CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for submission of CPAs that apply a small scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

Municipal waste composting Project for _____

Version ____

Date : _____

A.2. Description of the small-scale CPA:

This CPA is being proposed under the Uganda Municipal Waste Compost PoA, and represents the Municipal Waste Composting Activity in _____ municipality in Uganda. The CPA will be implemented as per the same implementation framework as described in the Uganda Municipal Waste Composting PoA-DD.

Solid waste management is an important responsibility of _____ municipality. Municipal solid wastes collected in ____ is primarily landfilled (in partially managed landfills), as a result of which, significant amount of methane is emitted to the atmosphere. The purpose of this CPA is to avoid such methane emissions by processing the organic fractions of the waste (which are responsible for methane emissions in a landfill) aerobically in a compost plant. This CPA proposes to set up an aerobic composting facility in _____ municipality for processing the municipal solid waste in an environmentally friendly and sustainable way. The project would also generate local employment and in development process of the country.

It is proposed to handle _____tons of waste per day or _____tons of waste per annum at the compost facility. About _____tons of compost would be generated per annum resulting in an average of about _____t Co_2e per year of emission reduction for the first 7 year crediting period.

A.3. Entity/individual responsible for the small-scale CPA:

Town Municipality, _____, represented by the Town Clerk

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

The Small scale CPA is undertaken in the _____municipality of Uganda.

A.4.1.1. Host Party:

