**PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Avoidance of Methane Emissions at Organic Compost Soil Amendment Facility from GEC Organics
Version number of the PDD	1
Completion date of the PDD	02.04.2014
Project participant(s)	M/s GEC Organics
Host Party(ies)	United States of America
Sectoral scope and selected methodology(ies)	13
Estimated amount of annual average GHG emission reductions (tonnes of CO_{2e})	740,694

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The proposed project activity involves aerobic decomposition of chicken litter and green waste through composting in Castleberry Alabama in the South-Eastern Region of the United States. The (GS) Gold Standard (VER) Verified Emission Reduction project activity will be undertaken by M/s GEC Organics ("GECO"), a fully reporting publicly traded company that is committed to the development, production and marketing of advanced technologies that address specific worldwide environmental challenges. The chicken litter and green waste (wood shavings, potash from lumber operations) is purchased from local companies and received at the compositing facility as raw material to produce a high potency organic compost, OSA1000TM that is pathogen free and odourless.

The composting facility has a waste processing capacity of 3000 TPM (chicken litter 2000 TPM + 1000 TPM) and will process the organic content of waste through windrow composting to produce the final product, organic compost. The entire process of the GS VER project will be as follows:

1. Delivery of Waste
2. Weighing of loaded truck containing waste in weigh bridge scale
3. Formation of Windrows and aerobic decomposition
4. Curing and refinement of treated waste
5. Screening
6. Packing and storage of compost

In the current situation, the PP is operating 5 windrows in 70 acreage of leased land. In the existing project, the combination of the above waste streams are heated to 160 degrees, turned and blended with a dominate all natural microbe formula over a 30 to 45 day cycle. The result is organic USDA certified compost which is odourless, safe for the environment and will rebuild the soil while retaining moisture.

M/s GEC Organics will be the responsible implementing and coordinating agency for the project activity. The compost thus produced will be applied to soil as a soil enricher for agricultural activities. In the absence of the project activity the generated waste would have continued to be dumped at an existing unscientific and ordinary landfill. This would have resulted in anaerobic decomposition of the waste materials and generation of methane due to anaerobic decay. Implementation of the project activity will thus avoid the emission of methane by facilitating aerobic decomposition of the wastes and result in emission reductions. The **estimated amount of annual average GHG emission reductions** from the VER project activity are estimated to be around 740,694 tonnes of CO_2e. In addition to this direct global benefit, the final product, compost, when applied to soil will help in stabilizing soil from erosion, provide nutrients and replenish depleted organic matter of the soil and also lead to paradigm shift from synthetic fertilizers to more sustainable organic agricultural production practices.

A.2. Location of project activity

A.2.1. Host Party(ies)

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United States

A.2.2. Region/State/Province etc.

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Alabama

A.2.3. City/Town/Community etc.

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Conecuh Castleberry

A.2.4. Physical/Geographical location

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The Project is located in 70 acreage of land at 630 Conecuh County Road, Castleberry Alabama 36432 United States of America (USA). The geo-coordinates of 70 acreage campus (31° 19°23 75°N / 87° 01°22.04°W). At present 5 windrows are operating and the future capacity additions of windrows will be undertaken within this 70 acreage of Land. The detail geo-coordinates of project are mentioned below.

#	Project Area	(31° 19°23 75°N / 87° 01°22.04°W)
1	Windrow 1	(31° 19°17 22°N / 87° 02°05.12°W)
2	Windrow 2	(31° 19°19 43°N / 87° 02°02.42°W)
3	Windrow 3	(31° 19°21 23°N / 87° 02°00.53°W)
4	Windrow 4	(31° 19°23 52°N / 87° 02°13.07°W)
5	Windrow 5	(31° 19°25 31°N / 87° 02°10.44°W)

A.3. Technologies and/or measures

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Technology description:

GECO is undertaking to set up a Greenfield Organic Compost ("OSA 1000") ("OSA –CT1000") Soil Amendment production unit using 3000 TPM of chicken waste and green waste on Conecuh County Road, in Conecuh County, in Castleberry Alabama, United States of America (USA). The technology to be adopted will be aerobic composting by Windrow method. The waste is collected and transported by third party transporters to the composting facility. The waste comprises in ratio of 66% chicken manure and 34% green waste by weight of raw materials.

The project activity involves aerobic treatment of the received raw material i.e. chicken litter waste and green waste (this can be untreated wood chips, husks from farmers after crops are harvested, ground tree limbs and leaves, etc). The compost recovered will be around 80% by weight of the waste to be processed. The compost thus produced will be sold to local farmers as a soil enricher for agricultural activities.

The entire process of composting of fresh waste consists of the following important steps:

1. **Waste Reception:**

The raw material is delivered in trailer loads of 25 tons each and is stored on an open cement pad for a short time, approximately 2 to 3 days and treated immediately with liquid microbe blend to begin the de-oderization and degradation of the material. At the same time the bio-solids are being accumulated, the cellulosic biomass, or "green waste" will be received and weighed separately.

2. **Mixing of Waste:**

The tons of chicken litter will be sprayed on the cement pad to prevent excessive nutrient leaching into the local soil and preserve the proper consistency of the material. In parallel the green waste is staged in separate piles prior to being combined in windrows with the chicken litter. The green waste is processed to a size which will degrade quickly when the process begins.

3. **Windrow Formation and Aerobic Decomposition:**

The green waste is spread as a first layer on a windrow. A windrow is an open area 12 feet wide and up to 1000 feet in length. After the green waste is in place the bio-solids are distributed over the same area. This will be in a ratio of 2 parts bio-solids/animal manure and 1 part green waste (Carbon/Nitrogen Ratio 25:1). During this process, the windrows will be sprayed with soil inoculants, a proprietary blend of beneficial microbes and organic microbe growth enhancers to accelerate the process. After the spray is completed, a combine like machine known as a windrow turner will blend the raw material mixture and begin the heating process for the 30 to 45 day decomposition period. The windrow turner machine will mix and blend each odour free windrow approximately 3 times per week and the microbe formula will be added with each turning. The temperature will be maintained at a minimum of 140-160 degrees during this phase. The temperatures will be taken in each windrow twice daily during this process, which will last 30 to 45 days. At the end of this period, the waste materials will be blended and ready to be moved to the curing pile to cool at the ambient temperature and sprayed again with our soil inoculants. Additional raw material decomposition may also occur during this short phase of the process. When the pile reaches ambient temperature, it is sufficiently cooled and will be put through a sifting machine.

4. **Segregation:**

The produced compost will be fed through a sifting machine for coarse segregation containing a single Screen of approx. 6.35 mm particle size.). The pieces which have not been made small enough to go through a commercial spreader will be put back onto the new windrows. The material that has gone through the sifter machine is now ready for packaging.

5. **Packing:**

The high quality compost prepared will be finally packed in for sales. Depending on the customer's needs, the weight of pack is as follows; (1) 20 or 40 lb. bags, (2) ½ ton (3) bulk sales by truck load will be based on the size of the truck that the customer provides. A full size tractor trailer can hold 25 tons and smaller trucks with as little as 3 tons.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
United States of America	Private entity GECO	No

A.5. Public funding of project activity

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NA

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

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Approved consolidated baseline and monitoring methodology ACM0022-"Alternative waste treatment processes", Version 1.0.0

Reference:

http://cdm.unfccc.int/filestorage/k/5/5WCZ2B37GHKJ6ETPQRANUI40VDLS1F.pdf/eb69_repan11.pdf?t=SGp8bWFqY2VyfDCpjEkAaq_03O5VXzGtbX6S

Referred Tools used in the project activity:

1. "Emission from solid waste disposal site"-Version 06.0.1

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v6.0.1.pdf

2. "Project and leakage emission from composting"-Version 01.0.0

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-13-v1.pdf

3. "Combined tool to identify the baseline scenario and demonstrate additionality"-Version 05.0.0.

http://cdm.unfccc.int/filestorage/l/j/1HSU9BJI4NVGQ6KWE2MD5Y8ZLAFOTP.pdf/eb70_repan09.pdf?t=cmZ8bWUzMTExfDAOdnDmvyqDVvXcl2_HK1t6

4. Tool to calculate the baseline, project and/or leakage from electricity consumption-Version 01

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf

5. Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion – Version 02

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

B.2. Applicability of methodology

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The applicable meth is Approved Consolidated Baseline and Monitoring Methodology ACM0022 – "Alternative waste treatment processes", Version 1.0.0, Annex 11, EB 69:

Table 1: Applicability of Methodology ACM0022

Applicability of ACM0022	Justification
"This methodology applies to project activities where fresh waste, originally intended for disposal in a SWDS, is treated using any	The project activity utilises two different types of fresh waste i.e. chicken litter and wood shavings from nearby chicken farms and lumber operators. 1. The chicken litter was primarily purchased by local area farmers in the price of $ 10 to $ 35 depending upon the

(combination) of the waste treatment options listed in Table 1 below. The project activity therefore avoids emissions of methane associated with disposing organic waste in a SWDS with or without a partial LFG capture system.	chicken litter, NPK contents[1] and disposed of in nearby agricultural farms and used as fertilizer. 2. The wood shavings will be disposed in nurseries, landscaping[2] municipality without LFG capture system.
In addition, the project activity may also potentially claim emission reductions for: *Avoiding methane emissions from degradation of wastewater in an anaerobic lagoon or sludge pit by treating the wastewater in combination with fresh waste by either co-composting or anaerobic digestion;"*	The project activity does not involve treatment of wastewater through co-composting or anaerobic digestion. Hence, this condition is not applicable to the project activity.
"Displacing natural gas in a natural gas distribution system with upgraded biogas;"	The project does not involve any displacement of the natural gas distribution system. Hence this condition is not applicable to the project activity.
Displacing electricity in a grid or electricity generation by a fossil fuel fired captive power-only or cogeneration plant; and	The proposed project activity does not include electricity generation by fossil fuel fired captive power plant or any cogeneration plant. Therefore this scope & applicability is not applicable to the proposed project activity.
Displacing heat generation by a fossil fuel fired cogeneration plant, boiler or air heater."	The proposed project activity does not involve in any thermal treatment process by fossil fuel fired captive power plant or any cogeneration plant. Therefore this scope & applicability is not applicable to the proposed project activity.

[1] http://www.aaes.auburn.edu/comm/pubs/highlightsonline/fall01/fall-adhik.html
[2] http://alabamarock.com/

As per the methodology Approved consolidated baseline and monitoring methodology ACM0022- "Alternative waste treatment processes", Version 1.0.0, "Table 1 (of the methodology, given below) *provides the applicability conditions that apply for each specific treatment option. In addition, the following general applicability conditions apply to all project activities using this methodology:* *The project activity involves the construction of a new plant to implement one or several of the alternative waste treatment options provided in Table 1 below;"*	The project activity includes the construction of a new composting plant for treating the two different types of fresh waste consisting of chicken litter and wood shavings generated from the local chicken broiler farms and lumber operations from Conecuh County Alabama. So this scope & applicability is applicable to the project activity.
"In the project plant, except for the case of composting, co-composting and anaerobic digestion, only wastes for which emission reductions are claimed (fresh waste or wastewater) are processed. In the case of anaerobic digestion, only run-off wastewater may be processed in addition to fresh waste and wastewater;"	The project activity involves composting process. The project activity only processes waste (fresh waste) (chicken litter) and (wood shavings) for which emission reductions are claimed.
"Neither organic fresh waste nor products and by-	In the project activity, the fresh solid waste (chicken litter) and (wood shavings) is collected from nearby chicken broiler farms

products from the waste treatment plant established under the project activity are stored on-site under anaerobic conditions. For example, no organic materials are stored in a stockpile that is considered a SWDS;"	and lumber operations and transferred to the project site for treatment. The produced compost will be used as soil inoculant and it will be sold primarily to local farmers and in the local market. Thus, neither organic fresh waste nor products and by-products from the waste treatment plant established under the project activity are stored on-site under anaerobic conditions. The compost will not be stored in a manner that may result in anaerobic conditions before its use. The sale of USDA certified compost is the primary source of revenue from the project activity. Hence, the project manager ensures that products are packed and sold as soon as a batch of waste completes the waste treatment process cycle. The proper records are maintained for the amount of product produced and sold.
"Any run-off wastewater is treated within the project boundary;"	The proposed project activity is a composting plant and does not involve any run off waste water treatment hence, applicability criteria is not applicable for the proposed project activity. So the above mentioned scope & applicability is met by the project activity.
"The project does not reduce the amount of waste that would be recycled in the absence of the project activity. Detailed justifications shall be provided and documented in the CDM-PDD for demonstrating that the project activity does not reduce the amount of waste that would be recycled in the absence of the project activity."	The project does not reduce the amount of waste that would be recycled in the absence of the project activity. Prior to implementation of the project, the recyclable wastes if any are dumped in the SWDS. After the implementation of the project activity, only fresh waste will be processed within the project facility boundary.
"Finally, the methodology is only applicable if the procedure for the selection of the most plausible baseline scenario, as	In the absence of the project activity the most plausible baseline situation is as follows for both the waste products: 1. The estimated amount of poultry litter produced annually in Alabama is more than 1,250,000 tons[3].

[3] http://onlinelibrary.wiley.com/doi/10.1002/ep.10303/abstract

outlined below, results in that the baseline scenario is: (a) *The disposal of the fresh waste in a SWDS with or without a partial LFG capture system (M2 or M3);"*	Chicken litter waste generated from broiler farms is used as a fertilizer by local nearby farmers on their agricultural land. This practice is widely adopted in entire state of Alabama and there is great demand of this waste material and the price is $30 per tonne and higher. A national survey indicated that 90% of litter is disposed on the poultry grower's acreage in the south central and southeastern United States, this practice of waste disposal causes nutrient overloading and other Environmental problems.[4] 2. Wood Shavings are currently sold by lumbers mill operators as a mulch at a price of $25 per tonne. Their prospective customers are landscapers, nurseries and municipalities, chicken house and horse breeders[5]. 3. Both the waste chicken litter and wood shavings are not used as in any form energy conversion process such as LFG. Therefore this alternative (M3) is a real and plausible baseline alternative. Therefore, the project activity meets the applicability criteria.
(b) *"In the case of co-composting or the use of wastewater in an anaerobic digester: the treatment of organic wastewater in an existing or new to be built anaerobic lagoon or sludge pit without methane recovery (W1 or W4);"*	The project activity does not involve co-composting activity or the treatment of waste water in an anaerobic digester. Therefore, the applicability criterion is not applicable to the project activity.

