Kulim (Malaysia) Berhad (23370–V)

CARBON FOOTPRINT REPORT 2014


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CARBON FOOTPRINT REPORT 2014

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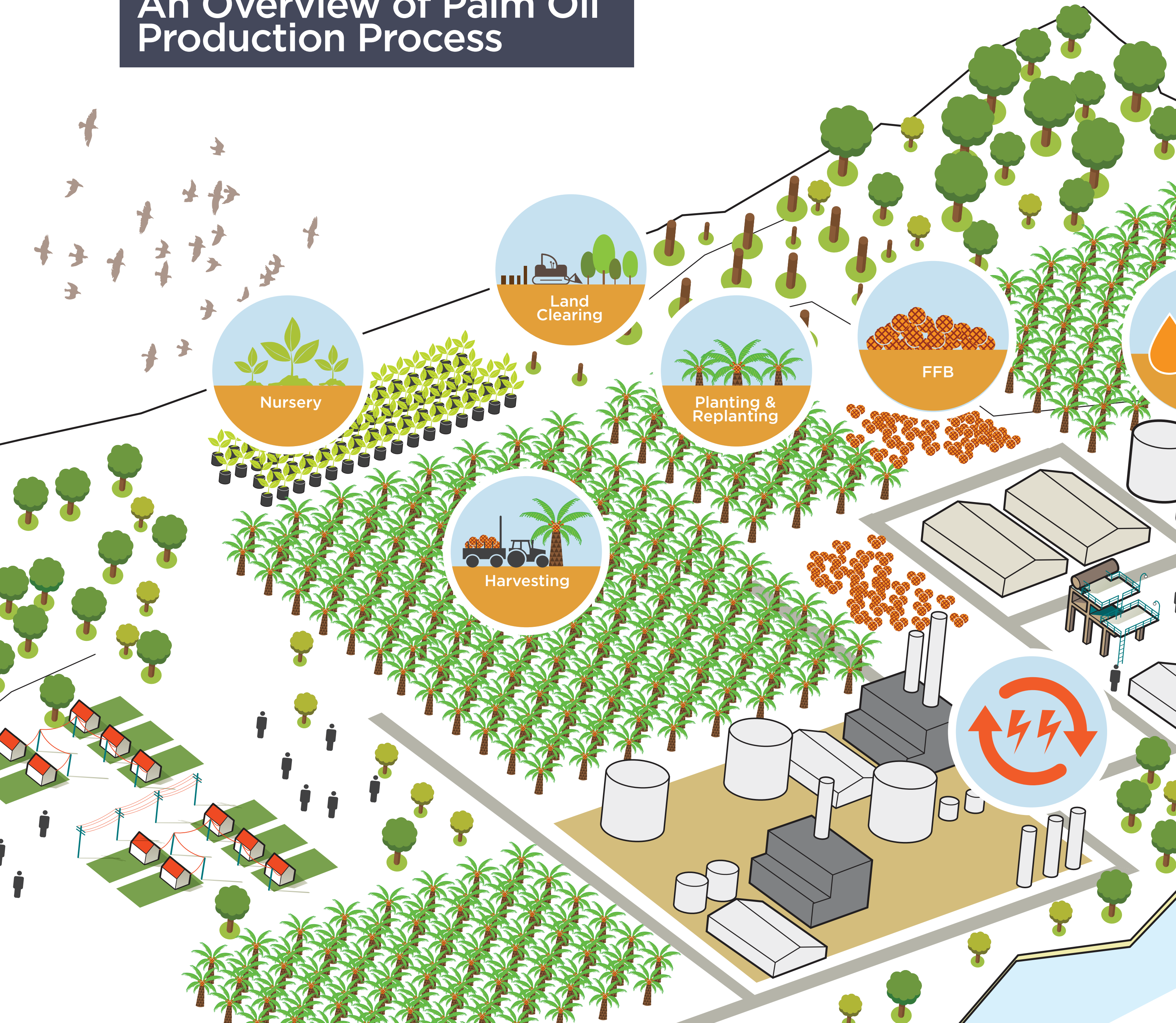
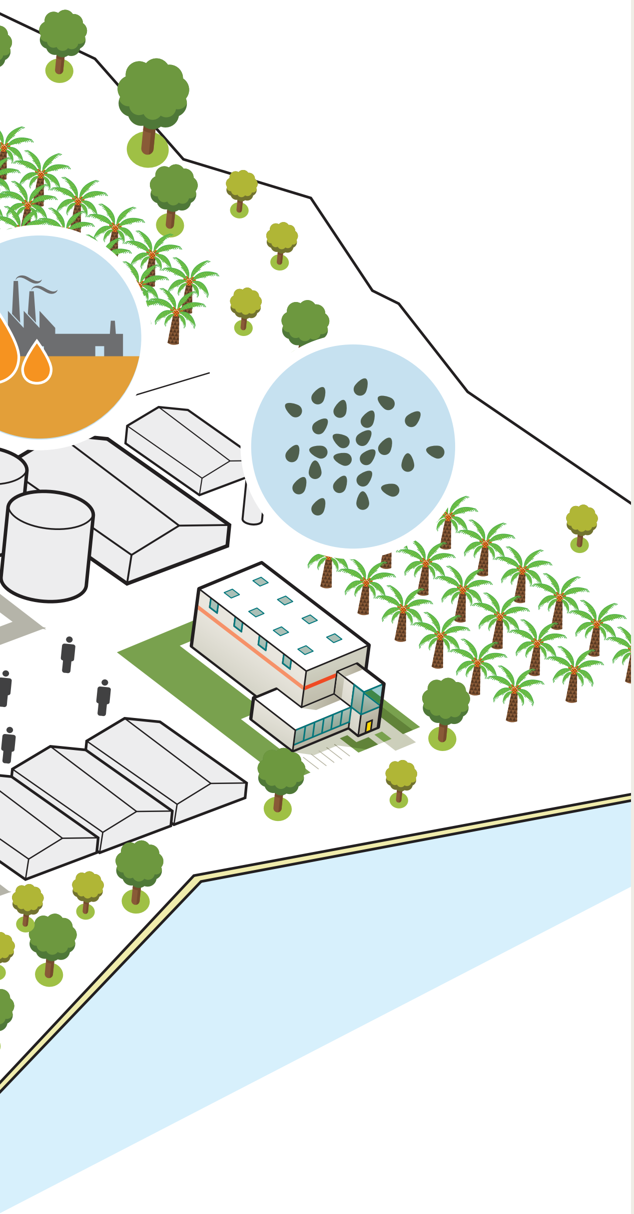
ABOUT THIS REPORT

An Overview of Palm Oil Production Process





Highlights and Targets

34%
reduction in total GHG emissions

38.4%
lower product carbon footprint

41%
lower fertiliser emissions

Our goals by 2017:

100%
of our mills will include biogas capture

At least
35%
less emissions from POME

Our ambition:

