as it will provide the answer to the global demand for edible oils. Accelerating yields to reach over 2 tonnes per hectare will be the game changer, but we think it may take more effort to reach such a level.

## Positioned for higher CPO price: Focus on upstream

A recent significant M&A was IOI Corporation's (IOI) disposal of 70% of its stake in units of the Loders Croklaan Group – those primarily involved in refining activities and the production of specialty oils and fats – for approximately RM4b to a unit of Bunge Limited.

While this move is expected bring IOI sizeable disposal gains (an estimated RM2.5b), it will notably halve its top line and shrink its bottom line by as much as 13% (due to relatively lower margins). We think this development highlights the challenges of maintaining high profitability in the downstream segment, and the need for scale and a wide geographical presence. We think another major implication for the sector going forward is greater emphasis on upstream activities for firms that do not already have a sizeable downstream presence and experience.

## Searching for growth

Though there is a scarcity of quality brownfield plantation land to acquire, there have been observable efforts from Malaysian firms to make such acquisitions. A recent example of success is Genting Plantations (GENP) which, in August 2017, announced the acquisition of PT Kharisma Inti Usaha (PT KIU), a plantation based in South Kalimantan, Indonesia, with 12.9k ha of planted area and a 60 MT/hour palm oil mill. The low average tree age implies that net near-term earnings accretion will be minimal (if any) after including financing costs, but will be more than offset by the improved long-term growth prospects. We think that other groups with balance sheet headroom would be similarly seeking out such opportunities, so pricing will be key, given the implied competitive pressures.

The main challenge in M&As in the plantation space is the availability of a candidate. The CPO business currently is still profitable; even without a rally in CPO prices, well maintained estates can generally still enjoy gross profit margins of 30-40%.

There is still a lot of room for operational and productivity improvements; meanwhile, prices

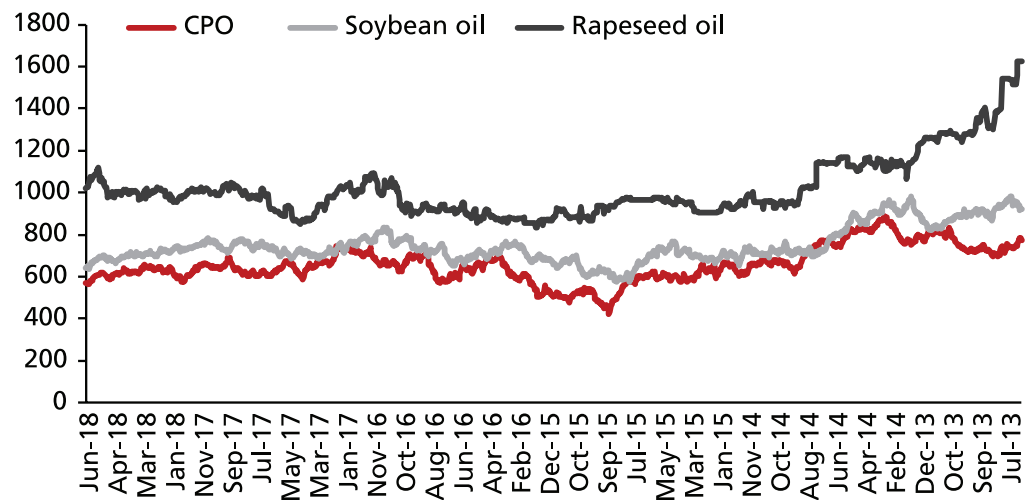
of Indonesian estates are still generally relatively affordable compared to Malaysian ones. Bolt-on acquisitions also deal with fewer of the risks associated with early-stage set-up, such as land permission approval. Smaller Indonesian estates are now at around a 30% discount to Malaysian ones, as seen in the valuations mentioned earlier, hence we will continue to see more Malaysian estates buying their Indonesian counterparts.

Average enterprise value per hectare of land is US\$11,000-13,000 per hectare in Indonesia versus US\$17,000-20,000 per hectare in Malaysia's mature estates. Considering the potential for growth and earnings accretion, a bolt-on acquisition is one of the alternatives for a well-established planter. We consider GENP's recently acquisition of PT KIU for US\$15,200 per hectare to be a smart acquisition, given the latter's age profile and the lack of sellers in Indonesia. ❌

# CPO Demand Will Continue to Grow

CPO demand will continue to grow on the back of food-related needs and biodiesel demand. Cooking oil will be the backbone of food-related demand. CPO's price competitiveness against other edible oils will continue to support demand from both households and food & beverage manufacturers.

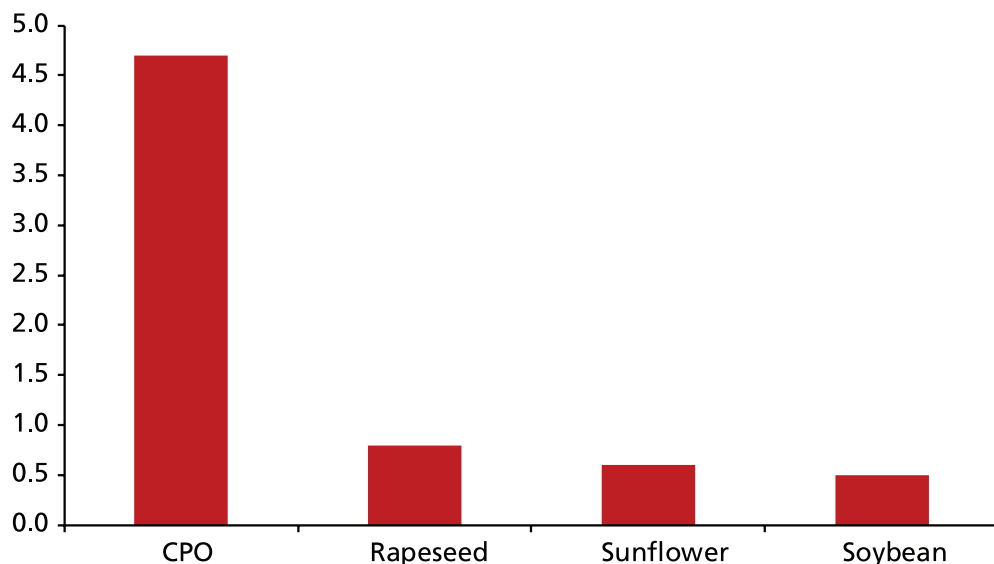
Price: Palm oil vs. other edible oils



Source: Bloomberg Finance L.P, DBSVI

The competitiveness of CPO's prices will be the key driver of demand in the short-term; however, the ultimate driver of demand will be the availability of CPO. CPO estates bear 5 tonnes per hectare of fruit annually, compared to 1 tonne per hectare for other edible oil crops.