[4] https://www.cotton.org/journal/2007-11/1/upload/jcs11-26.pdf
[5] http://www.shaneyfeltshavings.com/index.html

(c) *In the case that the project activity generates electricity: the electricity is generated in an existing/new captive fossil fuel fired power-only plant, captive cogeneration plant and/or in the grid (P2, P4 or P6);*	The proposed project activity does not involve any electricity generation or any waste to energy generation process. Therefore, the applicability criterion is not applicable to the project activity.
(d) *In the case that the project activity generates heat and this displaces heat generation in the baseline: the heat is generated in an existing/new fossil fuel fired cogeneration plant, boiler or air heater (H2 or H4).”*	The project activity does not involve any heat generation and displacement of heat generation in the baseline. Therefore, the applicability criterion is not applicable to the project activity.
Furthermore, approved consolidated baseline and monitoring methodology ACM0022-“Alternative waste treatment processes”, Version 1.0.0, states, *“note that in the case that applicable laws or regulations require the use of the waste treatment option(s) implemented under the project activity, the compliance rate of such laws and regulations should be below 50% in the period for which issuance of VER is requested in order to claim*	The regulations of Alabama Department of Environment Management (ADEM) US govt. do not mandate[6] the use of waste treatment options mentioned in table 1 of meth ACM0022 and composting. Thus project compost activity do not fall under any compliance trend to enforced regulation and hence the compliance rate is 0%[7].

[6] http://www.recycle.cc/compostregs.htm#Alabama
[7] http://www.recycle.cc/compostregs.htm#Alabama

emission reductions for that period	

As identified with the help of procedures mentioned in the methodology under section - Baseline Methodology procedure:

Table 2: Applicability conditions of different waste treatment options

Waste treatment option under the project activity	**Applicable types of wastes that may be treated**	**Applicable products and their use**	**Applicable waste by-products**	**Specific applicability conditions for the treatment option**
Composting or co-composing	# Types of waste specified in the scope and applicability section of the methodological tool "Project and leakage emissions from composting"; # Run-off wastewater # Excluding hospital and industrial waste	Compost : any use applicable	# Glass, aluminum, ferrous metals and plastics from waste sorting stages; # Run-off wastewater	Any applicability conditions specified in the methodological tool "Project and leakage emissions from composting"
The methodological tool "Project and leakage emissions from composting", requires processing of fresh waste in the composting facility. In line with the tool, the project activity involves processing of fresh waste (chicken litter + wood shavings) in a compost plant. The project activity shall also treat the waste water generated from the composting process known as leachate. The project activity shall not process any hospital and industrial waste. The process of composting would result in the production of compost that will be supplied to the local agricultural farms to displace chemical fertilizers. The project activity only utilizes (chicken litter + wood shavings) which are biodegradable in nature. There is no, Non-biodegradable and recyclables like glass, metal, plastic etc. The segregated recyclables are sold to the scrap dealers. The leachate produced as a by-product in the project activity is collected and treated and recycled to the windrow process to maintaining the moisture percentage of the windrow.				
Anaerobic digestion	Wastewater; Fresh waste, excluding hospital and industrial waste	Biogas which may be flared, used to generate electricity or heat, and/or is upgraded and distributed in a	Glass, aluminum, ferrous metals and plastics from waste sorting stages;	Any applicability conditions specified in the methodological tool "Project and leakage

		natural gas distribution grid	Run-off wastewater; Digestate	emissions from anaerobic digesters"
The project activity does not involve any anaerobic digestion of waste water or any fresh waste. Hence the applicable condition is not applicable to the project activity.				
Thermal treatment	Fresh waste, excluding hospital and industrial waste	RDF: any use is applicable	Glass, aluminium and ferrous metals from waste sorting stages	-
The proposed project activity does not involve any thermal treatment of waste. So this applicable condition not satisfies the applicability criterion in case of this project activity.				
Mechanical treatment	Fresh waste, excluding hospital and industrial waste	RDF: any use is applicable	Run-off wastewater; Glass, aluminium and ferrous metals from waste sorting stages	-
The proposed project activity does not involve any thermal treatment of waste. So this applicable condition not satisfies the applicability criterion in case of this project activity.				
Gasification	Fresh waste	Syngas which may be used to generate electricity and/or heat	Gasification by-products (e.g. inert materials); Run-off wastewater; Glass, aluminium and ferrous metals from waste sorting stages	
The project activity does not involve gasification. Hence the applicable condition is not applicable to the project activity.				
Incineration	Fresh waste	Electricity and/or heat	Incineration by-product (e.g. inert materials); Run-off wastewater; Glass, aluminium and ferrous metals from waste sorting stages	Incineration technology is rotary kiln, rotating fluidized bed, circulating fluidized bed, hearth or grate type; The fraction of energy generated by

				auxiliary fossil fuels is not more than 50% of the total energy generated in the incinerator
Since the project activity does not involves incineration technology, this condition is not applicable for the project activity.				

B.3. Project boundary

Table 3: Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline Emissions	Emissions from heat generation	CO_2	Excluded	The baseline scenario does not involve heat generation
		CH_4	Excluded	The baseline scenario does not involve heat generation
		N_2O	Excluded	The baseline scenario does not involve heat generation
	Emissions from decomposition of waste at SWDS	CH_4	Included	The main source of emissions in the baseline
		N_2O	Excluded	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative
		CO_2	Excluded	CO_2 emissions from the decomposition of fresh waste are not accounted as GHG emissions as per EB 20, annex 8
	Emissions from anaerobic lagoons or sludge pits	CO_2	Excluded	The baseline scenario does not include anaerobic lagoons
		CH_4	Excluded	The baseline scenario does not include anaerobic lagoons
		N_2O	Excluded	The baseline scenario does not include anaerobic lagoons
	Emissions from electricity generation	CO_2	Excluded	The baseline scenario does not involve electricity generation
		CH_4	Excluded	The baseline scenario does not involve electricity generation

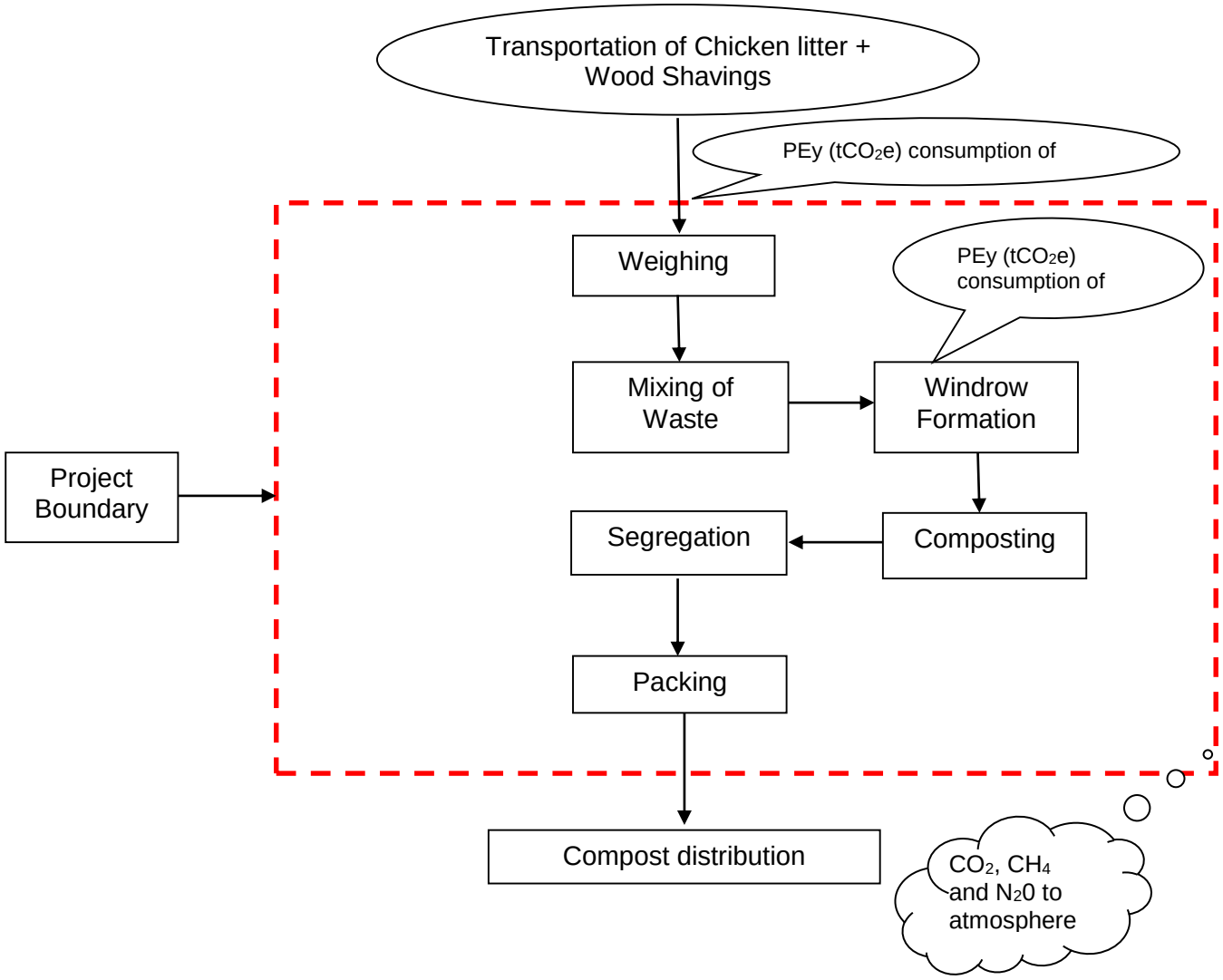
Source		Gas	Included?	Justification/Explanation
		N_2O	Excluded	The baseline scenario does not involve electricity generation
	Emissions from Natural gas	CO_2	Excluded	The baseline scenario does not involve supply of natural gas
		CH_4	Excluded	The baseline scenario does not involve supply of natural gas
		N_2O	Excluded	The baseline scenario does not involve supply of natural gas
Project Emissions	Emissions from on-site fossil fuel consumption due to the project activity other than for electricity generation	CO_2	Included	On-site fossil fuel shall be used in the project activity for transportation of waste and products within the project site and hence, the emission due to on-site fossil fuel consumption shall be included
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Emissions from on-site electricity use	CO_2	Excluded	Excluded for simplification. This emission source is assumed to be very small and not related to project
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Emissions from the on-site waste treatment processes	CO_2	Excluded	CO_2 emissions from the decomposition of fresh waste are not accounted as GHG emissions as per EB 20, annex 8
		CH_4	Included	CH4 may be emitted from composting. RDF is not combusted in the project activity. Inclusion of this gas is conservative

Source		Gas	Included?	Justification/Explanation
		N_2O	Included	N_2O may be emitted from composting. RDF is not combusted in the project activity. Inclusion of this gas is conservative
	Emissions from wastewater treatment	CO_2	Excluded	CO_2 emissions from the decomposition of fresh waste are not accounted as GHG emissions as per EB 20, annex 8
		CH_4	Excluded	Aerobic treatment of wastewater which is employed in the project activity shall not result in CH_4 emissions
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small

Note a - "CO_2 emissions from the combustion or decomposition of biomass (see definition by the Board in annex 8 of the Board's 20th meeting report) are not accounted as GHG emissions. Where the combustion or decomposition of biomass under a CDM project activity results in a decrease of carbon pools, such stock changes should be considered in the calculation of emission reductions. This is not the case for waste treatment projects"

In the absence of the project activity, the chicken litter and wood shavings waste was being disposed in the existing disposal site with or without LFG capture.

As per Appendix 1 of the applied Methodology Approved consolidated baseline and monitoring methodology ACM0022-"Alternative waste treatment processes", Version 1.0.0, the project boundary for project activity is given in the following figure:


Transportation of Chicken litter + Wood Shavings
PEy (tCO2e) consumption of
Weighing
PEy (tCO2e) consumption of
Mixing of Waste
Windrow Formation
Project Boundary
Segregation
Composting
Packing
Compost distribution
CO2, CH4 and N20 to atmosphere

B.4. Establishment and description of baseline scenario
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As per the applied methodology "Approved consolidated baseline and monitoring methodology ACM0022- "Alternative waste treatment processes", Version 1.0.0, the "Combined tool to identify the baseline scenario and demonstrate additionality" version 05.0.0, has been used for baseline identification and demonstration of additionality.

Step 1: Identification of alternatives Scenario

Sub-step 1a: Define alternatives scenarios to the proposed CDM project activity

Sub-step 1b: Consistency with mandatory applicable laws and regulations

As per the methodology, ACM0022 version 1, "In identifying baseline alternatives for the treatment of the fresh waste, the following alternatives or combinations of these alternatives shall, inter alia, be considered:"

Table B.4.1 Alternatives for disposal /treatment of the fresh waste in the absence of the project activity, inter alia:

Table 4: Alternative Scenarios for Waste Disposal

Representation	***Parameters***	***Plausible Baseline Scenario***	***Reason with Justification***
M1	The Project activity without being registered as a VER project activity (*i.e.* any (combination) of the waste treatment options listed in Table 1 of approved consolidated baseline and monitoring methodology ACM0022-"alternative waste treatment processes", version 1.0.0	***No***	This alternative involves processing of waste (chicken litter + wood shavings) in a compost plant which could be sold in the market as organic manure. The project activity without Carbon revenue stream is not a financially attractive alternative. Composting Project requires high up-front investment costs and brings very little or no revenues since the compost market in Alabama is not well developed. This option is in compliance with all the mandatory laws and regulations. Hence this option is not considered as plausible baseline alternative.
M2	Disposal of the fresh waste in a SWDS with a partial capture of the LFG and flaring of the captured LFG;	***No***	The common practice in Alabama is to dump the Solid Waste (chicken litter) generated from broiler farms in agricultural fields as fertilizer. The disposal of

			chicken litter in agricultural field causes strong offensive odour and Nitrate leaching into the groundwater, nonpoint source P runoff into surface water bodies, and release of pathogenic microorganisms are three of the main problems encountered with improper management of this resource[8]. The other waste wood shavings generated from lumber operators is used in nursery, landscapers and few percentage (~15%) is incinerated onsite. There are no mandatory rules or regulations which restrict the installation of a LFG capture system at the SWDS with flaring of the captured LFG. Moreover Collection of LFG and flaring involves cost and no revenues. In the absence of the Project, the chicken litter waste would be dumped in agricultural farms with no capture and flaring process. As the Project Developer is a private company seeking financial benefits, this alternative would not be selected since it has no financial returns. It is also not in the Project Developer's core business area. Hence, this option is not considered as a baseline alternative.
M3	Disposal of the fresh waste in a SWDS without a LFG capture system;	***Yes***	The common practice in Alabama is to dump the Solid Waste (chicken litter) generated from broiler farms in agricultural fields as fertilizer. The other waste wood shavings generated from lumber operators is used in nursery, landscapers and few percentage (~15%) is incinerated onsite.

