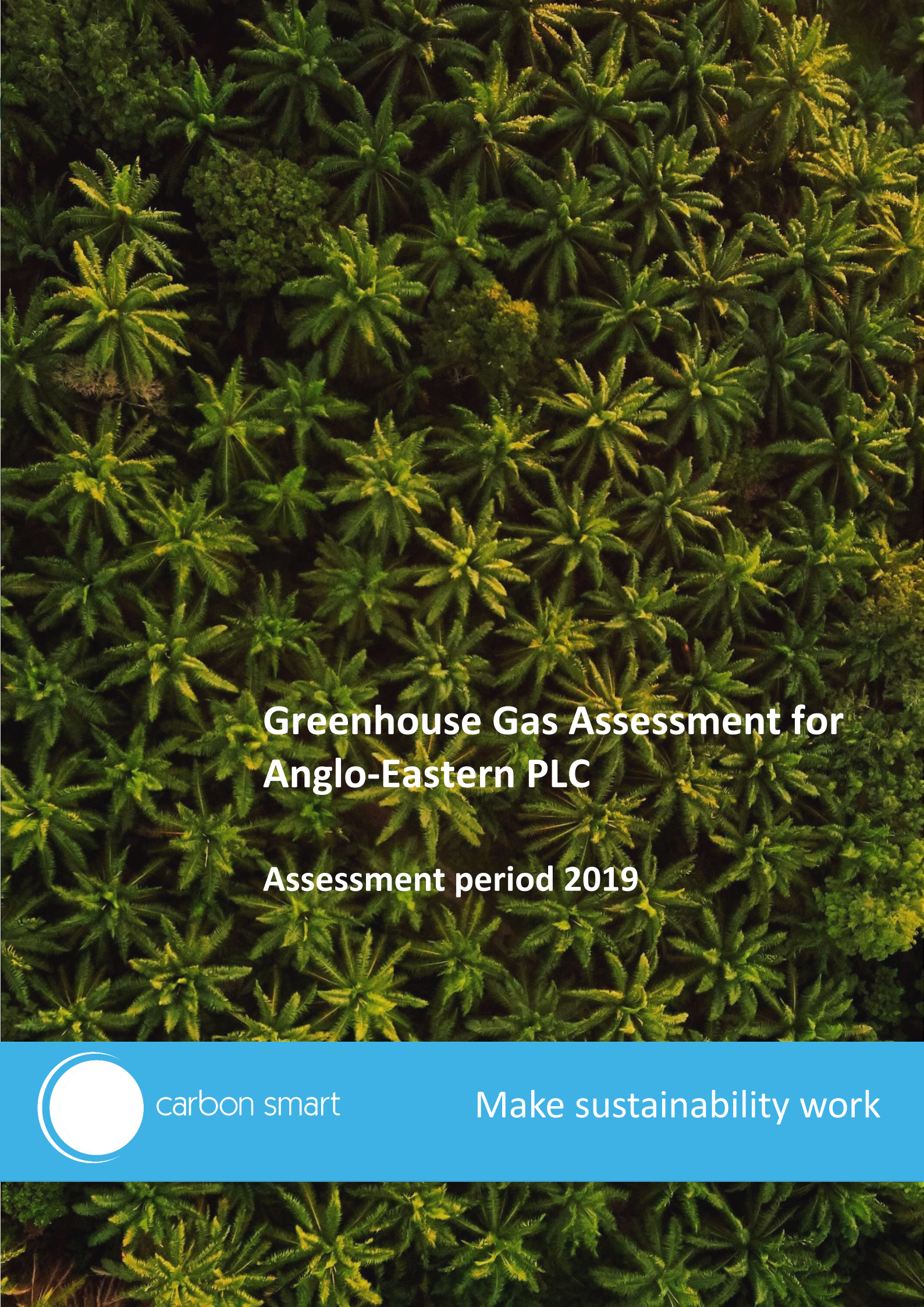


Greenhouse Gas Assessment for Anglo-Eastern PLC

Assessment period 2019

carbon smart

Make sustainability work

Contents

Report control

Version reference	Date reviewed	Reviewer	Overview of changes
1.0	31/01/2020	Ben Murray	First issue
1.1	31/03/2020	Ben Murray	Minor amendments to tables

Assessor & contact: Madeleine Alexander

Reviewer: Ben Murray

Organisational boundary: Anglo-Eastern Plantations owned premises and outgrower estates

Operational boundary: Emissions associated with premises activities, company owned vehicles, employee mileage, employee housing, land clearance, carbon sequestration, cultivation on peat soils

Reporting period: 1st January 2019 – 31st December 2019

Client contact: Kuna Srinivasan & Ronald Sihombing

About Carbon Smart

Carbon Smart is a global, well-established, independent sustainability consultancy based in London. Founded in 2007 as part of a leading environmental services group to offer an alternative to carbon neutrality. Our first services were carbon footprints and energy audits. We developed the Carbon Smart Certification - an SME focused alternative to ISO14001 – and have helped over 1,000 businesses to adopt environmental policies, carbon footprints, and management commitment. As the company has grown, we have worked with central government departments, local councils and major UK and global corporations to tackle some of the biggest sustainability challenges. In 2015, we became an independent company, and reflecting our belief that our people are our greatest asset, Carbon Smart has become an employee owned business

Today, our work covers all areas of sustainability, including supply chain, renewable energy, and compliance working with clients in all sectors, large and small.