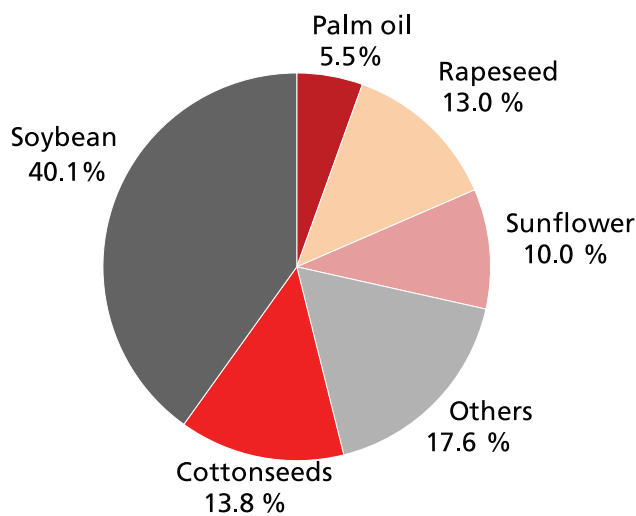
**Yield: CPO vs. other edible oils**



Source: Company, DBSVI

In a scenario under which demand for edible oil doubles, we will not need to double the CPO plantation land acreage to fulfil global demand, given CPO’s robust yield-per-hectare. Currently, palm oil hectareage is significantly lower than that of other edible oils. Palm oil only accounts for 5.5% of total planted area for oilseeds globally, but palm oil and palm kernel oil account for 32% of market share worldwide.

**Planted area: CPO vs. other edible oils**

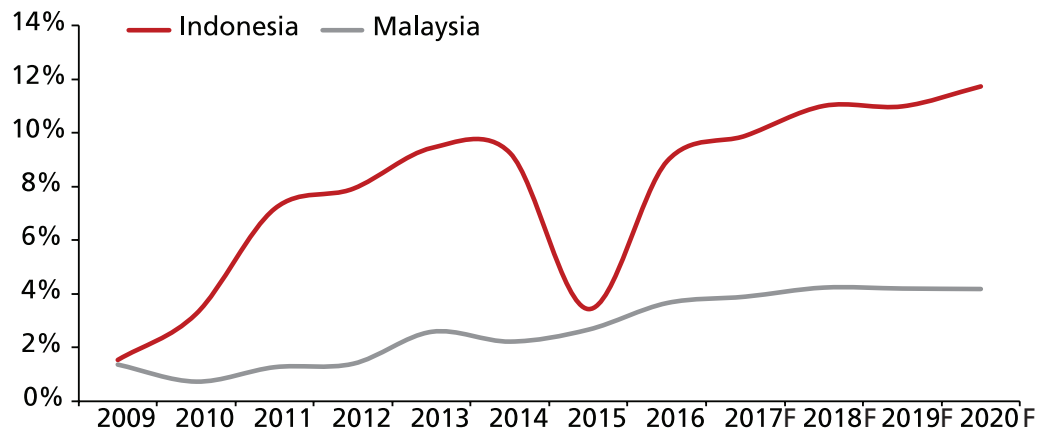


Source: Company, Oil World, DBSVI



The global initiative to increase the share of biofuel in the energy mix will also boost demand. The future of biodiesel, based on edible oils, including CPO, is promising, given the sustainability of these products versus fossil fuels.

### Allocation of palm oil output for use in biodiesel

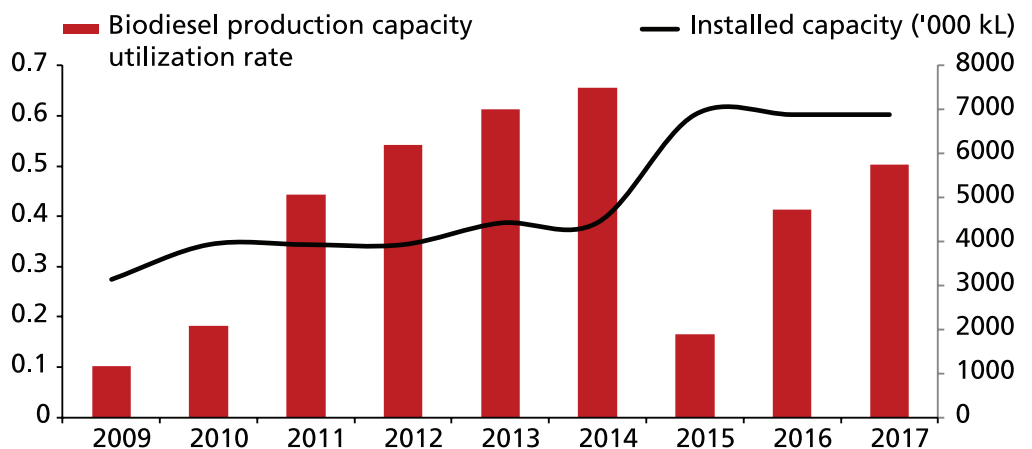


Source: Company, APROBI, DBSVI

Moreover, CPO-producing countries such as Indonesia already have sizable installed capacity, in anticipation of growing biodiesel demand, hence, we see that there will be no time lag in infrastructure establishment and capacity expansion ahead.

