# The Practical Manual for the Palm Oil LCA Spreadsheet (Initial Draft)

December 2013

### 1. Contents of the spreadsheet

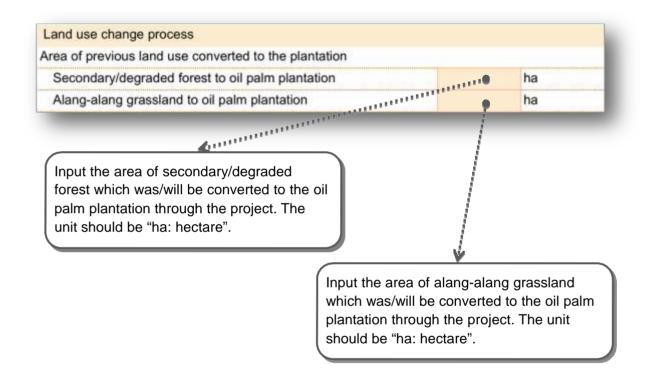
Name of sheet	Outline
Inputs	- All the necessary data will be inputted in this sheet.
	- Data will be separately inputted by processes.
Result (LCI)	- One of the results. After completing "Inputs" sheet, the lifecycle
	inventory will be automatically established.
Result (LCI per 1t-FFB)	- One of the results. The lifecycle inventory (per 1 ton of FFB) will
	be automatically established.
Result (IA)	- One of the results. The impact assessment, including global
	warming, acidification and eutrophication, will be automatically
	done.
Result (IA per 1t-FFB)	- One of the results. The impact assessment (per 1 ton of FFB),
	including global warming, acidification and eutrophication, will be
	automatically done.
Graphs	- One of the results. Graphs of the inventory and the impact
	assessment will be automatically created.
Default	- Provides necessary fixed data for calculation of emissions etc. No
	need for project participants to modify this sheet.
cal	- Intermediate calculation sheet for the inventory and the impact
	assessment. No need for project participants to modify this sheet.

0.	御御田泉 米小市 & 一・四・五・	Q T (A)	シート内主	10.00		
	A &- L L-570+ 7-74 957 SmartArt					v 0.
	D21 : 0 0 - fx	4115 7 - × 1030				
-		II C	D	Ŧ	F	1
1	Input data for the inventory analysis and the impac					
2						
1	Land use change process					
4	Area of previous land use converted to the plantation					
5	Secondary/degraded forest to oil paim plantation	ha				
6	Alang-alang grassland to oil paim plantation	ha				
7						
8	Oil paim cultivation process					
9	FFB production	tyear				
10	Solid biomass waste outputs, e.g. litter and deadwood	Uyear				
11	Fertilizer use					
12	AN: Ammonium nitrate	tonnes/year				
13	SOA: Sulphate of ammonia	tonnes/year				
14	DAP: Diammonium phosphate	tonnes/year				
15	Urea	tonnes/year				
Lñ.	AC: Ammonium chloride	tonnes/year				
17	Kieserite	tonnes/year				
18	MOP: Munate of potash	tonnes/year				
19	GRP: Ground rock phosphate	tonnes/year				
20	TSP: Triple superphosphate	tonnes/year				

2. Procedure of data input - Explanation of the "Inputs" sheet -

### 2.1 Land use change process

"Land use change process" includes changes of the land use through the project development. The transformation can be from previous land types, such as secondary/degraded forest or alang-alang grassland, to the oil palm plantation. As a result of land use change, carbon in the soil/vegetation is converted to  $CO_2$  and emitted to the air, or  $CO_2$  is sequestered in the soil/vegetation.