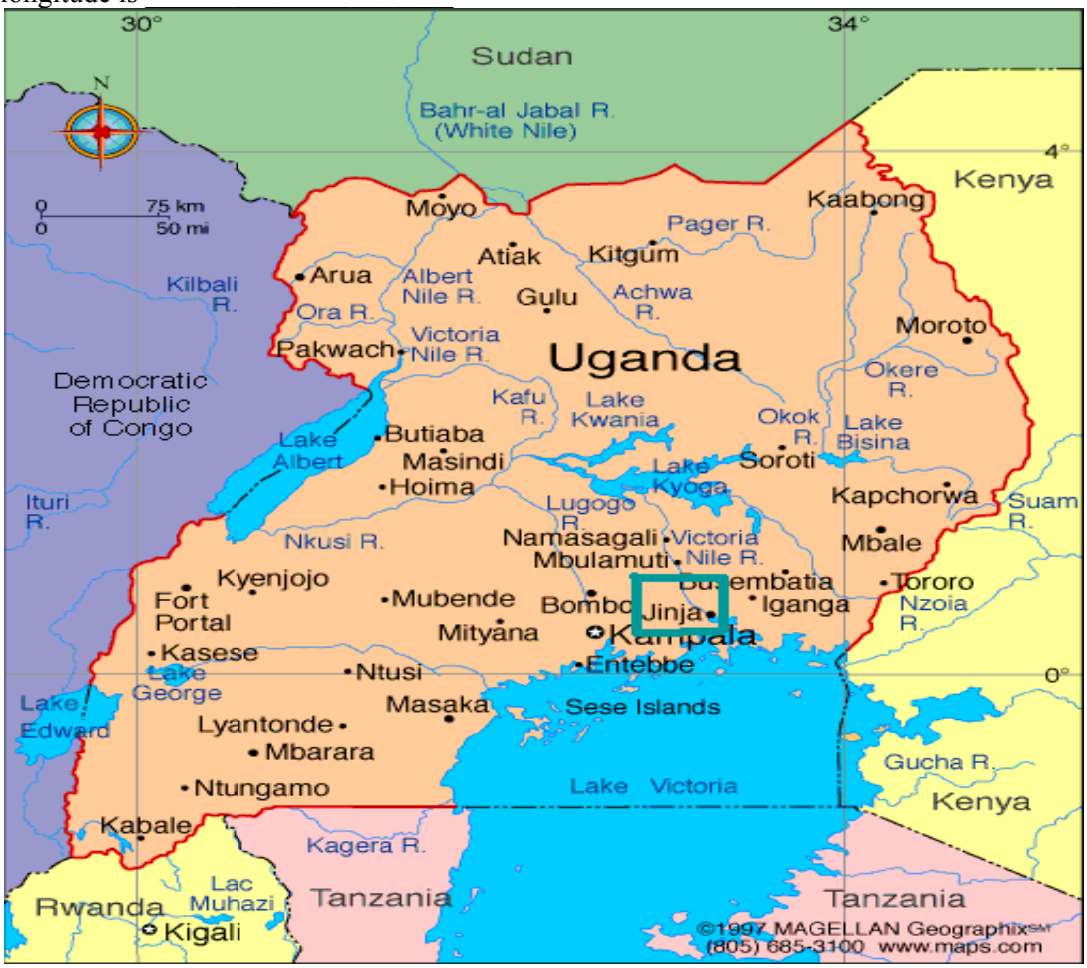
Uganda

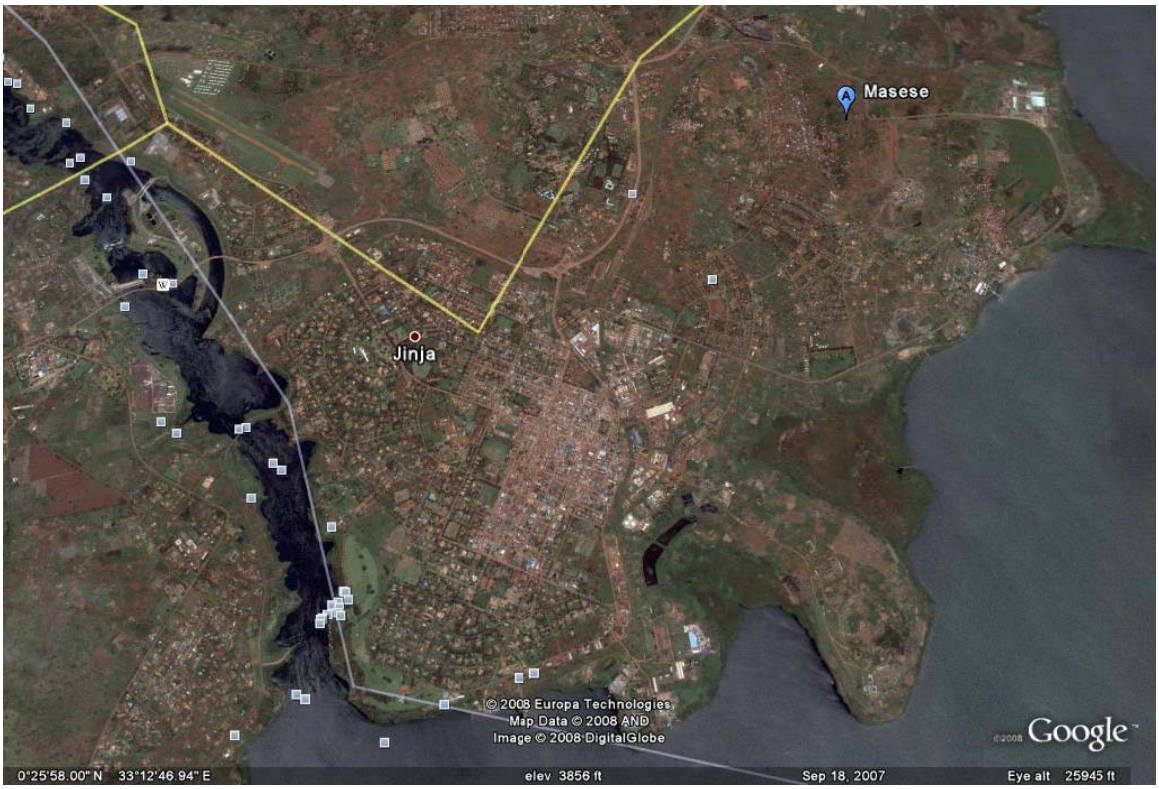
A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

Identification of the CPA.

Parameters	Details
Name of the Urban Local Body	
Type (town , municipal, city Council)	
Latitude and Longitude	
District	
Nearest airport	

_____ is located in Uganda. Uganda is located in Africa and is a landlocked country with borders with Kenya, Sudan, Rwanda and Tanzania. The Map of Africa showing location of Uganda is given below. _____ is located _____. The Map of Uganda showing _____ is given below. _____ is at a distance of about _____km from the Ugandan Capital of Kampala. The composting facility is located at Village _____ in _____ division of _____ Town. The latitude longitude is _____





The contact details of the agency responsible for the CPA is

TOWN CLERK
_____
P.O. Box ____
_____

UGANDA
Office of the Town Clerk
Tel : _____

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

_____(the date on which the contract is awarded to the contractor for construction of the plant – start of real action)

A.4.2.2. Expected operational lifetime of the small-scale CPA:

The project would have a life span of 15 years.

A.4.3. Choice of the crediting period and related information:

Renewable crediting period: 7 years x 2 = total of 14 years

A.4.3.1. Starting date of the crediting period:

_____or the date of registration of the CPA whichever is later.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

7 years

NOTE: Please note that the duration of crediting period of any *CPA* shall be limited to the end date of the *PoA* regardless of when the CPA was added..

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

_____t CO_2e (over the first Crediting Period of 7 years)

A.4.5. Public funding of the CPA:

The CPA (as part of the Uganda Muncipal Waste Compost Program – PoA) is partly financed through the IDA Credit to Uganda under the project "Environment Management and Capacity Building Project-II". The DOE will be provided with the evidence that the same IDA money is not being used for purchasing emission reductions.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

Similar projects do not exist in _____ Municipal Council. This is the first such project in _____. The CPA implementor, in this case _____ Municipal Council, has neither been involved in any other PoA of the same sectoral scope, nor have they assumed the role of any Cordinating/Managing Entity.

This is the first CDM activity in the solid waste sector in _____ and there does not exist any other registered CDM activity in the same sector. The _____ CPA is therefore not a de-bundled component.

The cooperation agreement signed between _____Municipal Council and NEMA confirms that the _____Municipal Council has not included the same project in any other CDM Program of Activities or CDM Project activities. Further, the Uganda Municipal Waste Compost Program is the first PoA in Uganda under which this CPA is being proposed.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

The project is not registered as an individual CDM project and is not part of another PoA. The Co-operation agreement and subsequent amendments to the co-operation agreements signed between NEMA and the _____Municipal Council confirm the above statement. The _____municipal council has signed a declaration that their compost plant is neither part of any other CDM Program of Activities nor any other CDM activities. These signed agreements will be provided to the DoE.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

Uganda Municipal Waste Compost Programme. This CPA is part of the request for registration of the above mentioned PoA

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA :

The project is eligible to be included as a CPA in the proposed PoA as it complies with all the eligibility criteria listed in the PoA-DD as described below.