To achieve
58%
Lower carbon footprint by 2020

01 INTRODUCTION AND OVERVIEW

EVOLVING FOR A **GREENER FUTURE**

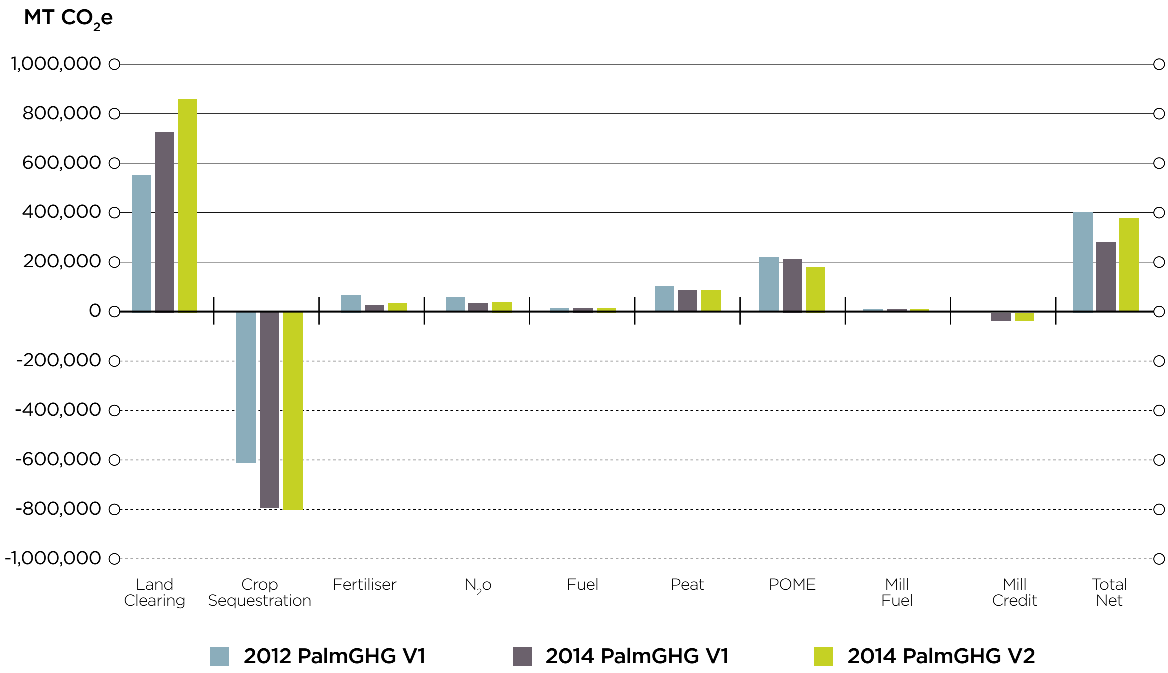
Kulim (Malaysia) Berhad ("Kulim") has long been a champion of sustainable development and is focused towards the protection of our environment while securing the needs for development of current and future generations.

Climate change is one of the greatest threats to our planet and we recognise that it can have severe impacts on the agricultural sector and rural communities. We support the Malaysian national target of achieving 40% in carbon emissions by 2020, as we believe that every individual and every business has a role to play in protecting our planet.

This is the second biennial Carbon Footprint Report for Kulim which ensures that we track our progress towards this commitment. The report provides an overview of Kulim's climate change impacts, as well as a product carbon footprint of Crude Palm Oil ("CPO") and Palm Kernel ("PK") produced at Kulim's Malaysian mills.

The report is based on the PalmGHG calculator developed by the Roundtable on Sustainable Palm Oil ("RSPO"). As there were significant changes made in this methodology since our last report in 2012, we have developed two parallel accounts to enable us to track progress against our own 2012 figures which used PalmGHG Calculator Beta Version 1.a ("PalmGHG V1"), as well as allowing benchmarks with peers who are reporting against PalmGHG Calculator Beta Version 2.1.1 ("PalmGHG V2").

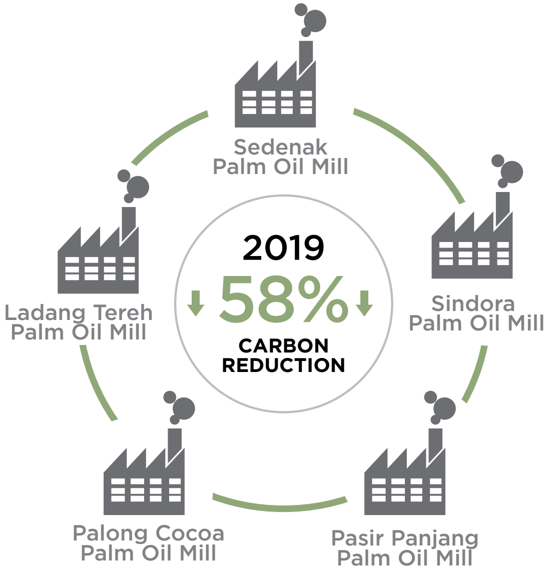
GHG emissions (MT CO_2e) for Kulim's Malaysian operations including smallholders for the year 2012 and 2014



To enable year-on-year comparisons and track like-for-like improvements, total emissions for 2012 exclude Tunjuk Laut Palm Oil Mill which is no longer under Kulim's management. Please see Methodology for a detailed overview of the main differences in PalmGHG V1 and PalmGHG V2.

We are pleased to be able to demonstrate a reduction in total like-for-like net carbon emissions of 34% (using PalmGHG V1) from approximately 337,000 MT CO_2e to just over 220,000 MT CO_2e. On a per tonne basis our footprint has been reduced by 38.4% from 1.15 MT CO_2e per MT CPO/PK to 0.71 MT CO_2e per MT CPO/PK (PalmGHG V2 is per 1.15 CO_2e per MT CPO/PK). There are three main contributing factors to this; a significant reduction in fertiliser usage, a reduction in peat area and the tracking of palm kernel shell sold for fuel usage allowing for a significant emissions credit.

By far the largest proportion of our emissions are from those associated with previous land use. As most of our land bank is oil palm replant or converted from other agricultural crops such as rubber with a similar emissions profile, the sequestration associated with oil palm planting has balanced out these emissions. Using the PalmGHG V1, our land use emissions are in fact negative, and PalmGHG V2 only results in net emissions of just over 42,000 MT CO_2e.



Going forward, our main focus will be on the elimination of emissions from mills, where we are establishing biogas facilities to make use of methane capture technologies to convert Palm Oil Mill Effluent ("POME") emissions to electricity. With one plant already commissioned at our largest mill; Sedenak Palm Oil Mill and another plant under construction at Sindora Palm Oil Mill, we expect to be able to reduce our total emissions from POME by 32% over the coming five years. Combined with progress made so far, the impacts from these two projects will result in overall carbon reductions of about 58% by year-end 2019 from a 2012 baseline.

We will target additional savings when the incorporated biogas plant at our new Pasir Panjang Palm Oil Mill be commissioned by year-end 2015, as well as at Palong Cocoa Palm Oil Mill and Ladang Tereh Palm Oil Mill by the end of 2017.

