www.kulim.com.my

KULIM (MALAYSIA) BERHAD 197501001832 (23370-V)
Level 16, Menara KOMTAR, Johor Bahru City Centre, 80000 Johor Bahru, Johor Darul Takzim, Malaysia
T: +607 219 2692 **F:** +607 223 3175

Ulu Tiram Estate, 81800 Ulu Tiram, Johor Darul Takzim, Malaysia
T: +607 861 1611 **F:** +607 861 1701

KULIM (MALAYSIA) BERHAD 197501001832 (23370-V)

CARBON FOOTPRINT REPORT 2020

KULIM

KULIM (MALAYSIA) BERHAD 197501001832 (23370-V)

a JCORP company

OUR UNWAVERED COMMITMENT TOWARDS DELIVERING ON OUR PROMISES AND MAINTAINING THE HIGHEST STANDARDS OF EXCELLENCE IS INGRAINED IN OUR BELIEF AS WE STRIVE ONWARDS AS A RESPONSIBLE AND PROFITABLE AGRIBUSINESS ORGANISATION.

The illustrative elements featured on the front cover visual represents our diverse business spectrum and unique paradigms where our utmost efforts are concentrated to enhance processes geared towards carbon emission management and reduction in compliance with global standards.

Scan the QR code or visit our website for more information: www.kulim.com.my

WHAT'S INSIDE

CARBON FOOTPRINT REPORT 2020

KULIM (MALAYSIA) BERHAD

HIGHLIGHTS

OUR ACHIEVEMENTS 2019-2020

4th Methane capture facility installed and commissioned at Palong Cocoa Palm Oil Mill

5th Final methane capture facility under construction in Tereh Palm Oil Mill

Additional **bio-methane** project under construction at **Sedenak Palm Oil Mill**

OUR GOALS BY 2025

Methane capture facilities installed at **100%** of our mills, Four out of five mills with methane capture facilities

ON TRACK

A minimum **50%** reduction in emissions from Palm Oil Mill Effluent ("POME") from 2012 baseline of 250,415 MT CO_2e

ON TRACK

An overall **50%** carbon footprint reduction from 2012 baseline of 1.76 MT CO_2e per MT CPO/PK

ON TRACK

ABOUT KULIM

Kulim (Malaysia) Berhad ("Kulim") is a leading producer of Crude Palm Oil ("CPO") and Palm Kernel ("PK"). As of 31 December 2020, our total landbank was 74,575 hectares across Malaysia and Indonesia. Headquartered at Ulu Tiram, Johor, Malaysia, Kulim is a wholly-owned subsidiary of Johor Corporation ("JCorp").

Our Malaysian landbank covers 60,064 hectares across the states of Johor and Pahang in the southern Peninsular Malaysia, of which 56,147 hectares are planted with oil palm. In total, our Malaysian operations produced 316,066 tonnes of CPO and 79,711 tonnes of PK in 2020. This represents a 6.5% and 4% increment over a five-year rolling average.

Our Indonesian estates of PT Tempirai Palm Resources ("PT TPR") and PT Rambang Agro Jaya ("PT RAJ") were acquired in 2016. The rehabilitation programmes for these estates have generated positive outcomes. While Fresh Fruit Bunches ("FFB") yields are below average, it has improved by over 40% over the first two years of harvesting. Timebound plans are in place to achieve Roundtable on Sustainable Palm Oil ("RSPO") certification by 2023. However, at the time of publication, these operations are not yet completely established, nor are they comparable with our Malaysia operations. Therefore, they are not included within the scope of this report.

Kulim was one of the first palm oil producers to achieve certification under the RSPO standard. All five of our mills are RSPO certified. These facilities collectively processed 1,501,949 tonnes in 2020, of which 362,875 tonnes (24.16%) were purchased from external smallholders and outgrowers. Most of Kulim plantations were established between 1970 and 1990 on land converted from other crops, mainly rubber. As per our No Planting On Peat commitment, we have not developed any new peatland. Existing planted peat areas use best management practices and have remained at 1,360 hectares.

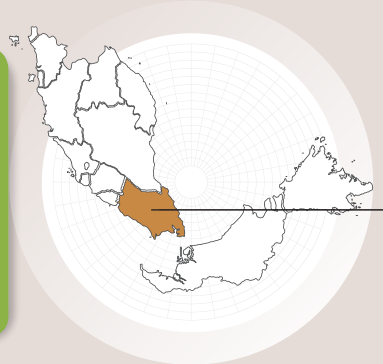
Landbank

74,575
HECTARES

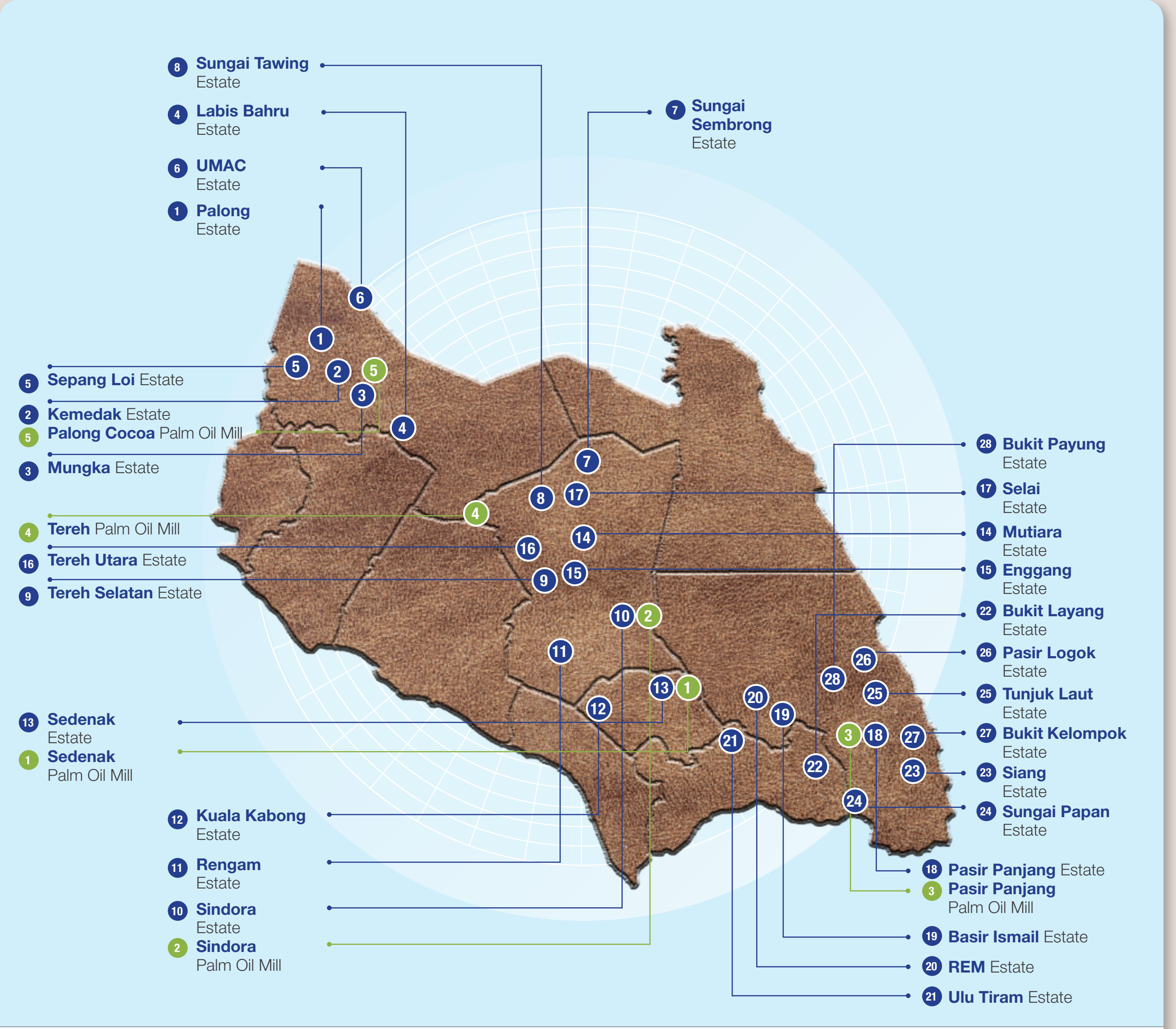
2% ↑
produced 316,066 tonnes of CPO in 2020 compared to 2019

3% ↑
produced 79,711 tonnes of PK in 2020 compared to 2019

Kulim was one of the first **palm oil producers** to achieve certification under the **RSPO** standard



Locations of Estates and Mills



Sustainability is a critical factor in all aspects of Kulim's work. As we continue to strive to meet the basic needs and secure development opportunities for the communities in which we operate, we also recognise the need to take action to protect our planet's natural resources and climate for current and future generations.