1. Introduction

Anglo-Eastern Plantations (AEP) are committed to managing their impact on the environment through a robust sustainability reporting process. AEP have calculated and reported their greenhouse gas (GHG) emissions each year since 2013, complying with the UK's Mandatory Greenhouse Gas regulations (Directors' Reports) and following internationally recognised best practice in this area.

AEP's GHG emissions assessment quantifies the total greenhouse gases produced directly and indirectly from their business activities. The results of this assessment provide understanding of AEP's environmental impact, allowing the business to take a proactive management approach. Carbon Smart have worked with the team at AEP to ensure all relevant sources of GHG emissions are included, that data collected is accurate and that industry best practice is followed in all instances, with up to date emissions factors applied.

2. Methodology

This GHG Assessment has been performed in accordance with the World Business Council for Sustainable Development and World Resources Institute (WBCSD/WRI) *Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (Revised edition)* (2015). AEP operate 26 estates and 6 mills across Indonesia and Malaysia which are all considered in scope. In addition, there are three offices globally in Indonesia, Malaysia and London. Only the office in Medan, Indonesia is within scope for this assessment.

AEP have taken an operational control approach to determining the boundary for inclusion in this assessment. As such all scope 1 and 2 emissions sources from AEP's operations have been included, alongside the most material scope 3 emissions. Carbon Smart have aligned AEP's operational activities within scope 1, 2 and 3 as per Table 1 below. Scope 1 accounts for all direct GHG emissions from sources that AEP owns or controls, such as natural gas or fuel for company vehicles. Scope 2 refers to the indirect GHG emissions associated with the purchasing of electricity. Scope 3 is an optional category including all other indirect emissions arising from waste disposal, purchased goods and services, business travel and others. Whilst optional, Carbon Smart recommend that scope 3 emissions are included to provide a full representation of business impacts.

Table 1: Emissions sources by scope

Emissions source	Scope
POME treatment	1
Fertiliser application	1
Premises fuel consumption	1
Electricity consumption	2
Electricity – Transmission & Distribution losses	3
Company owned vehicles	1
Employee mileage	3
Employee housing	2
Land clearance (AEP crop)	1
Carbon sequestration (AEP crop)	1
Peat soils cultivation (AEP crop)	1
Land clearance (outgrower crops)	3
Carbon sequestration (outgrower crops)	3
Peat soils cultivation (outgrower crops)	3

2.1 Agricultural emissions

Emissions from agricultural cultivation form the most significant part of AEP's carbon footprint. As such, Carbon Smart have assessed these emissions in line with the methodology developed by the Roundtable for Sustainable Palm Oil (RSPO) (Chase et al, 2012). Version 4 of RSPO's PalmGHG application has been used to source relevant emission factors and provide a sense check of calculations (RSPO, 2018).

2.1.1 Emissions from Land clearance

As AEP expand into new planting area there is an associated change in land use and cover. AEP monitor the total hectares of oil palm planted on each of their estates for each year of an average crop cycle (28 years for AEP estates). The previous land use is also recorded, grouped according to categories provided within the PalmGHG application (see Table 2). AEP provide this data to Carbon Smart for each year 1991 – 2019. The GHG emissions associated with this planting activity are then calculated according to the change in the carbon stock of the land. The RSPO figures have been derived from a review of literature and satellite data on land use changes associated with oil palm plantations in Indonesia and Malaysia. These values have been used in the absence of estate-specific data.

Note: emissions from land clearance are only reported for the land clearance occurring during the reporting year in question.

Table 2: Reference carbon stock of previous land use (RSPO, 2018)

Previous land use	tC/ha
Primary forest	268
Logged forest	128
Grassland	5
Tree crops	75
Food crops	8.5
Secondary regrowth	68.25

2.1.2 Emissions from peat soil cultivation

A small proportion of AEP's plantations cover peat soil areas. Cultivation of peat soils result in GHG emissions due to the oxidation of organic carbon. Carbon Smart have included an estimate of these emissions in alignment with the methodology used in the PalmGHG application. This is based on a report by Hooijer et al (2010) whereby CO_2 emissions are factor of the drainage depth of the soil. AEP have confirmed that their peat soil estates are actively managed at a 55cm drainage depth.

2.1.3 Carbon sequestration from planted areas

To provide a full overview of the carbon impact of AEP's operations the carbon sequestration of each estate has been estimated in line with the PalmGHG application methodology. The amount of carbon sequesters varies with age across the lifecycle of an oil palm plant. This assessment uses the carbon sequestration per hectare per age of plant values from the OPRODSIM and OPCABSIM vigorous growth models (Henson, 2005) referenced by RSPO. Applying these factors to the age profile of AEP's estates provides an estimate of the carbon impact. Whilst highly researched and referenced, these models cannot replace the accuracy of estate specific measurements.

2.2. Operational emissions

AEP operate 26 estates, 6 mills and 1 office across Indonesia and Malaysia. Emissions from the operations of these premises are significantly lower than the agricultural emissions, however, must be included for completeness. The key emission sources include:

- Electricity: premises and employee housing
- Biomass: for use in mill boilers
- Treatment of Palm Oil Mill Effluent (POME)
- Diesel for vehicles
- Fertiliser application

For each emission source AEP provided data which is converted using Defra 2019 conversion factors where appropriate, or PalmGHG approved factors for palm oil specific sources.