02 ABOUT KULIM

COMMITTED TO REDUCING EMISSIONS

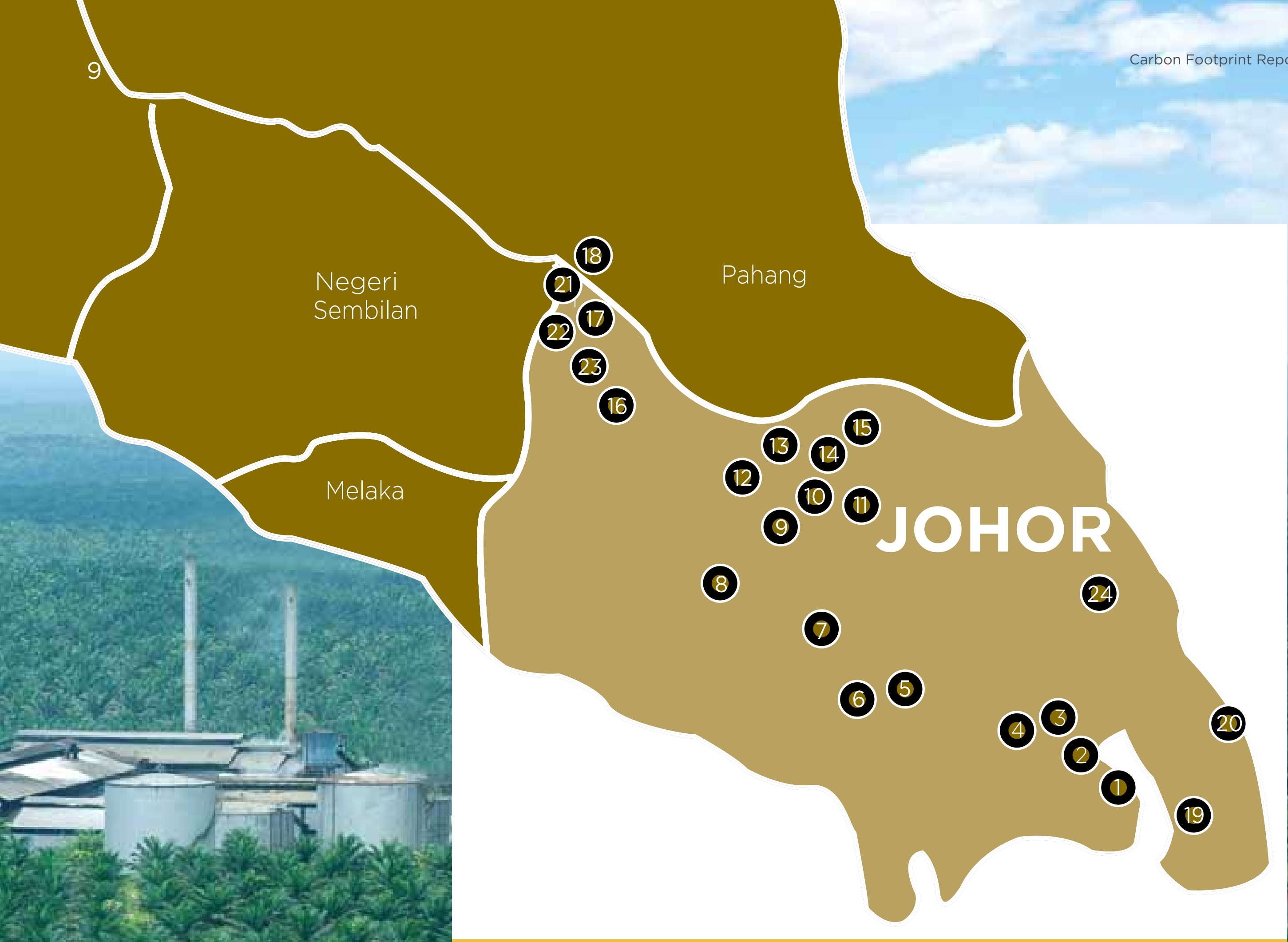
Kulim (Malaysia) Berhad is a plantation company listed on the Main Market of Bursa Malaysia Securities Berhad.

Our operations are located in the southern part of Peninsular Malaysia in the states of Johor and Pahang. In 2014, we also started developing land in Central Kalimantan, Indonesia and have planted 71 hectares of oil palm as at 31 December 2014.

As at 31 December 2014, our land bank in Malaysia was 51,160 hectares, of which over 47,123 ha are planted with oil palm. We produce CPO and PK. In 2014, our total production was 257,881 tonnes of CPO and 69,681 tonnes of PK.

We have four mills which processed a total of 1,252,825 tonnes of Fresh Fruit Bunches ("FFB") in 2014. This includes 407,568 tonnes (32.5%) FFB purchased from external smallholders and outgrowers. Our new Pasir Panjang Palm Oil mill was commissioned in March 2015, and will be included in future carbon calculations.

Most of our plantations were established between 1970 and 1990. A majority of areas were converted from other agricultural crops, particularly rubber. Only a 1,380 ha of our planted area is on peat.



ESTATES AND MILLS:

1. Bukit Layang Estate
2. Basir Ismail Estate
3. REM Estate
4. Ulu Tiram Estate
5. Sedenak Estate and Mill
6. Kuala Kabung Estate
7. Rengam Estate
8. Sindora Estate and Mill
9. Tereh Selatan Estate
10. Enggang Estate
11. Mutiara Estate
12. Tereh Utara Estate and Ladang Tereh Mill
13. Sungai Tawing Estate
14. Selai Estate
15. Sungai Sembrong Estate
16. Labis Bahru Estate
17. Sepang Loi Estate
18. UMAC Estate
19. Sungai Papan Estate
20. Siang Estate
21. Palong Estate
22. Kemedak Estate and Palong Cocoa Mill
23. Mungka Estate
24. Pasir Panjang Estate and Mill

03 SOURCES OF EMISSIONS, SEQUESTRATION AND OFFSETS

ADOPTING PROGRESSIVE **EMISSION STRATEGIES**

We believe in using the latest and best available science and tools to measure our performance. As an early adopter, we were amongst the first companies to use the PalmGHG tool (PalmGHG V1) developed by the RSPO GHG Working Group. This was updated to (PalmGHG V2) in early 2014 with significant changes to the categorisation of previous land use as well as default values. Depending on whether the PalmGHG tool continues to be updated, we will review which version to use as a benchmark in future carbon reports.

To facilitate a comparison between the figures presented in our 2012 Carbon Footprint Report and our updated results, whilst still enabling benchmarking against our sector peers, we are presenting both versions in this report. As the main focus of the analysis and narrative is on our internal progress, comparisons presented highlight changes in the PalmGHG V1 results. In addition, we have included some commentary around the main differences between our results based on the two PalmGHG versions.

EMISSION AND REDUCTION SOURCES

Field - oil palm cultivation

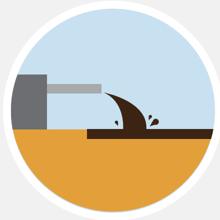
Fertiliser transport and use of fertilisers.

Field fuel use due to harvesting and collection of FFB. Diesel and gasoline combustion is a source of CO_2 emissions.

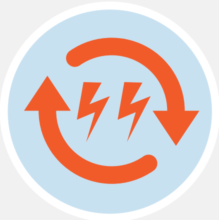
Mill diesel usage - fuel combustion is a source of CO_2.

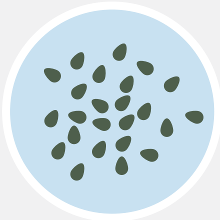
Palm Oil Mill Effluent release methane, which is a powerful greenhouse gas.

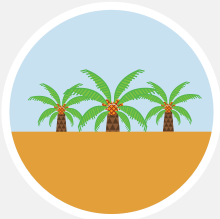
Land clearing release stored carbon in the biomass. The level of emissions depends on the type of previous land use, with high levels of forest cover, such as primary forest releasing high levels of CO_2, whereas glass land releasing only small amounts.



Peatland cultivation - these represent a significant source of GHG emissions. We have a small portion of peat within the cultivated area - 1,380 hectares (slightly over 1% of our cultivated land). This land was cultivated in 1999 - 2002 and the total area has remained unchanged since.







Biogass offset: Methane from Palm Oil Mill Effluent is captured and can be used for electricity or other energy usage, avoiding emissions.

Palm Kernel Shell ("PKS") Sales: PKS sold externally and used as a replacement for fossil fuels can be offset as it reduces emissions.