SL.	Eligibility Criteria as defined in the PoA	CPA's Compliance with the eligibility criteria
1	The CPA would be from a town council, municipal council or city council in Uganda. Only one CPA for each urban local body	The CPA is from one of the municipal councils (_____Municipal Council) in Uganda, and this is the first CPA from _____being proposed under the Uganda Municipal Waste Compost Program.
2	The urban local body would have land designated for the compost plant.	_____Municipal Council has designated land for waste processing and disposal. The compost plant proposed in the CPA is being located at the same designated land
3	The urban local body would have signed a cooperation agreement with NEMA to participate in the program, and to transfer the emission reduction rights to NEMA	_____Municipal Council has already signed the Cooperation agreement and subsequent amendments to the Cooperation Agreement with NEMA
4	The urban local body shall take responsibility for operating the compost facility and landfill, as per the guidelines and training provided in the program	As per the Cooperation Agreement , _____Municipal Council is obligated to operate the compost plant as per the guidelines and training provided in the program.

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

Table B 3.1. Eligibility of the small scale CPA as per eligibility criteria in PoA.

S.No	Eligibility Criteria as per PoA	Situation in _____
1	There should not be any existing composting operations of capacity greater than 5 tons of waste handled per day in the	

	urban local body proposing a CPA[3]	
2	The common practice for waste disposal in the urban local body area should be land filling.	
3	The financial analysis[4] of composting operations should prove the Programme to be unviable w/o carbon revenues, if the plant is designed for a different capacity than the standard 70 TPD considered in the program (A variation of 20% in the design capacity is considered reasonable and will not require separate financial analysis).	

The CPA is thus proved to be additional.

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

_____municipal council is located within the geographical boundary of Uganda, which is the boundary of the PoA. Waste that would have otherwise been, within _____ Municipal Council area, in the absence of the CDM project, will be composted and the compost will be used within Uganda and the rejects will be disposed off at landfill located adjacent to the compost plant site in _____. The CPA is thus located within the geographical boundary of the PoA. There is only one set of policies and regulations pertaining to solid waste management that applies across Uganda. The CPA boundary includes the physical boundary of the compost plant and the landfill site.

Gases and sources relevant to the Project are listed below.

Table B 4.1. Emissions sources within Project Boundary that are considered

	Source	Gas		Justification / Explanation
Baseline	Emissions from decomposition of waste at the landfill site	CH_4	Included	The major source of emissions in the baseline
		N_2O	Excluded	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of the gas is conservative
		CO_2	Excluded	CO_2 emissions from decomposition of organic waste are not accounted
	Emissions from electricity consumption	CO_2 N_2O CH_4	Excluded	Electricity is not consumed or generated in the baseline scenario

[3] Existence of any unorganised or small scale composting activity at a scale less than 5 TPD capacity will not disqualify a CPA on additionality.

[4] Since a standard design of 70 TPD compost plant has been adopted for the program and the financial analysis carried for the 70 TPD plant has proved that composting is not the least cost option for the municipalities, separate financial analysis will not be required to establish the additionality of the CPAs , unless the CPAs are designed for different sizes (beyond 20% variation).

	Emissions from thermal energy generation	CO_2 CH_4 N_2O	Excluded	Thermal energy is not consumed or generated in the baseline scenario
Project Activity	On-site fossil fuel consumption due to the project activity	CO_2	Included	May be an important emission source
		CH_4	Excluded	Excluded for simplification. The emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. The emission source is assumed to be very small.
	Emissions from transport of compost	CO2	Included	May be an important emission source
		CH4	Excluded	Excluded for simplification. The emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. The emission source is assumed to be very small.
	Emissions from on-site electricity use	CO_2	Included	May be an important emission source
		CH_4	Excluded	Excluded for simplification. The emission source is assumed to be very small.
		N_2O	Excluded	Excluded as the emission source is negligible.
	Direct emissions from the waste treatment process	CO_2	Excluded	CO_2 emissions from decomposition of organic waste are not accounted
		CH_4	Included	Included for composting, run off and residual disposal processes.
		N_2O	Excluded	Excluded as the activity is a small scale.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Data / Parameter:	**EF_{co2}**
Data unit:	kg CO2/ km
Description:	Emission factor for diesel vehicles
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories combined with data from Ugandan references
Value applied:	0.545
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default CO2 emission factor of diesel used in road transport as per IPCC (2006 IPCC Guidelines for National Greenhouse Gas Inventories) is 74,100 kgCO2/TJ. Calorific Value and density of diesel according to Uganda Energy Balance data is 43.3 GJ/ton, and 0.85 ton/m3 respectively. (Ref: http://www.energyandminerals.go.ug/Energy_Balance_2004(1)%20basic%20data%20and%20assumptios.pdf). The above data results in an emission coefficient of 2.727 kgCO2/litre for diesel. Considering an average efficiency of transport vehicle as 5 km/litre, this translates to an emission factor of 0.545 kgCO2/km.
Any comment:	