2.3. Outgrower emissions

AEP mills process not only crop from their own estates, but oil palm crop sourced from a variety of outgrowers. This means that AEP's final product will include a proportion of emissions associated with the agricultural cultivation of outgrower crops. It has not been possible for AEP to collect specific information from outgrowers on their land clearance, planted area age profile or soil types. Therefore, an estimate has been developed based on the emissions from AEP's own estates. For land clearance emissions and carbon sequestration this has been estimated by calculating the carbon intensity of these emission sources per tonne of crop harvested in AEP's estate, and multiplying by the tonnes of outgrower crop used. Emissions from peat soil cultivation has one small methodological difference; these emissions have been scaled down to reflect the understood lower proportion of peat soil cultivation by outgrowers than by AEP. This is an estimate and should be revisited and revised in future years.

2.4 Methodological changes from 2018

2019 is the first year that Carbon Smart have supported AEP's GHG Assessment. As part of a continuous improvement process there have been a number of methodological changes from the previous assessments. These all relate to updates to the previous carbon conversion factors, with use of most recent factors now adopted. This affects the following emission sources; methane GWP for POME treatment, diesel for company vehicles and biomass for mill boilers.

The most significant change has been an update to the carbon sequestration calculations. In previous years it is understood that an average carbon sequestration value was taken across a 28-year crop cycle, and the average applied to each age of oil palm plant. In order to better reflect the impact of AEP's specific plant age profile the specific carbon sequestration value for each age of plant is applied only to that age of plant. This will result in variations year on year; however, it also provides a more accurate and detailed view of AEP's impact.

3. 2019 Carbon Footprint

Due to the methodology changes implemented in 2019, AEP's 2018 carbon footprint has also been re-calculated to show these changes. This allows more accurate comparison year on year.

3.1 2019 results summary

AEP's operational emissions are detailed in Table 3, below. For the first time in 2019 total operational emissions are greater than agricultural emissions. This is partly due to the change in methodology resulting in POME treatment emissions increasing in significance and greater carbon sequestration, reducing agricultural emissions.

Table 3: AEP 2019 GHG emissions summary (excluding outgrowers)

Emissions source	Results (tCO_2e)
POME treatment	212,215
Fertiliser application	26,614
Premises energy consumption	19,781
Company owned vehicles	9,399
Third party vehicle use	7,367
Employee housing	1,041
Total operational emissions	276,417
Land clearance (AEP crop)	322,182
Carbon sequestered (AEP crop)	-549,475
Peat soils cultivation (AEP crop)	488,823
Total land use emissions	261,530
Overall emissions	537,947