Existential threats from global climate change are becoming ever apparent. The effects can be devastating and preventing and mitigating them requires positive action by every country, company and individual. Reducing atmospheric anthropogenic carbon emissions is a necessary and immediate measure to help reduce the climate emergency. As part of RSPO's certification standard, Kulim has monitored and accounted for our palm oil operations carbon footprint since 2012. This has helped us to be responsive to stakeholder concerns as well as contributing to the collective momentum of our customers and supply chain partners in the global ambition to reduce the carbon footprint of the palm oil value chain.

The fifth biennial Kulim Carbon Footprint Report is part of our on-going efforts to measure our progress towards this commitment. The following pages provide an overview of our climate change impacts, and the carbon footprint of the CPO and PK produced at our Malaysian mills.

REPORTING TOOL AND FRAMEWORKS

Our primary carbon reporting and accounting tool is RSPO's PalmGHG Calculator. It was developed for RSPO growers and millers to estimate and monitor their Greenhouse Gas ("GHG") emissions and identify reduction opportunities based on a wide range of operational parameters of oil palm estates and extraction mills. The Calculator is the industry standard and helps provide some measure of assurance to our reported GHG emissions against our peers.

Since the launch of Version 1 in 2012, the PalmGHG Calculator's formula and emission factors have been updated several times. Version 2.1.1 was released in 2014 with significant changes to the categorisation of previous land use and default values. A further 2016 update to Version 3 saw additional changes in default values. PalmGHG Version 4 (V4) is the latest iteration. It has migrated to a centralised online platform whereby emissions data is digitally submitted to the RSPO. Nevertheless, the underlying formulas and default values remain unchanged from Version 3.

This report is based on the output from PalmGHG V4 and contains a comparative analysis of our emissions performance from 2015 to 2020. Earlier methodological changes (particularly between Version 1 and 3) meant that data from our 2012 to 2014 reporting period is not comparable.

Please refer the methodology on page 24 for specific discussions regarding PalmGHG Calculator limitations and assumptions.

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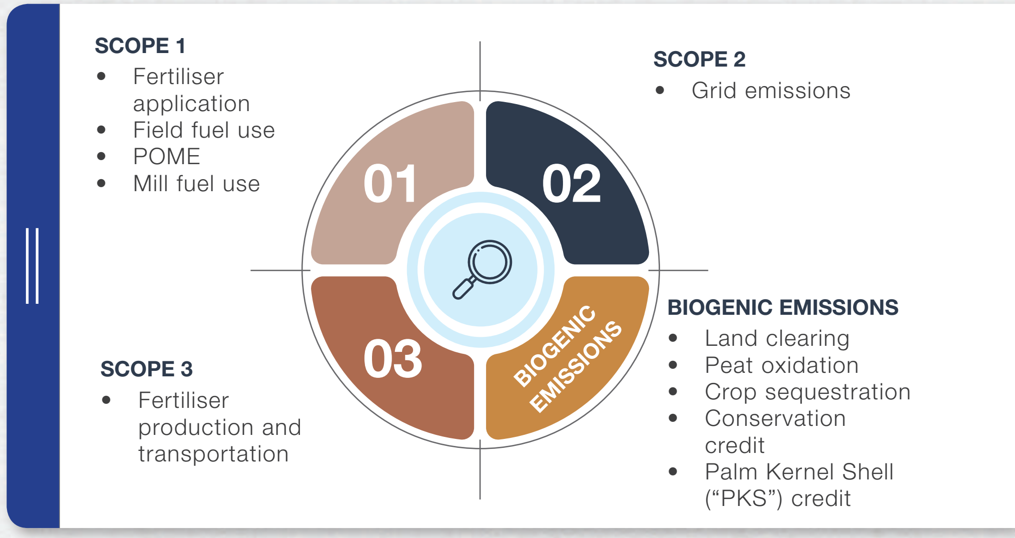
GHG PROTOCOL

With GHG emissions increase at the forefront of conversations around climate change, a universally accepted, industry-agnostic GHG accounting framework is crucial to enable benchmarking and comparability of all human-induced GHG emissions. Kulim recognises this, and for the first time in our carbon reporting, we will be presenting our GHG emissions according to the GHG Protocol developed by the World Resource Institute and the World Business Council for Sustainable Development – specifically referencing GHG Protocol Corporate Accounting and Reporting Standard and the GHG Protocol Agricultural Guidance. We will continue publishing our GHG emissions according to the RSPO's framework to measure our progress towards our 2025 target.

Although the RSPO PalmGHG Calculator has been instrumental in making GHG accounting the standard for sustainable palm oil production, its reporting framework is incompatible with consensus around ownership, offsets, and types of specific carbon emissions to account for. This unfortunately limited the Calculator's application only within the palm oil upstream sector. By adopting the GHG Protocol, emissions performance data of our estates and mills can readily be applied to GHG accounting and inventories further downstream. Our approach to reporting according to the GHG Protocol is to allocate individual emission sources and sinks as calculated by the PalmGHG Calculator into the defined scopes and biogenic emissions. Organisational and operational boundaries remain unchanged.



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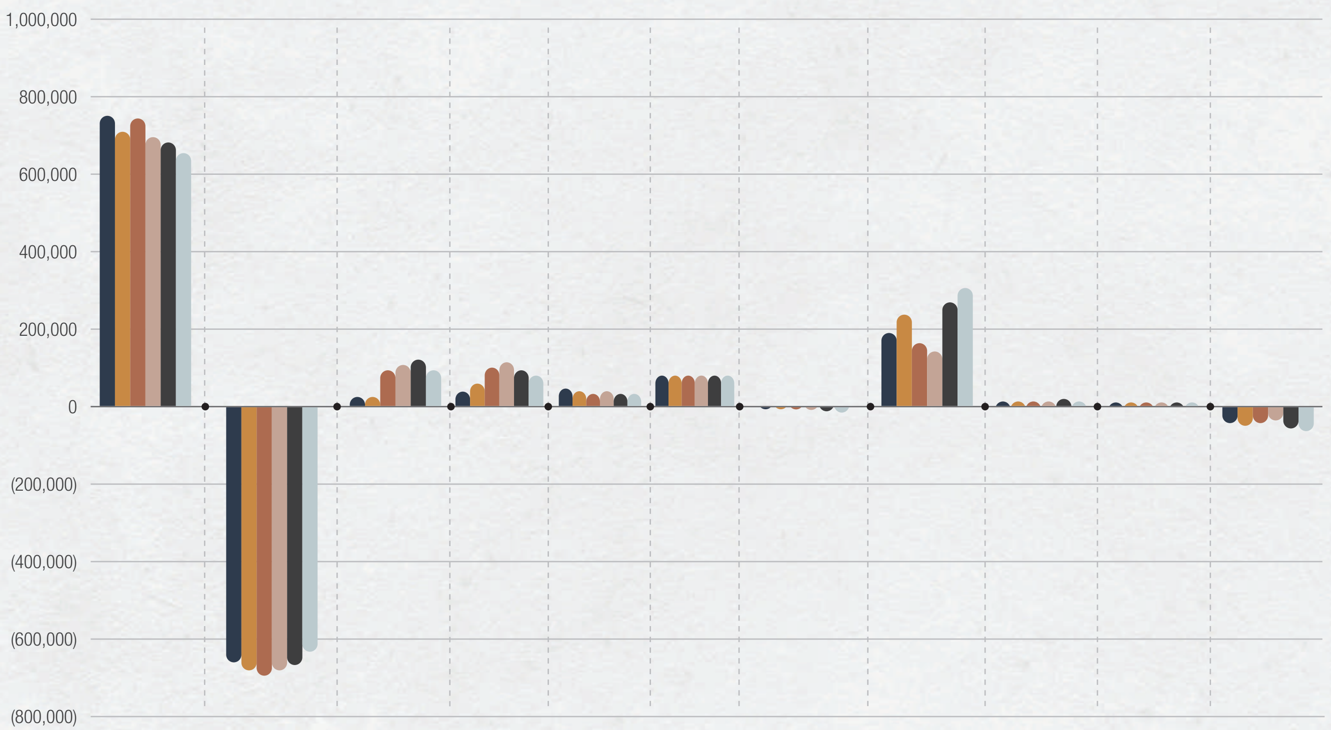
EMISSIONS PERFORMANCE SUMMARY