We estimate that installed capacity can fulfil domestic production targets up to 2020; Indonesia is revamping its domestic consumption of biodiesel to maximise the installed production capacity of current producers.

### Biodiesel production capacity utilisation rate



Source: Company, DBSVI

## Long-term demand

A growing population will remain the key driver of food-based demand for CPO. We see global CPO demand growing at a compound annual growth rate (CAGR) of 5.7% in FY17-21F.

Food-related demand will remain the backbone of CPO demand going forward given its proven wide usage, especially as a consumer staple, e.g. cooking oil, and as ingredient support for pastries and cosmetics. Population growth will continue to drive CPO demand growth, while widening CPO usage may drive demand even higher.

Demand from this segment is hard to replace given CPO's unique nutritional content and characteristics, such as being rich in Vitamin E and carotenoids, which make it compatible with cosmetics and health supplement products.

Other edible oils, such as soybean oil, rapeseed oil and canola oil, are positioned in premium segments relative to CPO, given their lower yield per hectare and annual crop characteristics that can affect their availability in meeting demand.

### Palm oil usage

#### PALM OIL

Soap and detergents  
 Dry soup and mixes  
 Lubrication  
 Textile oils  
 Cooking oils  
 Vanaspati (vegetable ghee)  
 Margarine  
 Shortening  
 Ice-cream  
 Bakery fats  
 Instant noodles  
 Cocoa-butter extender  
 Chocolate and coatings  
 Specialty fats  
 Sugar confectionaery  
 Biscuits cream fats  
 Vitamin E

#### PALM KERNEL OIL

Shampoo  
 Cosmetics  
 Cocoa butter substitute  
 Specialty fats  
 Shortening  
 Ice-cream  
 Coffee-whiteners  
 Sugar confectionery  
 Biscuits cream fats  
 Imitation cream

#### PALM KERNEL MEAL

Animal feed

#### OLEOCHEMICALS

METHYL ESTERS  
 Plastics  
 Textile processing  
 Metal processing  
 Lubricants  
 Emulsifiers  
 Pharmaceutical products  
 Detergents  
 Plasticiers

GLYCERINE  
 Cosmetics  
 Explosives  
 Pharmaceutical products  
 Food protective coatings

Source: Company, DBSVI

Moreover, having a well-balanced fat profile means that palm oil-based cooking oil is actually a lot better relative to the negative perception that some people may have today. A normal and balanced use of palm oil-based cooking oil does not cause health issues. Having an equal amount of saturated and unsaturated fat means that palm oil will behave like monounsaturated fat in our body, with no adverse impact on cholesterol levels.

Beyond food-based demand, the kick-off of biodiesel programmes will be the game changer. Biodiesel consumption will compete with food-based demand and help narrow the price spread between palm oil and soybean oil.

Execution remains the key factor to watch for, but we believe potential biodiesel demand may provide a cushion for palm oil prices – lower CPO prices relative to crude oil prices mean that biodiesel programmes can kick off without any additional subsidy from the government.

The establishment of a subsidy scheme can act as a key driver for biodiesel programmes in some countries, particularly Indonesia, besides the establishment of fuel specifications and supporting infrastructure. The Indonesian government has introduced an annual fuel subsidy programme to keep domestic diesel prices affordable. Further biodiesel subsidy allocations may face challenges with regard to maintaining a healthy and balanced budget.

CPO's price affordability and availability will also help drive the demand for both food and biodiesel use. CPO availability the world over, backed by its five tonnes per hectare yield, also means that output expansion will still be possible despite the absence of new planting. ❌

# Sustainability Issues: Perspective Matters

**E**nvironmental issues surrounding palm oil have cropped up, as the oil gained popularity in the last two decades. There is growing awareness of the need for sustainable practices due to buyers’ increasing efforts to ensure compliance with prescribed standards, increasing consumer awareness in general, and the strategy of fighting the smear campaign against palm oil.

Joint efforts by governments to raise planters’ awareness of sustainability issues are key to increasing CPO’s share of the global edible oil market. CPO already enjoys a strong global position and is set to make its presence felt in most regions, and we think that the current efforts to address palm oil sustainability issues could further boost its global profile.

## Palm oil sustainability efforts across the years

2004	2007	2010	2011	2013	2014	2015
RSPO formally established	RSPO’s first Principles and Criteria (P&Cs) drawn up  First shipment of RSPO Certified Sustainable Palm Oil (CSPO) delivered in 2018	Greenpeace launch campaign on Nestlé’s palm oil practices.  Nestlé’s produces “zero deforestation” policy within 8 weeks	10% of global palm oil production is CSPO  Indonesian Sustainable Palm Oil (ISPO) developed	Malaysian Sustainable Palm oil (MSPO) developed  Progress in No Deforestation pledge	EU requires labelling of food products in Europe; more than 20 global food companies commit to deforestation-free palm oil sourcing policies	20% of global palm oil production is CSPO  Council of Palm Oil Producer Companies established

Source: RSPO, WWF, World Bank, DBS Bank

## Sustainability issues surrounding palm oil production

Various sustainability issues have been associated with the production of palm oil, of which four issues remain central today.

1. Deforestation. Following the forest fires of 1997 which spread to much of South-East Asia, the World Wide Fund for Nature and the International Union for Conservation of Nature identified the root cause to be use of fire for clearing of land for palm oil cultivation.
2. Climate change. Peatlands, which are carbon-rich swamps, are also being cleared to make way for palm oil plantations. Drainage of peatlands could contribute to high levels of carbon emissions, as well as cause air pollution.
3. Biodiversity loss. Many animal species, including native species, are also thought to be vulnerable to palm oil production as forests and peatlands are cleared for planting.
4. Land conflicts. There have been various land conflicts between plantation companies, the government, smallholders, and local and indigenous communities over land rights.