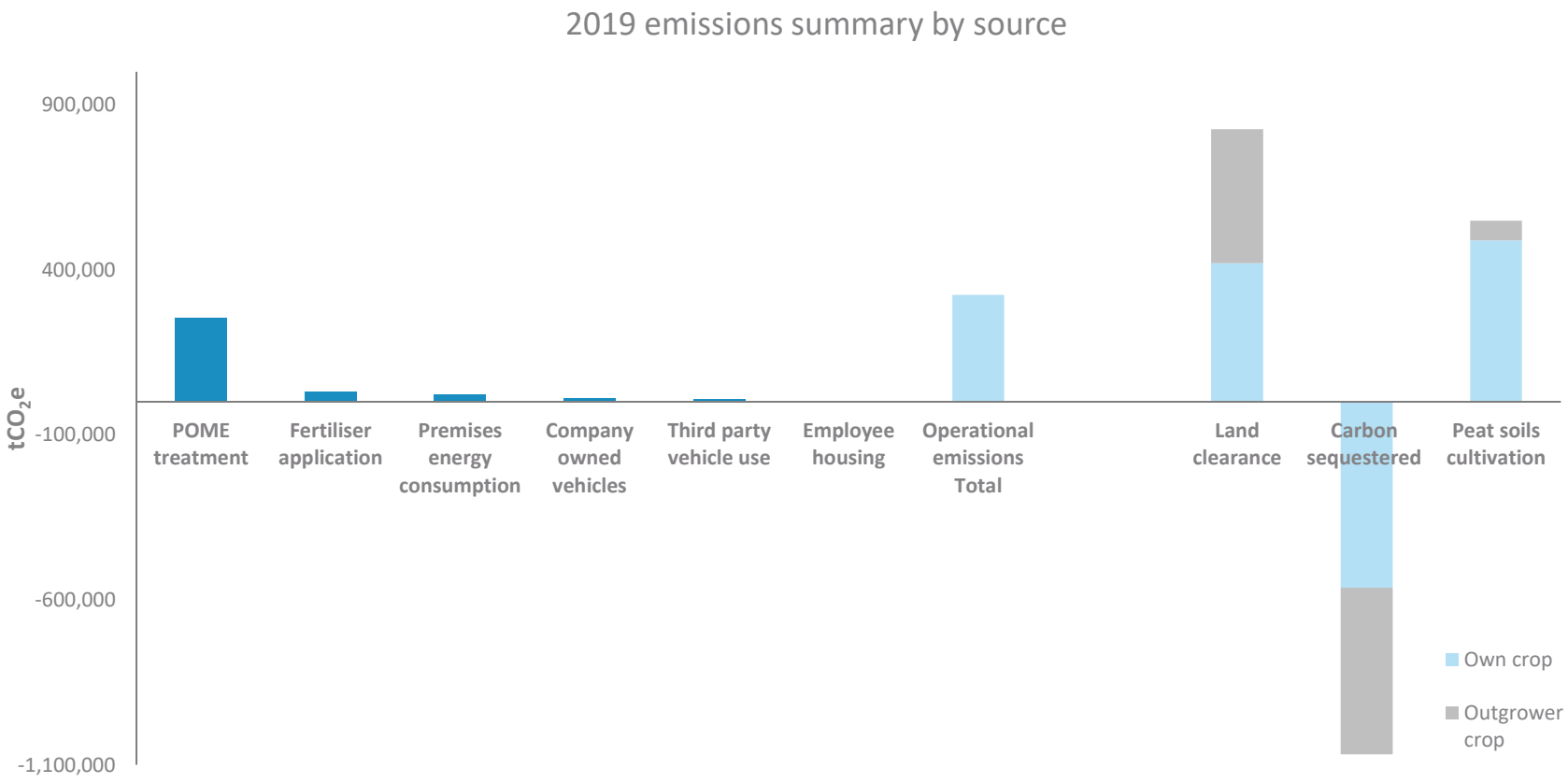


Figure 1: 2019 emissions summary by source

3.2 2019 vs 2018 comparison

AEP's GHG emissions have decreased by 31% in 2019, primarily due to a decrease in emissions associated with land clearance. Agricultural emissions have dropped by almost 50% since 2018, compared with a reduction in operational emissions of only 14%.

Table 4: 2019 vs 2018 emissions comparison

Emissions source	Results (tCO_2e)			
Emissions Source	**2018**		**2019**	
POME treatment	253,421		212,215	
Fertiliser application	30,687		26,614	
Premises energy consumption	20,295		19,781	
Company owned vehicles	11,053		9,399	
Third party vehicle use	7,641		7,367	
Employee housing	1,068		1,041	
Total operational emissions	324,165		276,417	
	Own Crop	Outgrower	Own Crop	Outgrower
Land clearance	420,102	406,014	322,182	285,094
Carbon sequestered	-563,786	-504,285	-549,475	-446,388
Peat soils cultivation	488,843	59,844	488,823	54,790
Total land use emissions	306,732		155,026	
Overall emissions	630,897		431,443	

The significant reduction in the land clearance emissions are explained by the lack of amortisation, as the area of land cleared fluctuates significantly year on year. 22% less land was cleared in 2019 compared to 2018. In addition, all land cleared in 2019 was secondary regrowth, whereas in 2018 10% of land clearance was previously used for rubber, which has a carbon stock >10% higher than secondary regrowth. Carbon sequestration does not face the same amortisation issues. Therefore, these emissions do not change as significantly resulting in a greater decrease in emissions.

Emissions from outgrower crop land clearance have decreased by 30%, compared to a decrease of 23% in emissions from AEP's own crop. This is related to the reduced proportion of outgrower crop processed in 2019.

In operational emissions, POME treatment saw the most significant drop. The 16% drop in emissions is directly aligned to the lower tonnage of POME produced, in part due to lower CPO production in 2019.