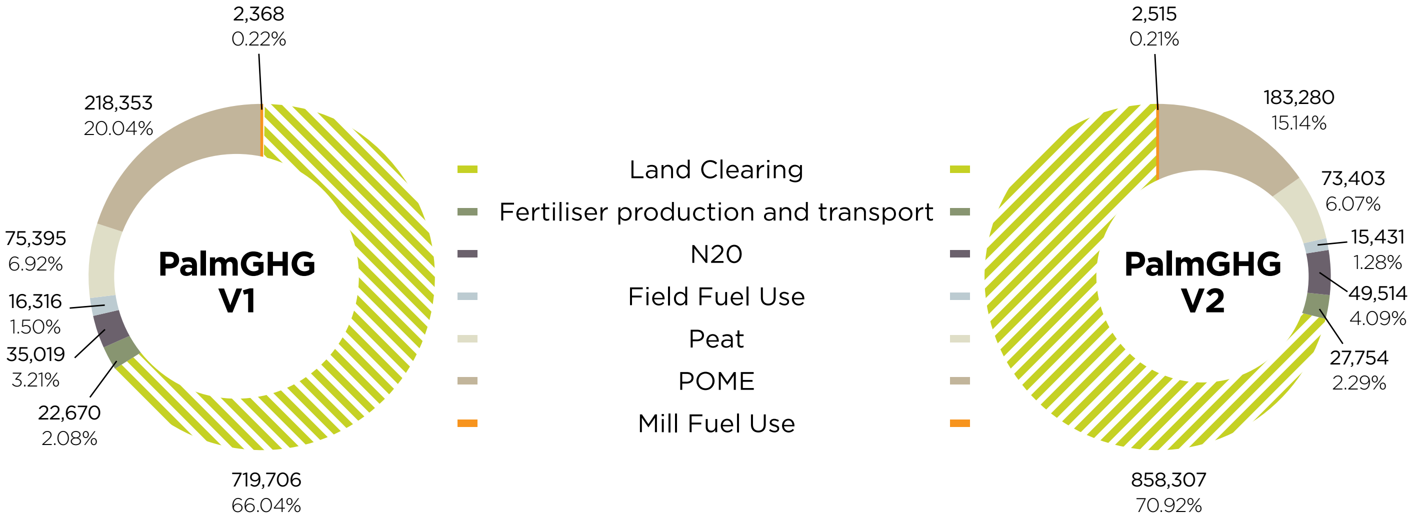
Carbon sequestration in the palm biomass. Oil palm can act as a 'sink' which fixes carbon and prevents emissions into the atmosphere.

Mill fuel offset - most power generation in the mill is based on biomass, (shell and fibre) with only a small volume of diesel used for back-up generators. This leads to avoided emissions and can be offset.

Mill - palm oil production

Sources of emissions, sequestration and offsets

Kulim's gross emissions (MT CO_2e) attributable to:



'The primary difference between PalmGHG V1 and PalmGHG V2 is the major changes in default values and categorisation of secondary or disturbed forest. As this affects a large share of our land bank, the calculated emissions from land clearing have a differential of almost 19% between the two versions of PalmGHG as a result of the changed methodology. In addition, changes in the default values for POME means that calculated emissions are 16% lower in PalmGHG V2 than in PalmGHG V1.

The largest contribution to gross carbon emissions remains that from land clearing. However, regardless of methodology (i.e. PalmGHG V1 vs PalmGHG V2), the share has increased significantly compared to 2012 where just 53% was due to land clearing. This is partially because of the progress of our replanting programme in which 3%-5% of our land is replanted annually. In addition, our fertiliser usage has been reduced significantly.

Emission reductions by mill

Overall, our net Carbon Footprint by mill has been reduced by 38.4% since 2012, largely due to the introduction of a tracking system for PKS sold for power generation, allowing carbon credits. In addition, some reductions have been obtained through the reduced use of fertiliser, particularly at Sindora Palm Oil Mill, due largely to the replanting programme in which manuring is largely stopped in the two years prior to felling.

	2012	2014	2012	2014	Remarks
	MT CO_2e/MT CPO		MT CO_2e/MT PK		
Kulim Group	**1.15**	**0.71**	**1.15**	**0.71**	**Decreased by 38.4%**
Palong Cocoa Palm Oil Mill	1.32	0.85	1.32	0.85	Decreased by 35.6%
Sedenak Palm Oil Mill	1.51	0.71	1.51	0.71	Decreased by 53.1%
Sindora Palm Oil Mill	1.44	0.54	1.44	0.54	Decreased by 62.5%
Ladang Tereh Palm Oil Mill	0.66	0.73	0.66	0.73	Increased by 10.6%
Tunjuk Laut Palm Oil Mill	0.75	N/A	0.75	N/A	Mill no longer under Kulim's management

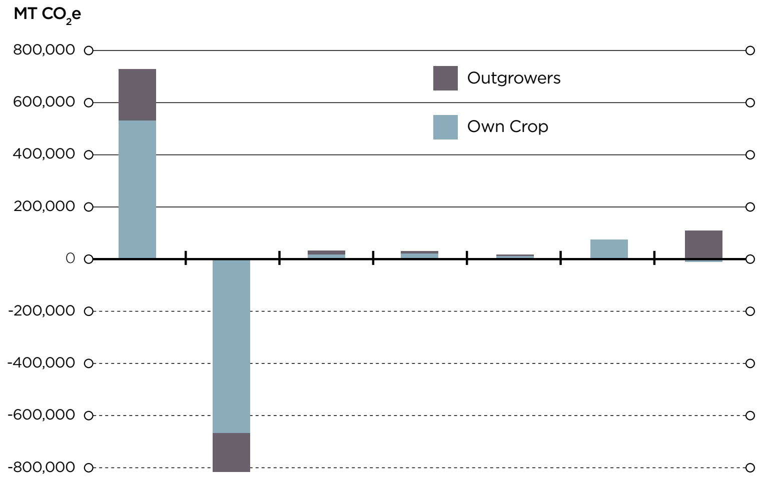
Emissions from oil palm cultivation

Land clearing and crop sequestration

Land clearing is responsible for 66.04% (PalmGHG V2: 70.92%) of Kulim's carbon emissions, and constitutes a total of 719,706 tonnes of CO_2e, inclusive of outgrower emissions. By far the biggest contribution comes from replanting of oil palm, with minor areas of land conversion of rubber estates, sentang and arable crops. In 2013-2014, there was no conversion from non-agricultural land in our Malaysian operations.

The amount of carbon emissions from land clearing activity is offset by the carbon sequestration from the planting of oil palms which amounts to 832,790 MT CO_2e. This results in a net carbon savings of 113,084 MT CO_2e if using the PalmGHG V1 methodology. However, due to the higher default values for previous land use in PalmGHG V2, land clearing emissions are not offset entirely, resulting in net emissions of 42,156 MT CO_2e.

Sources of emissions, sequestration and offsets



	Land clearing	Crop sequestration	Fertilisers	N20	Fuel	Peat	Total
Outgrowers (MT CO_2e)	197,127	-176,429	11,914	8,390	5,242	0	46,243
Own Crop (MT CO_2e)	522,578	-656,361	10,757	26,630	11,074	75,395	9,927

Default values and categories for previous land use of PalmGHG V1 and PalmGHG V2

PalmGHG V1 Category	MT Carbon stock/Ha	PalmGHG V2 category	MT Carbon stock/Ha
Primary forest	225	Undisturbed forest	268
Logged forest	87	Disturbed forest	128
Secondary regrowth	48		
Scrubland	26	Scrubland	46
Coconut	75	Tree crops	75
Rubber	62		
Cocoa under shade	70		
Oil palm	≥50		
Food crops	9	Food crops	8.5
Grassland	5	Grassland	5

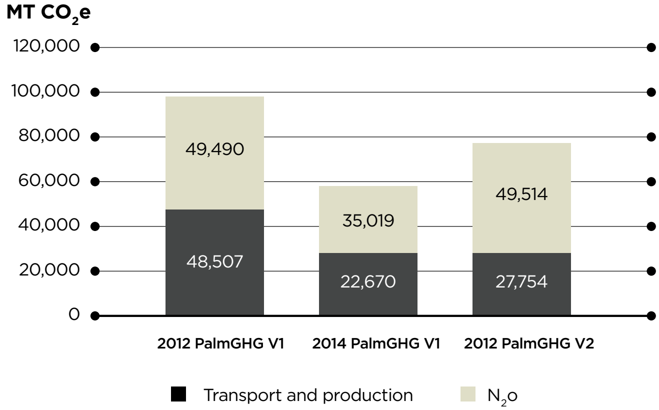
Fertiliser use and N_2O emissions

Green House Gas ("GHG") emissions from the use of fertiliser in the planting of oil palms contributes 57,690 MT CO_2e or 5.29% of the total emission in 2014, a significant reduction from 2012 where fertiliser-related emissions were 98,000 MT CO_2e. We do have a long-term target to reduce fertiliser/ha. However, although we are pleased to note reduced emissions, the fertiliser reduction is primarily a result of the current planting cycle.