### 2.2 Oil palm cultivation process

POME: Palm oil mill effluent

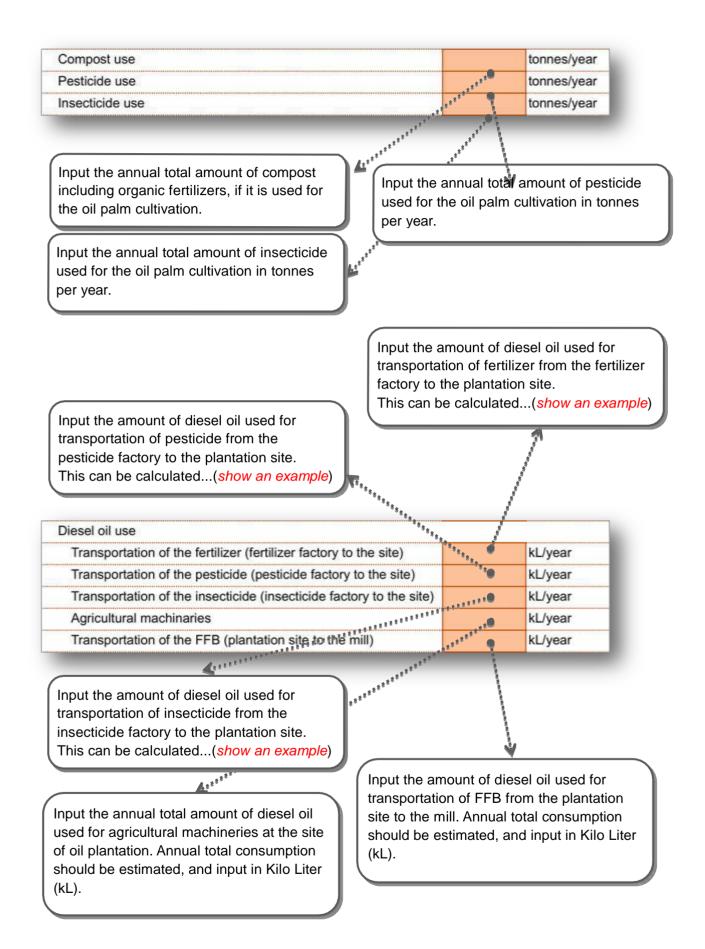
The process includes activities related to cultivation of oil palm, such as fertilizer application, pesticide and insecticide use. Diesel oil use for transportation of FFB and other materials are also included in the process.

FB production			t/year
Soild biomass waste outputs, e.g. litter and de	adwood	******	t/year
- 2 E E E			
nput the annual total production of FFB Fresh Fruit Bunch) from the oil palm plantation, in tonnes per year.		No. of Concession, Name	
fro	put the amount of so om the oil palm planta ear. The waste includ	ation in tone	s per
CC	overed crops etc.	,	unito,
			tonnes/year
Fertilizer use		e = = = = =	
Fertilizer use AN: Ammonium nitrate		<	tonnes/year
Fertilizer use AN: Ammonium nitrate SOA: Sulphate of ammonia		e = = = = =	tonnes/year onnes/year onnes/year
Fertilizer use AN: Ammonium nitrate SOA: Sulphate of ammonia DAP: Diammonium phosphate		<pre></pre>	tonnes/year
Fertilizer use AN: Ammonium nitrate SOA: Sulphate of ammonia DAP: Diammonium phosphate Urea		<pre></pre>	tonnes/year onnes/year onnes/year onnes/year
Fertilizer use AN: Ammonium nitrate SOA: Sulphate of ammonia DAP: Diammonium phosphate Urea AC: Ammonium chloride			tonnes/year onnes/year onnes/year onnes/year onnes/year
Fertilizer use AN: Ammonium nitrate SOA: Sulphate of ammonia DAP: Diammonium phosphate Urea AC: Ammonium chloride Kieserite			onnes/year onnes/year onnes/year onnes/year
Fertilizer use AN: Ammonium nitrate SOA: Sulphate of ammonia DAP: Diammonium phosphate Urea AC: Ammonium chloride Kieserite MOP: Muriate of potash			tonnes/year onnes/year onnes/year onnes/year onnes/year onnes/year
Fertilizer use AN: Ammonium nitrate SOA: Sulphate of ammonia DAP: Diammonium phosphate Urea AC: Ammonium chloride Kieserite MOP: Muriate of potash GRP: Ground rock phosphate			tonnes/year onnes/year onnes/year onnes/year onnes/year onnes/year

Input the annual total amount of fertilizers used for the oil palm cultivation. Please input the amount by types of fertilizers in tonnes per year.