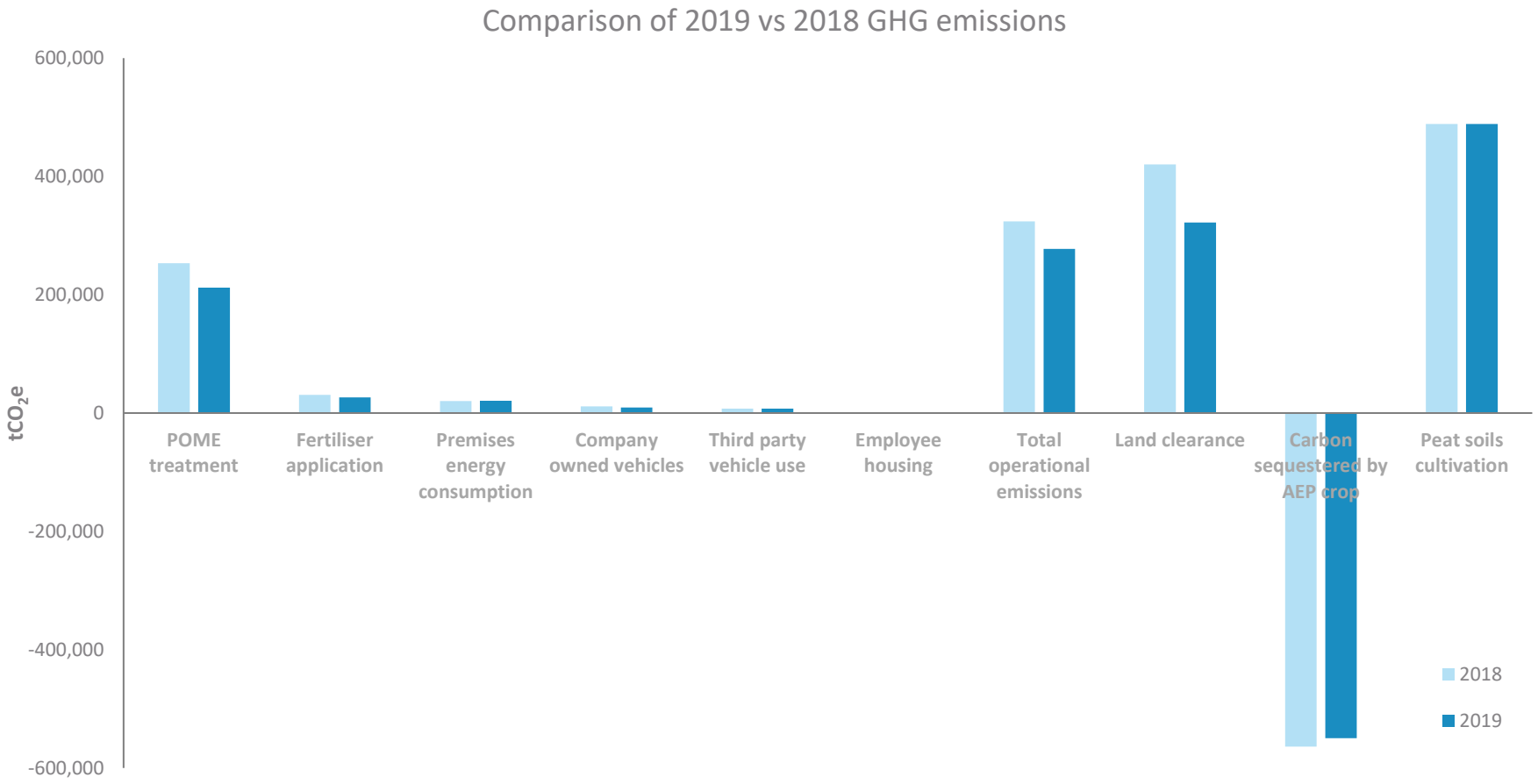


Figure 2: Comparison of 2019 vs 2018 GHG emissions

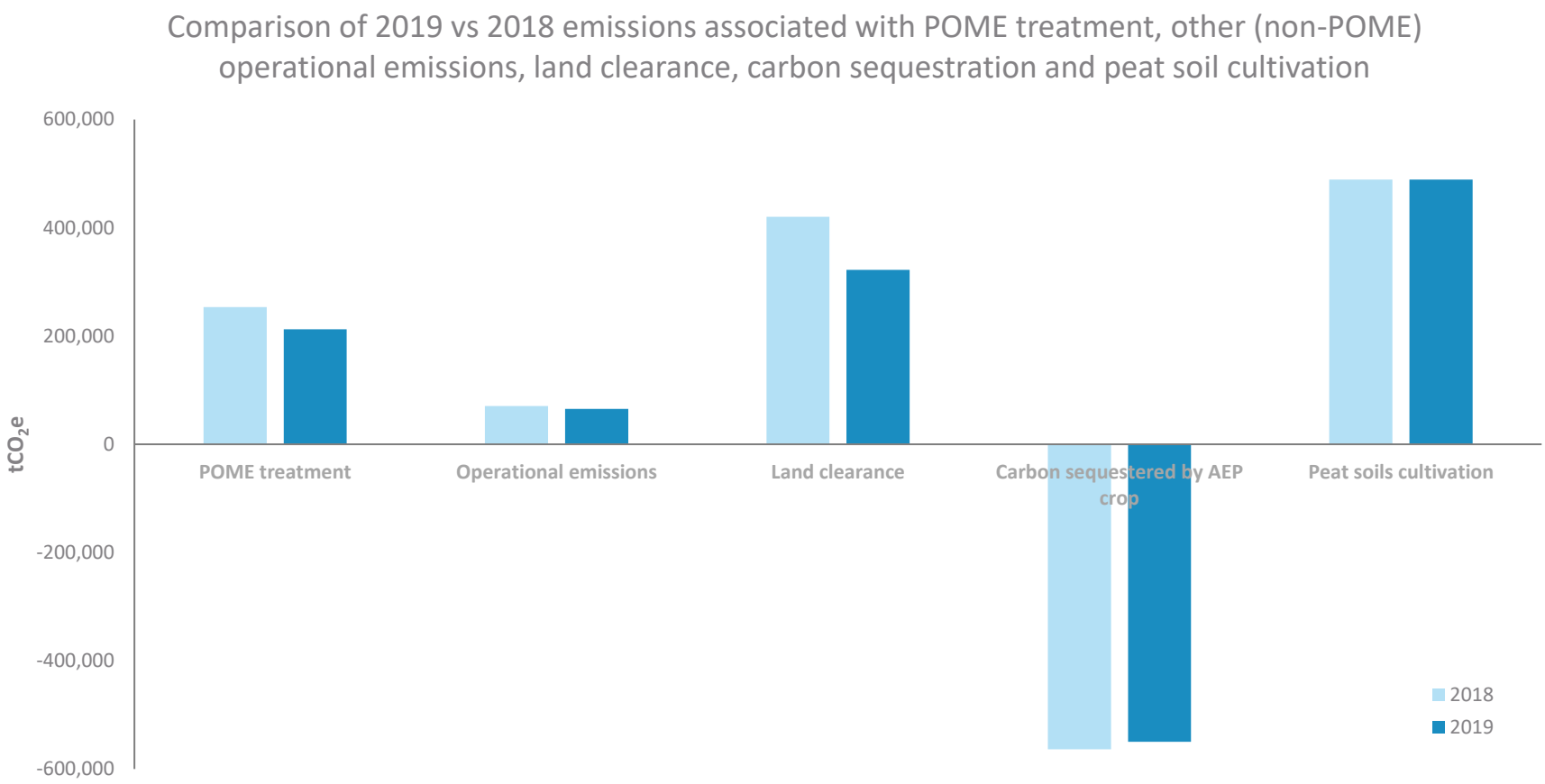


Figure 3: 2019 vs 2018 emissions associated with POME treatment, other (non-POME) operational emissions, land clearance, carbon sequestration and peat soil cultivation