In 2020, our net emissions increased by 18.13% over our four-year average from 2015 to 2018 from just over 410,540 MT CO_2e to 484,970 MT CO_2e. This was the highest recorded since 2015. Our carbon footprint per tonne of product also trended upward during the same period, from 1.01 MT CO_2e in 2018 to 1.23 MT CO_2e in 2020. Despite the increase, our current carbon footprint still represents a 30.24% reduction from our 2012 base year figure of 1.76 MT CO_2e per MT CPO/PK. In subsequent sections of this report, we will examine what contributed to the lapse in our mitigation performance.

CARBON FOOTPRINT PER TONNE OF PRODUCT (MT CO_2e PER MT CPO/PK)

Year	Kulim	Palong	Sedenak	Sindora	Tereh	Pasir Panjang
2015	**1.13**	1.07	1.35	0.99	0.90	1.22
2016	**1.23**	1.09	1.32	1.30	1.37	0.82
2017	**1.08**	0.97	1.37	1.16	1.05	0.76
2018	**1.01**	1.02	1.27	1.12	0.85	0.62
2019	**1.25**	1.10	2.03	1.45	1.28	0.50
2020	**1.23**	1.34	2.09	1.10	1.28	0.35

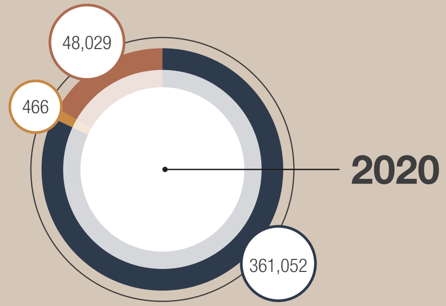
GHG EMISSIONS FOR KULIM'S MALAYSIAN OPERATIONS INCLUDING SMALLHOLDERS 2015 – 2020 (MT CO_2e)



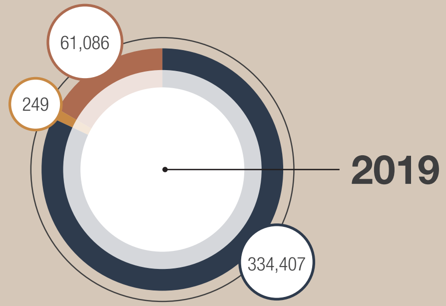
Year	Land Clearing	Crop Sequestration	Fertilisers	N_2O	Field Fuel Use	Peat	Conservation	POME	Mill Fuel Use	Grid Emissions	Mill Credit
2015	756,867	(656,079)	21,859	38,382	22,200	75,083	(3,247)	191,017	3,173	269	(28,406)
2016	734,449	(667,826)	22,205	44,907	19,608	74,292	(3,366)	227,198	3,030	320	(32,932)
2017	756,518	(690,397)	48,159	60,505	16,445	74,292	(3,410)	175,592	3,445	315	(32,208)
2018	729,751	(672,087)	55,738	65,672	19,417	74,292	(4,261)	145,492	3,382	310	(27,809)
2019	717,995	(661,870)	61,086	55,682	17,304	74,607	(4,196)	257,781	3,640	249	(38,857)
2020	673,068	(623,316)	48,029	51,617	18,193	74,607	(4,192)	288,021	3,221	466	(44,744)

2015 2016 2017 2018 2019 2020

GHG Emissions for Kulim Operations Including Smallholders 2020 (MT CO_2e) by GHG Protocol Scopes



GHG Emissions for Kulim Operations Including Smallholders 2019 (MT CO_2e) by GHG Protocol Scopes



Main Emissions Sources

Emissions Sources and Emissions Sinks

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 grassland releasing only small amounts.

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.

POME releases methane, which is a powerful GHG.

Peatland cultivation - these represent a significant source of GHG emissions. We have a small portion of peat within the cultivated area - 1,360 hectares which was cultivated in 1999 to 2002.

Biogas offset - Methane from POME is captured and can be used for electricity or other energy usage, avoiding emissions.

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 (PKS and fibre) with only a small volume of diesel used for back-up generators. This leads to avoided emissions and can be offset.

OIL PALM CULTIVATION EMISSIONS

Historical land-use change has been by far the most significant contributor to Kulim's GHG emissions. As most of our planted area has been converted from other crops with similar emissions profiles (mainly rubber), the sequestration associated with oil palm planting has broadly balanced out these emissions. This has resulted in net planting emissions of just below 49,800 MT CO_2e for 2020.

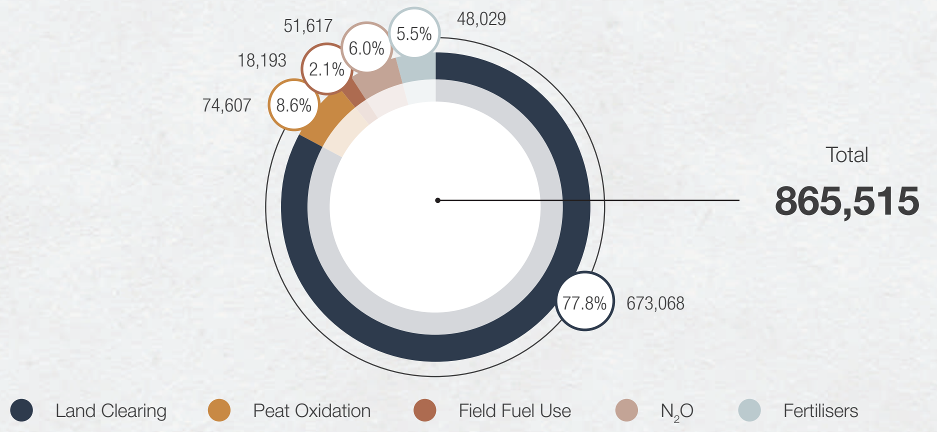
Methane (CH_4) released from POME accounts for just over 288,000 MT CO_2e, making up 25% of our 2020 gross GHG emissions. This is almost double the emissions attributed to POME in 2018 and was a major cause of the increased of our net emissions. The spike was primarily due to the shutdown of two methane capture facilities: Sedenak in 2018 and Sindora in 2019. While every effort is being made to rectify the plant malfunctioning and restart the facilities, we are simultaneously establishing several new effluent treatment systems to help reduce the Biological Oxygen Demand ("BOD") and Chemical Oxygen Demand ("COD") levels of effluent, which directly correspond to methane generation potential before discharging to furrows.