These emissions are generated from the production, bulk transport and application of the fertiliser in the field by both Kulim's estates as well as those of outgrowers. Kulim's estates contribute approximately 64.8% of emissions while the remaining 35.2% is from outgrowers.

For each chemical component in the fertiliser products vary widely from 44kg to 2,380kg CO_2e MT fertiliser as provided in the stable below. Nitrous oxide (N_2O) emissions are from the nitrogen content in the fertilisers, determined by multiplying by the factor of 44/28[1].

Fertiliser emissions (MT CO_2e) including outgrowers



Default values

Fertiliser Production	Material kgCO_2e/MT
Ammonium nitrate (AN)	2,380
Diammonium phosphate (DAP)	460
Ground magnesium limestone (GML)	547
Ground rock phosphate (GRP)	44
Kieserite	200
Muriate of potash (MOP)	200
Sulphate of ammonia (SOA)	340
Triple superphosphate (TSP)	170
Ammonium Chloride (AC)	1,040
Urea	1,340

[1] *PalmGHG version 1 guidelines: Base on conversion of N_2O (molecular wt. 44) to N_2 (moleculer wt.28)*

Sources of emissions, sequestration and offsets

For field operation

The use of fossil fuel i.e. diesel for all our field operations constitutes only 1.5% of total emissions (PalmGHG V2 1.28%). These operations include fuel consumption by equipment, vehicles and machinery used in the transportation of materials and workers, field maintenance, fertiliser application and Fresh Fruits Bunch ("FFB") harvesting. The emissions factor for diesel use is 3.12kg CO_2e per litre (unchanged in PalmGHG V2).

Plantings on peat land

Emissions generated from cultivation of oil palm on peat land is due to microbial decomposition of the exposed organic carbon in the peat as well as associated N_2O emissions. There is still significant degree of uncertainty in the various factors affecting the magnitude of the emissions such as drainage depth, peat subsidence and age of plantation.

Only 1.8% of land cleared and cultivated in Kulim's estates and outgrowers' is peat land. However, due to the high emissions factor of peat GHG emissions from peat cultivation are significant and contribute 75,395 MT CO_2e (6.92%) of the total emissions including outgrowers in 2014.

To reduce emissions from peat, Kulim implements best management practices in compliance with the RSPO Principles and Criteria. We actively monitor and control water tables with a drainage depth of 60cm to limit GHG emissions from the peat land.

In determining GHG emissions from peat land, the default emission value used is 0.91 MT CO_2 per cm per year (or 54.6 MT CO_2 per ha per year for 60cm drainage depth) and 16 kg N-N_2O per ha per year as proposed by the PalmGHG calculator.

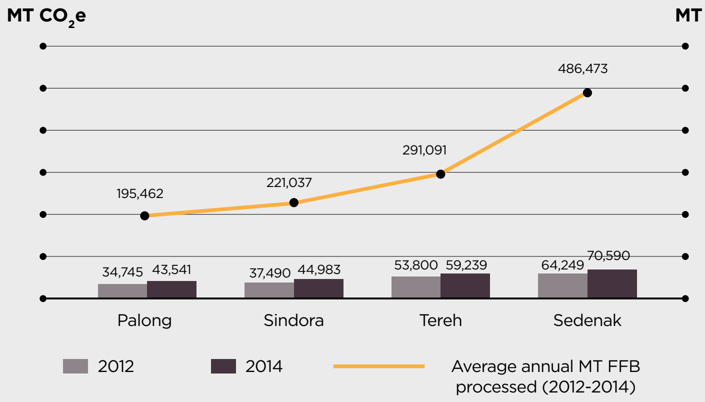
Sequestration in conservation areas

Land which is conserved instead of being used for oil palm can be included for carbon sequestration. However, as this is not currently included in the RSPO PalmGHG Kulim has excluded this offset component from the current carbon footprint calculation.

Emissions from palm oil production

Given that the majority of field emissions are fixed, the largest avoidable CO_2 emissions are found in the processing of FFB into CPO. At mill level, there are two emissions factors; methane from POME and fuel for mill use. The latter is insignificant for Kulim, as operations are largely driven by biomass, with only a small amount of diesel being used to fire up machinery which represents around 0.2% of the company's gross emissions.

POME emissions by mills



Palm Oil Mill Effluent (POME) methane emissions

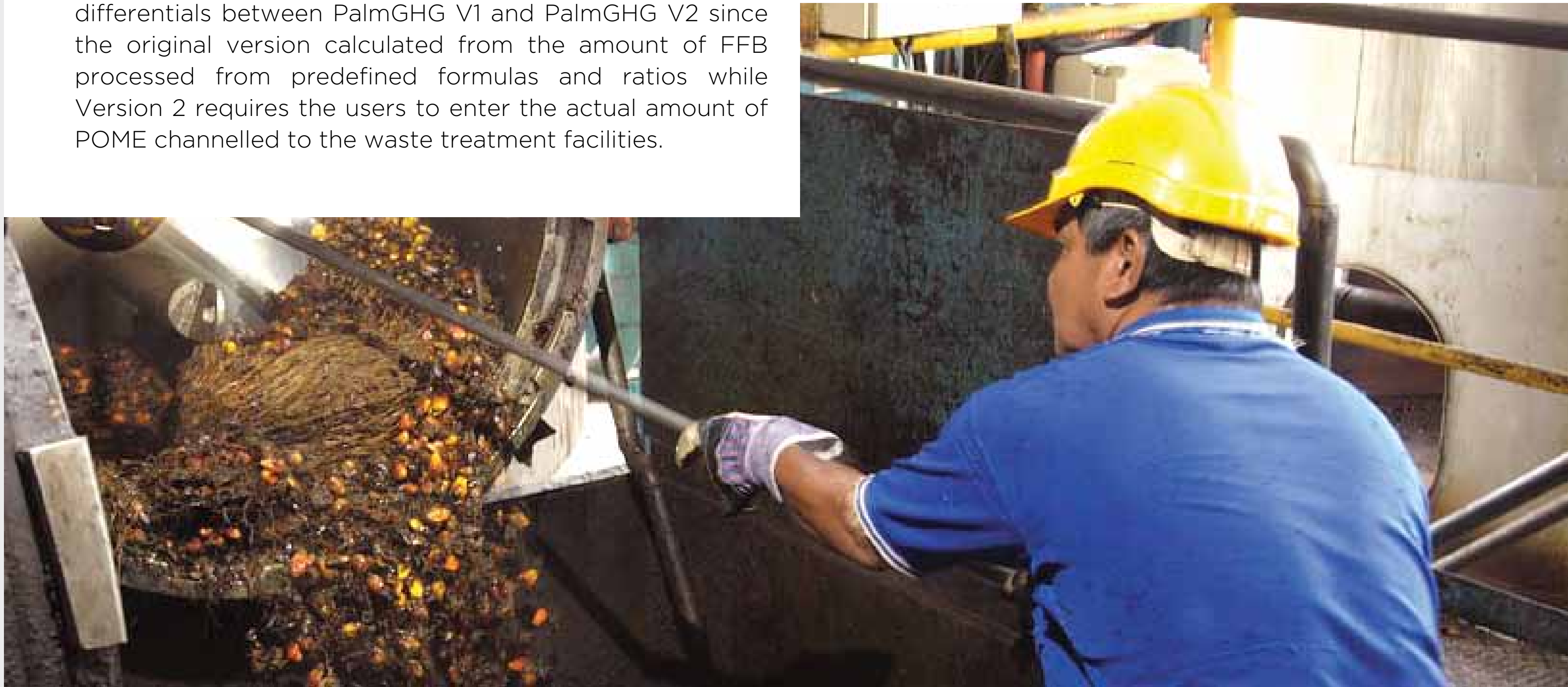
GHG emissions in the form of methane from the decomposition of POME is the second-largest contributor at 20% (PalmGHG V2: 15.1%) of total emissions of Kulim's oil palm operations for 2014. The total amount of emission of this component is 218,353 MT CO_2e. This large contribution from the mill operations is to be expected given that the majority of estates under Kulim and its outgrowers are already matured fields and our mills are processing at maximum capacity. Sedenak Palm Oil Mill has the highest emissions due to POME emissions, as this mill has a much higher production. A biogas plant for electricity generation and flaring was commissioned at Sedenak Palm Oil Mill in April 2014. However, as the PalmGHG tool operates on a three-year average, emissions reductions for the current reporting period were insignificant. For the initial, only a small amount of POME was diverted to the biogas facility. More POME will be diverted as the biogas production process stabilise (see page 20 for a projection of estimated reductions).

