Siat
Group

GREEN HOUSE GAS EMISSION

2017

CONTENTS

ABSTRACT

In order to limit its carbon footprint and to comply with the RSPO requirements, SIAT has started evaluating the greenhouse gas (GHG) emissions of its oil palm activities. This information can then be used to develop a mitigation plan. The implementation of the plan is monitored, and progress assessed on a yearly basis when the GHG assessment is repeated. From 2016 to 2017 the emissions in tons of equivalent CO_2 have slightly decrease and is still negative.
Our commitment in terms of GHG is in line with the SDG 9.4 (CO_2 emission per unit of value added).

METHOD

The GHG assessment is carried out using the RSPO's PalmGHG tool. Data such as land usage, surfaces planted and surfaces of conservation areas, fertilizer and fuel usage, oil production, POME production and treatment, electricity generation is gathered and used to calculate net carbon emissions in PalmGHG. The results generated allow us to identify the most important emission sources and sinks.
In 2017, GHG assessments were carried out for GOPDC in Ghana, and Presco and SNL in Nigeria. Below are the results.

LIST OF ABBREVIATIONS

RSPO	Roundtable on Sustainable Palm Oil	**POME**	Palm Oil Mill Effluent
GHG	Green House Gas	**PKO**	Palm Kernel Oil
CPO	Crude Palm Oil	**PKE**	Palm Kernel Expeller
PK	Palm Kernel	**OER**	Oil Extraction Rate
tCO2e	ton CO_2 equivalent	**KER**	Kernel Extraction Rate
PalmGHG	https://rspo.org/certification/palm-ghg-calculator		
SDGs	https://unstats.un.org/sdgs/indicators/indicators-list		

The Siat Group supports the SDG

9.4

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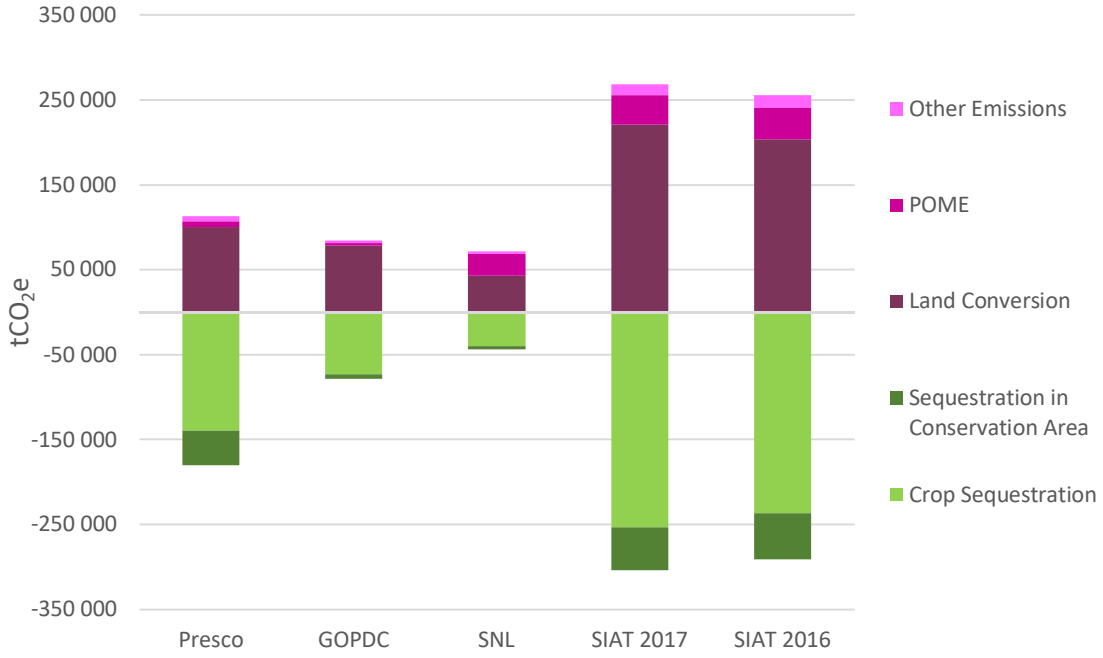
We value your comments and observations as source of improvement, so feel free to contact us at florent.robert@siat-group.com.