Lines.

tonnes/year



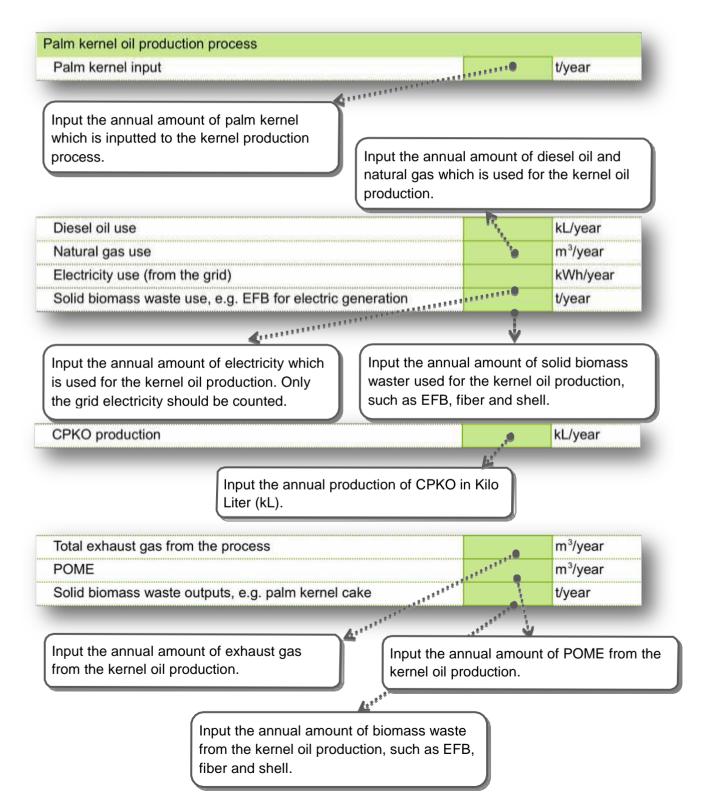
### 2.3 Palm oil production process

The process includes activities related to palm oil production, such as energy use, discharge of wastes.

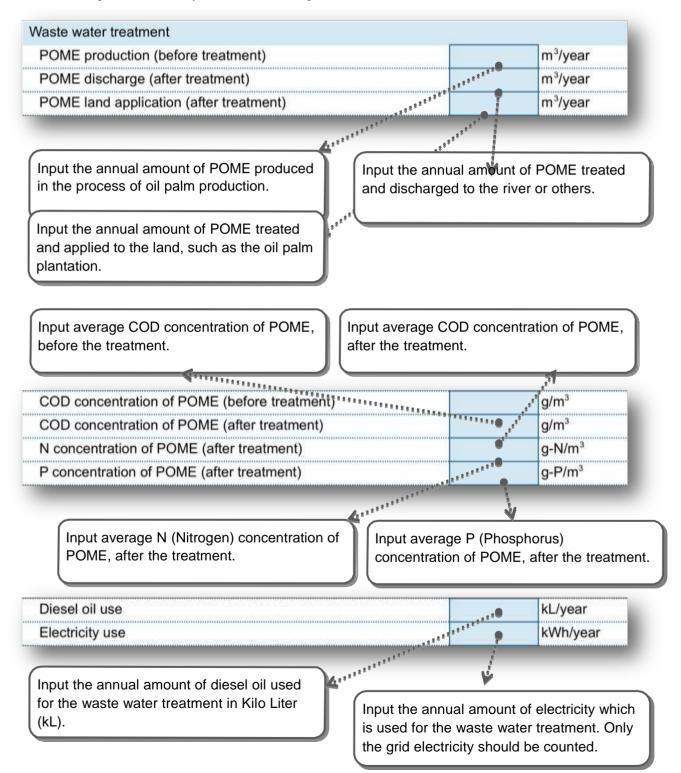
FFB input		*******	t/year
	***************************************		
the production of palm oil	Input the annual natural gas whic other purposes i	h is used fo	r the boiler or
Diesel oil use	~	R	kL/year
Natural gas use		1	m <sup>3</sup> /year
Electricity use (from the grid)			kWh/year
Solid biomass waste use, e.g. EFB for electric ger	eration	*******	t/year
<b>4</b> 111111111111111111111111111111111111	***************************************	Ĵ,	Lunchalan
Only the grid electricity should be counted.	in the oil mill, su	ıch as EFB,	
CPO production			kL/year
Palm kernel productuion		A state	kL/year t/year
	ter (kL) and tonr		t/year m³/year
Palm kernel productuion	ter (kL) and tonr		t/year
Palm kernel productuion Input the annual prod palm kernel, in Kilo Li per year, respectively. Total exhaust gas from the process	ter (kL) and tonr		t/year m³/year
Palm kernel productuion Input the annual prod palm kernel, in Kilo Li per year, respectively. Total exhaust gas from the process POME Solid biomass waste outputs, e.g. EFB, fiber, shell	ter (kL) and tonr		t/year m <sup>3</sup> /year m <sup>3</sup> /year
Palm kernel productuion Input the annual prod palm kernel, in Kilo Li per year, respectively. Total exhaust gas from the process POME	ter (kL) and tonr	es	t/year m <sup>3</sup> /year m <sup>3</sup> /year