Data / Parameter:	**EF_{Fuel}**

Data unit:	(kg CO2/ litre)
Description:	Emission factor for diesel used in construction equipments
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories combined with density of diesel from Ugandan references
Value applied:	2.727
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default CO2 emission factor of diesel used in construction as per IPCC (2006 IPCC Guidelines for National Greenhouse Gas Inventories) is 74,100 kgCO2/TJ. Calorific Value and density of diesel according to Uganda Energy Balance data is 43.3 GJ/ton, and 0.85 ton/m3 respectively. (Ref: http://www.energyandminerals.go.ug/Energy_Balance_2004(1)%20basic%20data%20and%20assumptios.pdf). The above data results in an emission factor of 2.727 kgCO2/litre for diesel.
Any comment:	

Data / Parameter:	**EF_m**
Data unit:	TCO2/ MWh
Description:	Emission factors for different types of fuels used to supply power to the grid
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Diesel: 0.68 Heavy Fuel Oil: 0.71 Biomass = 0 Hydro = 0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default emission factor for diesel as per IPCC 2006 is 74100 kg CO2 / TJ, η for equipment installed after year 2000 is taken as 39.5 % and calculation of emission factor is done using the formula EF_m * 3.6 / η_m /1000000. Default emission factor for HFO as per IPCC 2006 is 77,400 kg CO2 / TJ, η for equipment installed after year 2000 is taken as 39.5 % and calculation of emission factor is done using the formula EF_m * 3.6 / η_m /1000000.
Any comment:	Emission factor for Hydro Power and Biomass based power is zero

Data / Parameter:	η_m
Data unit:	%
Description:	Efficiency of power plant.
Source of data used:	" Tools to calculate the emission factor for an electricity system." Ver 1.1
Value applied:	39.5 %
Justification of the choice of data or description of measurement methods and procedures actually applied :	Uganda has diesel and heavy fuel oil power plants apart from Hydro and biomass based power. The diesel and heavy fuel oil power plants have been installed in 2005-06 and the efficiency data for plants set up after year 2000 is used.

Any comment:	

Data / Parameter:	$EF_{m\ ipcc,2006}$
Data unit:	Kg CO_2/ TJ
Description:	Emission factor for diesel fuel Emission factor for Heavy Fuel Oil (Residual fuel oils)
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Diesel : 74100 kg CO_2/ TJ Heavy Fuel Oil 77400 kg CO_2/ TJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value acceptable as per IPCC 2006.
Any comment:	

Data / Parameter:	**$EF_{composting}$**
Data unit:	Kg CH4/ton waste
Description:	Methane emission per ton wet waste composted
Source of data used:	AMS III F version 06
Value applied:	4 kg / ton wet waste
Justification of the choice of data or description of measurement methods and procedures actually applied :	Taken as per AMS III F version 06
Any comment:	

Data / Parameter:	$B_{o,ww}$
Data unit:	Kg methane / kg COD
Description:	Methane producing capacity of waste water.
Source of data used:	IPCC default value of 0.25 kg / kg COD
Value applied:	0.25
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default as recommended in methodology AMS III.F Version 06
Any comment:	

Data / Parameter:	$MCF_{ww,\ treatment}$

Data unit:	Factor
Description:	Methane Correction water for waste water treatment plant
Source of data used:	As per table III F.1
Value applied:	0.3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The composting process is proposed under a roof. No rain run off is expected. The process management would ensure that no leachate from excess watering is generated. Leachate generated due to moist waste input would be sprayed back onto the older waste windrows. In this context no treatment plant is proposed. In case leachate does get produced and which cannot be sprayed back an aerobic treatment system based on reed bed or similar botanical treatment system would be undertaken without use of power. The number for aerobic treatment poorly managed is adopted.
Any comment:	
Monitoring Frequency	Annually to check if any run off is there.

Data / Parameter:	UF_b
Data unit:	Factor
Description:	Model correction factor to account for uncertainties
Source of data used:	AMS III F
Value applied:	1.06
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default as recommended in AMS III F Version 06
Any comment:	

Parameters related to baseline emissions

Data / Parameter:	**Φ**
Data unit:	Factor
Description:	The Model Correction Factor to correct for the model uncertainties
Source of data used:	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (Version 04)
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	As recommended in the Tool referred to above.
Any comment:	Oonk et el. (1994) have validated several landfill gas models based on 17 realised landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the

	model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data / Parameter:	**OX**
Data unit:	Factor
Description:	Oxidation factor
Source of data used:	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 4.0
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	*OX* is determined by the following two ways: (1) Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied. (2) Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites. Since the landfill in baseline scenario can be considered as a unmanaged landfill with soil cover, the *OX* in this case is 0. The Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 4.0 says the OX be taken as 0.
Any comment:	

Data / Parameter:	**F**
Data unit:	Fraction
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 4.0
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.
Any comment:	