2017 KEY FIGURES - SIAT GROUP

Total area planted with oil palm	**42 994 ha**
Total mature	**39 450 ha**
Total conservation area *Does not include Sakponba estate developed at the end of the 2017 year.*	**5 881 ha**
Land conversion	**220 820 tCO2e**
Crop sequestration	**- 253 899 tCO2e**
Net emissions 2017	**- 35 782 tCO2e**
Net emissions 2016	**- 35 634 tCO2e**



Graph 1.1: Comparison of SIAT subsidiaries' 2017 GHG emissions

RESULTS – SIAT

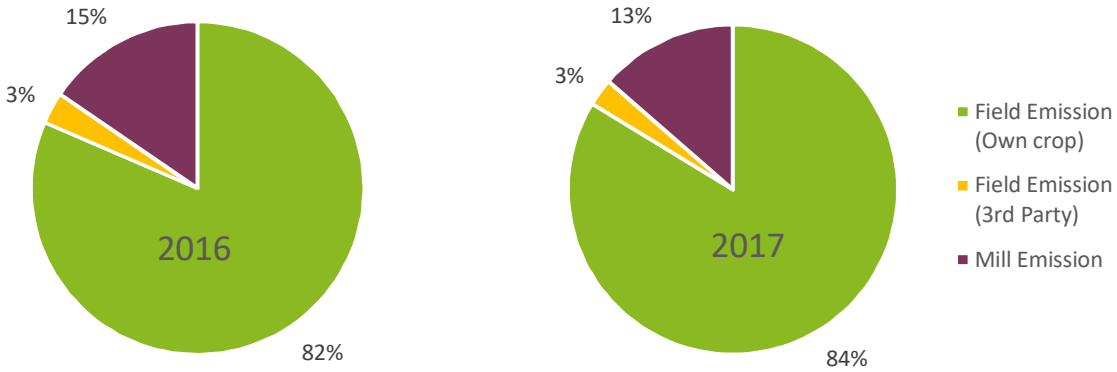
These results combine those of **GOPDC**, **Presco** and **SNL** to give a global overview of SIAT's palm activity emissions.

Description	Unit	Value
Total Planted Area	ha	39 450
Conservation Area	ha	5 881
OER	%	19,6

Table 1.1: SIAT key indicators (2017)

Product	tCO2e/t Product
CPO	-0,26
PK	-0,26
PKO	0,49
PKE	0,49

Table 1.2: SIAT emissions per ton of product (2017)



Graph 1.2: Distribution of SIAT's emissions (2016 & 2017)

	Own			3rd Party
Description	**tCO2e**	**tCO2e/ha**	**tCO2e/t FFB**	**tCO2e**
Land Conversion	220 820	5,6	0,67	0
Fertilizer application	3 442	0,09	0,01	0
N2O Emissions	3 148	0,08	0,01	0
Fuel Consumption	4 735	0,12	0,01	0
Crop Sequestration	-253 899	-6,44	-0,78	0
Sequestration in Conservation Area	-50 310	-1,28	-0,15	0
Total	-72 064	-1,83	-0,22	7 420

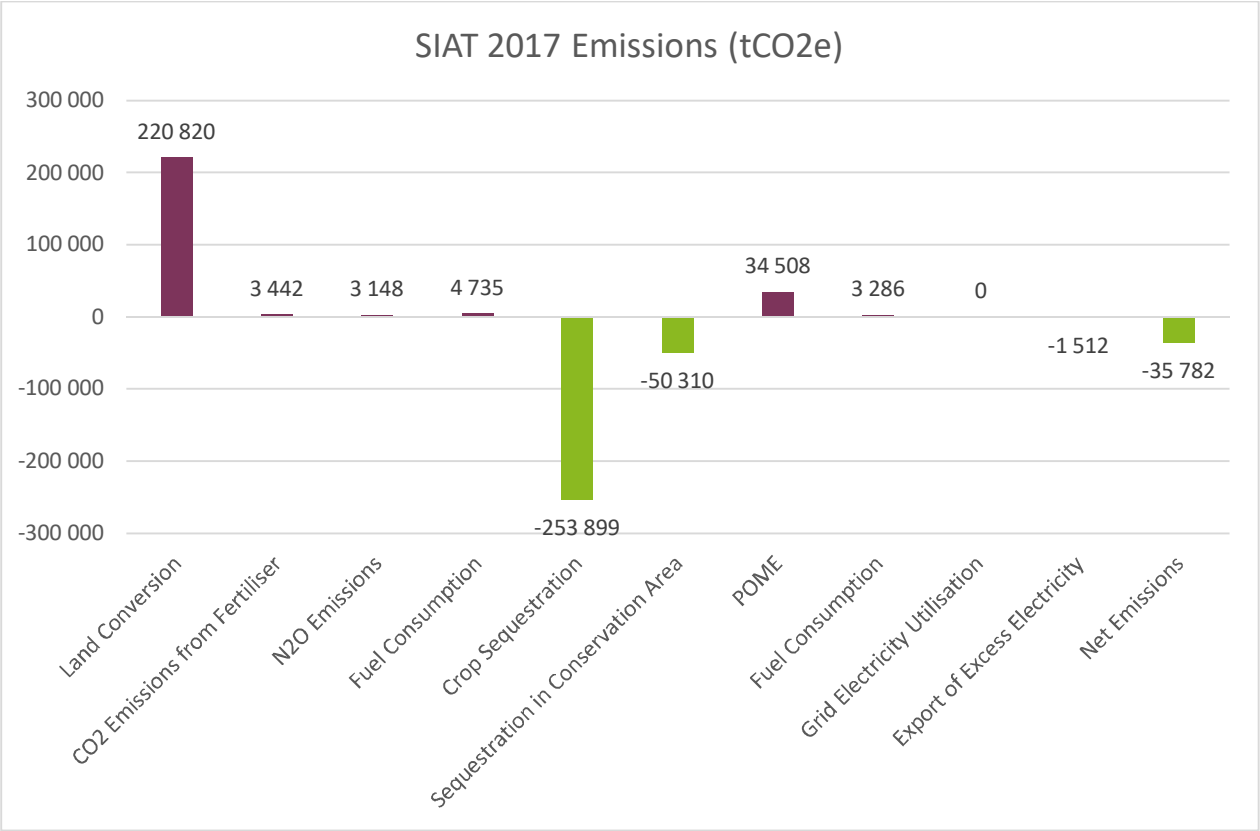
Table 1.3: SIAT plantation emissions – sources and sinks (2017)