In calculations of POME emissions, there were some differentials between PalmGHG V1 and PalmGHG V2 since the original version calculated from the amount of FFB processed from predefined formulas and ratios while Version 2 requires the users to enter the actual amount of POME channelled to the waste treatment facilities.

Emissions credit from Palm Kernel Shell ("PKS")

PKS from the operation of the mills is currently used for power generation, either within the respective mills or sold to traders for third party use. In our 2012 Carbon Report, we identified this as a potential source of carbon offset. We estimated that the total amount of PKS produced annually by Kulim's mill operations amount to 60,000 MT and that around 14,500 MT was sold for external use, and that if monitored and recorded could translate into a carbon credit potential of 30,000 MT CO_2e if the PKS was found to be used to generate power and offset fossil-based fuel sources (primarily coal).

We have now begun a programme of ongoing tracking and monitoring, and have been able to establish that most of the PKS sold is indeed used as a replacement for fossil-based fuels. Hence, we have been able to incorporate a carbon credit of 37,234 MT CO_2e – more than our own combined field and mill fossil-fuel use.



04 MITIGATION STRATEGIES AND REDUCTION TARGETS

SETTING **HIGHER REDUCTION** TARGETS

Methane capture and biogas generation

We commissioned our first methane capture and power generation project in Sedenak Palm Oil Mill in April 2014. The choice of Sedenak Palm Oil Mill was logical considering that this mill has the highest GHG emissions among the five mills owned and operated by Kulim, including Pasir Panjang Palm Oil Mill, which commenced operation in March 2015. A second methane capture project in Sindora Palm Oil Mill is under construction and is expected to be commissioned in September 2016 (slightly delayed due to the regulatory approvals on the construction area with the proposed widening of biogas pond).

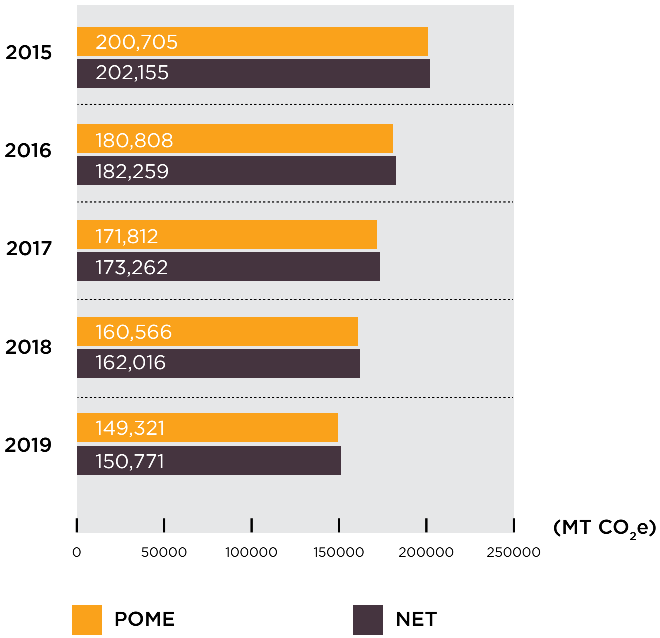
Under these projects, between 50% - 100% of the methane from the POME degradation will eventually be captured and channelled for power generation within the mill and flaring.

Overall, we expect these two projects combined to reduce our Malaysian emissions from POME by around 32% over the coming five years.

Mitigation Strategies and Reduction Targets

In addition, Pasir Panjang Palm Oil Mill will be equipped with a methane capture project, expected to be operational by end-2015. Potential savings from the biogas project at Pasir Panjang Palm Oil Mill have not been included in this projection as this mill was not operational at end-2014.

Projected emissions reductions from biogas initiatives 2015-2019



Fertiliser reduction

GHG emissions from the production, transport and use of chemical fertilisers is also one of the concerns that Kulim will address in our effort to reduce our impact on the environment. Excessive use of chemical fertilisers will also pollute river and underground water sources. In order to mitigate this without affecting FFB yield, Kulim has already embarked on a long-term organic fertiliser programme with field data collection underway to optimise the use of both types of fertiliser. In addition, all our mills have established composting projects to recycle the nutrient from the Empty Fruit Bunch ("EFB") and POME back to the fields.

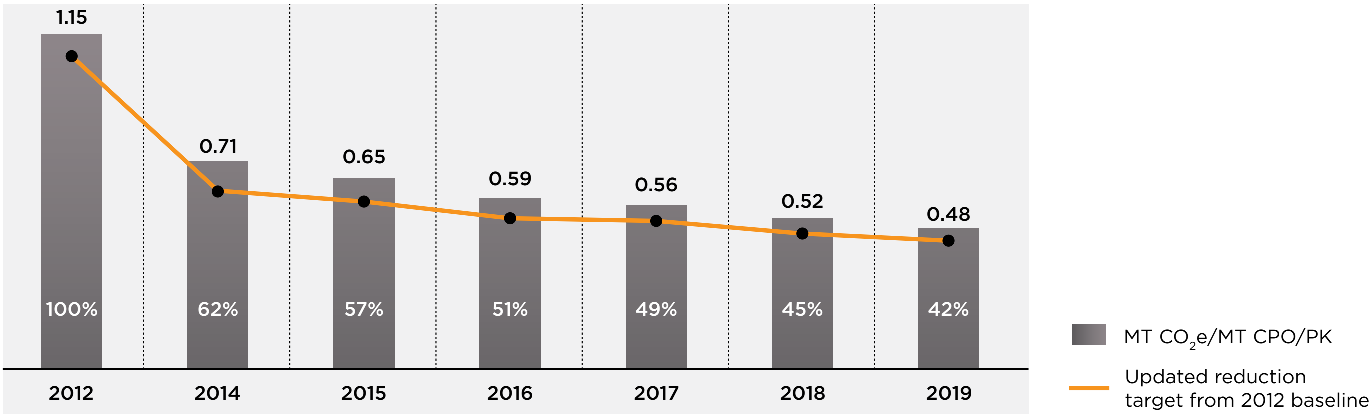
Outgrower engagement

In preparation for our 2012 Carbon Footprint Report, we began a long-term engagement process with all of our independent outgrowers, who we found to account for more than 30% of our total footprint. This work has been continued and is now evolving into a full-scale programme to assist these outgrowers in achieving RSPO certification. So far, two outgrowers groups have achieved certification and we continued to work with other outgrowers. We believe that the good agricultural practices, including efficient use of fertiliser will help to reduce emissions from third-party FFB.

Updated emissions reduction targets

Our original reduction target published in the 2012 Carbon Footprint Report was to reduce our emissions by just under 20% by year-end 2017. This was primarily based on the forecast of expected savings from biogas initiatives. Whilst the impact from biogas initiatives have yet to materialise, we did in fact surpass our emissions reductions targets significantly through the PKS tracking initiative as well as a reduction in fertiliser use and re-categorisation of peat areas. These are one-off savings that we largely expect to sustain at the same level, but factoring in the reduction in methane emissions from POME still allow us to project even further reductions, and decrease emissions by an additional 20% over the coming five years, resulting in a total projected reduction of our emissions intensity by around 58% from our 2012 baseline.