RSPO formed to promote sustainable palm oil

In 2004, the Roundtable on Sustainable Palm oil (RSPO) was formed with the objective of promoting growth and usage of sustainable palm oil products. Following the establishment of RSPO, RSPO's first Principles and Criteria (P&Cs) were drawn up and certification systems were implemented to support the production and trade in Certified Sustainable Palm Oil (CSPO). Since 2005, the RSPO P&Cs do not allow high conservation value forests to be developed. Today, RSPO seeks to transform markets to make sustainable palm oil the norm. There are currently more than 3,000 RSPO members worldwide who have committed to produce, source, and/or use CSPO.

Governments take action

### Response from governments and private sector

In 2011, Indonesia developed its own sustainable palm oil scheme, Indonesian Sustainable Palm Oil (ISPO), which is legally binding for all Indonesian palm oil plantations. ISPO was made mandatory as it was designed to ensure higher agricultural standards across the industry. This is in contrast to the voluntary inclusion to become an RSPO member, as ISPO non-compliance involves penalties. ISPO allows for a minimum standard to be achieved among all Indonesian palm oil companies. Large producers were required to comply by 2014 while there are plans for mandatory ISPO certification by 2020 for smallholders.

In 2013, the Malaysian government created the Malaysian Sustainable Palm Oil (MSPO) standard. The national certification standard was developed after incorporating stakeholders' feedback, with official implementation in 2015. While MSPO started off as a non-mandatory certification, Malaysia announced, in 2017, that MSPO certification compliance for palm oil plantations and smallholders will be mandatory by the end of 2019. Separately, in 2015, the Malaysian state of Sabah committed to producing 100% RSPO-certified palm oil by 2025.

### Comparisons of RSPO, ISPO, and MSPO

While this paper does not delve into the various criteria among the three standards, we note that the principles and criteria have various differences in the following areas: (1) Legal, (2) environment, (3) social, and (4) business responsibilities. ISPO and MSPO are also often thought to be easier to implement, having fewer criteria than RSPO, which includes various directives on plantations' practices and managements. In 2015, it is estimated at around 20% of the palm oil in the market is RSPO-certified, as demand for certified oil is low.

### Pushing toward zero deforestation policy

Over the years, environmentalists, non-government organisations, and various consumer companies have also put pressure on palm oil companies. In 2013, Wilmar pledged to commit to a "no deforestation, no peat, no exploitation" policy which was thought to be an industry game-changer, as various large palm oil companies and consumer companies including Astra Agro Lestari and Cargill followed suit thereafter. The two schemes developed in response to palm oil environmental issues, High Carbon Stocks (HCS) and High Conservation Value Indicator (HCV), prevent the commissioning of land conversion for land with high carbon content and the destruction of high biodiversity habitats for the purpose of producing palm oil.

### Creation of intergovernmental organisation for palm oil producing countries

The Council of Palm Oil Producing Countries was established in 2015. Led by Indonesia and Malaysia, the palm oil board announced a plan to harmonise the two respective national sustainability standards, ISPO and MSPO, and seeks to coordinate control of the palm oil market. The Ministerial Meeting of Palm Oil Producing Countries also saw the attendance of other palm oil producing countries such as Guatemala, Thailand, Papua New Guinea, and Colombia.

### Banning cultivation of peatland in Indonesia

In 2016, in response to the 2015 haze crisis, Indonesia issued a blanket ban on draining and clearing of carbon-rich peatland, including land previously licensed to plantation companies. The ban is an expansion on an older moratorium on forest clearing for plantation and mining activities, aimed at slashing greenhouse gas emissions and preventing peat fires that have enshrouded the region in haze. Together with the zero deforestation policies adopted in recent years, new planting of palm oil trees becomes increasingly difficult due to the many layers of compliance involved.

### Small-scale farmers certification remains a challenge

Increasingly, large palm oil companies have stepped in to aid in the certification process for plasma farmers, who manage smallholdings and have agreements with the respective large palm oil companies, which have various support in place for them. However, small-scale farmers who are not linked to any particular company or mill face various difficulties, such as the lack of access to ISPO-compliant fertilisers and seeds and lack of formal land documentation, among others. Going forward, meaningful reform of the palm oil industry requires the inclusion of independent small-scale farmers.

### Steps toward creating a sustainable future

#### **Looking ahead: The future of palm oil sustainability**

While there have been various disagreements over the years among the various stakeholders, we note that the industry has come a long way in collectively pushing toward higher standards of sustainability.

Land availability a key concern not just for palm oil

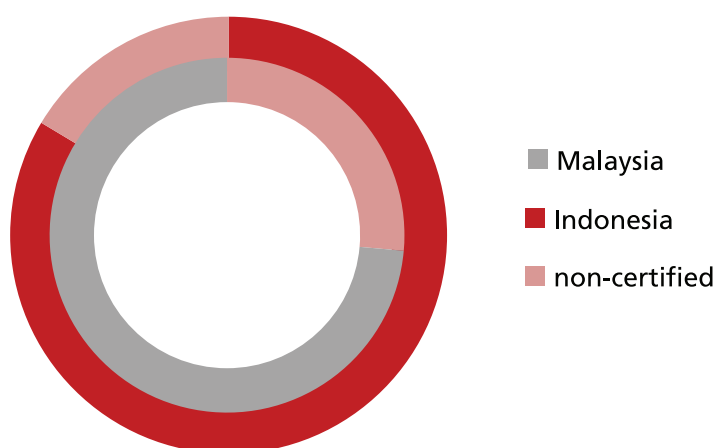
With increasing concerns over the environmental and social costs of clearing of land for crop cultivation, the issue of land availability for crops affects not only palm oil. Oilseeds, grains, and other crops also compete for land acreage. Increasing public scrutiny and higher compliance costs also make it difficult for new planting to take place. While there is a significant amount of land potentially suitable for palm oil cultivation, actual land availability is limited. There are estimates that conclude that taking into account HCS, HCV and all suitable land (determined by climatic conditions), around 10-20% of the suitable land can be used for future palm oil cultivation.