Description	**tCO2**	**tCO2e/t FFB**
POME	34 508	0,08
Fuel Consumption	3 286	0,01
Grid Electricity Utilization	0	0,00
Export of Excess Electricity to Housing & Grid	-1 512	0,00
Total Mill emissions	36 283	0,09

Table 1.4: SIAT mill emissions (2017)

Emission Source	**tCO2e**
PK from own mill	2 141
PK from other sources	11 460
Fuel consumption	383
Total crusher emissions	13 984

Table 1.5: SIAT crusher emissions (2017)



Graph 1.3: Summary of SIAT emissions – sources and sinks (2017)

The emissions from the above table 1.5 are not included in the total net emissions of the graphs 1.2 and 1.3 as the RSPO has not yet made it compulsory for mills to estimate their palm kernel crusher emissions. Nevertheless, we choose to start assessing them before the obligation comes into effect.

SIAT contributes to sequestering carbon through its oil palms and conservation areas, whilst its mill emissions are limited by the installation of biomethanation plants. Nevertheless, SIAT will strive to improve further its emission results in the years to come!

RESULTS BY SUBSIDIARY

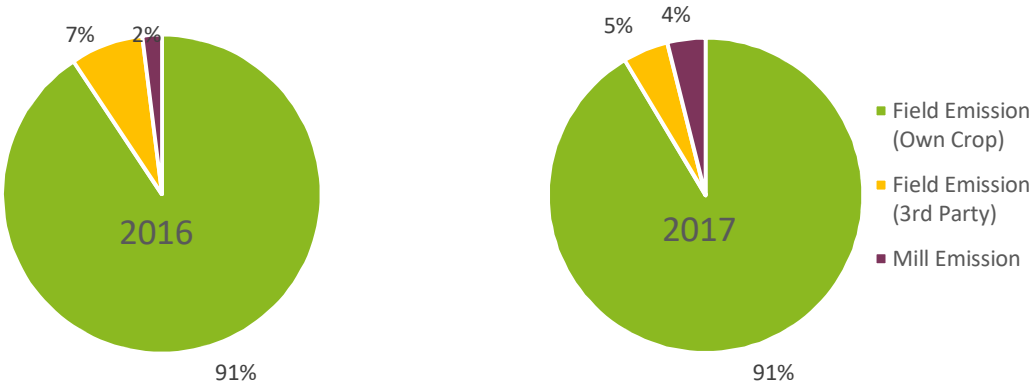
RESULTS – GOPDC

Description	Unit	Value
Total Planted Area	ha	7 831
Conservation Area	ha	640
OER	%	21,7

Table 2.1: GOPDC key indicators (2017)

Product	tCO2e/t Product
CPO	0,31
PK	0,31
PKO	0,43
PKE	0,43

Table 2.2: GOPDC emissions per ton of product (2017)



Graph 2.1: Distribution of GOPDC's emissions (2016 & 2017)

	Own			3rd Party
Description	**tCO2e**	**tCO2e/ha**	**tCO2e/t FFB**	**tCO2e**
Land Conversion	77 922	9,95	0,99	0
Fertilizer application	1 303	0,17	0,02	0
N2O Emissions	981	0,13	0,01	0
Fuel Consumption	1 346	0,17	0,02	0
Crop Sequestration	-73 312	-9,36	-0,93	0
Sequestration in Conservation Area	-5 660	-0,72	-0,07	0
Total	2 581	0,33	0,03	4 144