### 2.4 Palm kernel oil production process

The process includes activities related to palm kernel oil production only. If it is not possible to separate the necessary data from "Palm oil production process", this process and "Palm oil production process" should be combined with.

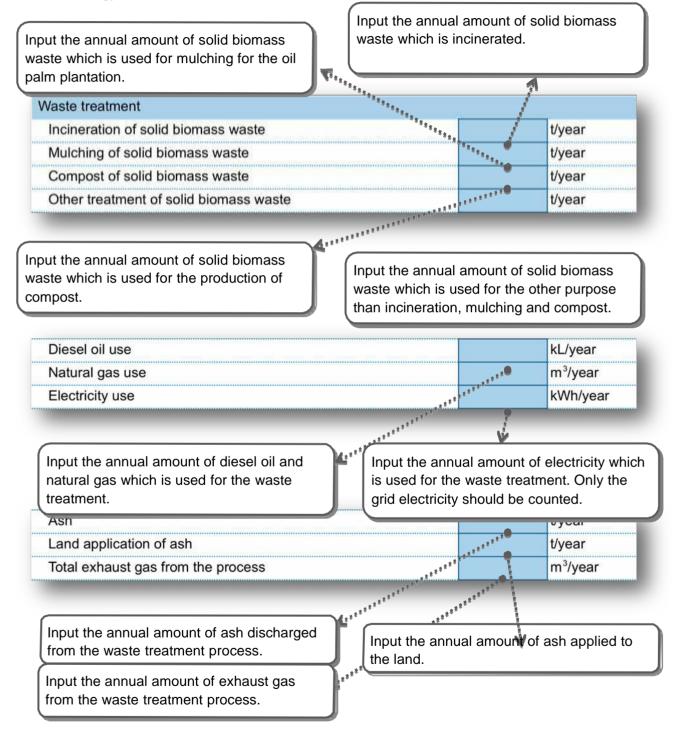


The process includes activities related to waste water treatment, such as POME treatment (such as aerobic/anaerobic treatment) and associated energy uses. (*Methane recovery and energy uses should be included in this process, but not yet included in the spreadsheet*)



### 2.6 Waste treatment

The process includes activities related to waste treatment, such as incineration, mulching, compost and associated energy uses.