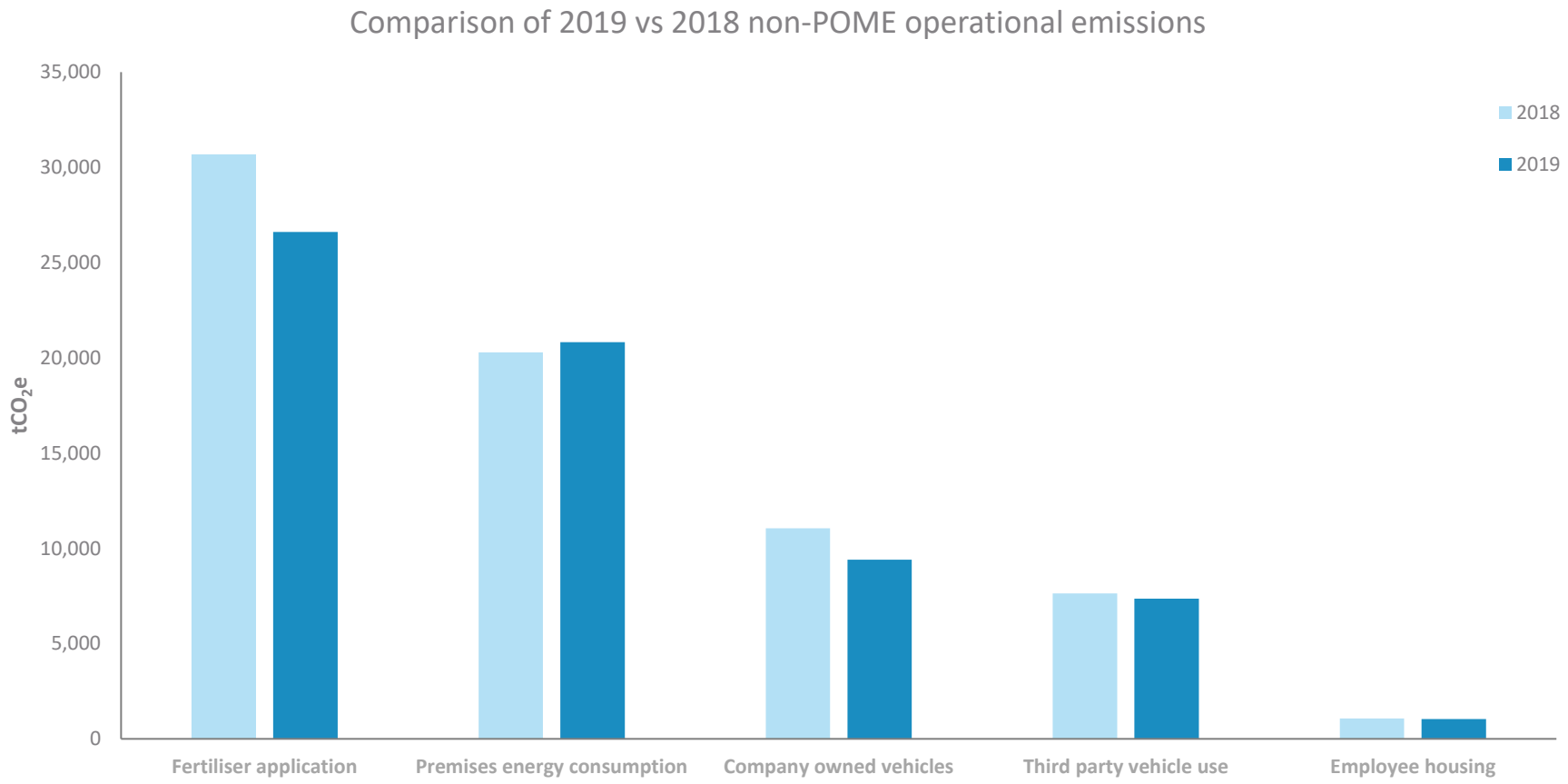


Figure 4: 2019 vs 2018 non-POME operational emissions

3.3 Intensity metrics

In addition to absolute GHG emissions, AEP report a series of intensity metrics to better allow for comparison of performance year on year. These metrics are:

- Per tonne of Crude Palm Oil (CPO) production
- Per tonne of Fresh Fruit Bunch (FFB) production
- Per tonne of Fresh Fruit Bunch (FFB) processed
- Per hectare of planted area

Table 5: 2019 vs 2018 Operational emissions intensity (tCO_2e)

	2018	2019
Per tonne of CPO production	0.77	0.70
Per tonne of FFB production	0.31	0.27
Per tonne of FFB processed	0.16	0.15
per hectare of planted area	4.87	4.07

