

**Gold standard for the global goals
Monitoring report**



June 2017, version 1

Title of the project	Municipal Waste Composting in Dschang, Cameroon
Gold Standard project id	GS 4593
Version number of the monitoring report	01
Completion date of the monitoring report	05/03/2020
Date of project design certification	18/02/2019
Start date of crediting period	01/03/2017
Duration of this monitoring period	(01/03/2017) to (31/12/2017) (01/01/2018) to (31/12/2018) (01/01/2019) to (31/12/2019)
Duration of previous monitoring period	This is the first monitoring period
Project representative(s)	GOODPLANET FOUNDATION
Host Country	Cameroon
Certification pathway (activity certification/impact certification)	Impact certification (VERs)
SDG Contributions targeted (as per approved PDD)	SDG 13: 4,364 VER's SDG 2: 300 tons of compost/year SDG 8: 40 beneficiaries SDG 11: 140 tons of Compost
Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)	GS VER
Selected methodology(ies)	AMS.III-F: "Avoidance of methane emissions through composting", version 11
Estimated amount of annual average certified SDG impact (as per approved PDD)	SDG 13: 4,583 VER's SDG 2: 300 tons of compost/year SDG 8: 40 beneficiaries SDG 11: 140 tons of Compost
Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	<p>2017 – SDG13 : 2277 tCO₂eq SDG 2: 155.6 tons of compost produced SDG 8: 38 employees SDG 11: 146.3 tons of compost sold</p> <p>2018 – SDG13 : 2362 tCO₂eq SDG 2: 322.15 tons of compost produced SDG 8: 36 employees SDG 11: 364.1 tons of compost sold</p> <p>2019 – SDG13 : 1546 tCO₂eq SDG 2: 214.79 tons of compost produced SDG 8: 30 employees SDG 11: 191.83 tons of compost sold</p>

SECTION A. Description of project

A.1. Purpose and general description of project

Purpose of the project activity:

The purpose of the project activity is to implement a composting unit to treat the organic fraction of the domestic wastes generated from the city of Dschang (in Cameroon). The project is the first domestic waste composting site in Cameroon and working on a commercial basis. The effects of the project on the improvement of the local life conditions and on the local economic development are strong and could be elaborated following the three dimensions: environmental, economic and social of the sustainable development. By avoiding the organic wastes dumping on the SWDS (solid waste disposal site), the composting process in the project activity will avoid methane emissions.

The use of the compost to agricultural soils, will enhance the water retention capacity of the soils, and will also contribute to minimize soil erosions. It can be moreover pointed out that the chemical fertilizer consumption will be reduced thus improving the food quality and inhabitant's health. On a long-term basis, compost is cheaper than chemical fertilizer, leading to income savings for the local farmers and market gardeners. The project has created jobs, mainly for less educated and marginalized people (a part being women). The people employed on the composting site will preferentially be informal reintegrated into the system, given a job with a regular salary and hygienic and secured work conditions. The project will thus contribute to a sustainable development of the city.

Description of the installed technology (composting process):

The composting technology proposed in the project activity consists of a Biological Mechanical Treatment (BMT). A BMT system is a form of waste processing operation that combines a physical treatment (both manual and mechanical) and a biological treatment. In developed countries, BMT are increasingly used, due to regulations controlling the amount of organic matter allowed in landfills. In the proposed project, the biological treatment (composting) takes place during the fermentation in piles or windrows.

Composting consists in bio-degradation of organic matter in aerobic conditions. The composting parameters like temperature and aeration are continuously controlled by the production team during the two stage of composting: fermentation and Maturation. The temperature is controlled daily by plunging a temperature sensor in composting windrows. Fermentation is a two months process during which the windrows are turned 6 times. Then, in Maturation phase, an organic stabilization occurs. Please refer to the references provided a pdf document 'Windrow Turning' for each crediting year 2017, 2018 and 2019.

The physical part of the process is largely carried out manually to save both on energy and investment costs and to provide regular jobs to informal workers on the dumpsite.

The composting process includes the following steps:

- i) Manual sorting to remove (or break) the coarse elements and inorganic waste components.
- ii) Windrows preparation and control of bio-degradation conditions by manual turn-overs and
- iii) Manual screening of the compost.

The photos of each process are provided below.



The project activity was started in the month December 2014 and the compost production was initiated on a large scale in 2015. The project estimates to save around 43 646 tons of CO₂eq over a 10 years crediting period. The project was registered with the GS in the month of February 2019. Therefore, the first crediting period of the project activity is from March 2017 and ends on the February 2027.

This is the first monitoring report for the project activity and the represents following crediting years:

- 01/03/2017 to 31/12/2017
- 01/01/2018 to 31/12/2018
- 01/01/2019 to 31/12/2019

A.2. Location of project

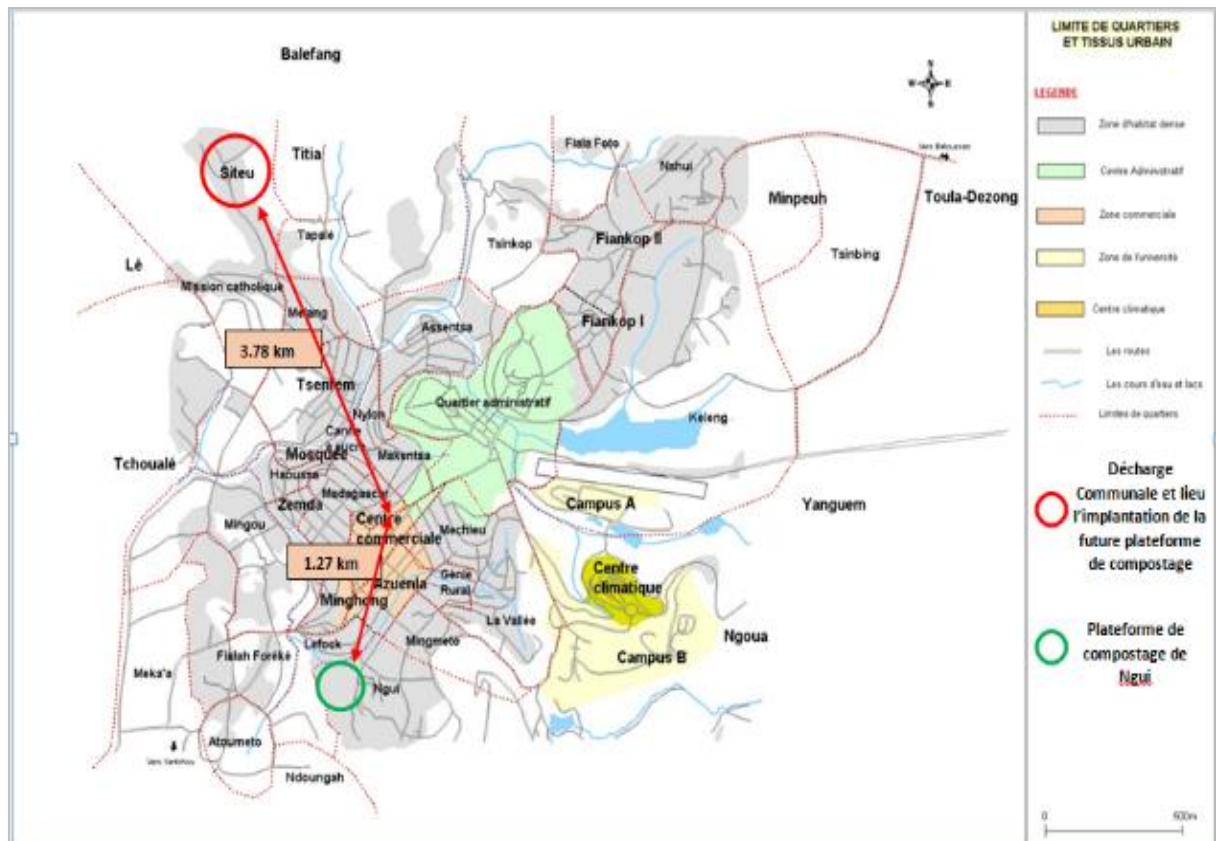
Cameroon, Western Region, Department of Menoua, Province of Dschang

The project has two production sites: one located in Siteu district, the second in N’gui district. The two production sites are 5.05 km apart.