Updated projection of emissions reduction 2012 – 2019



05 METHODOLOGY

INNOVATIVE SOLUTIONS MAKE ALL THE DIFFERENCE

PalmGHG

Unless otherwise noted, the calculations and definitions applied in this report is based on the PalmGHG Calculator Beta Version 1.a developed by the RSPO Greenhouse Working Group 2, which is based on the Global Warming Potential Assessment of Palm Oil Production model.

The PalmGHG framework was developed to identify GHG emission 'hotspots' in the life cycle of palm oil, to allow internal monitoring of GHG emission and to assist palm oil producers in highlighting GHG emission reduction opportunities and developing reduction plans.

Sources of emissions in the PalmGHG framework:

- Land clearing
- Production and transport of fertiliser
- N_2O and CO_2 emissions from the application of fertilisers in the field
- Use of fossil fuels in the plantation for planting work, harvesting, collection and transport to mills
- Use of fossil fuels in the mill operations
- Emissions of CH_4 from the anaerobic degradation of POME from the mills
- CO_2 and N_2O emissions from cultivation on peat soil

GHG fixation and credits included in the PalmGHG framework:

- CO_2 fixation by the growth of palm trees
- CO_2 fixation by biomass in the conservation areas
- GHG emission avoidance from the use of by-products such as palm kernel shell as well as use of electricity generated by the biomass from the mills

Exclusion of GHG emissions sources/sins in the PalmGHG tool:

- Nursery planting stage
- Pesticides manufacturing, transport and use
- Fossil fuel use during land clearing activities
- Carbon footprint of infrastructure, plant and equipment
- Carbon sequestration in palm end-products
- Work-related employees travel and commute

Assumptions of the PalmGHG framework

The PalmGHG tool provides a set of default values that is used in areas where company specific field data is not available. In this report, we use our own field data whenever the data is available and can be verified from the records of our operations.

Other than that, default values will be used such as in the case of determining GHG emissions from land use change, peat emissions, as well as the production and field application of fertilisers. Additionally, a number of emission factors were also based on the default values provided in the PalmGHG tool such as conversion of POME to methane, diesel fuel and grid electricity offset.

Methodology

Differences between PalmGHG V1 and PalmGHG V2

	2012 PalmGHG V1	2014 PalmGHG V1	2014 PalmGHG V2	2012 PalmGHG V1	2014 PalmGHG V1	2014 PalmGHG V2
	MT CO_2e/MT CPO			MT CO_2e/MT PK		
KULIM Group	**1.15**	**0.71**	**1.15**	**1.15**	**0.71**	**1.15**
Palong Cocoa Palm Oil Mill	1.32	0.85	1.41	1.32	0.85	1.41
Sedenak Palm Oil Mill	1.51	0.71	1.32	1.51	0.71	1.32
Sindora Palm Oil Mill	1.44	0.54	1.13	1.44	0.54	1.13
Ladang Tereh Palm Oil Mill	0.66	0.73	0.71	0.66	0.73	0.71
Tunjuk Laut Palm Oil Mill	0.75	N.A.	N.A.	0.75	N.A.	N.A.

Three out of four mills would see higher carbon emissions based on the updated version of PalmGHG, and two, Tereh Palm Oil Mill and Palong Cocoa Palm Oil Mill would have a higher carbon footprint than in 2012 if the PalmGHG V2 was applied against 2012 PalmGHG V1 figures. The primary differences are illustrated in the consolidated table in the next page (page 25) in particular it is worth noting that the changes in previous land use categories (discussed on page 13) have resulted in a significant increase in land clearing emissions without a corresponding increase in crop sequestration. Likewise, as fertiliser default values are higher in PalmGHG V2 than in PalmGHG V1, the reduced use of fertiliser does not have the same impact. It is also worth noting that the impact of future POME emissions will also be lower in PalmGHG V2 than in PalmGHG V1.

SOURCES / SINKS	2012 PalmGHG V1	2014 PalmGHG V1	2014 PalmGHG V2
Land clearing	422,664	719,706	858,307
Crop sequestration	(462,492)	(832,790)	(816,151)
Fertilisers	48,507	22,670	27,754
N2O	49,490	35,019	49,514
Field fuel	10,155	16,316	15,431
Peat	75,395	75,395	73,403
POME	190,283	218,353	183,280
Mill fuel	2,739	2,368	2,515
Mill credit	(213)	(37,234)	(37,234)
Total Net	**336,529**	**219,803**	**356,818**

Assumptions for carbon reduction targets

The projection assumes that only two mills i.e. Sedenak Palm Oil Mill and Sindora Palm Oil Mill are installed with biogas plant within the next five years. For Sedenak Palm Oil Mill, 50% of total POME produced by the mill will be used in biogas production. As for Sindora Palm Oil Mill, it is expected that the biogas plant will be completed in June 2016 and commissioned in the 4th quarter of the year 2016. From 2017 onwards, it is assumed that POME will be gradually diverted from conventional ponding system to biogas plant at the rate of 25% each year until all POME or 100% is eventually diverted to the biogas plant.

To keep estimates conservative it is assumed that all the biogas generated will be flared, not for electricity generation in the mill (which will generate higher carbon offset).

All other data such as FFB throughput, land clearing, sources of emissions and sequestration etc. is assumed to remain at 2014 conditions.

06 BASE DATA

USING ONLY
WHAT WE NEED

Emission Data (PalmGHG Version 1)

DESCRIPTION	UNIT	PALONG COCOA PALM OIL MILL	SEDENAK PALM OIL MILL	SINDORA PALM OIL MILL	LADANG TEREH PALM OIL MILL
Crude Palm Oil	MT CO_2e/ MT CPO	0.71			
		0.85	0.71	0.54	0.73
Palm Kernel	MT CO_2e/ MT PK	0.71			
		0.85	0.71	0.54	0.73
Net Emission	MT CO_2e/yr	42,613	90,826	30,763	55,602
Land Clearing	MT CO_2e/yr	115,041	280,819	190,242	133,603
Crop Sequestration	MT CO_2e/yr	-131,330	-338,830	-211,960	-150,669
Fertiliser Production & Transport	MT CO_2e/yr	8,067	4,212	5,300	5,091
Fertiliser Application (N_2O)	MT CO_2e/yr	6,745	17,038	6,649	4,588
Field Fuel Use	MT CO_2e/yr	1,809	6,808	3,350	4,348
Peat Land Emission	MT CO_2e/yr	-	75,395	-	-
Conservation Area Offset	MT CO_2e/yr	-	-	-	-
Methane from POME	MT CO_2e/yr	43,541	70,590	44,983	59,239
Mill Fuel Use	MT CO_2e/yr	366	1,036	352	614
Mill Electricity Supply Offset	MT CO_2e/yr	-1,626	-26,243	-8,151	-1,213
GHG Emission by FFB Source (exclude emission from milling activities)					
Own Crops	MT CO_2e/yr	-21,068	47,631	-21,971	-14,518
Outgrowers	MT CO_2e/yr	21,400	-2,188	15,551	11,480

Emission Data (PalmGHG Version 2)