### 3. Results

### 3.1 The sheet "Result (LCI)"

	Forth	Qare .	(Ter)	1.6		50	entar	Should .	history	w ( )			Molette		
	System	Composit	Peakide	(medicite	Division of	Network game	famid blowane receive	Sinchedy (pre)	118	PK	PONE	Set of heart and a set of the set	Solid berasel (Mukhing)	Satid becerares -(Composit)	Solid brienses (Other)
	1971	(bole)	(Brid	ton -	M.	100	bom	NW9	1.00	301	-m <sup>2</sup>	2009	inet	100	1001
Land use change process		40	0.0	4.9	0.0	1.44	0.0	0,0	:00	0.0		0.0	0.0	-0.0	i 0.
Of party collegation processes	10.034.0	4.0	22	6.8			40	0.0	-0.0	0.0,	- 11	00	4.6		0
Pairs of productor process		2.0	0.0	.0.0	0.0		18.401.0	0.0	280,075.0	0.00		0.0	0.0	-0.0	0.00
Pairs kernel til productive piocess		4.0	0.0	- 40		0	. 0.0	0.0	4.0	14,048.8		0.0		- 4.0	
Waste worker brandmant	1.0.0	9.0	0.0	1.0	0.0	0.000	0.0	0.0	0.0	0.0	169.000.0	0.0	0.0	4.0	0.00
Waite Institute	188	4.0	0.0	1.0	1 10	1.00	0.0	0.0	0.0	110		600		4.0	17.816.0
Time 1	-01462.0	4.0	2.7		COMPLE-	1.84	08.471.0	5.6	381.075.0	10.040.01	168.000.0	au	0.0	-10	10.000

								Life	Cipcles in	ventory (cu	fpaulte peur peur	ri .									
	-	-				Erossee							rie -	ne -				10.0	na		First
		-	94	540	-	ALC: N			000	Shert ye	Salis Services Matte	ROME	NUME INCOME.	and law.	ANT	ANT ELECT	110	044		0.60	Strapes percises
		Auto -	hai .	494	- Butt	Anti-	8.4	001	int.		140	- W.		- at.	kan .	444	1840	100	her.	6,6	1000
and con the optimized	2981		8.4	. 64		99	100.00	- 028-00	0.08-10											8.0	
	Index.	44.	- 10		- M.	00	318-02	3.00-00	000-00	2 H	44.	- 84		9.0	.00	00			- 44		
	See.	ALC: NO. R.	18.8		- 11	66	818-50	1000	0.06-00	1 4		- 11		55						18.8	
Contraction of the local division of the loc	-	1200.0	14	18.8		- 244	100-00	1.10-04	10000				1 A A				and the	4.4	44		
	distant -	C PERMIT	- 117	117	107		218.01	1.00.00	1.40.41								Concession of the local division of the loca			188	
	Jan	16,017.8		18.1		84.	1.10.41	11.00	4.45.44			1.511 and					100.010.0	Surger and the state			
Part of productor process	Breed.		486.7		16116	904.	110.400	015.405	7.25-09		1 97,004,0	100,000.0	1. A.				1.00	- M*,000.R	54.040.0		
	ALBORT	- 14		11	1.04	0.0	11640	114.40	116-01		1.44	11	1.1	2.0			1	4.6	8.6		
	AND		- 010	1.10	101.0	10.4	118,405	100-00	128-48		10,106.0	168.000.0	0.0	1.00	30			er.310.81	14,548.8	1.0	
filmi-inertal of productors provided							118.40	1198-09			L BARRY						1		11		
	(National)	4.8		1,88	0.84	00	818400	100-08	128-08		1		1. A		00	.00	100000-008	1.000		1000	
	Test	8.4		1.64		66	100-00-	100-01	0.00-00	- BI	1 84412				- 00	-00	11 C 12	1	44	1944	
Trave Autor Instantial	2mm	11	1.8.8		84	0.0	148-00	140-08	639-61		1. 44	1.114	186.000.0	84	-00			1 84	. 88	18.0	1.17.001.0
	-	44	3.4	- 11	8.8		1010	1.0-18	1.04.00			- 11		- 64	- 34			48	. 44	- 10	
	244	6.6	44	8.8			436-10	5.00-04	100-01			- 84	100-001-0			100		4.4			
Most Indiana	the state	89.			4.9		120.00	1.00.00	100.00			1.88		- 10		- 147	10.000				
	Bellett.			1.86			100.000	0000	1.00		10		49						- 44		
	440	11	. 8.8				12440	20448	3,614	. 0	1 11	- 10	8.8					- 48		- 10	
THE /	met-		-404.0	10.0			418.40	100.00	11008-01	- U	1.198.077.8	100,000,0	100.000.0	4.0	- 20	-19		47.52.5	14,048,0	F.M.M.	41,000.0
	PORect	RUBAC.	1.1.1.2	12		1.86	2.28-02	1.10-09	1. 2.86-83		9.8	1017/88	8.0	- 23		00	1.1	0.000 88	11	88	4.8
	100	-0.190.0.	1 600.0	25.8	101.0	100.4	-100-005	3,36,00	1.000-01	0 84	1 108,0773	194,000.0	188-000 8	8.8		C 188		87,000 8	14,048.0	1.1.1.0.0	17.000.0