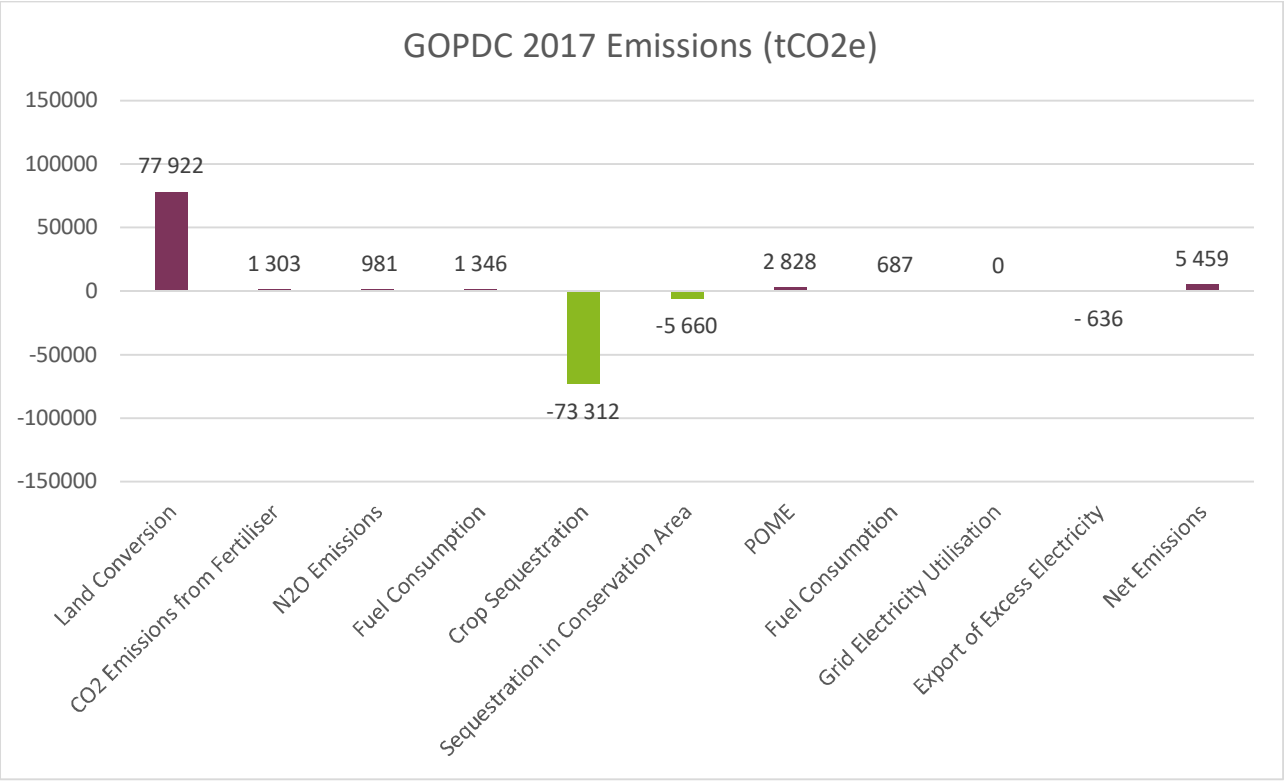
Table 2.3: GOPDC plantation emissions – sources and sinks (2017)

Description	**tCO2**	**tCO2e/t FFB**
POME	2 828	0,02
Fuel Consumption	687	0,01
Grid Electricity Utilization	0	0
Export of Excess Electricity to Housing & Grid	- 636	- 0,01
Total Mill emissions	2 879	0,02

Table 2.4: GOPDC mill emissions (2017)

Emission Source	**tCO2e**
PK from own mill	1 800
PK from other sources	584
Fuel consumption	97
Total crusher emissions	2 481

Table 2.5: GOPDC crusher emissions (2017)



Graph 2.2: Summary of GOPDC emissions – sources and sinks (2017)

The results show that the most important source of emissions is land clearing. However, these emissions are compensated by the carbon sequestered by the oil palms, as well as the conservation areas spread across the plantation. Fertilizer usage and fuel consumption on the plantation are also sources of emissions. At the mill, the palm oil mill effluent (POME) is the biggest source of emissions, although these emissions are already greatly decreased by the use of a biodigester to treat the POME and produce biogas for energy generation. The GOPDC mill continues to increase its usage of green energy, thereby decreasing its emissions linked to grid electricity usage.