Palm oil is likely to still remain relevant in the foreseeable future

As palm oil is the highest yielding oilseed crop in the world, yielding up to around 5 tonnes per hectare, the share of palm oil in global vegetable oil production has more than doubled in the last 20 years, overtaking soybean oil production. Today, palm oil represents around a 31% share of global vegetable oil production and is the most economical oil today, consistently maintaining its lower price advantage against other major vegetables oil, while taking up an estimated 0.3% of the world's agricultural area. Going forward, we believe the focus will be on increasing yields and improving efficiencies while zooming in on sustainable development for palm oil plantations.

**RSPO Certified Crude Palm Oil Production 2016**

Producer	Production capacity (million tonnes)	Production area (hectares)	%
Indonesia	6,688,788	8,000,000	83.6
Malaysia	3,599,780	4,888,756	73.6



Source: Company, Palm Oil Analytic, DBSV

# Scenario Analysis

Our scenario analysis also reveals that the downside risk for CPO price is minimal at this level. Lower CPO price could also attract more demand from biofuel. Our worst-case scenario puts CPO price at RM2,100 per MT (US\$550 per MT), or 7% below the current CPO price level. This is assuming an average crude oil price of US\$50 per bbl in 2019, which means that any excess supply or slower than expected food-based demand growth, could not be readily offset by biodiesel demand whose growth outlook would be muted due to weak crude oil price.

Beyond the biodiesel factor, any oversupply in our bear-case scenario will also not drag CPO price to around US\$2,200 per MT. This is due to the remote possibility of CPO yields going beyond six tonnes per hectare, coupled with the scarcity of land.

The key factor that may cap CPO price upside is the performance of its main competitor in the edible oils space, i.e. soybean oil. We do not expect CPO price can trade at a premium over soybean oil unless, 1) CPO-based biodiesel can prove itself to be of better quality vs. soybean oil and, 2) soybean oil loses its grip on major consuming countries such as China, which we think is highly unlikely. Under our best-case scenario that excludes weather issues, the upside potential for CPO price stands at 10%. The different characteristics and lower yields of the other edible oils, in our view, will maintain their price premium over CPO.

We find that the current demand projection is heavily reliant on food consumption, not biodiesel demand. If crude oil price stays above US\$65/bbl, we believe that CPO price could average above RM2,700 per MT if Indonesia and Malaysia biodiesel demand kicks in.

## Trade war?

A prolonged trade war, in our view, could be a positive for CPO price, despite recent short-term pressures. There are different characteristics of CPO price demand patterns. China's purchase patterns follow soybean oil. Lower-than-expected soybean crushing activities means lower soybean oil output and more opportunities for CPO. Our base case scenario assumes the effects of the trade war in 2018 and 2019, before slightly normalising in 2020.

## Base-case scenario

Tight supply-demand conditions will keep CPO price above US\$600 per MT over in 2019. We do not see any excess supply potential due to the lack of land expansion and slowing smallholders' yield expansion that could keep production in check. Meanwhile, food-based demand will be the key demand driver on the back of CPO affordability and availability. We conservatively assume Indonesia's annual biodiesel demand to stay at

Indonesia's biodiesel consumption takes off



around 3m KL going forward. Our 2019 crude oil price assumption stands at US\$65/bbl-US\$70/bbl.

### Bull-case scenario

Indonesia biodiesel consumption takes off

Indonesia's biodiesel programme is expected to add 4m-5m MT of demand per annum, or 7% of global CPO demand. With a stable output forecast, we expect CPO price to average above RM2,700 per MT (US\$640 per MT) if Indonesia can boost its national biodiesel production to 6m MT. Our bull-case scenario assumes that oil price will hover around at US\$70-75 per bbl in 2018 and US\$60-65/bbl in 2019 and beyond.

Slower-than-expected acreage expansion

Soybean acreage expansion of <1% per annum may structurally tighten the supply-demand conditions of other edible oils, as output expansion will grow at a slower pace vs. demand.

Stalling output from Indonesia's smallholders

Indonesia's replanting programme will not start until 2020. Indonesia's CPO production may start to flatten in 2019 and drop by 3% y-o-y from 2020. This may cause CPO price to exceed our forecast. We estimate that if this materialises, CPO price would trade at RM2,968per MT (US\$707 per MT) in the next decade, on par with soybean oil price next year.

### Bear-case scenario

European Union eliminates CPO-based biodiesel by 2020

The EU plans to totally eliminate CPO from its biodiesel mandate by 2020. The EU's accounts for 12% of global CPO demand. At the moment, EU demand is also able to sufficiently offset any seasonal demand weakness from Asia.

India import tax remains at >30%

India has implemented a higher import tariff of 44% for CPO. Despite the lack of a self-sufficiency programme in India so far, this tariff may be maintained, limiting import volume.

Increasing yields and acreage expansion of >2% for other edible oils

If research and development (R&D) for tree productivity delivers higher than expected yields for other edible oils, this will affect palm oil's price and position as a cheaper substitute. At this scenario, we expect price to hover at RM2,329 per MT (US\$555 per MT) in 2019.

Oil price hits US\$50, CPO price may fall further.

In the case of growing crude oil production at a CAGR of 7% and crude oil price heading towards US\$50 per bbl, CPO price could hit RM2,000 per MT (US\$488 per MT). We believe this is the worst-case scenario for CPO price, not taking into account weather-related factors.