Data / Parameter:	**DOC_f**
Data unit:	Factor
Description:	The fraction of DOC that can decompose
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories, and Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 4.0
Value applied:	0.5
Justification of the choice of data or	Default value

description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**MCF**
Data unit:	Factor
Description:	Methane Correction Factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	Use the following values for MCF: • 1.0 for anaerobic managed solid waste disposal sites. These must have controlled placement of waste (i.e., waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste. • 0.5 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 waste layer: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system. • 0.8 for unmanaged solid waste disposal sites – deep and/or with high water table. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. Latter situation corresponds to filling inland water, such as pond, river or wetland, by waste. • 0.4 for unmanaged-shallow solid waste disposal sites. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 metres. The landfill is unmanaged and >5 m depth
Any comment:	

Data / Parameter:	**DOC_j**	
Data unit:	%	
Description:	Percent of degradable organic carbon (by weight) in the waste type j	
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)	
Value applied:	**Waste Type**	**DOC_j (%)**
	Wood and wood products	43
	Pulp, paper and cardboard (other than sludge)	40
	Food, food waste beverages and tobacco (other than sludge)	15
	Textiles	24
	Garden, yard and park waste	20
	Glass, plastic, metal, other inert waste	0
Justification of the	Quantity of waste handled at the facility will be measured on an wet basis.	

choice of data or description of measurement methods and procedures actually applied :	Therefore DOCj values corresponding to the wet waste is used.
Any comment:	

Data / Parameter:	**k_j**		
Data unit:	Factor		
Description:	The decay rate for the waste stream type j		
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)		
Value applied:	**Waste Type**		**k_j (%) MAT>20°C MAP>1000 mm**
	Slowly degrading	Pulp, paper and cardboard (other than sludge), textiles	0.07
		Wood and wood products	0.035
	Moderately degrading	Other (non-food) organic putrescible garden and park waste	1.49
	Rapidly degrading	Food, food waste, beverages and tobacco (other than sludge)	1.49
Justification of the choice of data or description of measurement methods and procedures actually applied :	MAT for _____ Municipality is _____C MAP for _____Municipality is _____mm		
Any comment:			

B.5.2. Ex-ante calculation of emission reductions:

The emission reductions are calculated according to methodology AMS III F Version 06 and "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site version 04", which are referred to in the PoA-DD. The ex-ante calculation of emission reductions are completed with the following steps:

Project Emissions (PE_y):

The project emissions in year y for the composting process from equation **(1)** are:

$$PE_y = PE_{y,transport} + PE_{y,power} + PE_{y,comp} ++ PE_{y,\ phy\ leakage} + PE_{y,runoff} + PE_{y,reswaste} \quad (1)$$

1. Project emissions from fuel use in transport of compost:

$$\mathbf{PEy_{,transp}} = (Q_y/CT_y) * DAF_w * EF_{co2} + (Q_{y,comp}/CT_{y,comp}) * DAF_{comp} * EF_{co2} \quad \textbf{(2)}$$

Where:

Q_y = Quantity of raw waste treated in the year "y" (tonnes)
CT_y = Average truck capacity for waste transportation (tonnes/truck)
DAF_w = Average incremental distance for raw solid waste (km/truck)
EF_{Co2} = CO2 emission factor from fuel use due to transportation (kgCO2 /km)
$Q_{y,comp}$ = Quantity of final compost product produced in the year "y" (tonnes)
$CT_{y,comp}$ = average truck capacity for final compost product transportation (tonnes/truck)
DAF_{comp} average distance for final compost product transportation (km/truck)

The Compost facility is being located close to the place, where the waste would have been land filled and thus there is no additional transport of waste to the composting site and the project emission due to increased transport of waste is zero.

The estimated fuel consumption for transport of compost is estimated here. The compost production is estimated at 22 % of the input waste. All the compost will either be sold or distributed for demonstration. About 5621 tons of compost is transported out every year. 100 % of the compost marketed would be within an average travel distance (both way) of 100 km. The compost transported per truck is conservatively assumed at 6 tons.

Table B.5.2-1. Data used for the ex-ante calculation of $PE_{transport,y}$

Parameter	Value
Q_y	Year 2009 onwards : _____tonnes/year
CT_y	4 tons / truck
DAF_w	0
EF_{CO2}	0.545 tCO2/km (as established in the PoA-DD)
$Q_{y,comp}$	Year 2009 and onwards : _____ tonnes
$CTy_{,comp}$	6 tons / truck
DAF_{comp}	100 km
EF_{CO2}	0.545 (as established in the PoA-DD)
$PE_{transport,y}$	_____

2. Project emission from onsite energy use

$$\mathbf{PE_{y,power} = PE_{electricity,y} + PE_{fuel,onsite,y}} \quad \textbf{(3)}$$

$$\mathbf{PE_{electricity,y} = MWh_{e,y} * CEF_{elec}} \quad \textbf{(4)}$$

Where

$MWh_{e,y}$ is the amount of electricity consumed from the grid in the project activity, measured using an electricity meter (MWh).

CEF_{elec} is the carbon emissions factor for electricity generation (tCO_2/MWh). The CEF_{elec} shall be estimated using the weighted average method as per AMS ID ver 13 and the details is given in annex 3. A value of 0.14 is used ex ante for calculation.