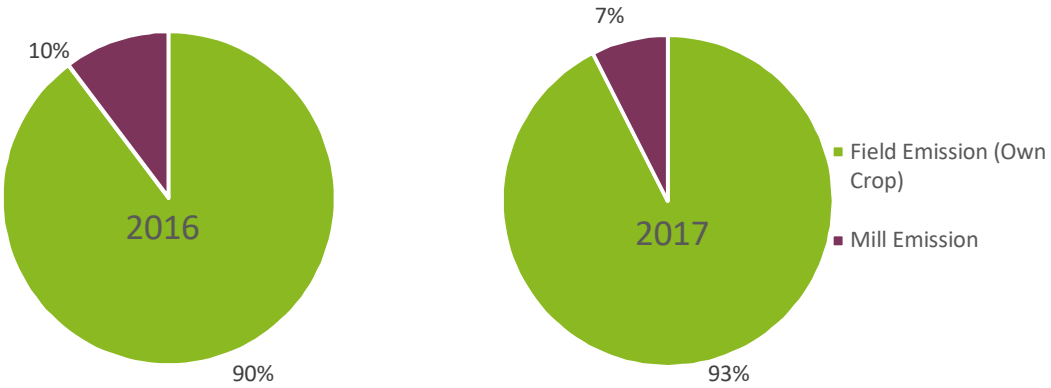
RESULTS - Presco

Description	Unit	Value
Total Planted Area	ha	16 388
Conservation Area	ha	4 810
OER	%	22,2

Table 3.1: Presco key indicators (2017)
Figures don't include Sakponba new development

Product	tCO2e/t Product
CPO	-1,45
PK	-1,45
PKO	-1,43
PKE	-1,43

Table 3.2: Presco emissions per ton of product (2017)



Graph 3.1: Distribution of Presco's emissions (2016 & 2017)

	Own			3rd Party
Description	**tCO2e**	**tCO2e/ha**	**tCO2e/t FFB**	**tCO2e**
Land Conversion	100 024	6,10	0,59	0
Fertilizer application	1 421	0,09	0,01	0
N2O Emissions	979	0,06	0,01	0
Fuel Consumption	2 214	0,14	0,01	0
Crop Sequestration	- 139 949	-8,54	-0,83	0
Sequestration in Conservation Area	- 40 840	-2,49	-0,24	0
Total	- 76 151	-4,65	-0,45	na

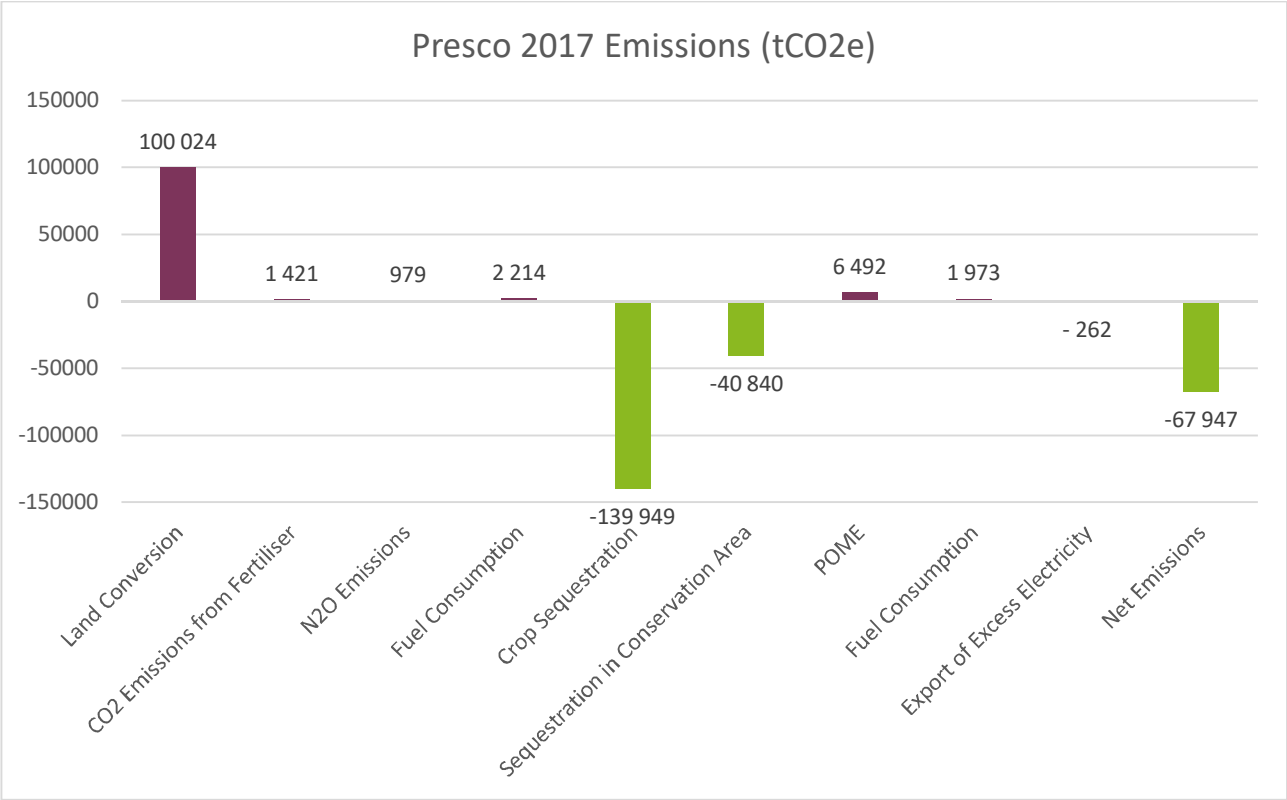
Table 3.3: Presco plantation emissions – sources and sinks (2017)