8 http://agriculture.state.pa.us/portal/server.pt/gateway/PTARGS_6_2_75292_10297_0_43/AgWebsite/Files/General/sccfiles/odormanagement/D6._Poultry_Manure_Mgmnt.pdf

			The disposal of waste chicken litter + wood shavings without the capture of the gas in a controlled dumpsite is the 'Business As Usual' Scenario. This alternative does not have any landfill gas capture and flaring system, since it does not require any capital investment or operation and maintenance cost or any other associated cost. Therefore this alternative is a real and plausible baseline alternative.
M4	Part of the fresh fraction of the solid waste is recycled and not disposed in the SWDS;	***No***	The project activity degrade the solid waste convert it into organic manure i.e. compost hence this alternative is a part of the project activity under consideration and therefore not considered as a baseline alternative.
M5	Part of the fresh fraction of the solid waste is treated aerobically and not disposed in the SWDS;	***No***	The project activity involves aerobic treatment through composting processes for treatment of solid waste in the project activity. Hence, this alternative is a part of the project activity under consideration and therefore not considered as a baseline alternative.
M6	Part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS;	***No***	Out of the various solid waste treatment options laid down by ADEM Rules 2012, GECO has adopted composting as the main process for treatment of solid waste comprised of (chicken litter + wood shavings). Incineration of solid wastes (in part or full) is not to be a credible alternative since it only involves cost and no revenues to GECO. Hence this alternative has not been considered as an alternative to the project activity.
M7	Part of the organic fraction of the solid waste is gasified and not disposed in the SWDS;	***No***	Out of the various solid waste treatment options laid down by ADEM Rules 2012, GECO has adopted composting as the main process for treatment of solid waste comprised of (chicken litter + wood shavings). Incineration of solid wastes (in part or full) is not

			to be a credible alternative since it only involves cost and no revenues to GECO. Hence this alternative has not been considered as an alternative to the project activity.
M8	Part of the organic fraction of the solid waste is treated in an anaerobic digester and not disposed in the SWDS	***No***	Out of the various solid waste treatment options laid down by ADEM Rules 2012, GECO has adopted composting as the main process for treatment of solid waste comprised of (chicken litter + wood shavings). Anaerobic digestion of solid wastes (in part or full) is not to be a credible alternative since it only involves cost to build digester and no revenues to GECO. Hence this alternative has not been considered as an alternative to the project activity.
M9	Part of the organic fraction of the solid waste is mechanically or thermally treated to produce RDF and not disposed in the SWDS	No	Out of the various solid waste treatment options laid down by ADEM Rules 2012, GECO has adopted composting as the main process for treatment of solid waste comprised of (chicken litter + wood shavings). Organic fraction of the solid waste is mechanically or thermally treated to produce RDF and not disposed in the SWDS is not possible and not the core business of GECO. Hence not been considered as an alternative to the project activity.

Since the proposed project activity does not involve any heat or electricity generation or treatment of waste water, so analysis for credible and plausible alternatives for steam generation, power generation or exporting of electricity to grid or treatment of wastewater has not been conducted. Please note that the project activity only treats the waste water (leachate) generated by the project activity aerobically and not any waste water that was generated prior to the project activity.

Outcome of step 1a and step 1b:

Following alternatives amongst the ones listed above are in compliance with all the mandatory legal and regulatory requirements:

Table 5: Plausible Scenario in compliance with all the mandatory legal and regulatory requirements

M3	Disposal of the fresh waste i.e. chicken litter in agricultural land and wood shavings in nursery and landscapers without a LFG capture system is the most plausible baseline scenario.

Step 2: Barrier analysis:

Project proponent (PP) is to determine whether the Project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity; and
(b) Do not prevent the implementation of at least one of the alternatives; using the following sub-steps:

Step 2a: Identify barriers that would prevent the implementation of alternative scenario

Step 2b: Eliminate alternative scenarios which are prevented by the identified barriers

As per the "Combined tool to identify the baseline scenario and demonstrate additionality", version 05, project participant is required to "*establish a complete list of realistic and credible barriers that may prevent alternative scenarios to occur. Such realistic and credible barriers may include:"*
Investment Barriers, (b) Technological Barriers and (c) Other barrier, preferably specified in the underlying methodology approved consolidated baseline and monitoring methodology ACM0022 – "Alternative waste treatment processes", version 1.0.0 as examples.

Outcome of Step 2(a) and 2(b): The following alternatives faces investment barrier:

Table 6: Alternative Scenario Facing Barriers

M1	The Project activity without being registered as a VER project activity *i.e.* any (combination) of the waste treatment options listed in Table 1 of approved consolidated baseline and monitoring methodology ACM0022-"alternative waste treatment processes", version 1.0.0	Investment barrier	The project activity involves composting of solid waste (chicken litter + wood shavings). The project activity is not viable without revenue from VER carbon credit apart from sale of compost. However, the return from the investment is not sustainable. The alternative does not face any barrier other than insufficient financial return which is elaborated in step 3 – Investment Analysis in accordance with the combined tool.
M2	Disposal of the fresh waste in a SWDS with a partial capture of the LFG and flaring of the captured LFG.	Investment Barrier	Installation of a system for capturing of LFG at a SWDS for flaring requires large amount investment with no economic return. No

			financial institution shall be willing to finance a project which does not have any monetary return for the costs involved for a LFG capture system[9]. Hence, this alternative faces investment barrier and thus cannot be considered further as a plausible baseline alternative.
M3	Disposal of the fresh waste in a SWDS without a LFG capture system;	No Barrier	This alternative does not face any barrier. This alternative neither requires any investment from the project developer nor does it generate any revenue.

As per the above analysis, there is only one alternative which do not face any barrier M3. M3 – Disposal of the fresh waste (chicken litter + wood shavings) in a SWDS without a LFG capture system. The same does not face any of the barriers as mentioned above. Thus, it is ascertained that continuation of the current scenario *i.e.* disposal of fresh waste on designated and undesignated disposal sites such as agricultural farms, nurseries and landscapers without the destruction or capture of landfill gas is the baseline scenario.

B.5. Demonstration of additionality

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Carbon revenues are extremely critical for the implementation of the project activity. Project participants considered carbon revenues at the time when the initial project planning was done. This is evident from the following timeline of implementation.

Table 7: Chronology of Project Milestones

#	Milestone	Date
1	Consulting Agreement with Global Enviro Services to help GEC and its Subsidiaries in arrangement of funds and exploring carbon credit opportunity by GHG emissions reduction from the remediation of waste in the production of compost.	1 Nov 2010
2	Board of Directors Resolution to proceed ahead with composting project implementation	15 Aug 2011
3	First meeting with Mayor, regulatory officials at Alabama	30 Aug 2011
4	Site Visit and discussions with Stakeholders about project and GHG reduction potential	31 Aug 2011
5	Purchase of Scarab Composter Machinery (Start date of Project as GS guidelines)	21 Sept 2011

[9] http://www.clu-in.org/conf/tio/methane/prez/methanepdf.pdf

6	Appreciation Letter from Mayor of Alabama for GEC efforts for composting project	22 Sept 2011
7	70 acre Land Lease valid till Sept 2012	1 Sept 2011
8	Hawk Associates news Release on behalf of GECO for start of construction on 70 acreage land	25 Oct 2011
9	First Purchase of Raw Material (Chicken litter)	12 Jan 2012
10	First Purchase of Raw Material (Wood Shavings)	24 Jan 2012
11	Visit of Mayor, Regulatory officials, NGOs and Local People to Project site and Town hall meetings with local people and NGOs (Roughly some date) *On this date we began to have different organizations visit the site. A few are Poarch Creek Indians, Alabama Extension System, Costal Gateway, Piedmont National, local farmers*	28 March 2012
12	Hawk Associates news release on behalf of GECO stating Alabama Govt. official praising the efforts of GECO	28 March 2012
13	Application submission to ADEM for permits and other approval	23 April 2012
14	Storm Water Permit Approval from ADEM	23 May 2012
15	First Meeting with Alabama Agriculture Commission	14 Aug 2012
16	Beta testing to meet the requirements of USDA	1 Nov 2012
17	Submission of form to Amricert International	5 Nov 2012
18	USDA certificate to Compost	22 Dec 2012
19	Carbon Credit forward purchase agreement with Kronos International Investments	8 May 2013
20	Agreement with Green Giant Venture Fund, for the carbon credit business	14 May 2013
210	Carbon Credit forward Purchase Agreement between GECO and GS Enviroservices Signs Carbon Credit Deal With GEC Organics Corp[10]. (date of carbon credit purchase document)	22 July 2013
22	Letter to stockholders mentioning about carbon credit forward purchase agreement	7 August 2013
23	Board Resolution to open account in Climate Action Reserve (CAR) in registry	19 Sept 2013
24	Board Resolution to open account in VCS in registry	9 Oct 2013
25	Opening of account in VCS registry	15 Oct 2013
26	Opening of account in Climate Action Reserve (CAR) registry	4 Nov 2013
27	Appointment of Validation Agency PJR	Dec 2013
28	Appointment of PDD writer	Jan 2014

From the very initial conceptualization stage PP was aware of carbon credit potential however due to financial liquidity crisis, PP was more focused toward arranging for funds, investors required for initial investment in the project. Thus it is evident from above mentioned timelines that carbon revenues are extremely critical for the construction of the project activity. Project construction could be started only after

[10] http://online.wsj.com/article/PR-CO-20130731-911563.html

signing the ERPA and obtaining the funds from prospective investors. In the absence of the carbon revenues and required funds, the project would not have been implemented.

As per the step 1 and step 2 mentioned above, only one alternative is considered to be a plausible option, M3 – "Disposal of the fresh waste (chicken litter + wood shavings) in designated and undesignated disposal sites such as agricultural farms, nurseries and landscapers without a LFG capture system" is a real and credible alternative. The same is in compliance with all applicable legal and regulatory requirements.

Step 3: Investment analysis

As per the "combined tool to identify the baseline scenario and demonstrate additionality", version 5, the investment analysis has been conducted in accordance with the *"Guidelines on the assessment of investment analysis",* version 5, EB 62, annex 5.

The project proponent "GECO" has chosen Benchmark Analysis for demonstration of additionality since the baseline scenario is the continuation of the current scenario wherein, the (chicken litter + wood shavings) in designated and undesignated disposal sites such as agricultural farms, nurseries and landscapers without a LFG capture system. The same is in line with section 19 of the Guidelines on the assessment of investment analysis" version 5, which states, *"The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest."*

The financial indicator used for carrying out the investment analysis is post tax equity IRR that will determine the feasibility of the project activity. The Equity IRR of the project is calculated and compared with the expected return on equity (RoE) as the benchmark. The same is in line with the para 12 of *"Guidelines on the assessment of investment analysis"*, Annex 5, EB 62 – "*Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for equity IRR".*

The expected return on equity of the company was calculated as 10.17% at the time of decision making by the project proponent. However, as per point no. 15 of the "*Guidelines on the assessment of investment analysis"*, version 5, Annex 5, EB 62, *"If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors. The values in the table in Appendix A may also be used, as a simple default option, if a company internal benchmark is used. Benchmark's should not include the subjective profitability expectations or risk profile of a particular project developer".* PP accordingly demonstrating the expected return/cost on equity as per option b of para 15 of guidance EB 62 Annex 5. The expected return on equity is composed of four elements: (a) a risk free rate of return; (b) an equity risk premium; (c) a risk premium for the host country; and (d) an adjustment factor to reflect the risk of projects in different sectoral scopes. All values are expressed in real terms from (Page 7 of 12 of guidance EB 62 Annex 5).

1. The risk free rate of return is calculated based on the long-term average returns of US treasury bonds. The US stock market is used as a proxy because it has the longest well recorded data for government bonds as well as stocks. A default value of 3.0% is used.

2. The equity risk premium is derived from the long-term historical returns on equity in the US market relative to the return of bonds. Arithmetic means are used because they are more appropriate for estimating forward looking equity risk premiums than geometric means. A value of 6.5% is used.

3. The risk premium for the host country is estimated using Moody's rating for the host country as a proxy for this risk. For those countries for which ratings by Moody's are not available, the risk premiums were derived based on comparisons with countries with similar gross national product per capita. The national product per capita has shown to be one of the key economic determinants which have a strong statistical explanatory power for country credit ratings.

    a. Risk premium of US[11] 5.32%

The Required rate of return i.e. Weighted Average Cost of Capital (WACC, r) is calculated using the approach from tool to determine the weighted average cost of capital. (WACC) MP 43 Annex 8[12]. The step wise approach to determine WACC.

Step 1: Determine whether r is estimated based on the situation of the entity undertaking the project activity or based on standard market expectations for the project type

Document and justify which of the following two situations applies to the project activity:

(I) The project activity can only be implemented by the project participants and not by an entity other than project participant, or

(II) The project activity could also be implemented by entities other than the project participants.

In our case step II applies since the composting project can also be implemented by other entities other than GECO. In case of step II the financial benchmark details of market are standard in the market.

Step 2: Determine the status of the legal entity that will host the project activity assets

Where case (II) in Step 1 applies, document and justify in the PD which of the following two situations applies to the project activity:

[11] http://people.stern.nyu.edu/adamodar/New_Home_Page/home.htm

[12] http://cdm.unfccc.int/Panels/meth/meeting/10/043/mp_043_an08.pdf

i. The accounting books of the legal entity reflect at least the total value of all the assets needed for the project activity; or

ii. The accounting books of the legal entity do not reflect the total value of all the assets needed for the project activity.

The project is 100% equity investment by GECO hence step 2 is not applicable NA.

Step 3: Determine the average cost of debt financing (kd)

The project is 100% equity investment by GECO hence step 3 and its option is not applicable NA.

Step 4: Determine the average cost of equity financing (ke)

Option 4B: Use the country specific equity return

This option can be used if:

• *Case (I) or (II) in Step 1 applies.*

This approach provides an equity return which differentiates according to the country risk. This means that for a country with a high country risk (as reflected in its government bond) a higher equity return (ke) will be calculated compared to a country with a low country risk.

The parameter ke is calculated equivalent to a risk free rate plus a country risk premium plus a general equity risk premium, as follows:

Ke = RF + CDS + PEg (4)

Where:
ke = Average cost of equity financing
RF = Risk free rate is 3%
GBi = Yield of a government bond issued by the host country
CDS = Country Default Spread is 0.67%
PEg = General equity risk premium is 6.50%

= 3% + 0.67% + 6.50% = 10.17%

Therefore the benchmark of the project is 10.17%.