Emissions resulting from peat oxidation remained stable

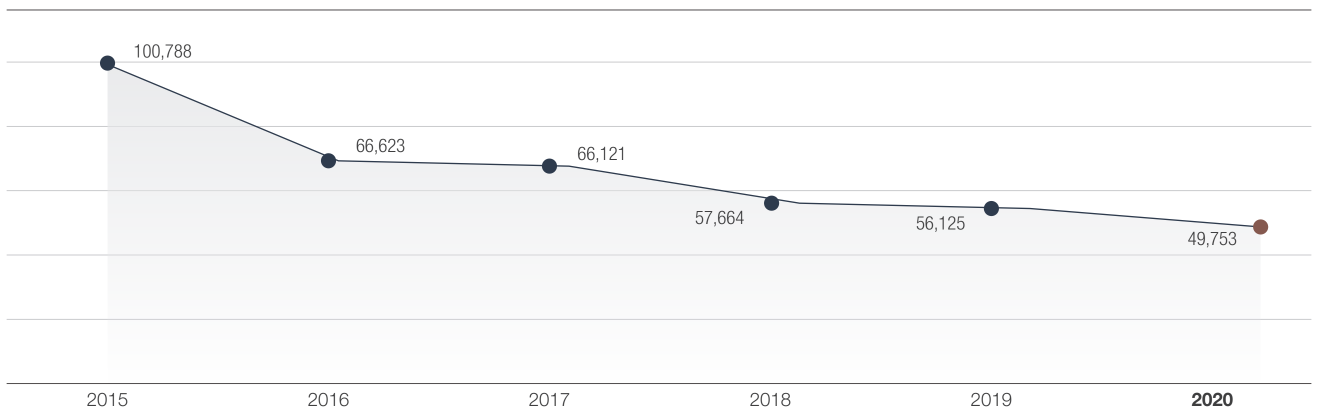
74,000
MT CO_2e

Emissions resulting from peat oxidation remained stable at around 74,000 MT CO_2e and, having committed to zero development on peat, we anticipate no future increase. Emissions attributable to fertiliser use and the resulting Nitrous Oxide (N_2O) contributed 99,650 MT CO_2e. This represents a decrease from the peak of 2018 due to changes in the types of fertiliser used and the timing of applications across our estates. Emissions derived from fuel consumption at mills and in the field are within the expected range and remain comparatively low at around 21,414 MT CO_2e.

Gross Carbon Emissions from Oil Palm Cultivation 2020 (MT CO_2e)



Net Emissions from Land Use Change 2015 – 2020 (MT CO_2e)



Land Clearing and Crop Sequestration

Approximately 78% of our 2020 oil palm cultivation gross carbon emissions resulted from land clearing, releasing 673,068 MT CO_2e (inclusive of outgrower emissions). The main factor behind these emissions is replanting of non-productive old oil palm trees. There has been no conversion from non-agricultural land for our Malaysian operations in either 2019 or 2020.

Carbon released from land clearing has been offset through the amount of carbon sequestered by oil palms planting. Carbon sequestration accounted for 623,316 MT CO_2e in 2020, resulting in net GHG emissions of 49,753 MT CO_2e from land-use change. This 50.6% drop from a 2015 peak of 100,788 MT CO_2e was expected, as replanted oil palms sequester increasing amounts of CO_2 during maturation.

Fertiliser Use and Nitrous Oxide (N_2O) Emissions

GHG emissions, particularly N_2O, are generated through the production, transportation, and application of fertilisers across our estates and in those belonging to our outgrowers. Fertiliser use contributed 99,646 MT CO_2e or 20.6% of our net GHG emissions in 2020 representing an 18% decrease from a 2018 peak of 121,409 MT CO_2e.

The COVID-19 pandemic brought significant disruptions to global supply chains, and Kulim was no exception. Many of our foreign workers visiting their home countries were not permitted to return to Malaysia once border restrictions were implemented to contain the spread of the virus. Subsequently, shortage of plantation workers impacted our fertiliser application schedule. Moreover, fertiliser imports were also delayed due to pandemic-related logistical constraints. In response, our agronomy department adopted slow-release type fertilisers for two to four year old palms to extend the interval between applications. This resulted in lower GHG emissions from fertiliser use in 2020.

Fertiliser Emissions Including Outgrowers 2015 – 2020 (MT CO_2e)

The amount of CO_2e emitted by each fertiliser chemical component can vary widely, from 44 kg to 2,380 kg CO_2e per MT. PalmGHG calculates N_2O emissions derived from fertiliser by multiplying the nitrogen content by a factor of 44/28 (Chase L.D.C., 2012)[1].

Field Fuel Use

Fossil fuels mainly diesel are used to power equipment, vehicles, and machinery across our field operations. This includes energy consumed for transporting materials and workers, field maintenance, fertiliser application and FFB harvesting. Our total consumption of fossil fuels for these purposes contributed just 2.1% of our gross GHG emissions from palm cultivation. The emissions factor for diesel use is 3.12 kg CO_2e per litre.

[1] Calculation is based on the conversion of N_2O (molecular wt. 44) to N_2 (molecular wt. 28).

Peatland Plantings

Peatlands are natural, significant stores of carbon that have accumulated over millennia. When disturbed, this stored organic carbon is exposed and begins to decompose due to crop cultivation. This releases GHGs, including CH_4 and N_2O, into the atmosphere. Despite significant uncertainty surrounding the factors determining the magnitude of these emissions, drainage depth, subsidence, and plantation age are all likely to play a part. Peat and other wetlands are now widely understood as areas that need to be conserved and preserved.

Kulim's existing peat planting comprised only 2.45% of the total planted area in Kulim estates. However, peat has a very high emissions factor and consequently makes a significant contribution to our overall carbon footprint. In 2020, peat-related emissions accounted for 74,607 MT CO_2e or 8.6% of our gross emissions from palm cultivation.

In compliance with RSPO Principles and Criteria (P&C), we have implemented best management practices to stabilise peat emissions, including drainability assessment which is required to be conducted five years prior to replanting following the RSPO Drainability Assessment Procedure to mitigate social and environmental impacts due to peatland subsidence. To determine peatland GHG emissions, the PalmGHG Calculator uses default emission values of 0.91 MT CO_2e per centimetre per year (or 54.6 MT CO_2e per hectare per year where drainage depth is 60 cm) and 16 kg $N\text{-}N_2O$ per hectare per year.

Carbon Sequestration in Conservation Areas

Sequestering and storing atmospheric carbon in biomass is an effective way to mitigate and decelerate the accumulation of atmospheric carbon dioxide. The PalmGHG Calculator allows for carbon sequestration in designated conservation areas to be considered for our net emissions.

As of the end of 2020, we have successfully established 1,119.14 hectares of set-aside land, offsetting our net GHG emissions by 4,192 MT CO_2e.

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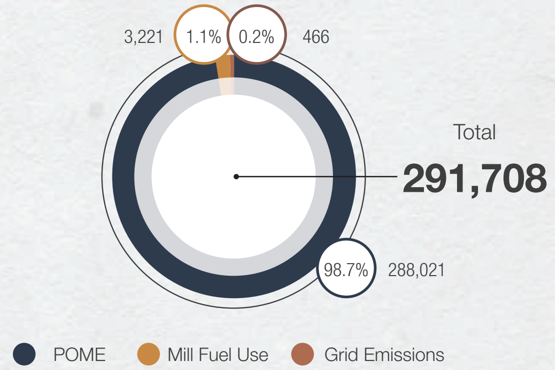
PALM OIL MILL EMISSIONS

GHG emissions from the processing of FFB into CPO and PK at our mills is our most significant modifiable source of GHGs. There are two primary emission sources at mill level: methane from POME and mill energy consumption. Fuel and grid electricity for mill use are insignificant, as most of our operations are powered by biomass. Only 1.3% of our 2020 gross emissions from palm oil mills are attributed to the use of diesel and grid electricity.