### Life Cyclce Inventory (outputs per year (e.g. CO2 equivalent))

		CO2	CH4	N <sub>2</sub> O	SO:	NOx	N	Р	COD
		ton-CO2eq	ton-COjeq	ton-CO2eq	ton-SO <sub>2</sub> eq	ton-SO2eq	ton	ton	ton
Land use change process	Direct	-17,105.9	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Total	-17,105.9	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
Oil palm cultivation process	Direct	3,233.5	10.9	4,583.5	4.8	14.4	0.0E+00	0.0E+00	0.0E+00
	Indirect	10,084.1	205.1	801.2	5.3	6.3	1.4E-03	5.3E-09	1.1E-04
	Total	13,317.5	216,0	5.384.8	10.1	20.7	1.4E-03	5.3E-09	1.1E-04
Palm oil production process	Direct	0.0	10,352.3	1.645.3	187.8	63.3	0.0E+00	0.0E+00	0.0E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Total	0.0	10,352.3	1,645.3	187.8	63.3	0.0E+00	0.0E+00	0.0E+00
Palm kernel oil production process	Direct	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Indirect	0.0	0,0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
Construction and the second structures of	Total	0,0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
Waste water treatment	Direct	0.0	236.3	0.0	0.0	0.0	2.0E+00	0.0E+00	1.0E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Total	0.0	236.3	0.0	0.0	0.0	2.0E+00	0.0E+00	1.0E+00
Waste treatment	Direct	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Total	0.0	0,0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
Total	Direct	-13,672.4	10.599.5	6,228.9	192.6	77.7	2.0E+00	0.0E+00	1.0E+00
	Indirect	10,084.1	205.1	801.2	5.3	6.3	1,4E-03	5.3E-09	1.1E-04
******	Total	-3,788.4	10,804.6	7.030.1	197.9	84.Q	2.0E+00	5.3E-09	1.0E+00

#### The sheet "Result (LCI per 1t-FFB)" 3.2

	700	Que I	tier			Bet	with the second s	25010012	hisie	100		1001004000	Voiere	0.5005600	
	System No.779	Composit	Persona	inscitting	Cleared at	Natural gas	Notice Providence Income Incom	Stactuch (pref)	112	PK NJAPPB	PO64E	Solid Leontains Systemation ( Appl.PPB	Solid Demand (Multhing) high-FTS	Stated becomposed (Composed) log/LPTR	Sold bereas (Other) Age-FTB
Canid use change process	2.8	4.0	0.0	1.3	0.0		0.0	D.D	- 00	0.0	2 2 44	0.0	0.0	.0.0	0.0
OF party cultivation (inclusion	32.4	4.0	0.0	8.3				0.0	40	0.0		1. 00	4.6	9.0	0. 0.0
Pairs of production process		0.0	0.0	. 4.8	0.0		314.8	0.0	1,080.0	0.00	1 1 1	0.0	0.0	-0.0	0.8
Pairs kernel to productive process			0.0			0	. 0.0	0.0	4.0			0.0		- 4.0	
Wester maker transforment	1.0.0	9.0	0.0	1.0	0.0	0.000	0.0	0.0	-0.0	0.00	1.1	0.0	0.0	4.0	0.0
Walte Fault wall	188	4.0	0.0	1.0	1 110		0.0	D.D	8.0	1 100		0.0		-0.0	11. 01.0
Time 1	- 107.8	4.01	0.0	:10		1.84	214.8	9.6	1.000.0	412	1.84	a.u	0.0	-10	01.0