The composting unit coordinates are:

Siteu:	N’gui:
X : 10°2’39.20’’E	X : 10°3’17.62’’E.
Y : 5°25’43.57’’N	Y : 5°26’0.73’’ N.

The following maps shows the two production sites. The solid waste disposal site and Siteu’s production are in the same location, 3.78km from the city center, when Ngui is 1.27km from the city center.



A.3. Reference of applied methodology

The project uses a CDM small-scale methodology AMS.III-F: “Avoidance of methane emissions through composting”, version 12.

In addition, the Methodological tool “Emissions from solid waste disposal site”, version 08.00, (EB 83, Annex 7, March 2th 2012),

As well as the “Tool to calculate project and/ or leakage emissions from electricity consumption”, version 1 (EB 39 Annex 7, May 16th 2008) and

The tool to calculate “project and leakage emissions from composting” versions 01.0.0, (EB 65, Annex 09, November 25th 2015) are used.

A.4. Crediting period of project

The project has a ten years crediting period from the 01/03/2017 to the 28/02/2027

SECTION B. Implementation of project

B.1. Description of implemented project

>> *(Provide information on the implementation status of the project during this monitoring period. Specify any deviations / delays compared to information in approved project.)*

The composting of the city waste was initiated since the year 2015. The emission reductions are claimed for the following years: i) 01/03/2017 – 31/12/2017; ii) 01/01/2018 – 31/12/2018 & iii) 01/01/2019 until the 31/12/2019.

The total waste treated during each crediting years are as follows:

- 2940 tons of wastes from the 01/03/2017 to the 31/12/2017
- 3174 tons of wastes from the 01/01/2018 to the 31/12/2018
- 2175 tons of wastes from the 01/01/2019 to the 31/12/2019

Process of collection and treatment of wastes:

The project team (ERA Cameroun) collects and treats the wastes at the composting sites. The trucks collect the Solid waste in Dschang city and deliver it to Ngui and Siteu sites. Once each truck has been unloaded at the composting site, the heterogeneous waste is submitted to a first separation stage on ground where coarse non-compostable products are removed. Then the remaining waste is dumped on tables to be finely sorted (manual sorting) and producing two homogeneous parts:

- First is the organic fraction, which is further sent to the composting windrows and
- Second is the fine non-compostable products.

Non-compostable products are considered as a final refuse, to be disposed in the SWDS.

The emission reduction calculations and the parameters are explained in the section E below.

There were no deviations in the project activity compared to the approved project documents. The project registration was delayed due to the change in the project team, therefore the change in the first period of crediting from the 01/03/2017, instead of the expected date of 01/01/2015 (as mentioned in the registered PDD).

For safety measures, each worker is provided with safety equipment, which are mandatory on the composting site.

B.2. Post-registration changes

B.2.1. Temporary deviations from Certified Key Project Information, Project Design Document, Monitoring & Reporting Plan, applied methodology or applied standardized baseline

>> (Indicate whether any temporary deviations have been applied during this monitoring period. If applied, provide a description of the deviation(s). Include the reasons for the deviation(s), how it deviates from the monitoring plan, applied methodology(ies) and/or applied approaches, the duration for which the deviation(s) is(are) applicable and justification on the conservativeness of the approach. Also indicate if prior approval from GS-TAC have been sought on the deviation.)

Not applicable

B.2.2. Corrections

>> (Indicate whether any corrections to project information or parameters fixed at validation have been applied.)

Not applicable

B.2.3. Changes to start date of crediting period

>> (Indicate whether any changes to the start date of the crediting period have been approved by Gold Standard that is relevant for this monitoring period.)

Not applicable

B.2.4. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

>> (Indicate whether any permanent changes from the approved monitoring plan, applied methodologies or applied approaches have been approved by GS-TAC that is relevant for this monitoring period.)

Not applicable

B.2.5. Changes to project design of approved project

>> (Indicate whether any changes to the design of the project have been approved by GS-TAC that is relevant for this monitoring period.)

Not applicable

SECTION C. Description of monitoring system applied by the project

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The project monitoring is carried out by the local project team present on the composting site. A separate monitoring system has been followed to correctly collect and record the required data of each of the four monitored parameters linked to the emission reduction calculations. The monitored parameters monitored are explained as below:

There are four monitored parameters linked to baseline emissions:

- i) **Fraction of methane captured at the SWDS (f):** Visits are done regularly (at least once a year) to the final disposal site. And, the baseline scenario includes a leveling of waste, but no methane capturing.

Information to be reported for monitoring: value of “f”

- ii) **Global Warming Potential (GWP) of methane and nitrous oxide:** The decisions under UNFCCC and the Kyoto Protocol have been taken into account. The corresponding values will be verified annually at the UNFCCC web site before filling the monitoring data.

Information to be reported for monitoring:

- **GWP_{CH4}** value (tonsCO₂/ton CH₄),
- **GWP_{N2O}** value (tonsCO₂/ton N₂O)

- iii) **Total amount of organic waste prevented from disposal per year:** Since the loads of the wastes delivery trucks vary not only with the season but also with the volume of waste to be transported, we have chosen a local adaptation based on the calculation of the carrying capacity of the wheelbarrows used at the composting site.

The total amount of organic waste (**W_x**), delivered to each of both composting installations (Siteu and Ngui), is the yearly sum of the organic fraction sent for composting.

The total amount of organic wastes is calculated on the basis of the wheelbarrow load (carrying capacity) of corresponding products multiplied by the number of wheelbarrows. The average carrying capacity of the wheelbarrows is defined for each product twice per year (one for the dry season and one for the wet season) on the basis of a representative number (10) of measurements of the carrying capacity of the wheelbarrows. The carrying capacity of the wheelbarrows is determined thanks to the weighing machine available on the site, calibrated following the legal local regulation.



Such procedure allows a much better accuracy of the total amount of organic waste delivered to the composting installations (Siteu and Ngui).