### Scenario analysis

	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
<b>Bull case</b>													
Indonesia biodiesel reach 6m KL													
US\$/MT	619.50	646.60	665.99	679.63	682.00	713.04	732.77	749.92	749.92	749.92	749.92	749.92	749.92
RM/MT	2,520	2,714	2,790	2,849	2,860	2,992	3,069	3,146	3,146	3,146	3,146	3,146	3,146
% changes vs. base case	5%	6%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Slower than expected land expansion edible oil													
US\$/MT	602	628	635	667	670	700	719	736	723	723	723	723	723
RM/MT	2,448	2,637	2,662	2,797	2,808	2,938	3,013	3,089	3,032	3,032	3,032	3,032	3,032
% changes vs. base case	2%	3%	4%	8%	8%	8%	8%	8%	6%	6%	6%	6%	6%
Stalling output from Indi smallholders estates													
US\$/MT	614	641	661	701	703	756	777	795	780	780	780	780	780
RM/MT	2,497	2,690	2,769	2,937	2,948	3,173	3,254	3,336	3,274	3,274	3,274	3,274	3,274
% changes vs. base case	2%	2%	4%	5%	5%	8%	8%	8%	8%	8%	8%	8%	8%
<b>Base case</b>													
	590	610	611	618	620	648	666	682	682	682	682	682	682
	2,400	2,560	2,560	2,590	2,600	2,720	2,790	2,860	2,860	2,860	2,860	2,860	2,860
<b>Bear case</b>													
EU eliminate CPO biodiesel by 2020													
US\$/MT	578.20	579.50	574.34	580.77	582.80	609.33	626.19	640.84	640.84	640.84	640.84	640.84	640.84
RM/MT	2352	2432	2406.4	2434.6	2444	2556.8	2622.6	2688.4	2688.4	2688.4	2688.4	2688.4	2688.4
% changes vs. base case	-2%	-5%	-6%	-6%	-6%	-6%	-6%	-6%	-6%	-6%	-6%	-6%	-6%
India import tax continue > 30%													
US\$/MT	560.50	567.30	568.23	574.59	576.60	602.85	619.52	627.20	627.20	627.20	627.20	627.20	627.20
RM/MT	2280	2380.8	2380.8	2408.7	2418	2529.6	2594.7	2631.2	2631.2	2631.2	2631.2	2631.2	2631.2
% changes vs. base case	-5%	-7%	-7%	-7%	-7%	-7%	-7%	-8%	-8%	-8%	-8%	-8%	-8%
Other edible oil acreage expansion 2% y-o-y													
US\$/MT	536.90	555.10	556.01	562.24	564.20	589.88	606.20	599.93	599.93	599.93	599.93	599.93	599.93
RM/MT	2184	2329.6	2329.6	2356.9	2366	2475.2	2538.9	2516.8	2516.8	2516.8	2516.8	2516.8	2516.8
% changes vs. base case	-9%	-9%	-9%	-9%	-9%	-9%	-9%	-12%	-12%	-12%	-12%	-12%	-12%
Oil price hit US\$50 per bbl													
US\$/MT	536.90	488.00	488.80	494.27	496.00	518.58	532.92	545.39	545.39	545.39	545.39	545.39	545.39
RM/MT	2,184	2,048	2,048	2,072	2,080	2,176	2,232	2,288	2,288	2,288	2,288	2,288	2,288
% changes vs. base case	-9%	-20%	-20%	-20%	-20%	-20%	-20%	-20%	-20%	-20%	-20%	-20%	-20%

Source : DBS Bank estimate

## **Weather: Still an important factor, but not a long-term price driver**

Periodic atmospheric disruptions in the Tropical Pacific, known as El Nino and La Nina, have a profound impact on palm oil output. The El Nino cycle brings drought while the La Nina cycle brings heavy rainfall. Drought can severely impact palm yields, with severe droughts reducing output by 2% for the ensuing three years.

Historically, while El Nino events can lead to low palm oil output, heavier rainfall under La Nina conditions may not always lead to higher palm oil harvests due to the probable incidence of floods, which can hinder harvesting activities.

Although palm oil production is highly susceptible to weather conditions, the same cannot be said about CPO prices. CPO prices do not always decrease during La Nina cycles or increase during El Nino events. Market forces, supply and demand dynamics, as well as the performance of palm oil substitutes, will have a say in determining CPO prices.

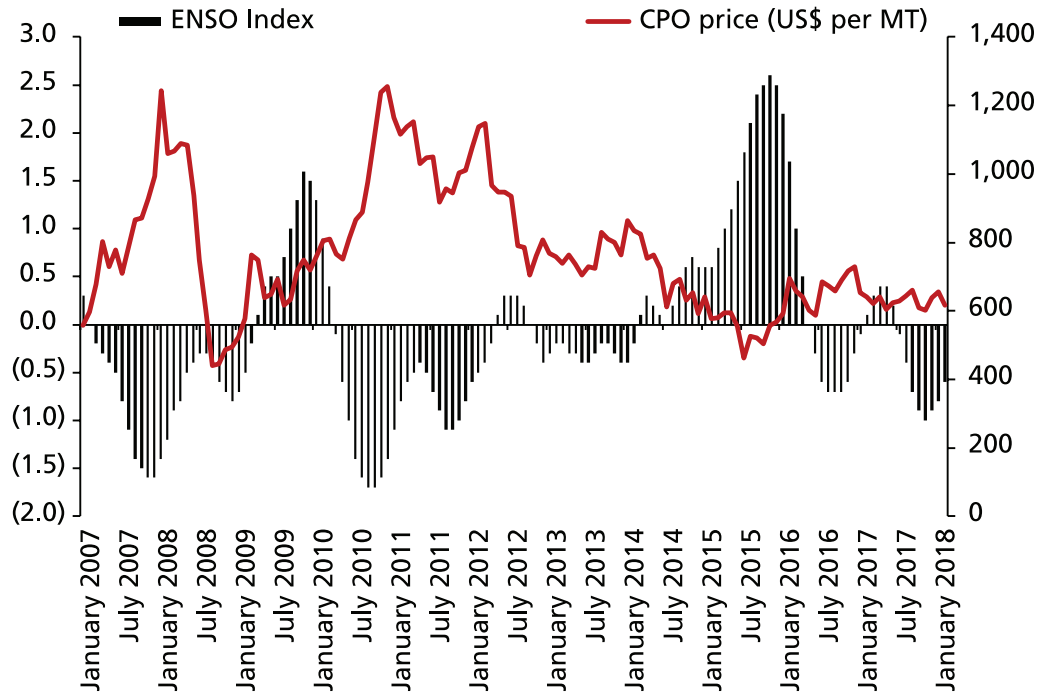
In the case of weather disruptions, we forecast that CPO prices may trade 20-30% higher than our forecast and this price strength may last for 12 months – before the ramp-up of output plays a normalising role. Nonetheless, we reckon that weather does not have much bearing on our long-term CPO price forecast.