Sub-step 3c: Calculation and comparison of financial indicators

The equity IRR for the proposed project activity without CDM revenue is computed for a period of 20 years. A detailed investment analysis has been carried out and presented in the supported excel sheets. The data and analysis is presented here. The techno-economical parameters used for the equity IRR calculation for the project activity is provided in the table below:

PARTICULAR	VALUE	UNIT	REFERENCE
Composting facility capacity	36000	tonne/year	based on raw material purchase invoices (2000 tonnes chicken litter + 1000 tonnes wood chips) per month
Operational days	260	days/year	As per General working days practice of United States
Operational hrs	64	hrs/day	This assumes that each employee has an 8 hour day and we have 8 employees direct on compost (8X8=64) No admin or marketing included
Raw material processed	36000	tonne/year	Based on raw material purchase invoices
Total quantity of composted material	28800	tonne/year	80% of raw material
Compost price	70	USD /tonne	The average price of fertilizer being used in Alabama, depending on soil quality is $400.00 per ton. Each acre requires 300lbs, so 1 ton covers 6 acres. This makes the cost per acre $67.00. Source: USDA Dept. of Agriculture, Montgomery Alabama.
Compost price escalation	0	USD /tonne	The price will not be increased
Raw material price			

Food waste price	30	USD/tonne	Chicken litter purchase bill dated 1/12/2012
Wood waste price	26	USD/tonne	Wood Purchase bill dated 24/01/2012
Amount of food waste to be composted	2000	tonne/month	Based on raw material purchase invoices
Amount of wood waste to be composted	1000	tonne/month	Based on raw material purchase invoices
Diesel consumption for project operation	3186	Gallons/Year	Diesel Purchase Invoice for FY 2012
Diesel price	10832	USD/year	3186 gallons per in FY 2012 (USD 3.4 per gallon)
Diesel Price	3.4	USD/gallon	Diesel purchase Invoice
Gasoline Consumption for project operation	50	Gallons/year	Approximate only one swifting machine consumes gasoline
Gasoline Purchase Expenses	190	USD/year	USD 3.8 per gallon
Gasoline Price	3.8	USD/gallon	
Electricity expenses	2400	USD/year	Electricity Invoice
Maintenance cost per tonnes	45	USD/tonne	Cost of Goods Sold
Escalation in Maintenance cost		0%	Per tonnes/year
Federal Tax rate	35%	of income	Auditor report
State tax rate	5%	of income	Auditor report
Depreciation Rate - Building (SLM)	4.5	percentage	for 20 year life as given in auditor report
Depreciation Rate - Machine & equipment (SLM)	10	percentage	for 10 year life as given in auditor report
Project Cost Particular			
Building & Civil work	125,743	USD	
Machinery & Equipment's & Furniture	267,142	USD	
Land cost and Building Repairs	391,607	USD	
Building improvement	35,595	USD	
Other expense (office, rent)	156,458	USD	Profit and loss sheet July -Sept 2013 + Salaries in P&L Sheet July-Sept 2013
Travel	36,618.25	USD	-
Marketing	4,606.77	USD	-
Insurance	9,203.71	USD	-
Telephone & computer, Internet	2,381.67	USD	-
Bank service charges	2,510.33	USD	-

Professional fees	1,495.92	USD	-
Payroll tax and sales tax	7,510.00	USD	-
Salaries	20,000.00	USD	-
Other expense except insurance	149,306.89	USD	-
Travel	36,618.25	USD	-
Marketing	4,606.77	USD	-
Insurance	9,203.71	USD	-
Telephone & computer, Internet	2,381.67	USD	-
Bank service charges	2,510.33	USD	-
Professional fees	1,495.92	USD	-
Payroll tax and sales tax	7,510.00	USD	-
Salaries	20,000.00	USD	-
Other expense except insurance	149,306.89	USD	-
Equity IRR of the Project Activity	**Negative**	**%**	IAS

As evident the equity IRR is lower than the benchmark rate computed as above. Hence, revenue from sale of GS VERs obtained through project is essential for implementation and operation of the project activity.

Sub-Step 2d: Sensitivity analysis:

The purpose of sensitivity analysis is to examine whether the conclusion regarding the financial viability of the proposed project is sound and tenable with those reasonable variations in the critical assumptions. As per the "Guidance on the Assessment of Investment Analysis, Version 5", Annex 5, EB 62, *"only variables, including the initial investment cost, that constitute more than 20% of either the total project costs or the total project revenues should be subjected to reasonable variation".* Thus, a sensitivity analysis is applied in accordance with the above guidelines to the following parameters considered critical to the operations of the project namely project cost, compost sale price, compost raw material, and operation and maintenance costs (which includes expenses due to salary, maintenance of equipment's and vehicles, chemical, lubricants, fuel and electricity). These parameters were subjected to 10% variation on either side, based on "Guidance on the Assessment of Investment Analysis, Version 5", Annex-5 of EB-62, to ascertain the impact on the profitability and hence the IRR of the project. The results of the sensitivity analysis are as given below:

Parameter	**Resulting Equity IRR**			
	Base Case	**+10%**	**Variation -10%**	**Remarks**
Project Cost	negative	negative	negative	Equity IRR in negative than benchmark
Compost Sale Price	negative	negative	negative	Equity IRR in negative than benchmark
Compost Raw Material	negative	negative	negative	Equity IRR in negative than benchmark
O&M cost	negative	negative	negative	Equity IRR in negative than benchmark

Thus, the sensitivity analysis reveals that even with minor +/-10% changes in various parameters, the project IRR doesn't crosses the benchmark rate. Therefore, from the above analysis it may be concluded that the project is additional and is not a business – as – usual scenario. Hence this proves that proposed activity is additional and is not a business – as – usual scenario.

Parameters	**Variation viz-a- viz IRR**	**Comments**
Project Scenario (Base Case)	Negative IRR	-
Benchmark Value	10.17%	-
Project Cost	With a variation of decrease in project cost to -495%; IRR crosses the benchmark.	It may be noted that with a significant reduction of -495% in project cost, the equity IRR cross the benchmark. However, reduction of -495% or more in the project cost is a highly unlikely scenario. The project cost has been source by actual expenditure occurred on machinery, land cost, Building & Civil works etc by the Project Participant i.e. GECO. Moreover, the associated expenditure on the project shall increase such as the vehicles and equipment's needs to be replaced after completion of technical life time, and the associated inflation related to maintenance, purchase above mentioned items. This additional capital expenditure that shall be incurred has not been taken in the IRR computation and hence the same is conservative.
Compost Sale Price	With a variation of increase +33% in the sale price of compost, the equity IRR crosses the benchmark.	The current selling price of 70 USD per tonne of compost is a very competitive price in agricultural sector of Alabama. Hence any increase in compost price in near future is not envisaged by PP considering the market dynamics and acceptability of product at a higher price.The price established at $70.00 per ton will not support any increase because of the competitive nature of the fertilizer industry. The existing competitive prices will be steady and will remain constant with general fertilizer industry improvements in the production of competitive products. Moreover the increase in sale price of compost is directly linked with increase in compost raw material price .By virtue of the GECO development and, the economy of scale for the purchase of raw material and other

		efficiencies, the existing compost price will be maintained.
Compost Raw Material Cost	With a variation of decrease -65% in the sale price of compost raw material (Chicken litter + wood shavings), the equity IRR crosses the benchmark.	The raw material (chicken litter + wood Shavings) is procured from Local chicken broiler farms and lumber operators. Since there is cost associated to dump in sanitary landfill and other miscellaneous for waste maintenance it is highly unlikely that the valuable waste material by these commercial chicken broiler farms and lumber operators will be sold less than -65% as compared to current selling price. This scenario is highly unlikely in the competitive market.
Operation & Maintenance cost	With a variation of decrease -52% in the operation and maintenance cost of compost, the equity IRR crosses the benchmark.	The benchmark value is exceeded with a decrease in overall O&M costs by -52%. It is highly improbable that each of the parameters included in (O&M costs decreases simultaneously by -52%. The cost of fuel and utilities (diesel + gasoline + Electricity + Salaries + vehicles + chemicals+ lubricants + miscellaneous expenditure for maintenance will increase and not decrease hence the decrease is highly unlikely scenario.

Step 4: Common practice Analysis:

As per the para 37 of the "Combined tool to identify the baseline scenario and demonstrate additionality", version 5, "if the proposed CDM project activity(s) applies measure(s) that are listed in the definitions section above (in the tool) proceed to Step 4 a (of the tool), otherwise, proceed to Step 4 b (of the tool)":

The project activity involves the measure – Methane formation avoidance, hence the step 4a, as mentioned above is followed for common practice analysis.

***Step 4a: The proposed project activity(s) applies measure(s) that are listed in the definitions section above* (of the combined tool to identify the baseline scenario and demonstrate additionality, version 05.0.0)**

The project activity involves the measure – Methane formation avoidance, hence the step 4a, as mentioned above is followed for common practice analysis.

Sub-step 4a: Analyze other activities similar to the proposed project activity

There are more than likely composting facilities in the state of Alabama. However according to the most recent data available from the US Composting Council[13] and USDA agricultural Marketing Service[14] there were no USDA certified compost products and therefore, organic USDA certified composting plants and product is not widely adopted projects in Alabama.

Sub-step 4b: Discuss similar options that are occurring

To date, no developer has fully implemented a composting project of this type or scale in the Alabama. While small-scale composting is undertaken, it is currently not utilized at a scale comparable to that of the Project. The use the microbe technology (soil inoculants, a proprietary blend of beneficial microbes and organic microbe growth enhancers to accelerate the process using the windrow turner for remediating waste. The other small scale composting facilities in general accumulate waste and leave it in piles and let the elements degrade it and create compost[15]. This process takes from a year to two years.

As per the "combined tool to identify the baseline scenario and demonstrate additionality", version 05.0.0, for assessment of common practice, "Guidelines on common practice", version 2 shall be applied. As per the section II of the Guidelines on Common practice, version 2, EB 69, annex 8, common practice assessment has been carried out in the following five steps:

Stepwise approach for assessment of common practice:

1. **Applicable Geographical Area**:

The area to a specific geographical area, Alabama within the host country. The justification for the limitation and distinction of the limited area is, (i) Climate; Compost is more efficiently produced in warmer climates. The North, Northeast, Northwest US will not allow the necessary outdoor activity needed to remediate waste for more than 5 months per year (ii) Access to Raw Material; Certain states in the Southeast have a ready supply of chicken litter but Alabama produces 1.7 million tons of chicken manure annually[16] (iii) Agricultural Area; The farming industry in Alabama has the need for organic soil amendments.

2. **Measure**:

(a) N/A (b) N/A (c) N/A (d) Methane formation avoidance. The Project uses biomass that would have been left to decay either in open fields, slurry ponds or landfills. Not all of these alternative disposal scenarios convert methane for energy generation but instead allow GHG emissions to continue unrestricted. The Project converts the biomass to remediated soil amendments and eliminates GHG emissions.

[13] http://compostingcouncil.org/admin/compostmap.php
[14] http://apps.ams.usda.gov/nop/
[15] http://www.captaincompostalabama.com/default.htm

[16] http://hubcap.clemson.edu/~blpprt/Aub-244.html

3. **Output**:

The goods and services produced by the Project is Organic Compost.

4. **Different Technologies**:

(a) Energy Source, N/A
(b) Feed Stock, N/A
(c) Size of Installation,
(i) No, (ii) No (iii) Large, Yes.
(d) Investment Climate on the date of the investment decision
(i) Access to Technology, Yes
(ii) Subsidies or other financial flows, No,
(iii) Promotional Policies, No
(iv) Legal Regulations, No
(e) Other Features:

The unit cost of capacity or the Project output will not be affected by a cost differential of up to 20 %.

II Stepwise Approach for Common Practice:

5. **Step 1.** There is no known applicable output range for +/- 50% of the Project output.

6. **Step 2.** Identify similar projects which fulfil all of the following conditions:

a. **Location of projects**. There are no projects located in Alabama which are similar in size or technology to the subject Project.

b. **Measure of Project Activity.** There are more than likely composting facilities in the state of Alabama. The project uses the proprietary blend of beneficial microbes and organic microbe growth enhancers to accelerate the process of degradation. After the spray is completed, a combine like machine known as a windrow turner will blend the raw material mixture in a ratio of 2 parts bio-solids/animal manure and 1 part green waste (Carbon/Nitrogen Ratio 25:1) and begin the heating process for the 30 days decomposition. Composting facilities in general accumulate waste and leave it in piles and let the elements degrade it and create compost. This process takes from a year to two years. All the while GHG emissions are free to flow into the atmosphere. Our process converts the waste in 30 days and our compost is different than any other compost because

(1) Project uses own blend of proprietary dominant microbes and
(2) Project is the only USDA approved Compost if Alabama.

PP submitted the extensive application and details of our process for this certification along with the guarantee that only natural material pathogen free was used in the process.

c. The feedstock is similar in most composting projects.
d. As set forth in "a" above, there are no known projects which would qualify as similar and as such no estimation of the quality can be determined.
e. No projects within range for similar products or technology.
f. N/A

7. Step 3. There are no projects identified in Step 2.
8. Step 4. There are no projects identified in Step 3.
9. Step 5. The calculation of the share of similar projects is not applicable in this context because there are no projects with the same technology, process, size and output.
10. The project activity is not common practice and first of its kind.

B.6. Emission reductions
B.6.1. Explanation of methodological choices
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The Emission reductions obtained as per the Methodology from the project activity will be given as:

$$ERy = BEy - PEy - Ly$$

Where:

ERy	Is the emissions reductions in year y (t CO_2e)
BEy	Is the emissions in the baseline scenario in year y (tCO_2e)
PEy	Is the emissions in the project scenario in year y (tCO_2e)
Ly	Is the leakage in year y (tCO_2e)

Baseline Emissions:

Baseline methane emissions occurring in year *y* generated from waste disposal at a SWDS during a time period ending in year *y* (where y is a period of 12 consecutive months).