Monthly weight of entrant household waste:

$WCW = (\text{Number of organic fraction wheelbarrows}) \times (\text{average weight of organic fraction wheelbarrows}) + (\text{Number of non-compostable fraction wheelbarrows}) \times (\text{average weight of non-compostable fraction})$

Information to be reported for monitoring:

- ***Tons of organic waste treated in Siteu installation.***
- ***Tons of organic waste treated in Ngui installation.***

- To estimate the quantity of treated waste, at the beginning of 2017, ten wheelbarrows full of organic matter and ten wheelbarrows full of rejections were weighed. The averages thus obtained are applied to the number of wheelbarrows of organic matter and to the number of wheelbarrows of rejections obtained daily.
- Since January 2018, the difference is made between the rejections of the sorting on the ground and the rejections of the sorting on the table. Also, every month ten wheelbarrows full of organic matter, ten wheelbarrows full of rejections of the sorting on the ground and ten wheelbarrows full of rejections of the sorting on the table are weighed. The averages thus obtained are applied to the number of wheelbarrows of organic matter and to the number of wheelbarrows of both types of rejections obtained daily during the concerned month.
- Considering the two sites, two seasons, different types of wastes/products and the three years of monitoring, this average wheelbarrow weight was determined each months on each site.

- The average weight of the wheelbarrows is determined each months on each sites. For more details, Refer to the reference pdf document - 'Weight Wheelbarrow' 2017-2018-2019

Monthly weight of entrant household waste:

$WCW = N^{\circ} \text{ wheelbarrows full of organic matter in the month } * + N^{\circ} \text{ wheelbarrows full of rejections in the month}$

iv) Weight fraction of the waste type j during the year y

The waste composition will be monitored independently for each source of organic waste. Household waste includes all of six waste categories defined in the AMS III.F methodology. (see table 2). For the complete characterization, please Refer to Section D2.

Waste source	Type j	Weight fraction
Household waste	Wood and wood products	2 %
	Pulp, paper and cardboard	6 %
	Food, food waste, beverages and tobacco	47 %
	Textiles	6 %
	Garden, yard and park waste	27 %
	Glass, plastic, metal and other inert waste	11 %

Table 2: Waste types for household waste during the 1st year (March 2017-December 2017)

According to the “methodological tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site”, the sample characterization was made by the production manager at least once a month.

The protocol used is for characterization is as follows :

500 kg of waste are sampled from 5 different trucks on different days if not enough deliveries occur on the same day. The samples are collected in different spots of the truck for representativeness.

The whole sample is then divided into 4 parts, manually homogenized and put back together.

A fourth of this sample is then selected by slicing the waste pile into 4. This part is the one which will be characterized.

The pile of waste is screened to separate waste bigger than 100mm and smaller than 100 mm. Then the same operation is done to separate waste bigger than 20 mm and smaller than 20mm. Each pile is then sorted into each category of waste type.

The following table is then filled by weighing each category of waste :

	Total		Wood and wood products	Food and food waste	Paper	Textiles	Garden waste	Inerts	Fines < 20
>100mm									
20<X<100	Total	Total used for cars ³							
<20									
Total (kg)									
Total (%)									

Table 3 : Characterization table

The full process is available in French in Annex. Refer to Characterisation Protocol French for further information.

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The characterization results are recorded and the annual average will be calculated for the different waste source.

Information to be reported for monitoring

- *Weight fraction of the waste type j for each waste source as shown above in the table 2.*

For other sources such as fruit empty bunches, or green waste as they are composed of only one type they will be recorded as such. (green waste as green waste – fruit leftovers as green waste also etc.)

The local team is highly competent to realize these monitoring surveys. The site manager is an agronomist and each procedures have been implemented under his guidance wherever required.

The project is only registered to GoldStandard VER, therefor no double counting of Emission reductions is possible.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	φ
Unit	-
Description	Model correction factor to account for model uncertainties
Source of data	CDM “Methodological tool: Emissions from solid waste disposal sites” Version 08
Value(s) applied)	0.85
Choice of data or measurement methods and procedures	According to CDM tool used, as not enough data is available to calculate φ , the default value was chosen. The default value of 0.85 corresponds to current project conditions: application B (project activity avoids disposal of waste at the SWDS) and humid/wet conditions (cf. climatic data in Annex 7).
Purpose of data	Emission reduction calculations
Additional comments	Oonk et al. (1994) have validated several landfill gas models based on 17 realized landfill gas projects.

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	Ox
Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering waste)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied)	0.1
Choice of data or measurement methods and procedures	According to the CDM “Methodological tool: Emissions from solid waste disposal sites” Version 08
Purpose of data	Emission reduction calculations
Additional comments	As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	F
Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied)	0.5
Choice of data or measurement methods and procedures	According to the CDM “Methodological tool: Emissions from solid waste disposal sites” Version 08
Purpose of data	Emission reduction calculations
Additional comments	As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	DOC_r
Unit	-
Description	Fraction of degradable organic carbon (DOC) that can decompose
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied)	0.5
Choice of data or measurement methods and procedures	According to the CDM “Methodological tool: Emissions from solid waste disposal sites” Version 08
Purpose of data	Emission reduction calculations
Additional comments	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	MCF
Unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied)	1
Choice of data or measurement methods and procedures	According to “Methodological tool: Emissions from solid waste disposal sites” Version 08”. The water table is at least 11 meters deep ¹ and the SWDS is anaerobically managed: The placement of waste is managed (waste directed to specific deposit areas, a degree of control of scavenging and a degree of control of fires) and includes a leveling of waste and a mechanical compacting.
Purpose of data	Emission reduction calculations
Additional comments	The SWDS is both anaerobic and managed: waste is located to a specific place when it gets to the SWDS, a bulldozer levels the waste regularly, and guards are at the SWDS to make sure that no fire is voluntarily started. See Annex 6 As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	DOC_j
Unit	-
Description	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)

¹Information from the technical study to implement the SWDS in Dschang.

Value(s) applied)	Waste type j	DOCj (% wet waste)
	Wood and wood products	43
	Pulp, paper and cardboard (other than sludge)	40
	Food, food waste beverages and tobacco (other than sludge)	15
	Textiles	24
	Garden, yard and park waste	20
	Glass, plastic, metal and other inerts	0
Choice of data or measurement methods and procedures	According to CDM “According to “Methodological tool: Emissions from solid waste disposal sites” Version 08”	
Purpose of data	Emission reduction calculations	
Additional comments	Waste that cannot clearly be attributed to one of those categories are assimilated in a conservative way to the one having the most similar characteristics. For example, after visual analysis particles smaller than 20 millimetres seems to be mostly organic matter thus they are assimilated to food waste. As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13	

Relevant SDG Indicator	SDG 13: Climate Action		
Data/parameter:	k_j		
Unit	1/year		
Description	Decay rate for the waste type j		
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)		
Value(s) applied)	Waste type j	Weather wet and tropical	
	Slowly degrading	Pulp, paper and cardboard (other than sludge), textiles	0.07
		Wood and wood products and straw	0.035
	Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.17
	Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.40
Choice of data or measurement methods and procedures	Climatic conditions in Dschang correspond to a tropical zone, with mean annual temperature >20°C and mean annual precipitation >1000mm.		