Gross Emissions from Palm Oil Mills 2020 (MT CO_2e)



Palm Oil Mill Effluent Methane Emissions

POME is the wastewater produced during palm oil milling processes and accounts for 98.7% of our gross mill emissions. POME is rich in residual organic material and is commonly treated through microbial digestion to reduce the BOD and COD, the two primary measurements of effluent quality. POME is typically retained in ponds by batches that allow naturally occurring micro-organisms to break down the organic nutrients. Retention times will vary; these depend on several factors before being discharged to the environment after meeting BOD and COD thresholds defined by the relevant authorities.

The by-product of this digestion process is a mixture of carbon dioxide and methane, both GHGs that are accounted for by the PalmGHG calculator.

Palm Kernel Shell Emissions Credits

PKS is a by-product derived from the extraction of PK. It is currently used for power generation at our mills or sold for external use. In 2020, we sold 20,338 MT of PKS to third parties.

Repurposing PKS enables the generation of carbon offsets (or carbon credits) as it displaces coal and other types of solid fossil fuels. PKS is in high demand in countries such as Japan and South Korea, where it is used for energy generation and cement production.

Kulim has monitored PKS usage since 2014, and determined that most of the PKS we sell is used for energy generation. We can consequently incorporate a carbon credit of 44,744 MT CO_2e for 2020. This exceeds our total combined emissions from fossil fuels consumed at mills and in field operations for that year.

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METHANE CAPTURE AND BIOGAS GENERATION

Mitigating POME GHG emissions — particularly methane (CH_4) — has been a central focus for Kulim since we began tracking our carbon footprint and climate change impacts.

Since our last report, the operating environment for energy-generating methane capture facilities has largely remained the same. The financial viability of these projects remains a barrier to broader industry adoption of renewable bio-methane energy solutions.

Notwithstanding these factors, we believe that the direct and indirect impacts of inaction far outweigh the cost of developing such facilities. Although there was a setback in our initial objective to have methane capture facilities installed at all our mills before 2020, we are pleased to report that we are on track to achieve this by a revised timeline of 2025.

Currently, a significant proportion of methane generated at our mills is captured and converted into electricity for internal use and flaring. Recorded total methane production increased by 83% from 3,781,857 m^3 in 2019 to 6,930,104 m^3 in 2020 once our methane capture facilities begin to stabilise. Since Palong Cocoa Palm Oil Mill methane capture facility became operational in July 2020, four of our mills now have methane capture facilities installed. Tereh's methane capture facility has started testing and commissioning in September 2021 – well in advanced of our revised timeline.

Regrettably, unforeseen major malfunctioning has significantly impacted our methane capture facilities at Sedenak Palm Oil Mill and Sindora Palm Oil Mill; they have been closed for repairs/upgrades since October 2018 and March 2019, respectively. This was the main reason for net emissions increases throughout 2019 and 2020.

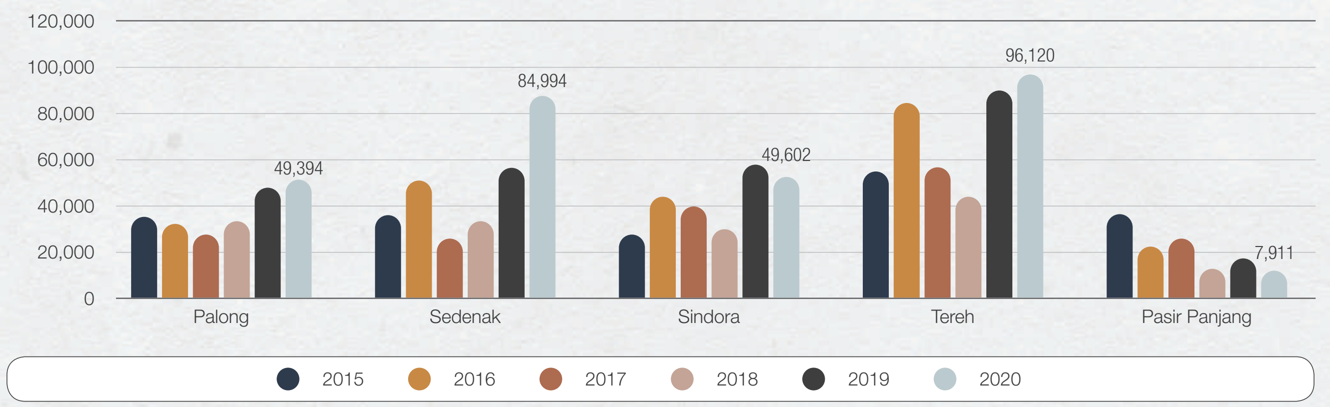
A damage assessment indicated that rectification would likely take some time as both systems need to be partially rebuilt – this has been compounded by pandemic-related issues concerning the availability of imported components.

An additional Bio-Methane project which upgraded of biogas plant in Sedenak has progressed well. This system also involves capturing POME-generated methane, but instead of in-situ consumption, the methane gas is treated and compressed before injection into Gas Malaysia's Natural Gas Distribution System ("NGDS") network. While for bio-compressed Natural Gas (Bio-CNG) which discussed in our 2018 carbon report for Tereh Palm Oil Mill is expected to complete by July 2023.

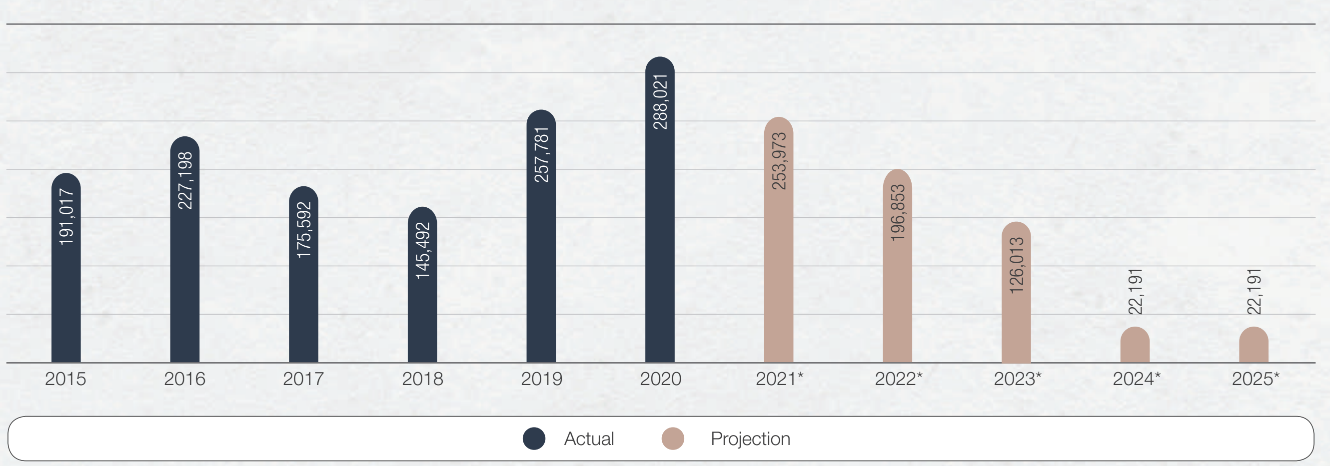
Our remaining operational methane capture facilities and other POME treatment measures including tertiary treatment plants and multi-disc screw press sludge dewatering systems – work in tandem to mitigate POME fugitive methane emissions. Regrettably, 2019 and 2020 POME GHG emissions doubled during this transitional phase of our methane capture plans.