$CEF_{elec,y} = \sum EF_m \times EG_{m,y-1} / \sum EG_{m,y-1}$

$EF_m = EF_{m\ ipcc2006} * 3.6/ \eta_m /1000000$

EF_m = emission factor for fuel m in TCO_2 / MWh.
$EF_{m,ipcc2006}$ = emission factor for the fuel as per IPCC 2006 in kg CO_2 / TJ.
m = fuel type m used for power generation.
η_m = efficiency of fuel taken as per " Tools to calculate the emission factor for an electricity system."
$EG_{m,y-1)}$ = Total energy generated using fuel m in the previous year of year under consideration.

The year prior to the year of generation is taken because ex-post option is chosen and the data would be available only 6 months after the year is complete, adopted as per guidance in " Tools to calculate the emission factor for an electricity system."

The feasibility study for the compost plant indicates that the total electric power consumption by the plant is only for lighting operations. The power requirement would be a maximum of _____kW on average for 8 hrs per day for 365 days per year. This is equivalent to an electricity consumption of _____MWh per annum.

The following data is therefore used to calculate the emissions associated with consumption of electricity in the plant.

Table B.5.2-2. Data used for the ex-ante calculation of $PE_{electricity,y}$

Parameter	Value
$MWh_{e,y}$	2009: _____ MWh 2009 onwards: _____ MWh
CEF_{elec}	0.14 tCO2/MWh
$PE_{electricity,y}$	2009: _____ tCO_2e/yr 2009 onwards: _____ tCO_2e/yr

$\mathbf{PE_{fuel,onsite,y}} = F_{cons,y} * EF_{fuel}$ **(5)**

The estimated fuel consumption for front end loaders for the composting operation is estimated at _____litres diesel fuel per year.

With an emission factor of 2.727 kgCO2/litre (refer to the PoA-DD), the emissions from fuel is estimated to be _____ tCO2/Year.

$PE_{fuel,onsite,y}$ = _____ l/year x 2.727 kgCO2/litre = _____tCO2/year

Table B.5.2-3. Data used for the ex-ante calculation of $PE_{fuel\ onsite,y}$

Parameter	Value
$F_{cons,y}$	_____ litres
EF_{fuel}	2.727 kg CO2/ litre
$PE_{fuel,onsite,y}$	_____ tCO_2e/yr

3. Project emission from methane emission from composting operations

Emissions from the composting process is calculated using the following formula.

$$\mathbf{PE_{y,comp}} = Q_y * EF_{composting} * GWP_{CH4} \quad \textbf{(6)}$$

Where**,**

$EF_{composting}$ is the methane emission factor of composting waste taken at 4 kg methane / ton wet waste.

The following data is used to calculate the emissions.

Table B.5.2.4 Data used for the ex-ante calculation of $PE_{compost,y}$

Parameter	Value
Q_y	_____[5]
$EF_{composting}$	4kg / ton
GWP_{CH4}	21
$\mathbf{PE_{y,comp.}}$	_____ tCO_2 e / year

4. Project emission from runoff from composting operations

Methane emissions from runoff water is calculated using the following formula.

$$\mathbf{PE_{y,runoff}} = Q_{y,ww,runoff} * COD_{y,ww,runoff} * B_{o,ww} * MCF_{ww,\,treatment} * UF_b * GWP_{CH4} \quad \textbf{(7)}$$

Where,

$Q_{y,ww,runoff}$ = Volume of run off water in year y (m^3)
$COD_{y,ww,runoff}$ =Chemical Oxygen demand of run off water leaving the composting facility in year y (gm / m^3)
$B_{o,ww}$ Methane producing capacity of waste water taken at IPCC default value of 0.25 kg . kg COD
$MCF_{ww,\,treatment}$ Methane Correction water for waste water treatment plant as per table III F.1 in the methodology III.F/Version 06
UF_b Model correction factor to account for uncertainities default of 1.06

[5] Total quantity of waste brought to the facility is _____ tons/year. Adjusting for the amount of inerts present in the incoming waste, which is assumed to be _____, the total quantity of organic waste (responsible for methane emissions) is calculated to be _____ tons/year.

GWP_{CH4} Global Warming Potential (GWP) of methane, valid for the relevant commitment period, taken at 21 for the first commitment period of Kyoto protocol.

The following data is used to calculate methane emissions from runoff water.

Table B.5.2.4 Data used for the ex-ante calculation of $PE_{runoff,y}$

Parameter	Value
$Q_{y,ww,runoff}$	_____ M3
$COD_{y,ww,runoff}$	_____ gm/M3
$B_{o,ww}$	0.25 kg / kg COD
$MCF_{ww, treatment}$	0.3
UF_b	1.06
GWP_{CH4}	21
$PE_{y,comp.}$	_____ tCO_2e / year

5. Project emission from landfill of residual of composting operations

The emissions from landfill of residuals from composting activity **$PE_{y,reswaste}$** are calculated using the equation

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot \left(1-e^{-k_j}\right)$$

The quantity of waste and the composition of waste in the above equation correspond to the residual waste. Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (Version 04) is used.

Compost and inert materials are the two types of residual wastes expected to be generated in the project activity. Only the inert materials will be disposed off in the landfill once in 3 days, which would not lead to any methane emissions unlike disposal of sludge and compost in the landfill. Compost produced in the plant is not intended to be disposed off in the landfill. If needed, compost may be sold at a low or no price in the initial years when the market is still being developed. Therefore emissions associated with anaerobic storage/disposal of residual waste is mostly not applicable. However provisions have been made to analyse and monitor the type of residual wastes that would be disposed off at the landfill and calculate the emissions if relevant.