Purpose of data	Emission reduction calculations
Additional comments	Cf Annex 7 for climatic data. As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	EF_{power}
Unit	tCO ₂ /MWh
Description	Emission factor for grid electricity
Source of data	“Tool to calculate baseline, project and/or leakage emissions from electricity consumption” EB 39 Annex 7 May 16th 2008
Value(s) applied)	1.3
Choice of data or measurement methods and procedures	The electricity used in the project comes from the grid, and the project consumes more energy (in the present situation due to lighting) than the baseline (scenario A, option A1 of the document sub-cited). Thus, the conservative default value of 1.3 MWh can be used.
Purpose of data	Emission reduction calculations
Additional comments	For the time being, the project works without electric power on both sites. The connection to the local grid is considered in the future; the electric consumption will then be monitored through the electricity meter and the periodic invoices of the distribution company As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	EF_{CH4,default}
Unit	tCH ₄ /T
Description	Default emission factor of methane per ton of waste composted (wet basis)
Source of data	Methodological tool “Project and leakage emissions from composting”. (Version 01.0.0)
Value(s) applied)	0.002
Choice of data or measurement methods and procedures	Default emission factor
Purpose of data	Emission reduction calculations
Additional comments	The emission factor was selected based on studying published results of emission measurements from composting facilities, literature reviews on the subject and published emission factors. Data from recent, high quality sources was analysed and a value conservatively selected from the higher end of the range in results. As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	EF_{N2O,default}
Unit	tN ₂ O/T
Description	Default emission factor of methane per ton of waste composted (wet basis)

Source of data	See DATA AND PARAMETERS NOT MONITORED, . Methodological tool “Project and leakage emissions from composting. (Version 01.0.0) “: The emission factor was selected based on studying published results of emission measurements from composting facilities, literature reviews on the subject and published emission factors. Data from recent, high quality sources was analyzed and a value conservatively selected from the higher end of the range in results.
Value(s) applied)	0.0002
Choice of data or measurement methods and procedures	
Purpose of data	Emission reduction calculations
Additional comments	As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	GWP_{CH4}
Unit	t _{CO2e} /t _{CH4}
Description	Global warming potential of CH4
Source of data	IPCC Fourth Assessment Report: Climate Change 2007 (See www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14)
Value(s) applied)	25
Choice of data or measurement methods and procedures	
Purpose of data	Emission reduction calculations
Additional comments	As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	GWP_{N2O}
Unit	t _{CO2e} /t _{N2O}
Description	Global warming potential of N2O
Source of data	IPCC Fourth Assessment Report: Climate Change 2007 (See www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14)
Value(s) applied)	298
Choice of data or measurement methods and procedures	
Purpose of data	Emission reduction calculations
Additional comments	As per the GS, no requirement for an indicator for the parameters linked to the goal SDG 13

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter)

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	f_y
Unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y.
Measured/calculated/default	Not applicable
Source of data	Historical data on the amount captured on the SWDS by the municipality or the entity managing the SWDS
Value(s) of monitored parameter	0
Monitoring equipment	-
Measuring/reading/recording frequency:	Once a year
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Not applicable
Purpose of data:	Not applicable
Additional comments:	There is no capture / combustion of gas at the solid waste disposal site at the time of writing the monitoring Report and the municipality doesn't has it as a project.

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	W_x
Unit	Tons
Description	Total amount of organic waste prevented from disposal in year
Measured/calculated/default	Measured
Source of data	Measurements by ERA (local team)

Value(s) of monitored parameter	<p>1st year (01/03/2017 to 31/12/2017): Ngui : 1358 tons Siteu : 1256 tons Total : 2614 tons</p> <p>2nd year (01/01/2018 to 31/12/2018): Ngui : 1201 tons Siteu : 1096 tons Total : 2848.51 tons</p> <p>3rd year (01/01/2019 to 31/12/2019): Ngui : 1179 tons Siteu : 427 tons Total : 1941 tons</p>
Monitoring equipment	The carrying capacity of the wheelbarrows is determined with the help of the weighing machine available on the site, calibrated following the legal local regulation.
Measuring/reading/recording frequency:	10 times per month
Calculation method (if applicable):	The calculation method has been explained in the section above, please refer the point (iii) on page 7.
QA/QC procedures:	<p>Every month ten wheelbarrows full of organic matter, ten wheelbarrows full of rejections of the sorting on the ground and ten wheelbarrows full of rejections of the sorting on the table are weighed.</p> <p>The carrying capacity of the wheelbarrows is determined with the help of the weighing machine available on the site, calibrated following the legal local regulation.</p>
Purpose of data:	Emission reduction calculations
Additional comments:	<p>The quantity of waste treated is estimated from the count of wheelbarrows.</p> <p>Please refer to ER calculation excel sheet – “Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020” :</p> <p>For 2017, please refer the sheet Year1.2017 cell D7, D8 & D9</p> <p>For 2018, please refer the sheet Year2.2018 cell D7, D8 & D9</p> <p>For 2019, please refer the sheet Year3.2019 cell D7, D8 & D9</p>

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	P_{n,j,x}
Unit	%
Description	Weight fraction of the waste type j in the sample n collected during the year x
Measured/calculated/default	Calculated

Source of data	<p>Characterization of raw waste made by ERA Cameroun in 2016- 2019 for ex-ante calculation.</p> <p>The figure used for emission reduction calculations are the mean of 32 different characterizations done from (01/03/2017) to (31/12/2019).</p> <p>Please refer the excel sheet “Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020 ; Sheet monitored datas_Column C20 to E25 ”</p>																																																
2	<p>YEAR 1: (01/03/2017)-(31/12/2020)</p> <table border="1" data-bbox="528 499 1437 887"> <thead> <tr> <th>Type j</th> <th>Weight fraction</th> <th></th> </tr> </thead> <tbody> <tr> <td>Wood and wood products</td> <td>2%</td> <td rowspan="6">Please refer the excel sheet: Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020; sheet: Year1.2017 - Column V40 to V45”</td> </tr> <tr> <td>Pulp, paper and cardboard</td> <td>6%</td> </tr> <tr> <td>Textiles</td> <td>6%</td> </tr> <tr> <td>Food, food waste, beverages and tobacco</td> <td>47%</td> </tr> <tr> <td>Garden, yard and park waste</td> <td>27%</td> </tr> <tr> <td>Glass, plastic, metal and other inert waste</td> <td>11%</td> </tr> </tbody> </table> <p>YEAR 2: (01/01/2018)- (31/12/2019)</p> <table border="1" data-bbox="528 981 1437 1368"> <thead> <tr> <th>Type j</th> <th>Weight fraction</th> <th></th> </tr> </thead> <tbody> <tr> <td>Wood and wood products</td> <td>2%</td> <td rowspan="6">Please refer the excel sheet: Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020 ; sheet: Year2.2018 - Column T40 to T45”</td> </tr> <tr> <td>Pulp, paper and cardboard</td> <td>6%</td> </tr> <tr> <td>Textiles</td> <td>7%</td> </tr> <tr> <td>Food, food waste, beverages and tobacco</td> <td>59%</td> </tr> <tr> <td>Garden, yard and park waste</td> <td>17%</td> </tr> <tr> <td>Glass, plastic, metal and other inert waste</td> <td>10%</td> </tr> </tbody> </table> <p>YEAR 3: (01/01/2019)- (31/12/2020)</p> <table border="1" data-bbox="528 1485 1437 1872"> <thead> <tr> <th>Type j</th> <th>Weight fraction</th> <th></th> </tr> </thead> <tbody> <tr> <td>Wood and wood products</td> <td>2%</td> <td rowspan="6">Please refer the excel sheet: Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020 ; sheet: Year3.2019 - Column T40 to T45”</td> </tr> <tr> <td>Pulp, paper and cardboard</td> <td>5%</td> </tr> <tr> <td>Textiles</td> <td>7%</td> </tr> <tr> <td>Food, food waste, beverages and tobacco</td> <td>60%</td> </tr> <tr> <td>Garden, yard and park waste</td> <td>15%</td> </tr> <tr> <td>Glass, plastic, metal and other inert waste</td> <td>11%</td> </tr> </tbody> </table>	Type j	Weight fraction		Wood and wood products	2%	Please refer the excel sheet: Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020; sheet: Year1.2017 - Column V40 to V45 ”	Pulp, paper and cardboard	6%	Textiles	6%	Food, food waste, beverages and tobacco	47%	Garden, yard and park waste	27%	Glass, plastic, metal and other inert waste	11%	Type j	Weight fraction		Wood and wood products	2%	Please refer the excel sheet: Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020 ; sheet: Year2.2018 - Column T40 to T45 ”	Pulp, paper and cardboard	6%	Textiles	7%	Food, food waste, beverages and tobacco	59%	Garden, yard and park waste	17%	Glass, plastic, metal and other inert waste	10%	Type j	Weight fraction		Wood and wood products	2%	Please refer the excel sheet: Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020 ; sheet: Year3.2019 - Column T40 to T45 ”	Pulp, paper and cardboard	5%	Textiles	7%	Food, food waste, beverages and tobacco	60%	Garden, yard and park waste	15%	Glass, plastic, metal and other inert waste	11%
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Monitoring equipment	-																																																
Measuring/reading/recording frequency:	Every month																																																