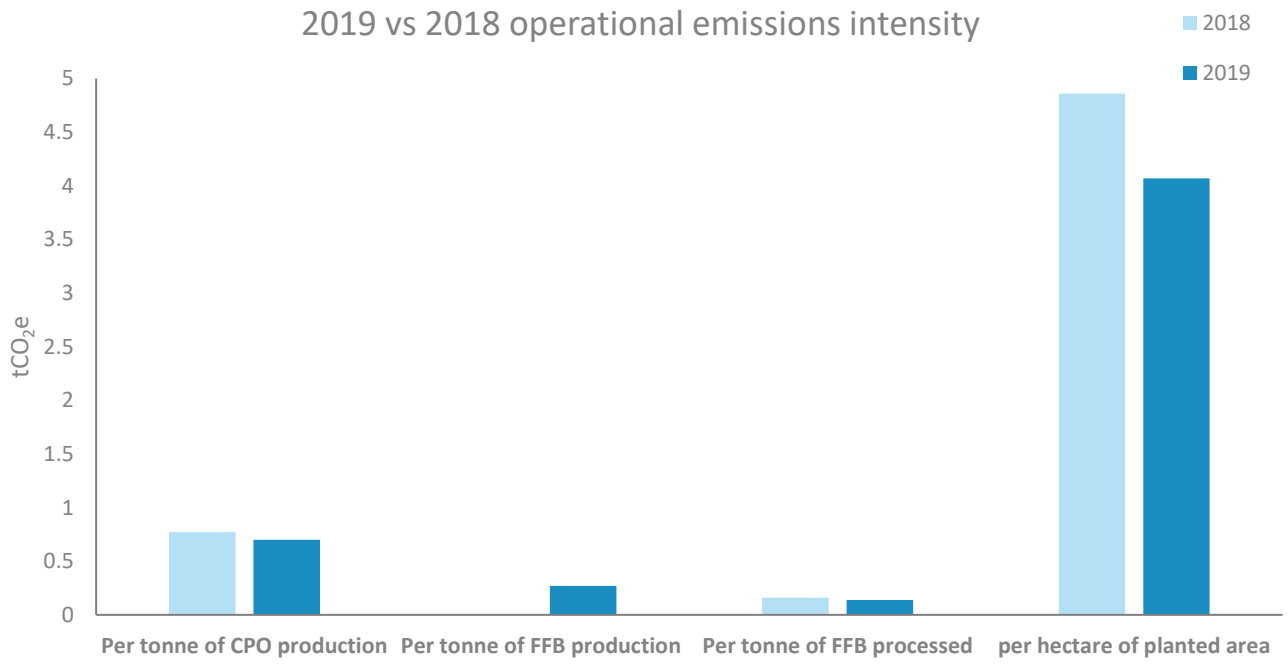


Figure 5: 2019 vs 2018 operational emissions intensity

All intensity metrics have decreased in 2019 indicating improved environmental performance per tonne of input or output. The main driver behind this is the improved performance of AEPs mills, with a reduction in POME produced and the first full year operating with three biogas plants, resulting in an increase of emissions being captured and flared.

Table 6: 2019 vs 2018 Total emissions intensity (excluding outgrower emissions) (tCO_2e)

	2018	2019
Per tonne of CPO production	1.6	1.36
Per tonne of FFB production	0.67	0.52
Per tonne of FFB processed	0.33	0.29
per hectare of planted area	10.04	7.92