DESCRIPTION	UNIT	PALONG COCOA PALM OIL MILL	SEDENAK PALM OIL MILL	SINDORA PALM OIL MILL	LADANG TEREH PALM OIL MILL
Crude Palm Oil	MT CO_2e/ MT CPO	1.15			
		1.41	1.32	1.13	0.71
Palm Kernel	MT CO_2e/ MT PK	1.15			
		1.41	1.32	1.13	0.71
Net Emission	MT CO_2e/yr	70716	167,387	64702	54,013
Land Clearing	MT CO_2e/yr	124,354	337,556	235,212	161,186
Crop Sequestration	MT CO_2e/yr	-118,999	-333,452	-213,093	-150,607
Fertiliser Production & Transport	MT CO_2e/yr	8,078	6,698	6357	6,621
Fertiliser Application (N_2O)	MT CO_2e/yr	9,332	20,796	8631	10,756
Field Fuel Use	MT CO_2e/yr	1,791	6,085	3325	4,230
Peat Land Emission	MT CO_2e/yr	-	73,403	0	-
Conservation Area Offset	MT CO_2e/yr	-	-	-	-
Methane from POME	MT CO_2e/yr	47,368	81,509	31,977	22,426
Mill Fuel Use	MT CO_2e/yr	366	1,036	352	614
Mill Electricity Supply Offset	MT CO_2e/yr	-1,626	-26,243	-8151	-1,213
GHG Emission by FFB Source (exclude emission from milling activities)					
Own Crops	MT CO_2e/yr	-4,781	2,939	11,254	17,609
Group	MT CO_2e/yr	3,314	82,559	-1,107	-2,280
Outgrowers	MT CO_2e/yr	26,022	25,587	30,284	16,856

Base Data

Scope of consolidated data in this report

To enable a robust comparison across 2012, 2014 figures as well as between PalmGHG V1 and PalmGHG V2 all absolute emissions figures for 2012 presented in this report exclude Tunjuk Laut Palm Oil Mill which is no longer under Kulim's management.

However, emissions intensity, expressed through MT CO_2e per MT CPO/PK includes Tunjuk Laut Palm Oil Mill as it more accurately expressed Kulim's product carbon footprint at the time.

For both absolute emissions and emissions intensity, the comparison has the effect of reducing the relative 2012-2014 improvements reported. Total emissions including Tunjuk Laut would be 367,878 MT CO_2e vs the stated 336,529 MT CO_2e. Carbon footprint would be 1.21 MT CO_2e per MT CPO/PK if excluding Tunjuk Laut as opposed to 1.15.

Restatements from 2012 Carbon Footprint Report

Data for 2012 have been adjusted following third party audits in 2014, as well as a review of peat classification for some outgrowers. Our emissions intensity has therefore been adjusted downwards by just under 9% from from 1.26 to 1.15 MT CO_2e per MT CPO/PK.

Production Data

Description	Unit	3-Year Average	2014	2013	2012
Palm Products					
Crude Palm Oil	MT CPO/yr	243,254	257,881	254,735	217,146
Palm Kernel	MT PK/yr	67,345	69,681	70,891	61,464
FFB Production					
Own Crop	MT FFB/yr	752,575	835,483	774,615	647,628
Outgrowers	MT FFB/yr	445,046	407,568	494,115	433,454
Planted Area					
Own Crop	Ha	53,257	55,976	53,729	50,065
Outgrowers	Ha	20,328	20,328	20,328	20,328
Fertiliser					
Own Crop	MT/yr	23,318	23,450	25,202	21,303
Outgrowers	MT/yr	9,400	5,941	10,143	12,117
Field Fuel Use					
Own Crop	litres/yr	3,549,311	4,904,199	3,186,046	2,557,688
Outgrowers	litres/yr	1,680,063	1,909,507	1,648,730	1,481,951
Mill Fuel Use	litres/yr	758,901	676,298	721,522	878,882

Data Collection And Limitations

There are two distinct sets of data used in this report. Each set of data has associated challenges and scope for improvement.

In-house data from estates and mills

Primary emission data from Kulim's estate and mills was obtained from statistics and monitoring undertaken by Kulim's Estates and Engineering Departments. This data is assumed to have a high level of accuracy, although continuous efforts to increase robustness will be undertaken. Two areas in particular may contribute to significant improvements.

Crop sequestration

Calculation of carbon sequestration from the planting of new palm trees are estimated from the default values provided in the PalmGHG calculator. These default values are obtained from the OPRODSIM and OPCABSIM models recommended in the calculator. Kulim does not presently have in place a practice of making on-site measurements of the biomass growth of its own palm trees.

Peat emissions

While the peat areas within Kulim-owned estates are being actively monitored and controlled for the water table level, similar monitoring and control cannot be ascertained for cultivation by outgrowers. Kulim is in the process of identifying these outgrowers within the supply chain and will work with them to preserve the peat land from degradation.

Outgrower data

The second set of data relates to outgrower crop. Kulim's external crop is primarily bought from third-party FFB traders who do not disclose the source of FFB. In order to allow some level of monitoring, data was therefore collected using interviews and questionnaires sent to FFB traders and smallholders. Kulim assigned dedicated personnel to engage these stakeholders in the process. A number of factors were found to contribute to a high margin of error:

Diversity of suppliers

All the respondents replied and provided the requested data. Data supplied suggested vast differences between suppliers due to differences in previous land use profiles.

Insufficient record keeping

Quality of record keeping varies significantly and may lead to a high level of uncertainty. This includes the record on previous land use for the past three decades and the identification of mineral soil versus peat land.

Emissions from non-palm related activity

It is assumed that all the fertilisers and fuels purchased by the smallholders and outgrowers are used for oil palm cultivation and harvesting activities. However, it is likely that resources may be used for other purposes such as additional crops or private transport. A more detailed methodology would therefore apportion use between palm and non-palm related activities.

Despite these shortcomings, we believe that this is still an improvement over standard assumptions that external FFB and a company's FFB have similar carbon profiles. Our calculations so far indicates that this is not the case. In addition, we believe that external FFB data can be improved over time as engagement with traders and external suppliers continue and levels of trust and transparency increase.

07 GLOSSARY

PLEDGING FOR A BETTER TOMORROW

Biogas is a mixture of methane and carbon dioxide produced by the bacterial decomposition of organic wastes and used as a fuel.

Biomass is biological material derived from living, or recently living organisms. In the context of biomass for energy this is often used to mean plant based material, but biomass can equally apply to both animal and vegetable derived material.

Carbon dioxide (CO_2e) is the most widespread greenhouse gas. CO_2e is released to the atmosphere through natural and human activities, including fossil fuel and biomass burning, industrial processes, and changes to land use, among others. Carbon dioxide accounts for 76.7% of emissions with 13.5% arising from agriculture and 17.4% from forestry.

Carbon dioxide equivalent (CO_2e) is a unit of measurement used to compare the climate effects of all greenhouse gases to each other. CO_2e is calculated by multiplying the quantity of a greenhouse gas by its global warming potential.

Carbon footprint is the standard form of labelling emissions is therefore to express them as carbon dioxide equivalents or CO_2e. For this reason reports on the emissions from human activity are referred to as carbon reports or carbon foot prints of an operation or product.

Carbon sequestration/carbon sink describes the process in which vegetation captures carbon dioxide from the atmosphere through the process of photosynthesis and releases oxygen, and some carbon dioxide, through respiration. Part of the carbon is retained in the plant as biomass. In general half of the biomass of a plant is carbon, therefore as the plant grows and adds biomass it also adds or sequesters carbon. This is a natural process but it can be enhanced, for example, planting trees on land that has not previously had trees will sequester more carbon because of the increase in biomass. The term 'sink' is used to mean any process, activity or mechanism that removes a greenhouse gas from the atmosphere.

Greenhouse gases (GHGs) are an important part of the Earth's natural cycle, keeping the planet warm enough to sustain life. Human activities are upsetting the balance, increasing the concentration of GHG to the point where rising temperatures threaten livelihoods, ecosystems and economies. The major GHGs and their contribution to the greenhouse effect (rounded up) are: water vapour (60%); Carbon Dioxide (26%); Methane (5%); Ozone (4%); fluorinated gases (4%); and Nitrous Oxide (2%).

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ABOUT THIS REPORT

This report covers Kulim's oil palm operations in Malaysia for the calendar year 2014. Data, commitments and targets do not cover Kulim's operations in Indonesia which were initiated in 2014.

Data presented in this report is on a best-effort basis, and may be subject to change. The data was collated in-house and was screened and analysed by a third party consultant from Helikonia Advisory Sdn Bhd, but has not been subject to independent verification or assurance.

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