Calculation method (if applicable):	A characterization is done every month by ERA Cameroun according to the characterization protocol on incoming waste (composed by the six types of waste described by the methodology).
QA/QC procedures:	Such measurement method is based on the NF X30-408 and NF XP X30-466 standards.
Purpose of data:	Emission reduction calculations
Additional comments:	<p>Characterization have been done every month to insure reliable information on the nature of the waste collected.</p> <p>Please refer to Annex 1 Year1.2017 - Column V40 to V45”, sheet: Year2.2018 - Column T40 to T45” & sheet: Year3.2019 -Column T40 to T45”</p>

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	EE_y
Unit	Kwh
Description	Electrical energy consumption for compost production in year y.
Measured/calculated/default	Measured
Source of data	Electricity meter.
Value(s) of monitored parameter	<p>1st year (March 1st 2017 to December 31th 2017): 391 Kwh</p> <p>2nd year (January 1st 2018 to December 31th 2018): 364 Kwh</p> <p>3rd year (January 1st 2019 to December 31th 2019): 663.0 Kwh</p>
Monitoring equipment	Electricity meter.
Measuring/reading/recording frequency:	Electricity meter checked once a month.
Calculation method (if applicable):	None
QA/QC procedures:	One electricity meter is available on each site
Purpose of data:	Emission reduction calculations
Additional comments:	<p>During the operation, the actual energy consumption is monitored through the electricity meter and crossed checked with the distribution company invoices.</p> <p>Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020 :</p> <p>For 2017 refer to the sheet Year1.2017 cell D50</p> <p>For 2018 refer to the sheet Year2.2018 cell D50</p> <p>For 2019 refer to the sheet Year3.2019 cell D50</p>

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	$Q_{y,treatment}$
Unit	Tons
Description	Quantity of compost produced in year y
Measured/calculated/default	Measured
Source of data	ERA's recording
Value(s) of monitored parameter	1st year (March 1st 2017 to December 31th 2017): 155.6 tons 2nd year (January 1st 2018 to December 31th 2018): 322.15 tons 3rd year (January 1st 2019 to December 31th 2019): 214.79 tons
Monitoring equipment	Weighing machine
Measuring/reading/recording frequency:	Data is cross-checked with both sales record and process analysis. (see "any comment").
Calculation method (if applicable):	Continuous measurement. After being screened, the compost is stored and packaged into 50kg bags ready for sale. Quantity of bags filled in is recorded on the platform.
QA/QC procedures:	
Purpose of data:	Monitoring the SDG 2 - Zero Hunger
Additional comments:	The aerobic conditions of the composting process were insured by regular windrow turning Please refer to the ER calculation sheet – "Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020" : For 2017 refer yourself to the sheet Year1.2017 cell D47 For 2018 refer yourself to the sheet Year2.2018 cell D47 For 2019 refer yourself to the sheet Year3.2019 cell D47

Relevant SDG Indicator	SDG 2 : 2.4.1 Proportion of agricultural area under productive and sustainable agriculture
Data/parameter:	$Q_{y,treatment}$
Unit	Tons of compost
Description	Quantity of compost produced in year
Measured/calculated/default	Recorded
Source of data	ERA's recording
Value(s) of monitored parameter	155.6 tons of compost produced in Year 1 (March 2017 - December 2018). 322.15 tons of compost produced in Year 2 (January 2018 – December 2018). 214.79 tons of compost was produced in Year 2 (January 2019 - December 2019).

Monitoring equipment	-
Measuring/reading/recording frequency:	When necessary
Calculation method (if applicable):	Sheets of good practices on the use of compost (written in French) will be drafted, discussed and made available to users.
QA/QC procedures:	Total quantity of the compost bags weighed and packed in sacks, are recorded by the team on the platform. The compost records are cross-checked by the project manager of the composting site. Data is cross-checked with both sales record and process analysis. In order to follow the buyers of the compost, a sales and delivery records are maintained as a part of the monitoring plan.
Purpose of data:	Monitoring the SDG 2
Additional comments:	Taking into account the project budget and the high cost to monitor the “proportion of agriculture area under production and sustainable agriculture”, the project activity has provided the total amount of compost produced per year, which is sold to local farmers for agriculture use, ensuring a sustainable and resilient agricultural practices.

Relevant SDG Indicator	SDG 11 : 11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities
Data/parameter:	i)Total amount of organic waste treated into compost ii)Compost analysis and its application for agriculture iii) Air and water quality near the surrounding areas of the waste composting facility
Unit	Tons
Description	This parameter is to ensure application of compost to organic soil and assure no foul odors or water pollution in the surrounding areas of the activity.
Measured/calculated/default	Recorded
Source of data	ERA’s commercial visits record. Sales and delivery record For air and water, a Inhabitants Complaint book is maintained at the site.
Value(s) of monitored parameter	<ul style="list-style-type: none"> • 2940 tons of waste treated in Year 1 (March 2017 - December 2018). • 3174 tons of waste treated in Year 2 (January 2018 – December 2018). • 2175 tons of waste treated in Year 3 (January 2019 - December 2019). <ul style="list-style-type: none"> • 146.30 tons of compost was sold in Year 1 (March 2017 - December 2018). • 364.1 tons of compost was sold in Year 2 (January 2018 – December 2018). • 191.83 tons of compost was sold in Year 3 (January 2019 - December 2019).
Monitoring equipment	-
Measuring/reading/recording frequency:	When necessary
Calculation method (if applicable):	Composts : The total amount of compost sold is maintained and recorded by the project team. It will be done through on site visits on a representative sample of clients. Sheets of good practices on the use of compost (written in French) will be drafted, discussed and made available to users. Air Quality :The air quality due to the project activity will also be monitored in this parameter to assure that there are no complaints of foul odours from the surrounding inhabitants. Water Quality : By measuring the water quality into the situe wells.
QA/QC procedures:	In order to follow the buyers of the compost, a sales and delivery records are maintained as a part of the monitoring plan.
Purpose of data:	Monitoring the SDG 11 - Make cities inclusive, safe, resilient and sustainable