### Ufe Dyelce Inventory per 1 ton of PPB (subjects per year)

						Engenerat							10	-				100	and a		Time:
		- 104	- 04	540	-	All a	. in .		059	Shout yes	famili Stormer Holite	ROME	TONE	troad tay.	44	ANT ELECS HERMONY	11%	0.000		0.60	Sugar parts
		100776	101010	4,01978	ApA TTR	10.0.1118		agi (114	Augusteria -		Aurente.		101794PM	0.000	100.000	491.778	ingenten :	igiteres.	AGALLER .	April Press	1000718
Land con Marige process	2944		8.0	. 44		99	0.008-00	0.008-00	-0.089-08		8.8		4			1 244					6
	fulleni.	84.	1.00			00	508-02	-0.008-449	0.008-08	- H			4 9.4	9.0			1.00		44		4 7 1
	Yest	-141.0	18.8		9.8		1518-41	0.08-65	0.000-68	0 4	44		8 88	- 60		6 00		44	1 84		A
Sum others and	Street C.	718.		4.0			6.00E 443	0.000 (04	Loop an				4				1.000.0	4.1	1 44		4
	- Padinant -	10.4					1100.04	1.000.43	1 deal and		1 14										-
	Jan	44	1.0				1185.44	3.998.41	1 AND OT	10 M			9	6.0			1000	Frances 40			4 1
Paper on production processo	page .						1106-01	00081466	0000-00		1 107 h		8	- 10			1.	100.0	50.0		8
	MARKEN .	8.81		8.0			0.006-404	0008-44	0.000-488		1 4.4	1.1	A	2.0		/ 00	1		1.1		4 1
	NAR .		18			44	10846	0.008-46	10,000-00	6.0	0		0 0.0			1 10		2000	1 88.0		A
fibri-inerial of productors' provine	See.	8.0	11				1116-40	0008-09	1.0000-00		1		8 88		00					18	
	Table	6.6	18.8	1.8.8		90	0.008-40	0008-68	0008-88		1. 10.0		8 8.8				1	1000		18	
	Test	A.0.		1.44			1108-00-	0008-66	COX-III	V 84	1 20.0		4		- 00	00	11.000		4.4		Part of the local division of the
Trade Aster Instantial	2mm	8.8	188		84	0.0	1118-65	0.008-68	10000	10 84	1. 44	1.18	6	84		k (88			88		A
	Sector .	8.6	- 34	44	1.11	44	10046	0.008-946			- BK		4			C 784		1 14	C 44	- 1	
	Test .	8.8		8.0			1198.24	2.00-04	1100.01		1 88		8 88			6 64		44	8.8		8 8
Advent Statement	and .	8.8			4.9		5.948.454	000e-m	Augente		100		8	-		1 14	44				
	PROPERTY.	6.6		1.86			100.00	0000-00	-	- 11	1.0		4 49				1 1				
	140	8.81	18.8				100.40	2006-05	10000		1		8 88			1		- 41		- 11	
Text 1.	met-	- 49.8		8.0		19.6	1716-02	0006-00	1.106-01		198.6					-00					
	PUSHE	19.8		8.0		-02	1./16-05	11008-11	1.000-01		10.00		8 8.8	- 22		00			0.048		2 1
	You		2.0	8.7	87	10.4	1100-01	1 408.71	1.000.001		1 100.0		8 9.8			·		1000	83.2	18	r 1