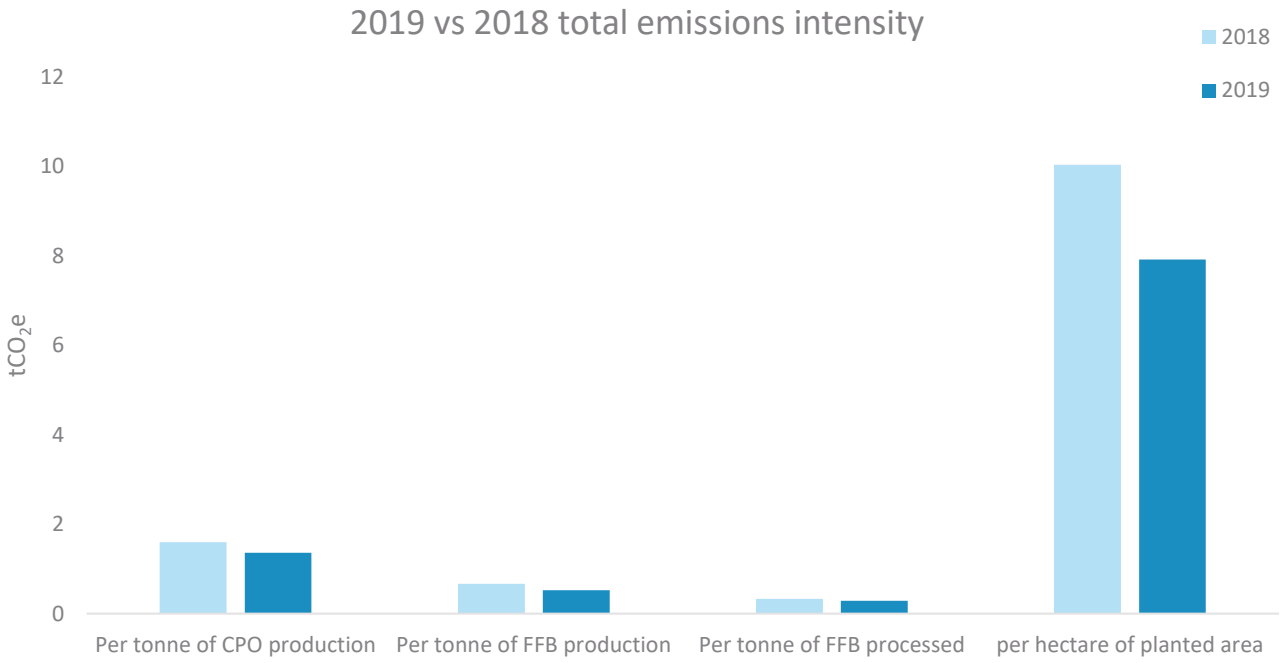


Figure 6: 2019 vs 2018 total emissions intensity

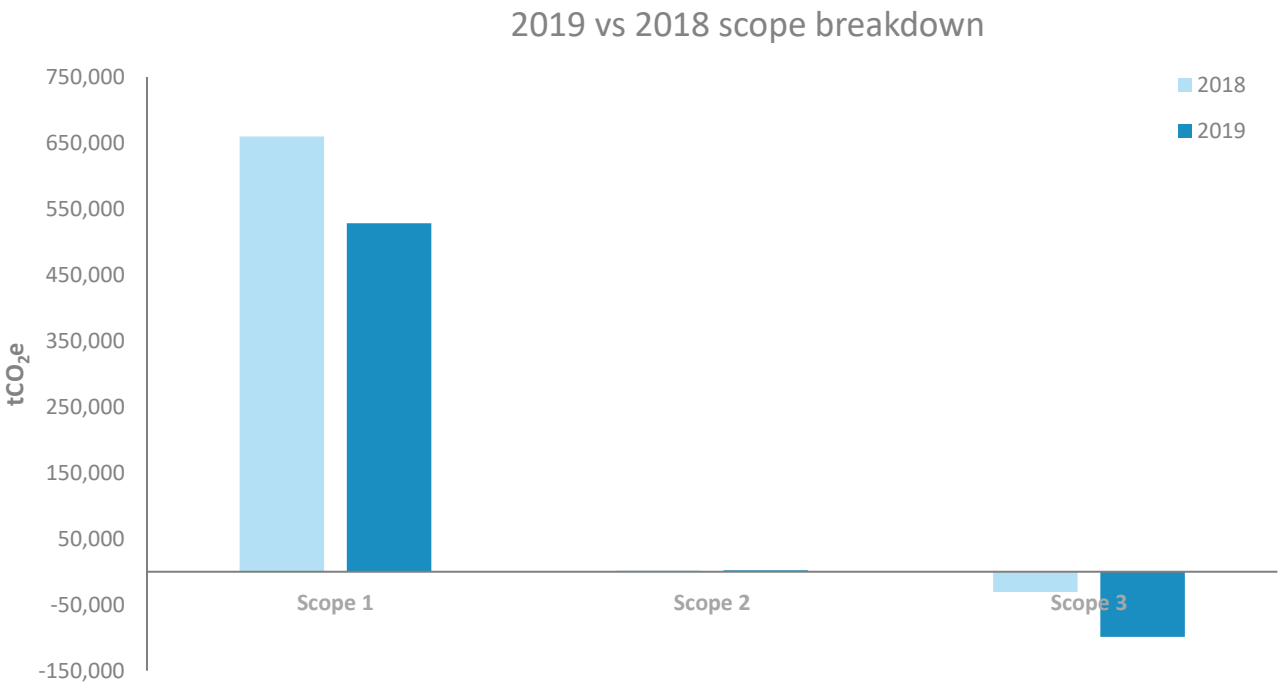
3.4 Scope breakdown

The majority of AEP's emissions are direct emissions in scope 1. The impact of their purchased electricity (scope 2) is minimal and scope 3 reporting is currently restricted to outgrower crop emissions with a small contribution from transmission & distribution losses from electricity and low employee mileage.

The reduction in scope 1 emissions is primarily due to the decrease in agricultural and POME emissions previously discussed. Scope 2 emissions have increased slightly, due to a small increase in electricity consumed. Scope 3 emissions are dominated by the outgrower crop emissions, which show a significant decrease due to the reduction in outgrower crop processed by AEP during 2019. These scope 3 emissions are also impact by the reduction in land clearance previously noted, due to the estimation methodology employed.

Table 7: Emissions breakdown by scope

	2018	2019
Scope 1	659,848	528,408
Scope 2	1,677	1,984
Scope 3	-30,628	-98,949



4. Looking forward

This GHG assessment provides AEP with an understanding of the environmental impact of their operations. In particular, the results highlight key areas where good monitoring and management is essential to ongoing emissions reduction. As a responsible business there are several actions AEP can take to ensure continuous improvement in carbon reporting and help achieve the wider sustainability goals of the business.

- **Improved data on agricultural emissions:** As the most significant part of AEP's carbon footprint it is essential that agricultural emissions are reported accurately. Whilst best practice methodology has been adopted, there are many underlying estimations where models and literature reviews have been utilised in place of measured data. AEP should consider rolling out estate specific monitoring to feed into this assessment in future.

- **Engagement with outgrowers:** Emissions from outgrower crops form 25% of AEP's total annual emissions, which are currently based on extrapolations. AEP should investigate the feasibility of beginning to gather data from key outgrowers to further tailor these assumptions.

- **Continue installation of biogas plants:** POME treatment is the most significant operational emission source. Half of AEP's mills currently have a biogas plant attached, significantly reducing emissions associated with POME treatment. Over time, the replacement of anaerobic lagoons with biogas plants will significantly reduce emissions from this source.

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