Additional comments:	<p>A registry of inhabitants complaints will be maintained at the composting site regarding the foul odors or water quality complaints. On the other hand the site team ensures to communicate with the neighbouring inhabitants. And so far they have not received any complaints regarding the odour or water quality.</p> <p>Water quality is ensured by covering compost Windrows. These Windrows are stored under a metal roof building which avoids water during rainy seasons. Please refer the photo “Workers PPE”. Therefore, no leaking of water from windrows is observed on site.</p>
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Relevant SDG Indicator	SDG 8 : 8.3.1 - Proportion of informal employment in non-agriculture employment, by sex
Data/parameter:	Number of workers
Unit	number
Description	Total number of workers employed due at the composting site of the project activity
Measured/calculated/default	Employment contracts
Source of data	Employment contract
Value(s) of monitored parameter	2017 – 38 employees 2018 – 36 employees 2019 – 30 employees
Monitoring equipment	-
Measuring/reading/recording frequency:	When necessary
Calculation method (if applicable):	None
QA/QC procedures:	Each worker at the composting site sign a work contract and a copy of the contracts are stored at the site. The project manager keeps a track of all the work contracts. Keeping a healthy and safe work environment to avoid any work related injuries. The project site manager keeps a regular check on the use of the PPE by each worker on the site.
Purpose of data:	Monitoring the SDG 8
Additional comments:	Few scan copies of the work contract and purchase of the PPE’s are provided for verification.

D.3. Implementation of sampling plan

>> (If data and parameters monitored described in section D.2 above are determined by a sampling approach, provide a description on how project participants implemented the sampling plan and surveys for those data and parameters according to the approved PDD.)

Characterization sampling plan:

The protocol used is for characterization is based on the NF X30-408 and NF XP X30-466 standards and is as follows:

The aim of this sampling is to get a good representation of the waste of Dschang, and of incoming waste on the platform. To insure a representative sampling, waste is gathered from different trucks in order to represent at best incoming waste.

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500 kg of waste are sampled from 5 different trucks on different days if not enough deliveries occur on the same day. The samples are collected in different spot of the truck for representativeness. The whole sample is then divided in 4 parts, manually homogenized and put back together.

A Fourth of this sample is then selected by slicing the waste pile in four. This part is the one, which will be characterized.

The pile of waste is screen to separate waste bigger than 100mm and smaller than 100 mm. Then the same operation is done to separate waste bigger than 20 mm and smaller than 20mm. Each pile is then sorted into each category of waste type.

The details are also provided on page 8 of the monitoring report.

SECTION E. Calculation of SDG outcomes

E.1. Calculation of baseline value or estimation of baseline situation of each SDG outcome

>> (Provide details of equations and approaches used to calculate/estimate baseline values.)

SDG 2: Zero Hunger

Without the composting project, there would have been no production of compost. Therefore, the baseline value for this indicator is zero tons of compost.

SDG 8: Decent Work and Economic Growth

Without the composting project, there would have been no creation of employment for the local communities. Therefore the baseline value for this indicator is zero employment at the composting site.

SDG 11: Sustainable Cities and Communities

Without this composting project, there would have been no sales of compost to local farmers. Hence no support of local sustainable practices. Therefore, the baseline value for this indicator is zero tons of compost.

SDG 13: Calculation of Baseline GHG emissions

As explained in the paragraph B.6.3 of the PDD, the GHG sources, sinks and reservoirs for the baseline are the methane emissions avoided from preventing waste disposal at the solid waste disposal site. These emissions are calculated as follow:

$$BE_{CH_4,SWDS,x} = \phi \cdot (1 - f) \cdot GWP_{CH_4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_x \sum_j^z W_{j,y} \cdot DOC_j \cdot e^{-k_j \cdot (Z-x)} \cdot (1 - e^{-k_j})$$

Where:

BE _{CH₄,SWDS} ,y	Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y in (tCO ₂ e)	Calculated
φ	Model correction factor to account for model uncertainties	φ = 0.85

F	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	f = 0 Monitored
GWP _{CH4}	Global warming potential (GWP) of methane, valid for the relevant commitment period	GWP _{CH4} = 25 Monitored
F	Fraction of methane in the SWDS gas (volume fraction)	F = 0.5
DOC _f	Fraction of degradable organic carbon (DOC) that can decompose	DOC _f = 0.5
MCF	Methane correction factor	MCF = 1
W _{j,k}	Amount of organic waste type j prevented from disposal in the SWDS in the year x (tons).	Calculated from two Monitored parameters: Total amount of organic waste prevented from disposal and Weight fraction of the waste type j
DOC _j	Fraction of degradable organic carbon (by weight) in the waste type j	Wood 43 Pulp, paper 40 Textile 24 Food waste 15 Garden waste 20 Inert waste 0
K _j	Decay rate for the waste type j	Wood 0.035 Pulp, paper 0.07 Textile 0.07 Food waste 0.40 Garden waste 0.17 Inert waste 0
j	Waste type category	Household waste
X	Year for which methane emissions are calculated	x runs from the first year of the crediting period (x=1) to year z, with z=10
Z	Final year considered for methane emissions calculation.	Following suggestion by the GS TAC, Z = 10 is used.

The factor “ $\phi \cdot (1-f) \cdot GWP_{CH4} \cdot 16/12 \cdot F \cdot DOC_f \cdot MCF$ ”, which could be considered as a constant K, independent from the year and from the waste type is equal to:

$$K = 0.85 \cdot 25 \cdot (1-0) \cdot 16/12 \cdot 0.5 \cdot 0.5 \cdot 1 = 6.375$$

The formula becomes then:

$$BE_{CH4,SWDS,y} = 6.375 * \sum_x^z \sum_j W_{j,y} \cdot DOC_j \cdot e^{-k_j \cdot (z-x)} \cdot (1 - e^{-k_j})$$

Calculation :

- (01/03/2017) to (31/12/2017) :
 - $BE_{CH4,SWDS,2017} = 6.375 * (6.96+38.18+22.04+205.51+129.47) = 2563.71 \text{ tCO}_2$
- (01/01/2018) to (31/12/2018):
 - $BE_{CH4,SWDS,2018} = 6.375 * (8.53+37.79+27.17+257.97+88.18) = 2675.14 \text{ tCO}_2$
- (01/01/2019) to (31/12/2019):
 - $BE_{CH4,SWDS,2019} = 6.375 * (3.81+19.06+16.36+188.27+48.47) = 1759.41 \text{ tCO}_2$

E.2. Calculation of project value or estimation of project situation of each SDG outcome

>> (Provide details of equations and approaches used to calculate/estimate project values.)

SDG 2: : Zero Hunger

This project produced 155.6t in 2017, 322.15t in 2018, 214.79t in 2019 of compost, helping to produce food locally.

SDG 8: Decent Work and Economic Growth

This project created 38 jobs in 2017, 36 jobs in 2018 and 30 jobs in 2019.