### Life Cyclce Inventory per 1 ton of FFB (outputs per year (e.g. CO2 equivalent))

		CO2	CH4	N <sub>2</sub> O	SO:	NOx	N	P	COD
		kgCO <sub>2</sub> eq/1-FFB	kgCO_eq/t-FFB	kgCO3eq/t-FFB	kgSO <sub>2</sub> eg/I-FFB	kgSO2eq/I-FFB	kg/t-FFB	kg/t-FFB	kg/t-FFB
Land use change process	Direct	-60.9	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00
	Total	-60.9	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00
Oil palm cultivation process	Direct	11.5	0.0	16.3	0.0	0.1	0.0E+00	0.0E+00	0.0E+00
	Indirect	35.9	0.7	2.9	0.0	0.0	4.8E-06	1.9E-11	3.8E-07
	Total	47.4	0.8	19.2	0.0	0.1	4.8E-06	1.9E-11	3.8E-07
Palm oil production process	Direct	0.0	36.8	5.9	0.7	0.2	0.0E+00	0.0E+00	0.0E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Total	0.0	36.8	5.9	0.7	0.2	0.0E+00	0.0E+00	0.0E+00
Palm kernel oil production process	Direct	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Total	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
Waste water treatment	Direct	0.0	0.8	0.0	0.0	0.0	7.2E-03	0.0E+00	3.6E-03
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Total	0.0	8.0	0.0	0.0	0.0	7.2E-03	0.0E+00	3.6E-03
Waste treatment	Direct	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Indirect	0.0	0.0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
	Total	0,0	0,0	0.0	0.0	0.0	0.0E+00	0.0E+00	0.0E+00
Total	Direct	-49.4	37.7	22.2	0.7	0.3	7.2E-03	0.0E+00	3.6E-03
	Indirect	35.9	0.7	2.9	0.0	0.0	4.8E-06	1.9E-11	3.8E-07
	Total	-13.5	38.5	25.0	0.7	0.3	7.2E-03	1.9E-11	3.6E-03

### 3.3 The sheet "Result (IA)"

		Global warming	Acidification	Eutrophication
		ton-CO2eq	ton-SO2eq	ton
Land use change process	Direct	-17,108	0	0.0E+00
	Indirect	0	0	0.0E+00
	Total	-17,106	0	0.0E+00
Oil palm cultivation process	Direct	7,828	19	0.0E+00
	Indirect	11,090	12	1.5E-03
	Total	18,918	31	1.5E-03
Palm oil production process	Direct	11,998	251	0.0E+00
	Indirect	0	0	0.0E+00
	Total	11,998	251	0.0E+00
Palm kernel oil production process	Direct	0	0	0.0E+00
	Indirect	0	0	0.0E+00
	Total	0	0	0.0E+00
Waste water treatment	Direct	236	0	3.0E+00
	Indirect	0	0	0.0E+00
	Total	236	Ũ	3.0E+00
Waste treatment	Direct	0	0	0.0E+00
	Indirect	0	0	0.0E+00
	Total	0	0	0.0E+00
Total	Direct	2,956	270	3.0E+00
	Indirect	11,090	12	1.5E-03
	Tatal	14,046	282	3.0E+00

### Life Cyclce Impact Assessment

## 3.4 The sheet "Result (IA per 1t-FFB)"

### Life Cyclce Impact Assessment (per 1 ton of FFB)

		Global warming kgCO3eq/t-FFB	Acidification kgSO;eg/t-FFB	Eutrophication kg/t-FFB
Land use change process	Direct	-60.9	0.0	0.0E+00
en a see charge process	Indirect	0.0	0.0	0.0E+00
	Total	-60.9		0.0E+00
Oil paim cultivation process	Direct	27.9	0.1	0.0E+00
	Indirect	39.5	0.0	5.2E-06
	Total	67.3	0.1	5.2E-06
Palm oil production process	Direct	42.7	0.9	0.0E+00
	Indirect	0.0	0.0	0.0E+00
	Total	42.7	0,9	0.0E+00
Palm kernel oil production process	Direct	0.0	0.0	0.0E+00
	Indirect	0.0	0.0	0.0E+00
	Total	0.0	0.0	0.0E+00
Waste water treatment	Direct	0.8	0.0	1.1E-02
	Indirect	0.0	0.0	0.0E+00
******	Total	0.8	0.0	1.1E-02
Waste treatment	Direct	0.0	0.0	0.0E+00
	Indirect	0.0	0.0	0.0E+00
	Total	0.0	0.0	0.0E+00
Total	Direct	10.5	1.0	1.1E-02
	Indirect	39.6	0.0	5.2E-06
	Total	50.0	1.0	1.1E-02

### 3.5 The sheet "Graphs"