The following data are used to calculate emissions from landfilling of residual organic wastes.

Table B.5.2-5. Ex-ante waste composition

Waste Type	**%**
Wood and wood products	
Pulp, paper and cardboard (other than sludge)	
Food, food waste beverages and tobacco (other than sludge)	
Textiles	

Garden, yard and park waste	
Glass, plastic, metal, other inert waste	

Table B.5.2-6. Parameters values used to calculate ex-ante baseline emissions

Parameter	Value
Φ	0.9
F	0
GWP_{CH4}	21
OX	0
F	0.5
DOC_f	0.5
MCF	0.8
DOCj: Wood and wood products	43
DOCj: Pulp, paper and cardboard (other than sludge)	40
DOCj: Food, food waste beverages and tobacco (other than sludge)	15
DOCj: Garden, yard and park waste	20
k - Pulp, paper and cardboard (other than sludge), textiles	0.07
k - Wood and wood products	0.035
k - Other (non-food) organic putrescible garden and park waste	0.17
k - Food, food waste, beverages and tobacco (other than sludge)	0.4

Table B.5.2-7. Ex-ante estimates of emissions from landfilling of residual organic wastes

Year	**Baseline emissions (tCO_2e/yr)**
2009	0
2010	
2011	
2012	
2013	
2014	
2015	

6. Summary of ex ante Project emissions

Table B.5.2-4. Summary of ex ante project emissions in the first crediting period

Year	**$PEy_{,transp}$**	**$PE_{y,power}$**	**$PE_{y,comp}$**	**$PE_{y,runoff}$**	**$PE_{y,reswaste}$**	**Total**
2009						
2010						
2011						
2012						
2013						

2014						
2015						
The first crediting period of 7 years						

Baseline Emissions:

There is no waste water co composting, no electricity or thermal energy consumed at the site in the absence of the project activity and finally no methane which requires to be captured and combusted. The baseline emissions for the composting activity are calculated using the following equation..

$$BE_y = BE_{CH4,SWDS,y} - (MD_{y,reg} * GWP\_CH_4) + (MEP_{y,ww} * GWP\_CH_4) \quad \textbf{(8)}$$

where:

BE_y is the baseline emissions in year y (tCO2e)

BECH4,SWDS,y yearly methane generation potential of the solid waste composted by the project during the years "x" from the beginning of the project activity (x=1) up to the year "y" estimated as described in "Tool to determine methane emissions avoided from disposal of waste at solid waste disposal site version 4".

$MEP_{y,ww}$ Methane emission potential in the year *y* of the wastewater co-composted. The value of this term is zero as co-composting of wastewater is not included in the project activity (tonne)

$MD_{reg,y}$ methane emissions that would be captured and destroyed to comply with national or local safety requirement or legal regulations in the year "y" (tCO_2e). In Uganda there is no requirement or regulation to capture and destroy methane and this value is zero and not considered further.

GWP_{CH4} Global Warming Potential (GWP) of methane, valid for the relevant commitment period, taken at 21 for the first commitment period of Kyoto protocol.

Thus the above equation reduces to :

$$\mathbf{BE_y = BE_{CH4,SWDS,y}} \quad \textbf{(9)}$$

Where

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1 - e^{-k_j}\right)$$

where:

φ = Model correction factor (default 0.9) to correct for the model-uncertainties

f = Fraction of methane captured at the SWDS and flared, combusted or used in another manner.

GWP_{CH4} = Global Warming Potential (GWP) of methane, valid for the relevant commitment period

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) (0.5)
DOC_j = Fraction of degradable organic carbon (by weight) in the waste type j
MCF = Methane Correction Factor (fraction)
$W_{j,x}$ = Amount of organic waste type j prevented from disposal in the SWDS in the year x (tonnes/year)
DOC_f = Fraction of degradable organic carbon that can decompose
k_j = Decay rate for the waste stream type j
j = Waste type category (index).
x = Year during the crediting period: x runs from the first year of the first crediting period (x=1) to the year y for which avoided emissions are calculated (x=y)
y = Year for which methane emissions are calculated

Where different waste types *j* are prevented from disposal, determine the amount of different waste types
($W_{j,x}$) through sampling and calculate the mean from the samples, as follows:

$$W_{j,x} = W_x \cdot \frac{\sum_{n=1}^{z} p_{n,j,x}}{z} \quad \textbf{(10)}$$

where:
$W_{j,x}$ = Amount of organic waste type j prevented from disposal in the year x (tonnes)
W_x = Total amount of organic waste prevented from disposal in the year x (tonnes/year)
$p_{n,j,x}$ = Weight fraction of the waste type j in the sample n collected during the year x
z = Number of samples taken during the year x

The percentage of organic waste type *j* prevented from disposal are shown in Table B.5.2.5, the other parameter values used are shown in Table B.5.2.6. The calculated results are shown in Table B.5.2.7. The actual quantity of organic waste will be monitored according to the Monitoring Methodology for *ex-post* CER calculations.