As per the applied methodology Approved consolidated baseline and monitoring methodology ACM0022- "Alternative waste treatment processes", Version 1.0.0, Annex 11,EB 69,*"baseline emissions are determined according to equation 1 and comprise the following sources:*

A. Methane emissions from the SWDS in the absence of the project activity;
B. Methane emissions from the treatment of organic wastewater in the absence of the project activity;
C. Energy generated or electricity consumed by the grid in the absence of the project activity;
D. Natural gas used from the natural gas network in the absence of the project activity.
In the case that legislative or regulatory requirements mandate the use of any (combination) of the waste treatment options t that are being implemented in the project activity, then the rate of compliance with these requirements in the host country shall be monitored (RATEcompliance,t,y). This rate is then used to adjust the baseline emissions calculation, according to equation 1. It shall be described and justified in the CDM-

PDD which baseline emission sources apply for each waste treatment option t implemented under the project activity."

$$BEy = \sum_{t}(BE_{CH4,t,y} + BE_{WW,y} + BE_{EN.t.y} + BE_{NG,t,y}) \times DF_{RATE,t,y} \quad \text{.....(1)}$$

With

$$DF_{RATEt,y} = \{1\text{-}RATE_{comliance,t,y} \text{ if } RATE_{compliance,t,y} < 0.5 \text{ , } 0 \text{ if } RATE_{compliance,t,y} \geq 0.5 \quad \text{.....(2)}$$

Where:

BEy = Baseline *emissions in year y (tCO_2e)*

$BE_{CH4,t,y}$ = *Baseline emissions of methane from the SWDS in year y (tCO_2e)*

$BE_{WW,y}$ = *Baseline methane emissions from anaerobic treatment of the wastewater in open anaerobic lagoons or of sludge in sludge pits in the absence of the project activity in year y (tCO_2e)*

$BE_{EN,t,y}$ = *Baseline emissions associated with energy generation in year y (tCO_2)*

$BE_{NG,t,y}$ = *Baseline emissions associated with natural gas use in year y (tCO_2)*

$DF_{RATE,t,y}$ = *Discount factor to account for $RATE_{Compliance,t,y}$*

RATEcompliance,t,y = Rate of compliance of a requirement that mandates the use of alternative waste treatment option t in year y

t = *Type of alternative waste treatment option*

For simplification, the type of alternative waste treatment option t is hitherto omitted."

Option A is the most plausible baseline scenario in the case of the project activity since the project activity shall process the waste that was being disposed in the SWDS in absence of the project activity which will result in avoidance of methane emissions from the SWDS. The detailed justification has been given in the section B.6.1 of the PDD.

The Options B, C and D are not applicable since the project activity does not involve waste water treatment, electricity generation or natural gas distribution.

Therefore,

$$BEy = \sum (BE_{CH4,t,y}) \text{ X } DF_{RATE,t,y} \quad \text{.....(3)}$$

Procedure (A): Baseline emissions of methane from the SWDS ($BE_{CH4,y}$)

As per the methodology, Approved consolidated baseline and monitoring methodology, ACM0022- "Alternative waste treatment processes", Version 1.0.0, *"baseline emissions of methane from the SWDS are determined using the methodological tool "Emissions from solid waste disposal sites". The following requirements shall be complied with when applying the tool:"*

1. Wj,x in the tool is the amount of organic fresh waste prevented from disposal in the baseline SWDS due to its treatment in any (combination) alternative waste treatment option;

Wj,x as mentioned in the said tool is the amount of organic fresh waste prevented from disposal in the baseline SWDS due to its treatment by the project activity.

2. Emissions are calculated using Application B in the tool, meaning that only waste avoided from the disposal after the start of the first crediting period shall be considered in the tool;

Emissions shall be calculated using Application B in the said tool.

3. Sampling to determine the fractions of different waste types is necessary (note that for the case that the waste is combusted in the project activity, then the parameter Qj,c,y in this methodology is equivalent to the variable Wj,x in the tool);

A sampling procedure shall be followed to determine the fraction of different waste types in the project activity.

4. The tool instructs that fy shall be determined based on historic data or contract or regulation requirements specifying the amount of methane that must be destroyed/used (if available). The following additional instruction applies:

i. If the regulation requirements specify a percentage of the LFG that is required to be flared, the amount shall equal fy.;

ii. If the regulation requirements do not specify the amount or percentage of LFG that should be destroyed but require the installation of a capture system, without requiring the captured LFG to be flared then fy= 0; and

iii. If the requirement do not specify any amount or percentage of LFG that should be destroyed but require the installation of a system to capture and flare the LFG, then it is assumed fy = 0.2.

In the absence of the project activity there was no capturing and flaring of methane (partially or completely) from the SWDS. Moreover, neither there is any existing contract nor any regulations which requires the capture and flaring/destruction of methane (partially or completely) resulting from the SWDS. Hence, fy = 0 from the project activity.

As per the tool *"Emissions from solid waste disposal sites (Version 06.0.1)",* the procedures to calculate baseline, project or leakage emissions of methane from solid waste disposed or prevented from disposal at a SWDS.

The tool can be used to determine emissions for the following types of applications:

• Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS

Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. ACM0001). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an *ex-ante* estimation of emissions in the CDM-PDD. The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS).

• Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS

An example of this application of the tool is Approved consolidated baseline and monitoring methodology ACM0022-"Alternative waste treatment processes", in which MSW is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both *ex-ante* and *ex-post* estimation of emissions.

For the calculation of baseline emissions from the project activity, **Application B** is chosen due to the following reasons:

- Project activity involves treating the waste (in form of wood & wood products) and prevented from being disposed in disposal sites; and the methane generated is avoided from disposal during the crediting period.
- The technology involved for the project does not demand any capturing & flaring/combustion of methane gas.

The amount of methane that is generated each year (MBy) is calculated as per the latest version of the approved methodological tool *"*Emissions from solid waste disposal sites" version 06.0.1, annex 46, EB 66 considering the following additional equation:

$BECH4,t,y = BECH4,SWDS,y$ …….**(5)**:

BECH4,SWDS,y	*Is the methane generation from the landfill in the absence of the project activity at year y that is methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site during the period from the start of the project activity to the end of the year y (tCO2e) as calculated using application B in the methodological tool "Emissions from solid waste disposal sites". The tool estimates methane generation adjusted for, using adjustment factor (fy), any landfill gas in the baseline that would have been captured and destroyed to comply with relevant regulations or contractual requirements, or to address safety and odour concerns. As this is already accounted for in equation given below, in this methodology, "fy" in the tool shall be assigned a value 0.*

As per the "Emissions from Solid Waste Disposal Sites", version 06.0.1, Annex 46, EB 66, an amount of methane would be generated in the absence of the project activity from disposal of waste at the solid waste disposal site ($BE_{CH4,SWDS,y}$) is calculated with a multi-phase, first order decay (FOD) model. The amount of methane produced in the year y is calculated as follows:

$BECH4,SWDS,y = \varphi y \cdot (1 - fy) \cdot GWP\ CH_4 \cdot (1\text{-}OX) \cdot 16/12 \cdot F \cdot DOCf,y \cdot MCFy \cdot \sum_{x=1}^{y} \sum_{j,x} DOC\ j \cdot e^{-kj\ (y-x)} \cdot (1 - e^{-kj})$ ..... **(6)**

BECH4,SWDS,y	Baseline methane emissions occurring in year *y* generated from waste disposal at a SWDS during a time period ending in year *y* (tCO_2e/yr).
Wj,x	Amount of solid waste type j prevented from disposal in the SWDS in the year x (t)
DOCf,y	Fraction of degradable organic carbon that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
φy	Model correction factor to account for model uncertainties for year y.
fy	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.
$GWPCH_4$	Global Warming Potential of methane
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	Fraction of methane in the SWDS gas (volume fraction)
MCFy	Methane correction factor for year y
DOCj	Fraction of degradable organic carbon in the waste type j (weight fraction)
Kj	Decay rate for the waste type j (1/yr).
j	Type of residual waste or types of waste in the MSW
x	Years in the time period in which the waste is disposed at the SWDS, extending from the first year in the time period (x = 1) to year y (y = x)
y	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months).

Determining the model correction factor (φy)

The model correction factor has been chosen, using option 1 of the methodological tool-"Emissions from solid waste disposal sites", version 6.0.1, where *φy= φdefault*

Determining the amounts of waste types j disposed in the SWDS (Wj,x)

Where different waste types j are disposed or prevented from disposal in the SWDS the amount of different type of wastes. For Application B, the amount of different waste types is determined through sampling and the mean is calculated from the samples- by using the following equation to determine the value of Wj,x for the yearly model:

$Wj,x = Wx.pj,x$ ..... **(7)**

Where,

Wj,x	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x(t)
Wx	Total amount of solid waste disposed or prevented from disposal in the SWDS in year x(t)

pj,x	Average fraction of the waste type j in the waste in year x (weight fraction)
j	Types of solid waste
x	Years in the time period for which waste is disposed at the SWDS, extending from the first year in the time period (x = 1) to year y (x = y)

The fraction of the waste type j in the waste for the year x calculated as follows:

$pj,x = \Sigma pn,j,x / Zx$ ……**(8)**

Where:

pj,x	Average fraction of the waste type j in the waste in year x (weight fraction)
pn,j,x	Fraction of the waste type j in the sample n collected during the year x (weight fraction)
Zx	Number of samples collected during the year x
n	Samples collected in year x
j	Types of solid waste
x	Years in the time period for which waste is disposed at the SWDS, extending from the first year in the time period (x = 1) to year y (x = y)

Determining the fraction of DOC that decomposes in the SWDS (DOCf,y)

The value of DOCf,y has been determined using the methodological tool "Emissions from Solid Waste Disposal Sites", version – 6.0.1, where $DOCf,y = DOCf,_{default}$ and the value is in the section B.6.2.

Procedure to determine the methane correction factor (MCFy)

The value of MCFy has been determined using application A of the above mentioned methodological tool as below:

Application A

The MCF has been selected as the default value mentioned the above tool.

$MCF_y = MCF_{default}$……**(9)**

As per equation18 of the methodology Approved consolidated baseline and monitoring methodology ACM0022-"Alternative waste treatment processes", Version 1.0.0:
The project emissions in year *y* are calculated for each alternative waste treatment option implemented in the project activity as follows:

$PE_y = PE_{COMP,y} + PE_{AD,y} + PE_{GAS,y} + PE_{RDF\_SB,y} + PE_{INC,y}$ ……**(10)**

Where:

PEy = Project emissions in year *y* (tCO_2e)

$PE_{COMP,y}$ = Project emissions from composting or co-composting in year *y* (tCO_2e)

$PE_{AD,y}$ = Project emissions from anaerobic digestion and biogas combustion in year *y* (tCO_2e)

$PE_{GAS,y}$ = Project emissions from gasification in year *y* (tCO_2e)

$PE_{RDF\_SB,y}$ = Project emissions associated with RDF in year *y* (tCO_2e)

$PE_{INC,y}$ = Project emissions from incineration in year *y* (tCO_2e)

The parameters which are applicable for calculating the project emissions for the proposed project activity are summarized in the table below:

Table: Parameters applicable for calculating the Project Emissions

Symbols	Parameters	Applicable	Justifications
$PE_{COMP,y}$	Project emission from composting or co-composting in year y (tCo_2e)	Yes	Since, the project activity is involved in composting process, so during composting some amount of methane and N_2O emissions occur along with CO_2 emissions due to electricity and fossil fuel usage. So this parameter is applicable for calculating the project emission.
$PE_{AD,y}$	Project emission from anaerobic digestion and biogas combustion in year y (tCO_2e)	No	Project activity does not involve any process where anaerobic digestion occurs, so this parameter is not included.
$PE_{GAS,y}$	Project emission from gasification in year y (tCO_2e)	No	No other emissions occurs except from stabilized biomass combustion during the entire process of the project activity
$PE_{RDF,SB,y}$	Project emission associated with RDF/SB in year y (tCO_2e)	Yes	The project activity involves process of RDF manufacturing. Therefore, emissions related to RDF processing are considered.
$PE_{INC,y}$	Project emission from incineration in year y (tCO_2e)	No	The project activity does not involve any waste incinerating during the entire process; so this parameter is not included.

Based on the parameters applicable for the proposed project activity, the Project Emissions are calculated based on the following basis:

$PEy = PE_{COMP,y} + PE_{RDF,SB,y}$ ……..**(11)**

Emissions from composting *(PEcomp,y)*

Project emissions associated with composting (PEcomp,y) are calculated according to the methodological tool "Project and leakage emissions from composting" version 01.0.0,Annex 09,EB 65[17]. According to this tool the project emission due to composting (PEc,y) is equivalent to parameter $PE_{COMP,y}$ in the tool.
So, as per the methodological tool:

$$PE_{COMP,y}=PE_{EC,y}+PE_{FC,y}+PE_{CH4,y}+PE_{N2O,y}+PE_{RO,y} \quad \text{.....(12)}$$

Where,

$PE_{COMP,y}$	Project emissions associated with composting in year y (tCO_2e/yr)
$PE_{EC,y}$	Project emissions from electricity consumption associated with composting in year y (tCO_2/yr)
$PE_{FC,y}$	Project emissions from fossil fuel consumption associated with composting in year y (tCO_2/yr)
$PE_{CH4,y}$	Project emissions of methane from the composting process in year y (tCO_2e/yr)
$PE_{N2O,y}$	Project emissions of nitrous oxide from the composting process in year y (tCO_2e/yr)
$PE_{RO,y}$	Project emissions of methane from run-off wastewater associated with co-composting in year y (tCO_2e/yr)

Determination of project emissions from electricity consumption ($PE_{EC,y}$):

There is no consumption of electricity in project activity hence project emissions are zero.

Determination of project emissions from fossil fuel consumption ($PE_{FC,y}$):

As per the methodology (Approved consolidated baseline and monitoring methodology ACM0022- "Alternative waste treatment processes", version1.0.0, EB69) the project proponent shall account for CO_2 emissions due to onsite fossil fuel combustion.

The fossil fuel consumption due to composting activities and in the project. Please refer equation 18 for calculation of emissions due to fossil fuel consumption in composting process

Determination of project emissions of methane ($PE_{CH4,y}$)

Project emissions of methane from composting ($PE_{CH4,y}$) are determined as follows***:***

$$PE_{CH4,y}=Q_y * EF_{CH4,y} * GWP_{CH4}$$

Where:

$PE_{CH4,y}$	Project emissions of methane from the composting process in year *y* ($t\ CO_2e$/yr)
Qy	Quantity of waste composted in year *y* (t/yr)
$EF_{CH4,y}$	Emission factor of methane per tonne of waste composted valid for year y (tCH_4/t)
GWP_{CH4}	Global Warming Potential of CH_4(tCO_2e /tCH_4)

[17] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-13-v1.pdf

Determination of the Quantity of waste composted (Qy)

As per the methodological tool "Project and Leakage Emissions from Composting" Version 01.0.0, Annex 09, EB 65, the quantity of waste composted can be determined using a weighing device or without using a weighing device. Project participant wishes to determine the quantity using a weighing device. The details of monitoring of the weighing device have been provided in section B.7.1.

Determination of the Emission factor of methane per tonne of waste composted valid for year y (tCH_4/t)

As per the methodological tool there are two options available for determining EF_{CH4}. Option 2 has been chosen for calculation of emission reduction for the project activity.

Option 2: Procedure using default values:

A default value is used: $EF_{CH4,y} = EF_{CH4}$,default. The value of EF_{CH4}, default is provided in the methodological tool "Project and Leakage Emissions from Composting", (EB 65, Version 01.0.0).