Historically, adverse weather conditions may act as a short-term catalyst for CPO prices but, at the end of the day, supply and demand dynamics will determine the price trend in the long haul.

The following chart shows the multivariate ENSO index (MEI), a method used to characterise the intensity of El Nino Southern Oscillation (ENSO) events. Warm and cold periods are based on a threshold of  $\pm 2 \times 0.50$  C for the Oceanic Nino Index (ONI). Conditions of above the threshold of 0.50 C (reaching 2.0 degrees) happened in 2015/2016, which met the definition of an El Nino event. The El Nino event had affected CPO output and stockpiles over that period.

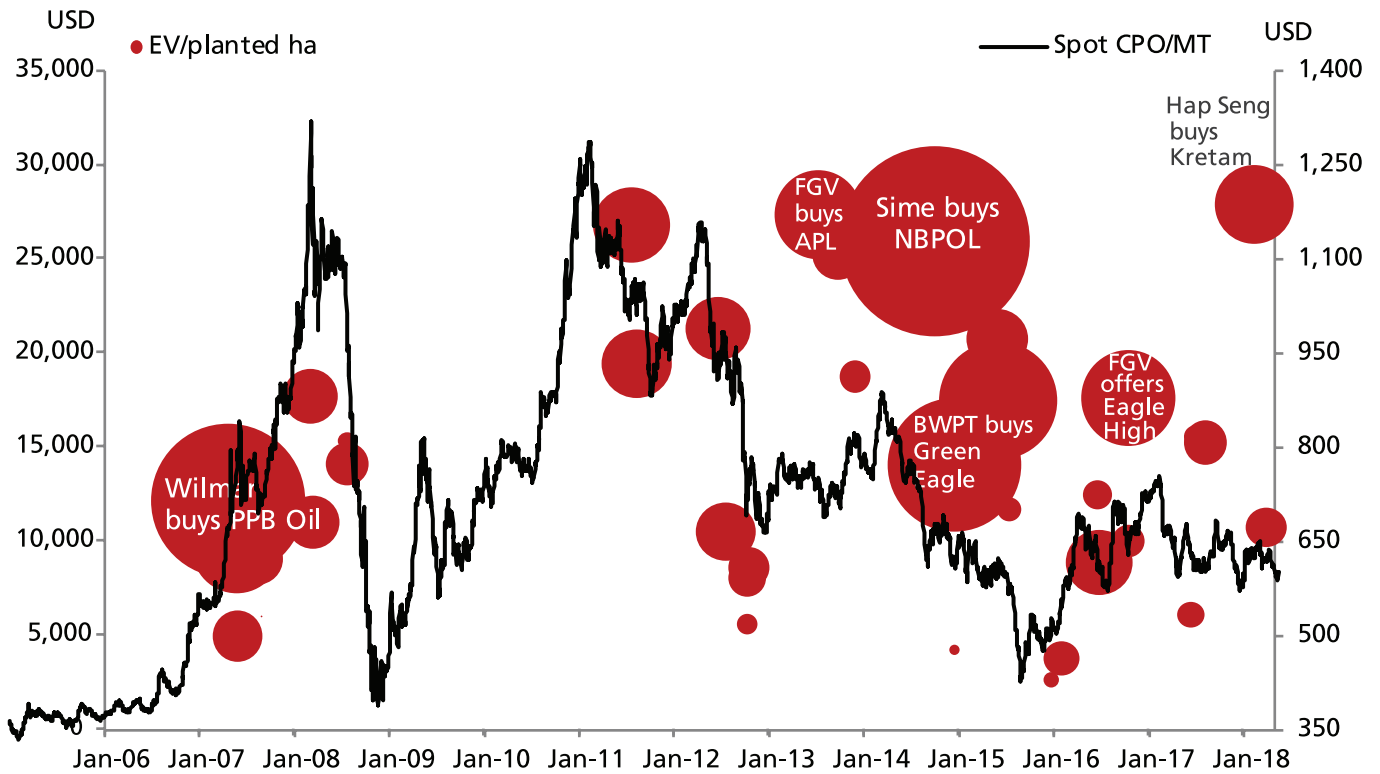
On the other hand, conditions of below the threshold of -0.50 C, which characterise La Nina events, were last seen in 2010/2012. Strong CPO prices were seen during that period.