Pasir Panjang Palm Oil Mill fully functioning methane capture facilities continue to reign in POME GHG emissions and are a testament to the effectiveness of our methane capture strategy. We are confident that we are still on track to achieve our 2025 objective of a 50% reduction in POME GHG emissions from our 2012 baseline of 250,415 MT CO_2e.

GHG EMISSIONS FOR POME BY MILL 2015 - 2020 (MT CO_2e)



PROJECTED EMISSIONS REDUCTION (MTCO_2e) FROM POME UP TO YEAR 2025



*Please refer to assumptions for carbon reduction targets on page 25.

REDUCING OUR RELIANCE ON SYNTHETIC FERTILISERS

As part of our continued efforts to reduce GHG emissions and our impact on the environment, we continue to manage the production, transportation and use of synthetic fertilisers. These fertilisers contribute to GHG emissions and when used excessively, can pollute rivers and underground water sources.

Our agronomy team regularly collects field data to analyse our usage to help us understand the footprint left by these compounds and to optimise our use of organic and non-organic fertilisers. Furthermore, all Kulim mills have established composting projects to recycle nutrients from empty fruit bunches and POME back into the fields.

Fertiliser use emissions represent the next best opportunity for mitigation (after methane capture). In 2020 switch to slow-release type fertiliser in response to pandemic-related disruptions have contributed to reductions in GHG from fertiliser use and may help inform our fertiliser strategy in the future.

OUTGROWER ENGAGEMENT

Independent FFB suppliers account for approximately 25% of the FFB processed at Kulim's mill, making them crucial stakeholders in reducing environmental impacts. We initiated long-term engagement processes with all our outgrowers in 2012. This has since developed into a comprehensive programme to support independent operators in achieving RSPO certification.

To date, three outgrower groups have achieved RSPO certification through this programme: Felda Paloh Estate, Wawasan Estate, and Eng Lee Heng. We continue to work with other groups and have established a new dedicated outgrower engagement department to help accelerate our efforts to establish a traceability system.

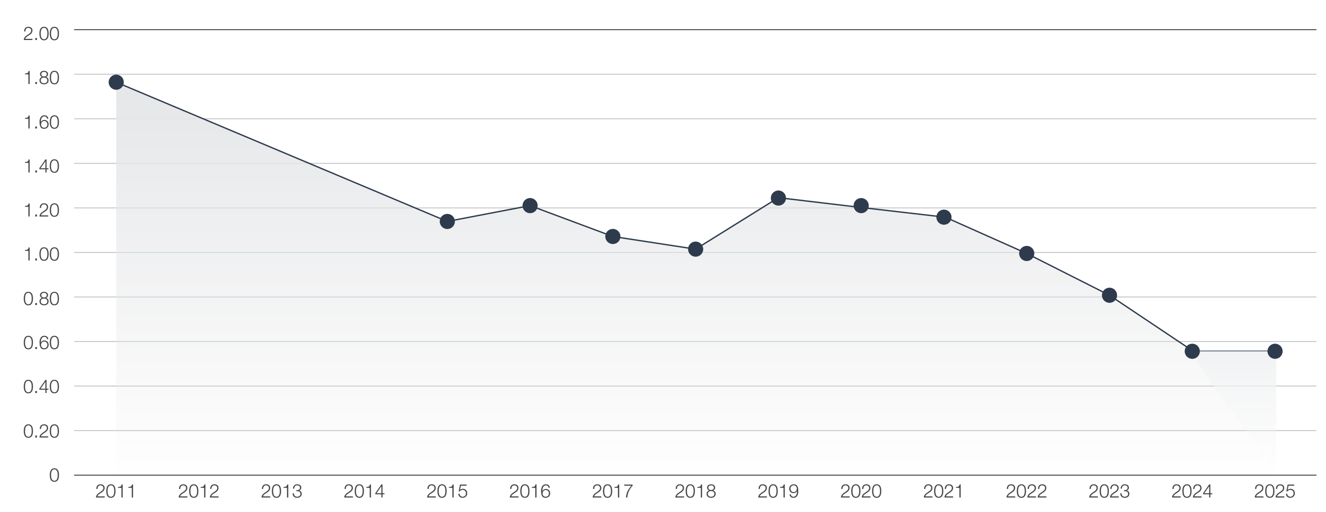
We believe that by encouraging the adoption of good agricultural practices, including the efficient use of fertilisers, these engagements will enable sustainable reductions in GHG emissions throughout our supply chain.

EMISSION REDUCTION TARGETS AND PROJECTIONS

Kulim's current GHG emissions target is to achieve 50% reduction in our 2025 carbon footprint. This is based on a recalculated base year (2012) carbon footprint to ensure comparability. The target date is in line with specific objectives for our biogas plans, as the overall carbon footprint is mainly dependent on the outcomes of our biogas initiatives.

Despite a setback in our 2019 to 2020 emissions performance, we are pleased to report that we are still on track to meet our 2025 goal. We are confident that robust mitigation strategies will mean further reductions in the coming years.

Product Carbon Footprint Projection (2015 - 2025)
*(*Assuming all other GHG emissions remains constant as of 2020)*



**Please refer to assumptions for carbon reduction targets on page 25.*

PALMGHG CALCULATOR

Unless otherwise stated, all calculations and definitions applied in this report are based on the PalmGHG Calculator developed by the RSPO Greenhouse Working Group 2. This version is based on the Global Warming Potential Assessment of Palm Oil Production ("GWAPP") model developed by Chase and Henson (2010).

The PalmGHG Calculator was developed to highlight GHG emission hotspots in the palm oil production chain. It enables palm oil producers to monitor their GHG emissions, identify reduction opportunities, and develop reduction plans.

1 GHG emissions sources listed under the PalmGHG framework include:

- Land clearing;
- Fertiliser production and transportation;
- N_2O and CO_2 emissions from the application of fertilisers in the field;
- Use of fossil fuels in plantations for planting and FFB harvesting, collection and transport to mills;
- Fossil fuels usage in mill operations;
- CH_4 emissions from the anaerobic degradation of POME; and
- CO_2 and N_2O emissions from cultivation on peat soil.

2 GHG fixation and credits listed in the PalmGHG framework include:

- CO_2 fixation through palm tree growth;
- CO_2 fixation by biomass in conservation areas; and
- GHG emissions avoidance from the use of by-products, such as palm kernel shells, and the use of electricity generated by biomass from the mills.

3 GHG emissions sources/sinks excluded in the PalmGHG Calculator are:

- Nursery planting stage;
- Pesticide: manufacturing, transport and use;
- Fossil fuel use during land clearing activities;
- The carbon footprint of infrastructure, plants and equipment;
- Carbon sequestration in palm end products; and
- Work-related employee travel and commuting.

PALMGHG FRAMEWORK ASSUMPTIONS

The PalmGHG Calculator provides a set of default values in the absence of company-specific field data. This report uses Kulim's field data whenever available, provided it can be verified through our operational records.

Elsewhere, default values are used to determine GHG emissions from land-use change, peat emissions, fertiliser production, and field application. Several emissions factors were also based on PalmGHG default values, including POME conversion to methane and fossil fuel and grid electricity offsets.

ASSUMPTIONS FOR CARBON REDUCTION TARGETS

All projections and forward-looking statements relating to goals and targets assume that:

- Due to the biological nature of the conversion process, once a biogas facility is operational, the first year of operation will only operate at a POME-to-biogas conversion rate of 10%, followed by 30%, 50% and 95% in the subsequent three years.
- All mills will have at least one methane capture facility installed by 2021.
- Reduction projection is based on the year where the mill POME emissions are the highest.
- All other emissions remain constant during this period.