Determination of project emissions of nitrous oxide ($PE_{N2O,y}$)

Project emissions of nitrous oxide from composting ($PE_{N2O,y}$) are determined as follows:

$PEN_20,y=Qy*EFN_20,y*GWPN_20$

Where:

$PE_{N20,y}$	Project emissions of nitrous oxide from composting in year y (tCO_2e/yr)
Qy	Quantity of waste composted in year y (t/yr)
$EF_{N20,y}$	Emission factor of nitrous oxide per tonne of waste composted valid for year y($t N_2O/t$)
GWP_{N20}	Global Warming Potential of N_2O ($tCO_2e/t N_2O$)

Determination of the Emission factor of nitrous oxide per tonne of waste composted valid for year y (tN_2O/t)

There are two options for determining EFN_2O,y. Option 2 has been chosen for calculation of emission reduction for the project activity.

Option 2: Procedure using default values

A default value is used for the calculation: $EFN_2O,y = EFN_2O$,default. The value of EFN_2O, default has been taken from "Project and Leakage Emissions from Composting", version 01.0.0, Annex 09, EB 65.

Determination of project emissions from run-off wastewater ($PE_{RO,y}$)

As per the tool, *"project and leakage emissions from composting"* version 1.0.0, *"project emissions of methane emissions from run-off wastewater ($PE_{RO,y}$) are calculated only for the case of co-composting. Moreover, if run-off wastewater is collected and re-circulated to the composting process, then $PE_{RO,y}$ is assumed to be zero"*.

In case of the project activity, the run-off wastewater/leachate is collected and re-circulated to the composting process. **Hence $PE_{RO,y}$ has been taken as zero.**

Project emissions associated with mechanical or thermal production of RDF/SB (PERDF_SB,y)

As per the methodology, *"Project emissions associated with RDF/SB comprise both the emissions from the mechanical/thermal production process (e.g. electricity, fossil fuel consumption and wastewater treatment, if relevant) as well as the combustion of RDF/SB (if this is part of the project activity). If the RDF/SB is disposed of in a SWDS, then this is accounted for as leakage emissions according to the procedure Leakage emissions associated with RDF/SB. Project emissions are determined as follows:"*

$PERDF\_SB,y = PECOM,RDF\_SB,y + PEEC,RDF\_SB,y + PEFC,RDF\_SB,y + PEww,RDF\_SB,y$

Where:

$PE_{RDF\_SB,y}$ = Project emissions associated with RDF/SB in year *y* (t CO_2e)
$PE_{COM,RDF\_SB,y}$ = Project emissions from combustion of fossil waste associated with combustion of RDF/SB within the project boundary in year *y* (t CO_2e)
$PE_{EC,RDF\_SB,y}$ = Project emissions from electricity consumption associated with RDF/SB (production and on-site combustion) in year *y* (t CO_2e)
$PE_{FC,RDF\_SB,y}$ = Project emissions from fossil fuel consumption associated with RDF/SB (production and on-site combustion) in year *y* (t CO_2e)
$PEww,RDF\_SB,y$ = Project emissions from the wastewater treatment associated with RDF/SB (production and on-site combustion) in year *y* (t CH_4)

In the project activity, RDF is not combusted within the project boundary, hence, project emissions from same is zero *i.e.* $PE_{COM,RDF\_SB,y} = 0$.

So, eq (19) is summarized as;

$PE_{RDF\_SB,y} = PE_{EC,RDF\_SB,y} + PE_{FC,RDF\_SB,y} + PE_{ww,RDF\_SB,y}$

Project emissions from electricity consumption associated with RDF/SB (production and on-site combustion)

As per the methodology, *"The project emissions from electricity consumption due to waste treatment process t implemented under the project activity ($PE_{EC,t,y}$) shall be calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". When applying the tool:*

(1) Project emissions shall be calculated for the sources of electricity consumed due to the alternative waste treatment process t, excluding consumption of electricity that was generated by the project activity (ECt,y); (2) If the project activity consists of more than one alternative waste treatment process, then project participants may choose to monitor electricity consumption for the entire site and then allocate this consumption to one of the different alternative waste treatment processes (e.g. apportionment based on sub-metering data is not required)."

The project activity consists of only composting and no RDF manufacturing. There is no Electricity consumption by the composting processes in the project activity. Hence it is project emissions from same is zero.

$EC_{t,y} = EC_{PJ,RDF\_SB,y} + EC_{PJ,comp,y}$

Where,

$EC_{t,y}$ is the electricity consumption by all the processes in the project activity
$EC_{PJ,RDF\_SB,y}$ is the electricity consumption the RDF manufacturing process
$EC_{PJ,comp,y}$ is the electricity consumption for composting process

Project emissions due to electricity by the project activity shall determined using the following equation:

$PE_{EC,t,y} = EC_{t,y} * EF_{grid,CM,y} * (1+TD_{Lj,y})$

Where,

$EF_{grid,CM,y}$ is the emission factor of the grid from which electricity is consumed in year y
$TD_{Lj,y}$ is the transmission and distribution losses for providing electricity to source j in year y

Project emissions from fossil fuel consumption associated with RDF/SB (production and on-site combustion)

As per the methodology, *"The project emissions from fossil fuel combustion associated with waste treatment process t implemented under the project activity ($PE_{FC,t,y}$) shall be calculated using the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". When applying the tool:*

(1) Processes j in the tool corresponds to the sources of fossil fuel consumption due to the alternative waste treatment process, other than for electricity generation. Consumption sources shall include, as relevant, fossil fuels used for starting the gasifier, auxiliary fossil fuels for operating the incinerator, heat generation for mechanical/thermal treatment process and on-site fossil fuel combustion during co-firing with waste. Fossil fuels used as part of the on-site processing or management of feedstocks and by-products shall also be included;

(2) If the project activity consists of more than one alternative waste treatment process, then project participants may choose to monitor fossil fuel consumption for the entire site and then allocate consumption to one of the different alternative waste treatment processes."

The project activity consists of composting manufacturing. Fossil fuel used in the project activity is diesel and Gasoline in machinery for compost manufacturing inside the project site. Fossil fuel consumption by all the processes in the project activity (Composting and RDF processing) is monitored together, FCi,j,y.

Emissions are calculated from the quantity of fuel used and the specific CO_2 emission factor of the fuel, as follows:

$PEPJ,FC,y = \sum FCi,j,y \times COEFi,y$

Where:

PEPJ,FC,y	Project emissions from fossil fuel consumption associated with the project activity (Composting processing) in year *y* (t CO_2 / yr)
FCi,j,y	Is the quantity of fuel type i combusted in the project activity (Composting processing) during the year y (mass or volume unit/yr)
COEFi,y	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

The CO_2 emission coefficient $CO_{EFi,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type i, as follows:

$CO_{EFi,y} = NCV\ i,y x\ EFCO_2,i,y$

Where,

COEFi,y	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
NCVi,y	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EFCO_2$,i,y	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

Project emissions from Fossil fuel consumption associated with RDF/SB (production and on-site combustion) is not there because RDF is not produced in the Project hence Project Emissions are zero.

In project activity there is no run-off wastewater generated by the project activity is treated using an aerobic treatment process, such as by co-composting, then project emissions from wastewater treatment are assumed to be zero. Therefore,

PEww,RDF_SB,y = PEww,t,y= 0

Project emissions from the waste water treatment associated with RDF/SB (production and on-site combustion

PEww,RDF_SB,y is determined according to the procedure "Project emissions from wastewater treatment", where PEww,RDF_SB,y= PEww,t,y and the alternative waste treatment option t is the production of RDF. Please refer explanation for PEww,t,y below.

Emissions from run-off wastewater management (PEww,t,y)

In project activity there is no run-off wastewater generated by the project activity is treated using an aerobic treatment process, such as by co-composting, then project emissions from wastewater treatment are assumed to be zero. Therefore,

PEww,RDF_SB,y= PEww,t,y= 0

As per the Methodology, "*leakage emissions are associated with composting/co-composting, anaerobic digestion and the use of RDF/SB that is exported outside the project boundary. For the case that waste by-products of the alternative waste treatment options are:*

- *Used for soil application, this emissions shall be neglected;*
- *Composted or co-composted, then these shall be treated as fresh waste with emissions estimated according to the procedure project emissions from composting (PECOMP,y)."*

Leakage emissions are determined as follows:

LEy = LECOMP,y+ LEAD,y + LE RDF_SB,y

Where:

LE,y	Leakage emissions in the year y (tCO_2e)
LECOMP,y	Leakage emissions from composting or co-composting in year y (tCO_2e)
$LE_{AD,y}$	Leakage emissions from anaerobic digester in year y (tCO_2e)
$LE_{RDF\_SB,y}$	Leakage emissions associated with RDF/SB in year y (tCO_2e)

The parameters which are applicable for the project activity for calculation of Leakage are provided in the table below:

Table 3: Parameters for calculating Leakage Emissions (LEy):

Symbols	Parameters	Applicable	Justification
LECOMP,y	Leakage emissions from composting or co-composting in year y (tCO_2e)	No	Since the compost is not subjected to anaerobic storage or disposed of in a SWDS rather it will be sold to the market to earn revenue so leakage emission associated with composting shall be zero.
LEAD,y	Leakage emissions from anaerobic digester in year (tCO_2e)	No	The project activity doesn't involve in anaerobic digestion of chicken litter + wood shavings, hence leakage emissions from these sources is not applicable for the project activity.
LE RDF,y	Leakage emissions associated with RDF/SB in year y (tCO_2e)	No	There is no leakage emission since no RDF/SB is produced

Leakage emissions associated with RDF/SB ($LE_{RDF\_SB,y}$)

As per the methodology, *"Leakage emissions associated with RDF/SB are accounted for the organic waste by-products of the treatment process (not by-products from the RDF/SB combustor), which may be composted or disposed of in a SWDS, and the end-use of RDF/SB that is exported off-site, as follows:"*

$$LE_{RDF\_SB,y} = LE_{ENDUSE,RDF\_SB,y} + LS_{WDS,WBP\_RDFSB,y}$$

Where:

$LE_{RDF\_SB,y}$ = Leakage emissions associated with RDF/SB in year *y* (tCO_2e)

$LE_{SWDS,\ WBP\_RDF\_SB,y}$ = Leakage emissions associated with disposing of waste by-products associated with RDF/SB production in a SWDS in year *y* (tCO_2e)

$LE_{ENDUSE,RDF\_SB,y}$ = Leakage emissions associated with the end-use of RDF/SB exported outside the project boundary in year *y* (tCO_2e)

Leakage emissions from disposal of waste by-products from RDF/SB production in a SWDS ($LE_{SWDS,WBP\_RDF\_SB,y}$)

There is no RDF manufacturing process in project activity. Hence Leakage is zero.

Leakage emissions associated with end use of RDF/SB exported outside the project boundary ($LE_{ENDUSE,RDF\_SB,y}$)

There is no RDF manufacturing process in project activity. Hence Leakage is zero.

Leakage emissions from combusted off-site end use of RDF/SB ($LE_{ENDUSE,RDF\_SB,y}$) (End use 2)

There is no RDF manufacturing process in project activity and hence Leakage is zero.

Leakage emissions from off-site anaerobic decomposition of RDF/SB (End use 3)

There is no RDF manufacturing process in project activity and hence Leakage is zero.

Hence, $LE_{ENDUSE,RDF\_SB,y} = 0$.

B.6.2. Data and parameters fixed ex ante
(Copy this table for each piece of data and parameter.)

<table>
<tr><td>Data / Parameter</td><td>Φdefault</td></tr>
<tr><td>Data unit</td><td>Unitless</td></tr>
<tr><td>Description</td><td>Default value for the model correction factor to account for model uncertainties.</td></tr>
<tr><td>Source of data</td><td>Methodological Tool-“Emissions from solid waste disposal site”(version-06.0.1)</td></tr>
<tr><td>Value applied:</td><td>0.80</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>For project or leakage emissions: φdefault = 1

For baseline emissions: refer to Table 3 to identify the appropriate factor based on the application of the tool (A or B) and the climate where the SWDS is located.
Table 3: Default values for the model correction factor:
<table><tr><td></td><td>Humid/Wet condition</td><td>Dry Condition</td></tr><tr><td>Application A</td><td>0.75</td><td>0.75</td></tr><tr><td>Application B</td><td>0.85</td><td>0.80</td></tr></table>
Conecuh County is located in Alabama State which tropical area with MAP of greater than 1400 mm per annum and average annual temperature</td></tr>
</table>

	of more than 18°C[18]. Hence, data for wet condition has been considered for the project activity. Please refer table for kj (decay rate for waste type j) below.
Purpose of Data	Calculation of baseline emissions
Comments	This value is applicable to option 1 in the procedure "Determining the model correction factor (Φy)

Data / Parameter	**OX**
Data unit	Unitless
Description	Oxidation Factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
Source of data	The value proposed, can be revalidated through the methodological tool "Emissions from solid waste disposal sites", Version 06.0.1, EB 66
Value applied:	0.1
Justification of choice of data or description of measurement methods and procedures applied	When methane passes through the top-layer, part of it is oxidized by methanotrophic bacteria to produce CO_2.The oxidation factor represents the proportion of methane that is oxidized to CO_2.This should be distinguished from the methane correction factor (MCF) which is to account for situation that ambient air might intrude into the SWDS and prevent methane from being formed in the upper layer of SWDS.
Purpose of Data	For calculating the Baseline emission
Comments	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories

Data / Parameter	**F**
Data unit	Unitless
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied	Default value adopted from IPCC guidelines
Purpose of Data	For calculating the Baseline emission
Comments	Upon biodegradation, organic material is converted to a mixture of methane and carbon dioxide.

[18] http://en.wikipedia.org/wiki/Climate_of_Alabama

Data / Parameter	**MCF**
Data unit	Unitless
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied	For semi-aerobic managed solid waste disposal sites. These must have controlled placement of waste and will include all of the following structures for introducing air to the waste layers: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system;
Purpose of Data	For calculating the Baseline emission
Comments	As per the methodology ACM0022, version1, "MCF accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS." The SWDS in case of project activity is a managed one with compacting levelling of waste. The data will archived for the entire crediting period and 2 years post crediting period.

Data / Parameter	**$DOC_{f,default}$**
Data unit	Unitless
Description	Fraction of degradable organic carbon (DOC) that can decompose
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied	Default value adopted from IPCC guidelines
Purpose of Data	For calculating the Baseline emission
Comments	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, in the SWDS. This default value can only be used for -Application B if the tool is applied to MSW.