**ENSO El Nino index and CPO prices**



Sources: National Weather Service (NOAA), Bloomberg Finance L.P., DBS Bank

**CPO planters' M&A and pricing trend vs. CPO price**



\*size indicates deal value

Sources: Companies, Bloomberg Finance L.P., DBS Bank

Indonesia	2014	2015	2016	2017F	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F
Transport diesel consumption (m litres)	26,437	26,142	26,220	26,966	27,053	27,152	27,253	27,353	27,454	27,555	27,657	27,759
in m MT	23.265	23.005	23.074	23.730	23.806	23.894	23.982	24.071	24.159	24.248	24.338	24.427
growth	-5%	-1%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%
Biodiesel exports (m litres)	1,350	343	200	100	-	-	-	-	-	-	-	-
Domestic biodiesel PSO (m litres)	1,520	817	2,490	3,332	4,062	4,259	4,703	5,052	5,315	5,511	5,786	6,007
implied blend	6%	3%	9%	12%	15%	16%	17%	18%	19%	20%	21%	22%
Domestic biodiesel non subsidised (m litres)	80	43	247	144	144	145	146	146	147	147	148	148
implied blend	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Chg. in inventory (m litres)	50	-23	0	0	0	0	0	0	0	0	0	0
<b>Total biodiesel produced (m litres)</b>	<b>3,000</b>	<b>1,180</b>	<b>2,937</b>	<b>3,576</b>	<b>4,207</b>	<b>4,404</b>	<b>4,848</b>	<b>5,199</b>	<b>5,461</b>	<b>5,658</b>	<b>5,933</b>	<b>6,155</b>
growth	7%	-61%	149%	22%	18%	5%	10%	7%	5%	4%	5%	4%
Nameplate capacity (m litres)	5,670	6,750	7,280	7,628	7,628	7,628	7,628	7,628	7,628	7,628	7,628	7,628
utilisation rate	53%	17%	40%	47%	55%	58%	64%	68%	72%	74%	78%	81%
Indonesia palm oil production (MT)	31,400,000	33,400,000	31,800,000	34,992,452	36,990,451	38,793,219	39,994,589	41,040,570	41,837,366	42,313,365	42,907,845	43,038,231
growth	9%	6%	-5%	10%	6%	5%	3%	3%	2%	1%	1%	0%
Palm oil required for biodiesel production (MT)	2,904,725	1,142,525	2,843,600	3,462,469	4,073,348	4,264,508	4,694,510	5,033,467	5,287,724	5,478,403	5,745,011	5,959,586
% energy recovery rate	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%
Non biodiesel palm oil consumption (MT)	5,688,275	5,884,475	6,206,400	5,928,786	6,254,869	6,648,926	7,067,808	7,513,080	7,986,404	8,489,548	9,024,389	9,592,926
growth	6%	3%	5%	-4%	6%	6%	6%	6%	6%	6%	6%	6%
correlation to GDP	118%	73%	107%	-83%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Total domestic palm oil consumption (MT)</b>	<b>8,593,000</b>	<b>7,027,000</b>	<b>9,050,000</b>	<b>9,391,255</b>	<b>10,328,217</b>	<b>10,913,434</b>	<b>11,762,318</b>	<b>12,546,548</b>	<b>13,274,129</b>	<b>13,967,950</b>	<b>14,769,400</b>	<b>15,552,512</b>
growth	6%	-18%	29%	4%	10%	6%	8%	7%	6%	5%	6%	5%

Malaysia	2014	2015	2016	2017F	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F
Diesel consumption (m litres)	5,286	5,416	5,544	5,793	6,054	6,326	6,611	6,908	7,219	7,544	7,884	8,238
in m MT	4.652	4.766	4.878	5.098	5.327	5.567	5.818	6.079	6.353	6.639	6.938	7.250
Biodiesel exports (m litres)	95	195	74	74	74	74	74	74	74	74	74	74
Domestic on-road biodiesel (m litres)	370	525	530	770	805	841	879	918	960	1,003	1,048	1,095
implied blend	7%	10%	10%	13%	13%	13%	13%	13%	13%	13%	13%	13%
Domestic biodiesel non subsidised (m litres)	-	-	-	-	-	-	-	-	-	-	-	-
implied blend	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Chg. in inventory (m litres)	-14	-170	93	-60	0	0	0	0	0	0	0	0
<b>Total biodiesel produced (m litres)</b>	<b>451</b>	<b>550</b>	<b>697</b>	<b>784</b>	<b>878</b>	<b>914</b>	<b>952</b>	<b>992</b>	<b>1,033</b>	<b>1,076</b>	<b>1,121</b>	<b>1,169</b>
growth	-12%	22%	27%	12%	12%	4%	4%	4%	4%	4%	4%	4%
Nameplate capacity (m litres)	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880
utilisation rate	16%	19%	24%	27%	30%	32%	33%	34%	36%	37%	39%	41%
Malaysia palm oil production (MT)	19,666,993	19,961,581	18,428,981	19,461,990	20,071,662	21,075,633	22,039,556	22,906,013	23,733,996	24,446,024	25,006,840	25,528,629
growth	2%	1%	-8%	6%	3%	5%	5%	4%	4%	3%	2%	2%
Palm oil required for biodiesel production (MT)	436,633	532,533	674,430	758,667	850,311	885,370	922,007	960,293	1,000,301	1,042,110	1,085,801	1,131,457
% energy recovery rate	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%
Non biodiesel domestic palm oil consumption (MT)	2,381,367	2,384,467	2,058,464	2,161,387	2,269,456	2,382,929	2,502,075	2,627,179	2,758,538	2,896,465	3,041,288	3,193,353
growth	31%	0%	-14%	5%	5%	5%	5%	5%	5%	5%	5%	5%
correlation to GDP	516%	3%	-273%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Total domestic palm oil consumption (MT)</b>	<b>2,818,000</b>	<b>2,917,000</b>	<b>2,732,893</b>	<b>2,920,054</b>	<b>3,119,767</b>	<b>3,268,299</b>	<b>3,424,083</b>	<b>3,587,472</b>	<b>3,758,839</b>	<b>3,938,575</b>	<b>4,127,089</b>	<b>4,324,809</b>
growth	22%	4%	-6%	7%	7%	5%	5%	5%	5%	5%	5%	5%
Malaysia palm oil available for exports (MT)	16,848,993	17,044,581	15,696,088	16,541,936	16,951,895	17,807,334	18,615,473	19,318,541	19,975,157	20,507,449	20,879,751	21,203,819
growth	0%	1%	-8%	5%	2%	5%	5%	4%	3%	3%	2%	2%

Source: USDA, Handbook and Energy & Economic Statistics of Indonesia, Oil World, Pertamina, Kontan newspaper, DBS Bank estimates  
Biodiesel pricing formula: CPO price + US\$125/MT



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