Description	**tCO2**	**tCO2e/t FFB**
POME	6 492	0,04
Fuel Consumption	1 973	0,01
Grid Electricity Utilization	0	0
Export of Excess Electricity to Housing & Grid	-262	0
Total Mill emissions	8 203	0,05

Table 3.4: Presco mill emissions (2017)

Emission Source	**tCO2e**
PK from own mill	- 13 353
PK from other sources	0
Fuel consumption	189
Total crusher emissions	- 13 163

Table 3.5: Presco crusher emissions (2017)



Graph 3.2: Summary of Presco emissions – sources and sinks (2017)

Presco is the SIAT subsidiary with the best overall results. Indeed, its emissions are negative – it sequesters carbon rather than emitting it! The highest contributor of emissions, land conversion emissions, is largely compensated by crop sequestration and sequestration in conservation areas. The sequestration in conservation areas is more important here than in GOPDC and SNL as Presco has a large conservation area of 4 810 ha, a big part of which is situated in its Ologbo estate, this area will increase in 2018 with new conservations plots in the Sakponba estate. Furthermore, as in GOPDC, emissions resulting from POME are limited by treatment in a biomethanation plant.

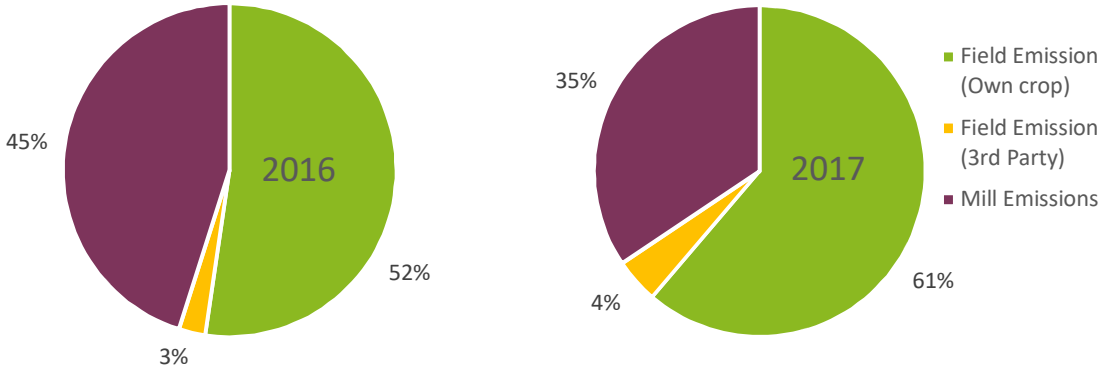
RESULTS - SNL

Description	Unit	Value
Total Planted Area	ha	15 231
Conservation Area	ha	431
OER	%	14,1

Table 4.1: SNL key indicators (2017)

Product	tCO2e/t Product
CPO	0,92
PK	0,92
PKO	1,84
PKE	1,84

Table 4.2: SNL emissions per ton of product (2017)



Graph 4.1: Distribution of SNL's emissions (2016 & 2017)

	Own			3rd Party
Description	**tCO2e**	**tCO2e/ha**	**tCO2e/t FFB**	**tCO2e**
Land Conversion	4 2874	2,81	0,54	0
Fertilizer application	718	0,05	0,01	0
N2O Emissions	1 187	0,08	0,02	0
Fuel Consumption	1 176	0,08	0,01	0
Crop Sequestration	- 40 639	-2,67	-0,51	0
Sequestration in Conservation Area	- 3 810	-0,25	-0,05	0
Total	1 505	0,1	0,02	3 276