Data / Parameter	**DOCj**
Data unit	Unitless
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,Table 2.4 and 2.5)

<table>
<tr><td>Value applied:</td><td>Apply the following values for the different waste type j:
<table><tr><th>Waste Type j</th><th>DOCj
(% wet waste)</th></tr><tr><td>Wood and wood products</td><td>43</td></tr><tr><td>Pulp, paper and cardboard (other than sludge)</td><td>40</td></tr><tr><td>Food waste, beverages and tobacco (other than sludge)</td><td>15</td></tr><tr><td>Textiles</td><td>24</td></tr><tr><td>Garden yard and park waste</td><td>20</td></tr><tr><td>Glass plastic, metal, other inter waste</td><td>0</td></tr></table>
The waste are generally wet type as the waste is treated in composting process in windrow system, generally the top of the windrow is open and the waste are degraded in presence of atmospheric oxygen.</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>Since, the project includes biodegradable organic waste so the default values for wood products and food waste are taken</td></tr>
<tr><td>Purpose of Data</td><td>For calculating the baseline emission</td></tr>
<tr><td>Comments</td><td>The procedure for the ignition loss test is described in BS EN 15169:2007 Characterization of waste - Determination of loss on ignition in waste, sludge and sediments.
The percentages are based on a wet waste basis which is concentrations in the waste as it is delivered to the SWDS. The IPCC Guidelines also specify DOC values on a dry waste basis, which are the concentration after complete removal of all moist from the waste, which is not believed practical for this situation.</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>Kj</td></tr>
<tr><td>Data unit</td><td>1/yr</td></tr>
<tr><td>Description</td><td>Decay rate for the waste type j</td></tr>
<tr><td>Source of data</td><td>IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)</td></tr>
<tr><td>Value applied:</td><td>Apply the following default values for the different waste type j.
<table><tr><td></td><td>Waste type j</td><td>Tropical (MAT>20°C</td></tr><tr><td></td><td></td><td>Wet (MAP > 1000m)</td></tr><tr><td>Slowly Degrading</td><td>Pump paper, cardboard (other than sludge), textiles</td><td>0.07</td></tr></table></td></tr>
</table>

		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*	*0.4*
	N.B: MAT- Mean annual temperature, MAP- Mean annual precipitation, PET-potential evapotranspiration. MAP/PET is ratio between the mean annual precipitation and the potential evapotranspiration		
Justification of choice of data or description of measurement methods and procedures applied	*Conecuh County is located in Alabama State which tropical area with MAP of greater than 1400 mm per annum and average annual temperature of more than 18°C*[19]*.*		
Purpose of Data	*For calculating the Baseline emission*		
Comments	*The data will archived for the entire crediting period and 2 years post crediting period.*		

Data / Parameter	**GWP_{CH_4}**
Data unit	tCO_2e/tCH_4
Description	Global Warming Potential of CH_4
Source of data	Fourth assessment period of IPCC 2007. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html
Value applied:	25
Justification of choice of data or description of measurement methods and procedures applied	The value for second commitment period is considered for the project as per the Point No7 of the Guidelines, "STANDARD FOR APPLICATION OF THE GLOBAL WARMING POTENTIALS TO CLEAN DEVELOPMENT MECHANISM PROJECT ACTIVITIES AND PROGRAMMES OF ACTIVITIES FOR THE SECOND COMMITMENT PERIOD OF THE KYOTO PROTOCOL" EB 69, Annex 3[20]
Purpose of Data	For calculating the Baseline emission

[19] http://en.wikipedia.org/wiki/Climate_of_Alabama
[20] http://cdm.unfccc.int/Reference/Standards/meth/reg_stan02.pdf

Comments	The data will archived for the entire crediting period and 2 years post crediting period.

Data / Parameter	**$EFCH_4$,default**
Data unit	tCH_4/t
Description	Default emission factor of methane per tonne of waste composted (wet basis).
Source of data	Based on the methodological tool "Project and leakage emission from composting ", Version 01.0.0 , Annex 09, EB 65
Value applied:	0.02
Justification of choice of data or description of measurement methods and procedures applied	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 source and analysed and a value conservatively selected from the higher end of the range in result.
Purpose of Data	For calculating the Project emission
Comments	Applicable to Option 2 in the step "Determination of methane and nitrous oxide emission from the composting process".

Data / Parameter	**EFN_2O,default**
Data unit	tN_20/t
Description	Default emission factor of methane per tonne of waste composted (wet basis)
Source of data	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 source and analyzed and a value conservatively selected from the higher end of the range in result.
Value applied:	0.0002
Justification of choice of data or description of measurement methods and procedures applied	Justify the choice of data source, providing references where applicable. Where values are based on measurement, include a description of the measurement methods and procedures applied (e.g., what standards or protocols have been followed), indicate the responsible person/entity that undertook the measurement, the date of the measurement and the measurement results. More detailed information may be provided in an appendix.
Purpose of Data	For calculating the Project emission
Comments	Applicable to Option 2 in the step "Determination of methane and nitrous oxide emission from the composting process".

Data / Parameter	**$GWPN_2O$**
Data unit	tCO_2e/tN_2O
Description	Global Warming Potential of N_2O
Source of data	Forth assessment period of IPCC 2007 for second commitment period of Kyoto protocol. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html
Value applied:	298
Justification of choice of data or description of measurement methods and procedures applied	The value for second commitment period is considered for the project as per the Point No 7 of the Guidelines "STANDARD FOR APPLICATION OF THE GLOBAL WARMING POTENTIALS TO CLEAN DEVELOPMENT MECHANISM PROJECT ACTIVITIES AND PROGRAMMES OF ACTIVITIES FOR THE SECOND COMMITMENT PERIOD OF THE KYOTO PROTOCOL" EB 69, Annex 3[21]
Purpose of Data	For calculating the Project emission
Comments	The data will archived for the entire crediting period and 2 years post crediting period.

B.6.3. Ex ante calculation of emission reductions

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Calculation of baseline emissions:

The amount of methane that is generated each year (BECH4, SWDS,y tCO_2e) is calculated for each year with the recommended multi-phase model, the First Order Decay (FOD) model.

As per equation

$$BEy = \sum_{t}(BE_{CH4,t,y} + BE_{WW,y} + BE_{EN.t.y} + BE_{NG,t,y}) \times DF_{RATE,t,y} \quad \text{.....} \quad \textbf{(1)}$$

With

$$DF_{RATEt,y} = \{1\text{-}RATE_{comliance,t,y} \text{ if } RATE_{compliance,t,y} < 0.5 \text{ , } 0 \text{ if } RATE_{compliance,t,y} \geq 0.5 \quad \text{.....} \quad \textbf{(2)}$$

x Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x = 1$) to year y ($x = y$

[21] http://cdm.unfccc.int/Reference/Standards/meth/reg_stan02.pdf

y Year of the crediting period for which methane emissions are calculated (*y* is a consecutive period of 12 months)

DOCf,y Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year *y* (weight fraction)

Wj,x Amount of solid waste type *j* disposed or prevented from disposal in the SWDS in the year *x*

Φy Model correction factor to account for model uncertainties for year y

fy 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

$GWPCH_4$ Global Warming Potential of methane

OX Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)

F Fraction of methane in the SWDS gas (volume fraction)

MCFy Methane correction factor for year y

DOCj Fraction of degradable organic carbon in the waste type j (weight fraction)

kj Decay rate for the waste type j (1 / yr)

j Type of residual waste or types of waste in the MSW

Steps for calculation of baseline emission using above equation:

Step 1: Calculate Wx for the given year x. However, for the estimation purpose, Wx for each year of the Crediting period has been considered.
Step 2: The variable Wj,x is substituted by Aj,x which is calculated for the given year x for all categories of waste. The value for weight fraction of each waste type j, is to be taken from the samples collected during each year. However, for estimation purpose, these values are taken from the waste sampling conducted during feasibility study.
Step 3: Divide the equation into 2 parts for calculation of methane potential:
Part a: Σ (1-e-kj)* e-kj(y-x), for every category of organic waste (j = A to E), calculate the rate of decay for every year, y during the crediting period.
Part b: Multiply (1-fy)*$GWPCH_4$*(1-OX)*F*DOCf,y*MCF factor with ***part a*** and ***Aj,x*** for every year during the crediting period, to calculate methane potential for the given quantity of waste processed during the year x in each year.
Step 4: Add the methane potential calculated for the waste quantity processed in the given year x.
Step 5: Replicate the calculations for every year during the crediting period for each category of organic waste.

Step 6: Add the methane potential for all the waste categories for every year. Multiply with global warming potential of methane to obtain the tonnes CO_2e (CER) for each year.

The Table below depicts the baseline emission calculations:

Parameters	Unit	Value	References
ϕy	_	0.85	Methodological Tool-"Emission from solid waste disposal sites", version 06.0.1, EB-66, Annex-46
fy	_	0	Methodological Tool-"Emission from solid waste disposal sites", version 06.0.1, EB-66, Annex-46
(1-fy)	_	1	Calculated
$GWPCH_4$	tCO_2/tCH_4	25	IPCC Fourth Assessment report: Climate Change 2007; Table-2.14: Lifetimes, radiative efficiencies and direct (except for CH_4) GWPs relative to CO_2. For ozone-depleting substances and their replacements, data are taken from IPCC/TEAP (2005) unless otherwise indicated.
OX	_	0.1	Methodological Tool-"Emission from solid waste disposal sites", version 06.0.1, EB-66, Annex-46
(1-OX)	_	0.9	Calculated
F	_	0.5	Methodological Tool-"Emission from solid waste disposal sites", version 06.0.1, EB-66,Annex-46
DOCf,y	Weight fraction	0.5	Methodological Tool-"Emission from solid waste disposal sites", version 06.0.1, EB-66, Annex-46
MCFy	_	1.0	Methodological Tool-"Emissions from solid waste disposal sites", version-06.0.1,EB-66, Annex-46
Product of [ϕy,(1-fy),$GWPCH_4$,(1-OX),F,DOCf,y ,MCFy*16/12]	_	6.375	Calculated
DOCj	Percent	0.43	Default value for showing the percentage of wet waste (Wood& wood product); Methodological Tool-"Emissions from solid waste disposal sites", version-06.0.1, EB-66, Annex-46;
	Percent	0.15	Default value for showing the percentage of wet waste (Food ,food waste ,beverages and tobacco); Methodological Tool-"Emissions from solid waste disposal sites", version-06.0.1, EB-66, Annex-46;
Kj	1/yr	0.40	http://en.wikipedia.org/wiki/Climate_of_Alabama
	1/yr	0.035	
Compost Production	Tonnes/day	138.46	Based on raw material purchase invoices (2000 tonnes chicken litter + 1000 tonnes wood chips) per month
Annual Operating Days	Days	260	As per General working days practice of United States
Total amount of solid waste disposed or prevented from	TPA	36000	Based on raw material purchase invoices (2000 tonnes chicken litter + 1000 tonnes wood chips) per month

disposal of SWDS (Wj,x)			
Total amount of organic waste to be treated	TPA	36000	Based on raw material purchase invoices (2000 tonnes chicken litter + 1000 tonnes wood chips) per month
Total percentage of organic waste treated for composting	Percent	100	66% Chicken Litter + 34% Wood Shavings
Total amount of waste to be treated for composting	TPA	36000	Based on raw material purchase invoices (2000 tonnes chicken litter + 1000 tonnes wood chips) per month
Conversion rate	Percent	80	DPR
Total amount of compost generated	TPA	28800	Calculated based on the conversion factor of degradable organic waste & the total amount of waste to be composted
Average Baseline Emission per year	tCO_2e	741313	Calculated

Table: Baseline emissions calculated with FOD model:

Description	**Unit**	**Total**
Avoided waste deposition, processed for composting	TPA	36000
Emissions from (A): wood and wood products	tCO_2e	1999616
Emissions from (C): food and food waste	tCO_2e	5770327
Total baseline methane emissions (BE_{CH4},SWDS,y) in ten years	tCO_2e	7769944
Net Baseline Emissions (BEy) in ten years	tCO_2e	7406945

Total Baseline Emissions in ten years is 7769944 tCO_2e

Project Emissions:

For the project activity, project emissions are as follows:

PEy = PECOMP,y + PERDF,SB,y

Emissions from composting *(PEcomp,y)*

$PECOMP,y=PEEC,y+PEFC,y+PE_{CH4},y+PEN_2O,y+PERO,y$

Project emission from electricity consumption at composting activity:

The project activity doesn't consume electricity for composting activity hence *PEEC,y is zero.*

Project emissions from fossil fuel consumption associated with composting (PEFC,y)

The project activity consists of fossil fuel consumption for preparation of compost. The diesel and gasoline are consumed in the project. Hence, the fossil fuel consumption for the entire project site is measured together using fossil fuel purchase invoices.

Project emissions of methane from the composting process (PECH4,y)

$PECH_4,y = Qy * EFCH_4,y * GWPCH_4$

Particular	Unit	Value
Qy	Tonnes per annum	36000
$EFCH_4,y$	tCH_4/tonne of waste composted	0.0207
$GWPCH_4$	tCO_2e / tCH_4	25
$PECH_4,y$	**tCO_2**	**1512**

Project emissions of nitrous oxide from the composting process (PEN_2O,y):

$PEN_2O, y = Qy * EFN_2O, y * GWPN_2O$

Particular	Unit	Value
Qy	Tonnes per annum	36000
EFN_2O,y	tN_2O/tonne of waste composted	0.0002
$GWPN_2O$	tCO_2e / tN_2O	298
PEN_2O,y	**tCO_2**	**2146**

Project emissions associated with mechanical or thermal production of RDF/SB ($PE_{RDF\_SB,y}$):

There is no mechanical or thermal production of RDF/SB in the project activity hence Project emissions associated with mechanical or thermal production of RDF/SB ($PE_{RDF\_SB,y}$) is zero.

Project emissions from electricity consumption associated with RDF/SB (production) ($PE_{EC,RDF\_SB,y}$):

There is no electricity consumption associated with RDF/SB in the project activity hence Project emissions from electricity consumption associated with RDF/SB (production) ($PE_{EC,RDF\_SB,y}$) is zero.

Project emission due to electricity consumption at RDF manufacturing facility is:

There is no electricity consumption associated with consumption at RDF manufacturing facility in the project activity hence Project emissions from electricity consumption at RDF manufacturing facility is zero.

Project emissions from electricity use ($PE_{EC,t,y}$)

There is no electricity consumption in the project activity related to compost manufacturing hence $PE_{EC,t,y}$ is zero.