SDG 11: Sustainable Cities and Communities

Thanks to this project, 146.3t in 2017, 364.1t in 2018 and 191.83t of compost in 2019 have been sold. This compost, sold locally allows to sustain local durable farming practices.

This compost is used by local communities as a soil amendment. It allows them to feed crops and build soil fertility.



One of the examples of the Farmers training on the Compost application



Farmers growing potatoes using Compost as soil amendment

SDG 13: Calculation of GHG emissions and/or removals for the project

As explained in the paragraph B.6.3 of the PDD, the project GHG emissions are:

- i) CO₂ emissions on account of electricity used by the project activity facilities for screening and mechanical sorting of compost.
- ii) Methane emissions during composting process
- iii) Nitrous oxide emissions during composting process

These emissions are calculated as follow:

$$PE_{comp,y} = PE_{EC,y} + PE_{CH_4,y} + PE_{N_2O,y}$$

Where:

- PE_{comp,y} = Project activity emissions in the year “y” (tonnes of CO₂ equivalent)
 PE_{EC,y} = Emissions from electricity consumption in the year “y”,
 PE_{CH₄,y} = Methane emissions during composting process during year "y"
 PE_{N₂O,y} = Nitrous oxide emissions during composting process during year "y"

Emissions from electricity consumption

$$PE_{y,power} = EE_y * EF_{CO_2} * (1 + TDL)$$

Where

EE _y	Electrical energy consumption in the year y (kWh)	Monitored
EF _{CO₂}	CO ₂ emission factor from electricity produced from fossil fuel	EF CO ₂ = 1.3 kg CO ₂ e/kWh
TDL	Average technical transmission and distribution losses for providing electricity to source j in year y	0.2

Calculation :

- (01/03/2017) to (31/12/2017) :
 - **PE_{2017,pow}** = (1+0.2) * 0.391 * 1.3 = 0.61 tCO₂
- (01/01/2018) to (31/12/2018):
 - **PE_{2018,pow}** = (1+0.2) * 0.364 * 1.3 = 0.54 tCO₂
- (01/01/2019) to (31/12/2019):
 - **PE_{2019,pow}** = (1+0.2) * 0.663 * 1.3 = 1.03 tCO₂

Methane emissions during composting process

$$PE_{y,comp} = Q_y * EF_{composting} * GWP_{CH_4}$$

Where

Qy	Quantity of raw waste treated in the year y (tonnes)	Monitored
EF _{composting}	Emission factor for composting of organic waste (t CH ₄ /ton waste treated).	EF _{composting} = 0.002t CH ₄ /t waste treated on a wet basis.
GWP _{CH₄}	Global warming potential (GWP) of methane, valid for the relevant commitment period	GWP _{CH₄} = 25

Calculation :

- (01/03/2017) to (31/12/2017) :
 - $PE_{2017,comp} = 2614.54 * 0.002 * 25 = 130.72 \text{ tCO}_2$
- (01/01/2018) to (31/12/2018):
 - $PE_{2018,comp} = 2848.51 * 0.002 * 25 = 142.43 \text{ tCO}_2$
- (01/01/2019) to (31/12/2019):
 - $PE_{2019,comp} = 1941.04 * 0.002 * 25 = 115.69 \text{ tCO}_2$

Nitrous oxide emissions during composting process

Nitrous Oxide emissions are calculated following the default values of the tool to determine "project and leakage emission from composting" versions 01.0.0, as the monitoring method is too expensive for a project this size.

$$PE_{N_2O,y} = Q_y * EF_{N_2O,y} * GWP_{N_2O}$$

Where

Qy	Quantity of waste composted in year y (t/yr)	Monitored data
EF _{N_{2O},y}	Emission factor of methane per tonne of waste composted valid for year y (t N _{2O} / t)	EF _{N_{2O},y} = 0.0002 t N _{2O} / t
GWP _{N_{2O}}	Global warming potential of N _{2O} (TCO ₂ e/t N _{2O})	GWP _{N_{2O}} = 298

Calculation :

- (01/03/2017) to (31/12/2017) :
 - $PE_{2017,N_2O} = 2614.45 * 0.0002 * 298 = 155.82 \text{ tCO}_2$
- (01/01/2018) to (31/12/2018):
 - $PE_{2018,N_2O} = 2848.51 * 0.0002 * 298 = 169.77 \text{ tCO}_2$
- (01/01/2019) to (31/12/2019):
 - $PE_{2019,N_2O} = 1941.04 * 0.0002 * 298 = 115.69 \text{ tCO}_2$

The various scans and pieces of document linked to this monitoring report are provided In 4 compressed documents. One for each year of monitoring and one for document regarding the three years of monitoring.

2017 :

- 2017_PPE & Soap Bills
- 2017_Vaccins
- Characterization Of Waste_2017_2018
- Confidential Pay Sheets 2017

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- Confidential_SCAN Employees
- Electricity Bill May&July 2017
- Number of Wheelbarrows March_2017_ February_2018 Ngui
- Number of WheelbarrowsMarch_2017_ February_2018 Siteu
- Pictures Packing and Sorting Compost
- Sorting and Packing of Compost 2017 Ngui & Siteu
- Waste collection_03_17-02_18
- Weight Wheelbarrow 2017 Ngui & Siteu
- Weight Wheelbarrow_2017
- Form A2 Windrow turning 2017 Ngui
- Form A2 Windrow turning 2017 Siteu
- Form A3 Compost screened and stocks 2017 CONFIDENTIAL

2018 :

- Form C1 Characterization january -december 2018 NGUI
- Form C1 Characterization january-december 2018_ SITEU
- Compost Production 2018 Ngui & Siteu
- Confidential Pay sheets 2018
- Confidential_SCAN Employees
- Electricity bill May 2018
- Number of Wheelbarrow 03_18_02_19 Ngui
- Packed & Sorted Compost 2018 Ngui & Siteu
- Waste Collection_03_18-02_19
- Waste pre-collection_2018
- Weight Wheelbarrow 2018 Ngui
- Weight Wheelbarrow 2018 Siteu
- Form A2 Weight Wheelbarrow Sheet_ FS_18
- Form A2 Windrow Turning 2018 Ngui
- Windrow Turning 2018 Siteu
- Form A3 Compost screened and stocks 2018 CONFIDENTIAL

2019 :

- Characterization Campaign jan-dec2019 NGUI
- Characterization Campaign jan-dec 2019_ SITEU
- Electricity Bill December 2019
- Electricity Bill May September 2019
- Number processed Wheelbarrows Ngui february-december 2019
- Number processed Wheelbarrows Siteu february-december 2019
- Confidential Pay Sheets 2019
- PPE Bill 2019
- Waste Pre-collection 2019
- Weight Wheelbarrow 2019 NGUI
- Weight Wheelbarrow 2019 Siteu
- Weight Wheelbarrow 2019
- Form A2 Windrow turning Ngui February-December 2019
- Form A2 Windrow turning Siteu February-December 2019
- Form A3 Compost screened and stocks 2019 CONFIDENTIAL
-

2017, 2018, 2019

- Causes and consequences of labour instability in agroindustrial
- Characterization Protocol French
- Composting Process French
- Grievances

Gold Standard[®]

- Sales Strategy French
- Sheet of good use Compost French
- Motor Pictures
- Workers PPE 1 & 2
- Form D1 Confidential ERA sales Database
- Contract between ERA & Dschang City
- CV Site coordinator SAGNE MOUMBE Joel
- CV Site manager NAGO
- Dschang city Waste collection Database
- Comparison weighing process pictures

E.3. Calculation of net benefits as difference of baseline and project values or direct calculation for each SDG outcome

>>

SDG 2: The net benefit production of this project is as follows:

- 155.6 tons in 2017
- 322.15 tons in 2018
- 214.79 tons in 2019

These amounts of compost allowed supporting of local food production.