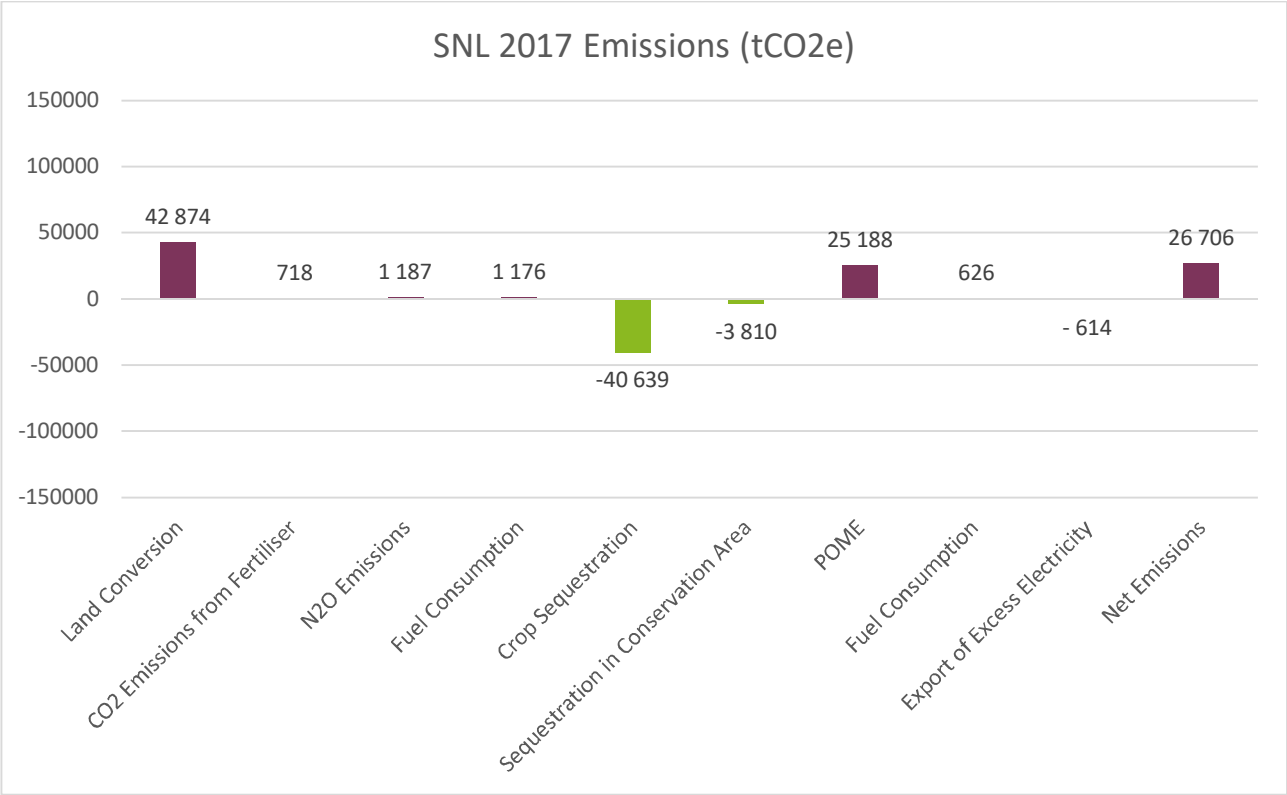
Table 4.3: SNL plantation emissions – sources and sinks (2017)

Description	**tCO2**	**tCO2e/t FFB**
POME	25 188	0,20
Fuel Consumption	626	0
Grid Electricity Utilization	0	0
Export of Excess Electricity to Housing & Grid	- 614	0
Total Mill emissions	25 201	0,20

Table 4.4: SNL mill emissions (2017)

Emission Source	**tCO2e**
PK from own mill	13 694
PK from other sources	10 876
Fuel consumption	96
Total crusher emissions	24 665

Table 4.5: SNL crusher emissions (2017)



Graph 4.2: Summary of SNL emissions – sources and sinks (2017)