For a conservative estimate, we assume that all methane captured will be flared or injected into the national gas grid and not used to generate electricity in mills (which would create a greater carbon offset). We believe that all other data, including FFB throughput, land clearing and sources of emissions and sequestration, will remain at 2020 conditions.

BASE DATA

EMISSIONS DATA 2020 (PALMGHG VERSION 4)

Description	Unit	Palong Cocoa Palm Oil Mill	Sedenak Palm Oil Mill	Sindora Palm Oil Mill	Tereh Palm Oil Mill	Pasir Panjang Palm Oil Mill
Carbon Footprint	MT CO_2e/ MT CPO/PK	1.23				
		1.34	2.09	1.10	1.28	0.35
Net Emission	MT CO_2e/yr	66,223	194,877	75,489	119,659	27,810
Land Clearing	MT CO_2e/yr	95,441	159,030	108,088	172,240	134,604
Crop Sequestration	MT CO_2e/yr	(89,247)	(145,217)	(94,530)	(163,260)	(127,587)
Fertiliser Production & Transport	MT CO_2e/yr	7,495	8,528	7,682	11,833	12,173
Fertiliser Application (N_2O)	MT CO_2e/yr	6,784	16,887	6,508	10,954	10,206
Field Fuel Use	MT CO_2e/yr	893	3,968	1,176	6,490	5,543
Peat Land Emissions	MT CO_2e/yr	-	73,421	-	1,186	-
Conservation Area Offset	MT CO_2e/yr	(233)	(6)	(16)	(448)	(3,490)
Methane from POME	MT CO_2e/yr	49,394	84,994	49,602	96,120	7,911
Mill Fuel Use	MT CO_2e/yr	169	1,189	756	776	331
Grid Emissions	MT CO_2e/yr	496	-	-	-	-
PKS Credit	MT CO_2e/yr	(4,940)	(7,917)	(3,776)	16,232	(11,880)
GHG emissions by FFB source						
Own Crops	MT CO_2e/yr	21,133.6	98,758.63	17,501.61	34,763.12	31,241.79
Group	MT CO_2e/yr	-	639.10	65.22	1,405.95	206.42
Outgrowers	MT CO_2e/yr	-	43,486.19	11,339.82	2,826.36	-

EMISSIONS DATA 2019 (PALMGHG VERSION 4)

Description	Unit	Palong Cocoa Palm Oil Mill	Sedenak Palm Oil Mill	Sindora Palm Oil Mill	Tereh Palm Oil Mill	Pasir Panjang Palm Oil Mill
Carbon Footprint	MT CO_2e/ MT CPO/PK	1.25				
		1.10	2.03	1.45	1.28	0.50
Net Emission	MT CO_2e/yr	61,533	173,931	88,951	121,457	36,509
Land Clearing	MT CO_2e/yr	95,441	193,766	124,032	168,896	132,194
Crop Sequestration	MT CO_2e/yr	(89,160)	(174,365)	(109,963)	(159,626)	(125,283)
Fertiliser Production & Transport	MT CO_2e/yr	9,632	11,060	11,428	14,540	14,018
Fertiliser Application (N_2O)	MT CO_2e/yr	7,529	17,496	8,316	12,490	9,528
Field Fuel Use	MT CO_2e/yr	1,165	3,948	1,587	5,597	4,889
Peat Land Emissions	MT CO_2e/yr	-	69,731	258	4,618	-
Conservation Area Offset	MT CO_2e/yr	(233)	-	(14)	(459)	(3,490)
Methane from POME	MT CO_2e/yr	44,320	57,972	57,334	89,602	11,553
Mill Fuel Use	MT CO_2e/yr	146	1,626	479	772	617
Grid Emissions	MT CO_2e/yr	249	-	-	-	-
PKS Credit	MT CO_2e/yr	(7,557)	(7,304)	(4,506)	(11,973)	(7,517)
GHG emissions by FFB source						
Own Crops	MT CO_2e/yr	24,374.06	93,601.29	19,303.94	38,425.23	31.299.65
Group	MT CO_2e/yr	-	476.28	384.32	5,864.47	556.40
Outgrowers	MT CO_2e/yr	-	51,822.97	22,532.21	1,766.80	-

PRODUCTION DATA

DESCRIPTION	UNIT	2020	2019	2018	2017	2016
PALM PRODUCTS						
Crude Palm Oil	MT CPO/yr	316,066	309,867	306,483	299,981	273,354
Palm Kernel	MT PK/yr	79,711	77,108	78,994	79,071	70,030
FFB PRODUCTION						
Own Crop	MT FFB/yr	1,131,887	1,058,543	1,051,446	1,149,709	974,881
Outgrowers	MT FFB/yr	370,062	371,972	407,886	317,986	364,778
PLANTED AREA						
Own Crop	Ha	55,874	55,877	53,470	56,204	56,097
Outgrowers	Ha	16,650	19,970	25,375	28,729	22,816
FERTILISER						
Own Crop	MT/yr	58,843	58,847	62,061	57,455	62,642
Outgrowers	MT/yr	9,707	10,785	6,608	5,268	7,671
FIELD FUEL USE						
Own Crop	liters/yr	4,809,922	4,275,052	4,596,450	5,078,590	2,960,339
Outgrowers	liters/yr	1,091,487	1,252,006	1,492,358	1,204,970	2,090,917
Mill Fuel Use	**liters/yr**	**1,032,417**	**1,166,820**	**788,379**	**1,104,043**	**971,047**

DATA COLLECTIONS AND LIMITATIONS

Two distinct data sets have been used in this report – each with associated challenges and scope for improvement.

IN-HOUSE DATA FROM ESTATES AND MILLS

Primary emissions data from Kulim estates and mills was obtained from statistics and monitoring by our estates and engineering departments. Although we assume this data is correct, continuous efforts will be taken to ensure a high degree of accuracy.

Crop Sequestration

Our calculations to determine the amount of carbon sequestered through new palm tree planting is based on estimates using the PalmGHG Calculator default values. These values are recommended in the Calculator guidelines and are taken from the OPRODSIM and OPCABSIM models[2]. Kulim does not currently have a system for making on-site measurements of the biomass growth of its palm trees.

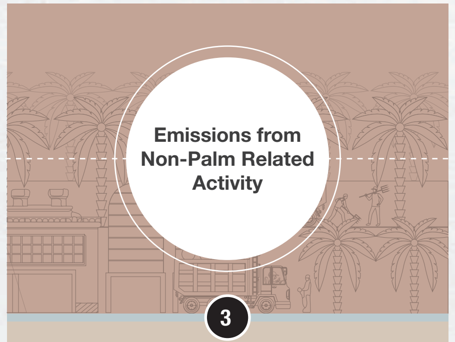
[2] *Oil Palm Production Simulator (OPRODSIM) and Oil Palm Carbon Budget Simulator (OPCABSIM) are oil palm models specifically designed to estimate plantation oil palm and associated biomass (litter and ground cover) by generating growth curves based on climate and soil data. These assumptions are largely based on Malaysian conditions.*

OUTGROWER DATA

The second data set relates to our outgrowers' crops. Kulim's external crop is primarily purchased from third-party FFB traders, where traceability data is often incomplete. Kulim has assigned dedicated personnel to engage these stakeholders as per our 2025 target for 100% certification of all external FFB – this includes helping some of our plantation traders to achieve RSPO certification. However, several factors contributing to a high margin of error have been identified:

Results from our traceability efforts indicate a vast difference among suppliers because of variations in previous land use profiles.

The quality of record keeping from traders and their smallholders varies significantly and can lead to a high level of uncertainty. This includes records of previous land use from the past three decades and identification of mineral soils versus peatlands.



We assume that all fertilisers and fuels purchased by smallholders and outgrowers will be used for oil palm cultivation and harvesting. However, these resources may also be used for other purposes, such as cultivating additional crops or private transport. We hope that increased engagement with our external FFB suppliers will encourage better record keeping differentiating between resources used for palm and non-palm related smallholder activities.