SDG 8: The net benefits of the project regarding employment is as follows :

- 38 jobs in 2017
- 36 jobs in 2018
- 30 jobs in 2019

SDG 11:

Thanks to this project, the total amount of compost sold per year is as follows :

- 146.3 tons in 2017,
- 364.1 tons in 2018 and
- 191.83 tons in 2019

. This compost, sold locally allows sustaining local durable farming practices.

SDG 13: Calculation of GHG emissions and/or removals for the project **Baseline Emissions**

Baseline emissions comprise the emissions that would have occurred if the waste had been diverted in the SWDS instead of the composting platform.

The baseline emission for the

- 1st year (01/03/2017-31/12/2017) is **2564** TCO₂eq
- 2nd year (01/01/2018- 31/12/2018) is **2675** TCO₂eq
- 3rd year (01/01/2019- 31/12/2019) is **1759** TCO₂eq

Project Emissions

Project emissions are produced both by the composting process and the electricity used on the platform.

Composting process: it is considered that each ton of composted waste produce 0.02% of methane, and 0.002% of nitrous oxide. With 3554 tons of waste treated in the 1st year March 2017-February 2018), the amount of methane emissions through composting is 177.72 TCO₂eq, and 211.84 TCO₂eq of nitrous oxide.

Electricity: The total consumption of electricity in the 1st year is 471 Kwh, which is equivalent to 0.73 TCO₂eq.

Project emissions for the

- 1st year (01/03/2017-31/12/2017) $130.72 + 155.82 + 0.61 = \mathbf{287}$ TCO₂eq
- 2nd year (01/01/2018- 31/12/2018) is $142.43 + 169.77 + 0.57 = \mathbf{313}$ TCO₂eq
- 3rd year (01/01/2019- 31/12/2019) is $97.05 + 115.69 + 1.03 = \mathbf{214}$ TCO₂eq

Please refer to Annex 1 VER calculation _2017_2018_2019 V0 05 03 2020, sheet PEy

Leakage

No equipment is transferred from another activity and the compost is not stored anaerobically, therefore no leakage is produced in this project.

E.4. Summary of ex-post values of each SDG outcome for the current monitoring period

YEAR 1: (01/03/17) – (31/12/2017):

Item	Baseline estimate	Project estimate	Net benefit
SDG 13 : Climate Action	2564 tCO2	287 tCO2	2277 tCO2
SDG 8: Decent Work and economic growth	0	38 employees	38 employees
SDG 2: Zero hunger	0	1800 tons of compost per year ²	155.6 tons of compost produced
SDG 11: Sustainable cities and communities	0	1800 tons of compost per year	146.3 tons of compost sold

YEAR 2: (01/01/2018) – (31/12/2018)

Item	Baseline estimate	Project estimate	Net benefit
SDG 13 : Climate Action	2675 tCO2	313 tCO2	2362 tCO2
SDG 8: Decent Work and economic growth	0	36 employees	36 employees
SDG 2: Zero hunger	0	1800 tons of compost produced per year	322.15 tons of compost produced
SDG 11: Sustainable cities and communities	0	1800 tons of compost produced per year	364.1 tons of compost sold

YEAR 3: (01/01/2019) – (31/12/2019)

Item	Baseline estimate	Project estimate	Net benefit
SDG 13 : Climate Action	1759 tCO2	214 tCO2	1546 tCO2
SDG 8: Decent Work and economic growth	0	30 employees	30 employees
SDG 2: Zero hunger	0	1800 tons of compost produced per year	214.79 tons of compost produced
SDG 11: Sustainable cities and communities	0	1800 tons of compost produced per year	191.83 tons of compost sold

² Page 10, PDD of the project activity

E.5. Comparison of actual value of outcomes with estimates in approved PDD

YEAR 1: (01/03/17) – (31/12/2017):

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 13 : Climate Action	3637 tCO2*	2277 tCO2
SDG 8: Decent Work and economic growth	40 employees	38 employees
SDG 2: Zero hunger	250 tons of compost produced per year *	155.6 tons of compost produced
SDG 11: Sustainable cities and communities	117 tons of compost*	146.3 tons of compost sold

* (only 10 months are accounted for 2017)

YEAR 2: (01/01/2018) – (31/12/2018)

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 13 : Climate Action	4364 tCO2	2362 tCO2
SDG 8: Decent Work and economic growth	40 employees	36 employees
SDG 2: Zero hunger	300 tons of compost produced per year	322.15 tons of compost produced
SDG 11: Sustainable cities and communities	140 tons of compost	364.1 tons of compost sold

YEAR 3: (01/01/2019) – (31/12/2019)

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 13 : Climate Action	4364 tCO2	1546 tCO2
SDG 8: Decent Work and economic growth	40 employees	30 employees
SDG 2: Zero hunger	300 tons of compost produced per year	214.79 tons of compost produced
SDG 11: Sustainable cities and communities	140 tons of compost	191.83 tons of compost sold

E.6. Remarks on difference from estimated value in approved PDD

>>

The quantities of VER (SDG 13) have not been achieved as estimated. The VER estimation was originally based in the PDD considering larger quantities of waste treated. This explains the lower volume of VER than estimation.

The goal of 40 employees (SDG 8) estimated in the transition annex is not completely reached. The number of employee depends on the quantity of waste and the variability of this quantity. During this monitoring period, the quantities delivered have not been regular enough to reach the goal of 40 employees.

For the compost production, it was estimated in the Transition annex around 300 tons of compost would be possible to be produced per year. This goal has been achieved for 2018 but not in 2017 and 2019. During this monitoring period, the quantities delivered have not allowed to reach the goal of 300 tons of compost.

Compost sales have outreached the sales goal established in the transition annex for 2017, 2018 & 2019

SECTION F. Stakeholder inputs and legal disputes

F.1. List all inputs/grievances which have been received for the project during the monitoring period together with their respective answers/actions

Please refer the “**Form3 2018_Justificatifs 2018_avis riverains NGUI**”, for the reviews of the local stakeholders regarding the project activity. The comments are in French but a translated version is provided in the same document (under comments)

“As my school stands close to the Mage TV Project, we are able to bring our pupils to visit the project site. It enables them to consolidate their knowledge in terms of waste management and compost manufacturing.”

“This site is welcome. It enables our pupils to understand in concrete terms compost manufacturing and its use in soil fertilization”

“The waste management project (MAGETV) is a success story. This project has contributed to a proper hygiene and sanitation of Dschang Urban and Peri-Urban centres.”

F.2. List all inputs/grievances from previous monitoring period where follow up action is to be verified in this monitoring period

>> *None*

F.3. Provide details of any legal contest or dispute that has arisen with the project during the monitoring period

>> *None*