Project emissions from fossil fuel use ($PE_{FC,t,y}$)

From equation no. 19 and 20

$PEy_{FC\ PJ} = \sum_{i} FCi,j,y \times COEFi,y$

$COEFi,y = NCVi,y \times EFCO_2,i,y$

Project emissions from fossil fuel (Diesel) consumption associated with composting ($PE_{FC,y}$)				
Parameter	**Description**	**Unit**	**Value applied**	**Source**
$FC_{diesel, onsite, y (L)}$	Fuel consumption on site per year (diesel)	Litres	12060.284	Invoice
ρ_{diesel}	Density of Diesel	kg/l	0.832	http://en.wikipedia.org/wiki/Diesel_fuel
$FC_{diesel, onsite, y (t)}$	Fuel consumption on site per year (diesel)	t	10034.2	Calculated
$NCV_{diesel, onsite}$	Net calorific value of fuel (diesel)	TJ/Gg	43	2006 IPCC
$EF_{CO2, diesel}$	CO_2 emission factor for fuel (diesel)	Kg/TJ	74100	IPCC
$PE_{CO2, diesel, onsite, y}$	**Emissions from on-site fuel consumption per year**	**tCO_2**	**31,9712**	**Calculated**

Project emissions from fossil fuel (Gasoline) consumption associated with composting ($PE_{FC,y}$)				
Parameter	**Description**	**Unit**	**Value applied**	**Source**
$FC_{gasoline, onsite, y (L)}$	Fuel consumption on site per year (Gasoline)	Litres	189.27	Invoice
ρgasoline	Density of Gasoline	kg/l	0.77	http://en.wikipedia.org/wiki/Gasoline
$FCGasoline_{, onsite, y (t)}$	Fuel consumption on site per year (diesel)	t	145.7	Calculated
$NCV_{Gasoline, onsite}$	Net calorific value of fuel (Gasoline)	TJ/Gg	44.3	2006 IPCC
$EF_{CO2, Gasoline}$	CO_2 emission factor for fuel (Gasoline)	Kg/TJ	69300	IPCC
$PE_{CO2, diesel, onsite, y}$	**Emissions from on-site fuel consumption per year**	**tCO_2**	**447**	**Calculated**

Total Project Emissions in ten years is 362999 tCO_2e

Leakage emission:

As there is no production of RDF in the project activity hence ex-ante estimation of leakage emission is considered as zero for 10 years.

Hence, $LE_{ENDUSE,RDF\_SB,y} = 0$

B.6.4. Summary of ex ante estimates of emission reductions:

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2014	341713	36300	0	305413
2015	584241	36300	0	547941
2016	759819	36300	0	723519
2017	890073	36300	0	853773
2018	989512	36300	0	953212
2019	1067879	36300	0	1031579
2020	1131717	36300	0	1095418
2021	843716	36300	0	807416
2022	647735	36300	0	611435
2023	513539	36300	0	477239
Total	7769944	3629999	0	7409645
Total number of crediting years	10			
Annual average over the crediting period	740,694			

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

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

Data / Parameter	**Wx or Wi**
Data unit	Tonne
Description	Total amount of waste disposed or prevented from disposal in a SWDS in year x or month i
Source of data	Measurement is done by project participants and record will be maintained in log books
Description of measurement methods and procedures to be applied	Measurement is done on wet basis for every incoming waste carrying vehicle by an electronic weigh-bridge and recorded electronically and manually
Frequency of monitoring/recording	Continuously, aggregated at least annually for year x or monthly for month i
Value applied:	36000 Tonnes/Year

Monitoring equipment	Weigh Bridge
QA/QC procedures to be applied	Calibration frequency: As per manufacturer's specification Accuracy Class: As per manufacturer's specification
Purpose of data	For calculating the baseline emission
Calculation method	Electronic Reading of Weighbridge will be recorded
Comments	All data will be archived for two years post the end of the crediting period

Data / Parameter	**Qy**
Data unit	Tonne/yr
Description	Quantity of waste composted in composting in year y (wet basis).
Source of data	Plant records
Description of measurement methods and procedures to be applied	Measurement is done by an electronic weigh-bridge and recorded electronically and manually
Frequency of monitoring/recording	Continuously, aggregated at least annually for year x or monthly for month i
Value applied:	36000 Tonnes/Year
Monitoring equipment	Weigh Bridge
QA/QC procedures to be applied	Calibration frequency: As per manufacturer's specification Accuracy Class: As per manufacturer's specification
Purpose of data	For calculating the project emission
Calculation method	Electronic Reading of Weighbridge will be recorded
Comments	Applicable to Option 1 in the step "Determination of the quantity of waste composted". The parameter corresponds to the quantity of solid waste delivered to the composting installation, weighed on a wet basis. All data will be archived for two years post the end of the crediting period.

Data / Parameter	**FCi,j,y**
Data unit	Mass or volume units of fuel
Description	Fuel consumption on-site during year y of the crediting period
Source of data	Purchase invoices

Value applied:	3186 gallon per annum for diesel 50 gallon per annum for gasoline
Justification of choice of data or description of measurement methods and procedures applied	Data is cross-checked based on invoices and archived electronically and manually
Purpose of Data	Calculation of project emissions
Comments	This parameter includes diesel + gasoline used waste treatment process in preparation of compost. All data will be archived for two years post the end of the crediting period.

Data / Parameter	**pn,i,y or pn,j,i**
Data unit	Weight Fraction
Description	Weight fraction of the waste type j in the sample n collected during the year y or month i
Source of data	Sample measurements by project participants
Value applied:	<table><tr><td>Different components of organic part of the Waste</td><td>% composition by wt</td></tr><tr><td>Wood and wood product</td><td>34%</td></tr><tr><td>Food Waste</td><td>66%</td></tr><tr><td>Total</td><td>100%</td></tr></table>
Justification of choice of data or description of measurement methods and procedures applied	Sample the waste composition, using the waste categories j, as provided in the table for DOCj and kj, and each waste fraction shall be weighed. A minimum of three samples shall be undertaken every three months with the mean value valid for year y. The size and frequency of sampling should be statistically significant with a maximum uncertainty range of 10% at a 95% confidence level.
Purpose of Data	Calculation of baseline emissions
Comments	All data will be archived for two years post the end of the crediting period

Data / Parameter	$\mathbf{RATE_{Compliance,y}}$
Data unit	Fraction

Description	Rate of Compliance with a regulatory requirement to implement the alternative waste treatment t implemented in the project activity.
Source of data	Ex post based on the information (annual report) to be provided by the local environment management authority + email communication if any from ADEM
Value applied:	0%
Justification of choice of data or description of measurement methods and procedures applied	Fraction is calculated as the number of instances of compliance divided by the number of instances of compliance plus non-compliance. The compliance rate is based on the annual reports of Alabama Environment Management Authority.
Purpose of Data	For calculation of Baseline Emissions
Comments	Provide any additional comments

Data / Parameter	**NCVi,y**
Data unit	TJ/Gg
Description	Net calorific value of diesel consumed for compost processing unit.
Source of data	Table 1.2 of IPCC 2006 of Guidelines of national Greenhouse gas Inventories.
Value applied:	43
Justification of choice of data or description of measurement methods and procedures applied	Default value as per IPCC 2006. Link is given below: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Purpose of Data	For calculation of Project Emissions
Comments	The data will archived for the entire crediting period and 2 years post crediting period

Data / Parameter	**EF**co_2,i,y
Data unit	$kgCO_2/TJ$
Description	CO_2 emission factor for diesel consumed at the MSW processing unit
Source of data	Table 1.4 of IPCC 2006 of guidelines of Greenhouse gas inventories
Value applied:	74800

Justification of choice of data or description of measurement methods and procedures applied	Default value as per IPCC 2006. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Purpose of Data	For calculation of Project Emissions
Comments	The data will archived for the entire crediting period and 2 years post crediting period

B.7.2. Sampling plan

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As per the Approved consolidated baseline and monitoring methodology *ACM0022 – "Alternative waste treatment processes", Version 1.0.0*, the sampling should be undertaken "A minimum of three samples shall be undertaken every three months with the mean value valid for year y

B.7.3. Other elements of monitoring plan

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The monitoring plan define the standards and rule according to which the emission reductions of the project activity are monitored and verified in conformance with all relevant equipment's of the projects.
GECO is the co-ordinating and managing entity, which is supervised the monitoring plant.

Use of the monitoring plan by the operators:

The Monitoring Plan identifies key performance indicators of the project and sets out the procedures for metering, monitoring, calculating and verifying the emission reductions generated by the GECO compost plant, annually. Adherence to the instructions in the monitoring plan will be issued to the operator to measure and track the impact of the project on the environment. The operator will prepare all data required for the periodic audit and verification process that must be undertaken to confirm the achievement of the corresponding Verified Emission Reductions. The monitoring plan is thus the basis for the production of verified emission reductions and issuance of the verified emission reductions within the framework. If the monitoring plan is updated and adjusted to meet operational requirements, it will be done so with DOE approval. Any shifts in the baseline scenario may lead to such amendments, which may be mandated by the DOE. Amendments may also be necessary as a consequence of new circumstances that affect the ability to monitor emission reductions as described here or to accommodate new or modified GS rules. All the results of monitoring shall be preserved by the project proponent for two years beyond the end of crediting period or the last issuance of verified emission reductions for the project activity whichever occurs later.

Organizational, Operational and Monitoring Obligations:

Obligations of the Operator:

Monitoring the project's performance in terms of emission reduction achievement requires the fulfilment of operational data collection and processing obligations from the operator. The operator of the compost plant has the primary obligation to collect data that would facilitate the calculation of the project emission

reduction. The data shall be collected by the operator based on the most recent available information as per the procedures presented in this PDD. In addition, roles and responsibilities of monitoring personnel would be well defined. Examples of roles and responsibilities for monitoring of data and parameters are provided with this monitoring plan; however these need to be updated on a regular basis. The documentation for the sales or delivery of the compost final product is also monitored.

It is believed that the monitoring plan approach presented here will result in an accurate, yet conservative calculation of emission reductions. However some uncertainties may lead to a deviation between monitored and verified emission reductions especially errors in the data monitoring and processing system. The operator is expected to prevent such errors and the verification audits are expected to uncover any possible errors. The operation of the composting facilities will be documented in a quality control program, monitoring the conditions and procedures that ensure the aerobic condition of the waste during the composting process.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

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21/09/2011

The GEC Organics purchased the Scarab Composting Machinery worth USD 97,290. This was the first and earliest major expenditure from PP related to project construction.

C.1.2. Expected operational lifetime of project activity

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20 years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Fixed

C.2.2. Start date of crediting period

>>

01/06/2014 or Date of registration whichever is earlier

C.2.3. Length of crediting period

10

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

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The compost production facility in Alabama is not mandatory and does not require any Environment Impact Studies and its approval[22]. The only approval required for project site was a "Storm Water Permit". The ADEM (Alabama Department of Environmental Management) approved the requirement. The Approval is valid till 31st May 2017.

D.2. Environmental impact assessment

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The compost production facility in Alabama is not mandatory and does not require any Environment impact studies and its approval[23]. The only approval required for project site was a "Storm Water Permit". The ADEM (Alabama Department of Environmental Management) approved the requirement. The Approval is valid till 31st May 2017.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

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Informal Consultations with local stakeholders about GHG reduction potential and project plan in Aug 2011:

In Aug of 2011, PP went to identify and select site area. During this trip, PP meet local stakeholders, prospective farmers nearby neighbors, etc. PP appraised about the GEC Business mission and prospective venture in the composting project in Conecuh County. PP also briefed during discussions that apart from composting process, project also has potential in environment protection such as reduction in soil pollution, dependence of synthetic fertilizers and reduction of GHG emissions while manufacturing of compost. PP appraised that this project is first of its kind initiative and there is significant risk. The GHG reduction potential provides opportunity for company to monetize the achieved GHG reductions and mitigate the investment risk. The project also requires significant testing and experimenting to confirm the quality, robustness in results and financial viability of the product in large scale as compared to synthetic fertilizers.

Few Questions asked by people during informal discussions

1. What will be the expected price of your product
2. Is the project area will be solid waste disposal site
3. Does the Project will create bad odour and nuisance in local surrounding
4. How much time company will take for commercial operations
5. Are there any side effects on crops using your product

[22] http://www.recycle.cc/compostregs.htm#Alabama
[23] http://www.recycle.cc/compostregs.htm#Alabama

6. How will provide GHG reduction monetization benefits, Private Company or US Govt.

Consultation and Site Visit for composting product testing Conducted in March 2012:

PP invited local stakeholders, NGOs to visit the site. The local people was appraised that the project is not a solid waste disposal site. PP distributed the compost product free cost to test at their agricultural land. The compost product was appreciated by local farmers and PP received positive feedback from local stakeholders. Moreover PP also invited four local leaders, Castleberry Mayor J.B. Jackson, County Commissioner Leonard Millender, State Representative Harry Shiver and the Executive Director of the Costal Gateway Regional Economic Development Alliance, James Searcy, to inspect and visit facility. The local govt. officials appraised the PP effort to implement the project in Castleberry and largest of its kind in Alabama. The Mayor appraised the project stating "This is a great opportunity for our community and the region as a whole. New jobs are being created for our citizens and the economy of the surrounding area has already experienced a positive impact."

E.2. Summary of comments received

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- Barbara Wolfe, retail customer and gardening expert. "I used the Compost from GEC on tomato plants by mixing it in with the soil. My plants were green and healthier and bloomed earlier while producing more tomatoes than all other years."

- Debra Burch, consumer and avid gardener. "I tilled the GEC Compost into the ground and planted squash and okra. The okra grew taller, had an increased yield and had a growing longer than the previous year. The squash plants were also bigger and healthier while producing more squash than last year."

- Josh Coleman, farmer. "I tilled the OSA1000 into the ground and planted winter greens. They are growing faster and doing better than I have ever seen"

- Johnny Andrews, farmer. I used the Compost on winter greens by first tilling it in the soil. My winter plants are doing better than all past years. I can't wait to see how the OSA1000 will perform in the summer."

- Josh Reeves, consumer. "I spread the Compost by hand on my lawn when I planted grass seed. In a short time the new grass was thicker than what was already growing for years in my backyard."

- Lavon Boutwell, owner of The Farm Center in Brewton Alabama, a representative for John Deere and formerly a fertilizer distributor throughout Alabama and Florida for 30 years. "I have experimented with the GEC OSA1000 and the results were very impressive. As an

example, I grew pineapple plants side by side using synthetic fertilizer and OSA1000. The OSA plants had greener leaves, grew faster and much bigger. A pineapple in Southern Alabama.

- Jeremy Padgett, farmer and builder. "For the last home I built, I laid sod for the lawn and it turned completely brown. I contacted GEC and purchased their Compost Tea, OSA-CT1000. I drenched the sod and in 3 days it was green and began to knit together. The results were hard to believe."

E.3. Report on consideration of comments received

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SECTION F. Approval and authorization

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Storm Water Permit Approval from ADEM (Alabama Department of Environmental Management) dated May 23 2012.

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Appendix 1: Contact information of project participants

Organization name	GEC Organics Corp.
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State/Region	New York
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Title	President & CEO
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Appendix 2: Affirmation regarding public funding

Appendix 3: Applicability of selected methodology

Appendix 4: Further background information on ex ante calculation of emission reductions

Appendix 5: Further background information on monitoring plan

Appendix 6: Summary of post registration changes

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06b 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
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