Despite any shortcomings with the current process, we believe it is still an improvement over the standard assumption that a company's FFB and externally sourced FFB have similar carbon profiles. Indeed, our calculations to date indicate that this is not the case. Furthermore, we believe that external FFB data can be improved over time through increased trust, transparency, continued engagement with traders and external suppliers.

GLOSSARY

Biogas: a mixture of methane and carbon dioxide from the bacterial decomposition of organic wastes. It is a renewable energy source that can be used as fuel for vehicles or injected into the natural gas grid.

Biogenic: a state of being formed from biological processes or being produced by living organisms.

Biomass: a biological material derived from living or recently living organisms. Energy biomass is often used to denote plant-based material, but biomass can apply to material derived from animal and vegetable sources.

Carbon Dioxide Equivalent (CO_2e): a unit of measurement to compare climatic effects of different greenhouse gases. CO_2e is calculated by multiplying the quantity of greenhouse gas by its global warming potential. Consequently, the standard way of labelling emissions is as carbon dioxide equivalents or CO_2e.

Carbon Dioxide (CO_2): the most widespread greenhouse gas. CO_2 is released into the atmosphere through natural and human activities, including fossil fuel and biomass combustion, industrial processes, and changes to land use. Carbon dioxide accounts for 76.7% of global greenhouse gas emissions, with 13.5% attributed to agriculture and 17.4% from forestry.

Carbon Sequestration (Or Carbon Sink): describes how vegetation captures carbon dioxide from the atmosphere through photosynthesis and releases oxygen and some carbon dioxide by respiration. Part of this carbon is retained in vegetation as biomass. As around half of a plant's biomass is carbon, as it grows and adds biomass, it also augments or sequesters carbon. This is a natural process, but it can be enhanced. For example, planting trees on previously unforested land will sequester more carbon because of the increase in biomass. The term 'sink' refers to any process, activity or mechanism that removes a greenhouse gas from the atmosphere.

Carbon Footprint: the amount of carbon dioxide and other carbon compounds emitted through the activities of a particular person or group. This can also be referred to as carbon reports or carbon footprints.

Crude Palm Oil (CPO): a type of unrefined vegetable oil obtained from the fruit of the oil palm tree.

Greenhouse Gases (GHGs): an essential part of the earth's natural cycle, keeping the planet warm enough to sustain life. Human activities are disrupting the balance by increasing the concentration of GHGs 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%).

Oil Palm: a species of palm (Elaeis guineensis) and the principal source of palm oil. It is native to west and southwest Africa but is now cultivated in over 26 countries. Ideal growing conditions are ten degrees on either side of the equator.

Fresh Fruit Bunches (FFB): bunch harvested from the oil palm tree. Each bunch can weigh from five to 50 kg and can contain 1,500 or more individual fruits.

Palm Kernel (PK): the kernel or core of the oil palm fruit. Palm products: these include versatile oil and fat products used in a wide range of applications, from food manufacture and cosmetics to biofuel and pharmaceuticals. Kulim is a leading processor of FFB and producer of CPO and PK.

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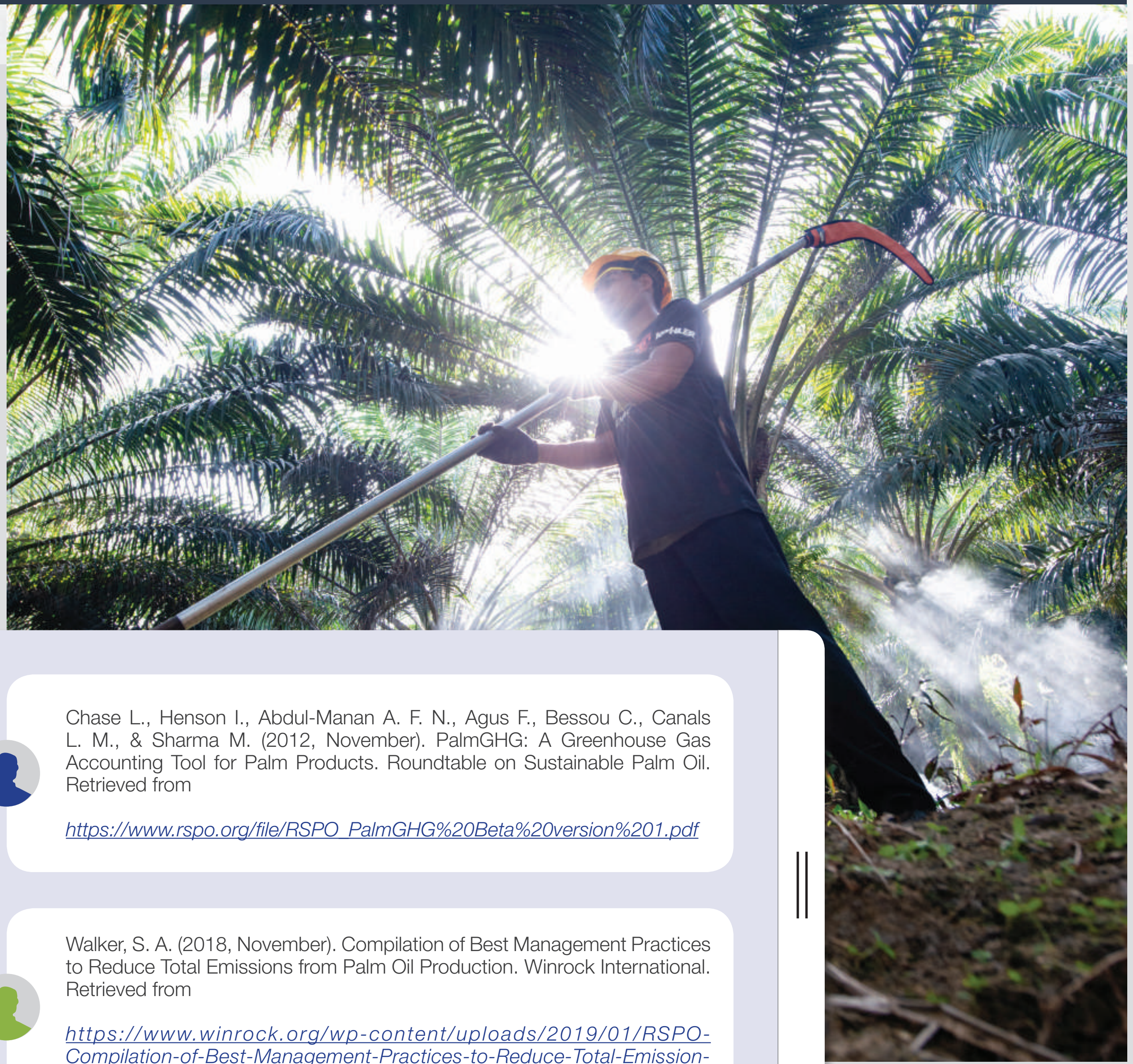

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ABOUT THIS REPORT

This report covers Kulim's oil palm operations in Malaysia for the calendar years 2019 and 2020. Data, commitments and targets do not include Kulim's operations in Indonesia, which were initiated in 2014. Since then, our landbank in Indonesia has undergone significant changes from disposals and acquisitions. At the time of publication, our Indonesia operations have not yet been fully stabilised. However, we aim to provide an interim update of their emissions performance independently of our Malaysian operations.

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

We welcome feedback and questions.
Please contact:

Salasah Elias
Kulim (Malaysia) Berhad
c/o Ulu Tiram Estate, 81800 Ulu Tiram, Johor Darul Takzim, Malaysia
T: +607 861 1611 F: +607 861 1701 Email: salasah@kulim.com.my

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