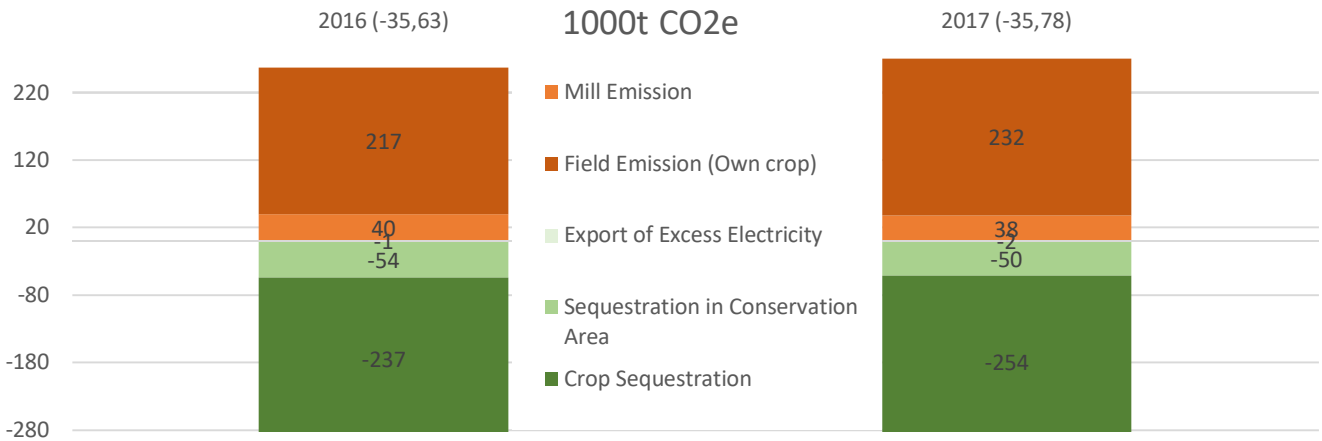
The results for SNL show that a majority of emissions come from the POME. This differs from GOPDC and Presco where biomethanation plants were installed to treat the POME and use the methane produced as an energy source. SNL does not yet have such an installation and therefore its POME emissions are much higher.

As for GOPDC and Presco, SNL's land conversion emissions are almost entirely compensated by the carbon crop sequestration and the sequestration in conservation areas.

MONITORING AND MITIGATION

Based on the above results and aiming towards continuous improvement, SIAT will develop and implement greenhouse gas mitigation plans for each of the subsidiaries. One such plan has already been developed at GOPDC, others are in the process of being developed. The actions detailed in the plans will contribute to decreasing overall emissions. These will include:

- Not converting high carbon stock areas to oil palm in new planting developments
- Forbidding burning for land preparation
- Where a biogas plant is running:
  - Ensuring that it always operates at its optimum level to capture the maximum CH_4 before effluent is released.
  - Verifying the efficiency of the treatment system by carrying out regular analyses.
  - Avoiding flaring by installing machines that run on gas
- Implementing fertigation projects: using sludge from the biogas reactors and treated effluent for oil palm fertilizing and irrigation.
- Carrying out regular maintenance to ensure that the boiler and turbine constantly operate at optimum efficiency in order to avoid using grid electricity or generators for power production
- Carrying out leaf sampling and analysis on a yearly basis to assess quantities of fertilizer to apply and adjust to actual needs of the crops so as to avoid applying fertilizer in excess.
- Carrying out experiments to assess optimal fertilizer dosage to use on oil palms for a maximized yield, thereby also adjusting fertilizer usage to actual needs.



Graph 5.1: Comparison emissions of two years analyses (2016 & 2017)

USE OF RENEWABLE ENERGY

The Siat Group decided to promote the use of renewable energy as an alternative to fossil energy: operating in rural areas where access to state supplied energy is not always possible, the Siat Group previously relied heavily on fossil energy to run its operations. For financial reasons, and as part of its environmental strategy, Siat has developed an ambitious renewable energy program. For the oil palm subsidiaries, in addition to the use of steam boilers and steam turbines that run on solid waste, the group has invested in biogas plants that treat effluent in bio digesters to produce methane used as an energy source.

The two biomethanation plants in operation, represent a total of **3 million liters** of fuel economy per year and the three cogenerations **22 600 Mwh** of renewable energy used per year.

Used electric resource and renewable energy production	GOPDC	PRESCO	SNL
Renewable source	Cogeneration and Biomethanation	Cogeneration and Biomethanation	Cogeneration
Total Mwh used by year	11 735	10 201	7 754
Renewable energy produced	9 344	6 850	6 405
% of renewable energy used	80%	67%	83%

Table 5.1: Use of renewable energy.

Focus on GOPDC: Treatment of Palm oil mill effluent (POME) and production of Biogas

To further improve on the quality of the Palm Oil Mill Effluent and to use the full capacity of the POME Siat decided to install biogas units for the GOPDC palm oil mill. Construction of the anaerobic waste water treatment started in February 2013 and the project was completed in September 2014.

The objective is the production of energy to run the operations of the refinery (boilers) as well as the improvement on the quality of POME discharged into the environment. Effluent from the mill is discharged through 2 sludge pits (total 20,000 m^3) before being fed into a system of 3 stabilization effluent ponds arranged in series via an oil trap. The system withdraws sludge and silt material from the POME and thus to increase the quality of the effluent discharged. In addition to continuous internal control, an external laboratory takes samples and analyses of the effluent every month. This biogas unit allows GOPDC to save an average of **1,7 million liters** of fuel every year (illustration next page).

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