Table B.5.2-5. Ex-ante waste composition

Waste Type	**%**
Wood and wood products	
Pulp, paper and cardboard (other than sludge)	
Food, food waste beverages and tobacco (other than sludge)	
Textiles	
Garden, yard and park waste	
Glass, plastic, metal, other inert waste	

Table B.5.2-6. Parameters values used to calculate ex-ante baseline emissions

Parameter	Value
Φ	0.9

F	0
GWP_{CH4}	21
OX	0
F	0.5
DOC_f	0.5
MCF	0.8
DOCj: Wood and wood products	43
DOCj: Pulp, paper and cardboard (other than sludge)	40
DOCj: Food, food waste beverages and tobacco (other than sludge)	15
DOCj: Garden, yard and park waste	20
k - Pulp, paper and cardboard (other than sludge), textiles	0.07
k - Wood and wood products	0.035
k - Other (non-food) organic putrescible garden and park waste	0.17
k - Food, food waste, beverages and tobacco (other than sludge)	0.4

Table B.5.2-7. Ex-ante estimates of baseline emissions

Year	**Baseline emissions (tCO_2e/yr)**
2009	
2010	
2011	
2012	
2013	
2014	
2015	
The first crediting period of 7 years	

Leakage:

There is no leakage.

B.5.3. Summary of the ex-ante estimation of emission reductions:

>>

Year	**Estimation of project activity emissions (tonnes of CO_2 e)**	**Estimation of baseline emissions (tonnes of CO_2 e)**	**Estimation of leakage (tonnes of CO_2 e)**	**Estimation of overall emission reductions (tonnes of CO_2 e)**
2009				
2010				
2011				
2012				
2013				
2014				

2015				
The first crediting period of 7 years. .				

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

The Monitoring Plan as described in section E.7 of the the Uganda Municipal Waste Composting PoA-DD, under which this CPA is being proposed, will be followed.

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

Environmental analysis has been carried for the _____ CPA. The outcomes of the EIA study is summarized in section C.2.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Uganda has a well established set of environment legislation developed along with the National Environment Action Program (NEAP) since 1991. The main acts governing the environment in the waste management activity is the National Environment act 1995 and the Water act 1997. The rules governing the activities are The EIA regulation 1998, The National Environment (waste Management) Regulation 1999, The National (wetlands, river banks and lake shore) regulation 2000. The National Environment (Noise standards and Control) regulations 2003 would also be applicable. There are no district level environmental regulations. The management of environment is supported through the various institutions and mechanisms at the country, district and local levels.

All project have to seek and obtain a clearance under the relevant provision of the environment act an the water act. An EIA has to be undertaken and approved prior to commencement of the project. The EIA would identify the impacts and the potential management requirements which are incorporated into the project execution.

An Environmental impact assessments for the proposed waste composting plant at _____ in _____ division of _____ municipal council has been carried out. The assessment identifies the following as the potential environmental impact due to the waste management activities:

- contamination of water sources by leachate,
- emission of odorous smell,
- vermin infestation,
- Occupational health and safety for workers,
- noise and dust generation from trucks transporting the waste, and

- likely accidents during transportation.

No trans-boundary impacts have been identified.

The following environment management measures have been proposed to mitigate the impacts identified.

- Construction and maintenance of an access road for transportation of waste to the site.
- Plantation of trees and appropriate vegetation around the site.
- Restriction of access to the site to ensure that the waste composting and disposal activities at the site are not interfered with by activities in the surroundings and vice-versa.
- Re-circulation of leachate to the extent possible and use of the same in the composting activities.
- Putting in place a leachate handling facility to manage leachate from the waste composting process and ensure that the effluent discharges conform to the National Environment (Standards for Discharge of the Effluent into Water or on Land) Regulations, 1999.
- Encouraging the separate collection of plastic mineral water bottles, other recyclable plastics and materials in the Municipality for recycling purposes.
- Undertaking community awareness about the project activities so that there is appreciation of the project and support of the project objectives, activities and outputs.
- Integrating the existing scavengers on site into the waste composting activities.
- Controlling rodents, pests and disease vectors at the waste dumpsite and the surroundings.
- Ensuring that persons working under the direction of _____ Municipal Council comply with the national environment laws and that they manage waste in a manner that does not cause ill heath to the persons or damage the environment.
- Ensuring that any undesirable environmental impacts that could result out of implementing the project are mitigated.

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

Yes and environmental Impact assessment is required for and the same has been carried for the site as per the Ugandan laws and regulations.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☐ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

The stakeholder consultation is undertaken at the PoA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

D.3. Summary of the comments received:

>>

D.4. Report on how due account was taken of any comments received:

>>

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	_____
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Cp;pountry:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	_____
Personal E-Mail:	_____

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The Program of Activity is partly financed through the IDA Credit to Uganda for the project "Environment Management and Capacity Building Project-II". The DOE will be provided with the evidence that the same IDA money is not being used for purchasing emission reductions.

Annex 3

BASELINE INFORMATION

A. The Mean annual Precipitation data for _____over last 10 years is presented below.

S.NO	Year	Mean annual Rainfall (mm)
1	1998	
2	1999	
3	2000	
4	2001	
5	2002	
6	2003	
7	2004	
8	2005	
9	2006	
10	2007	

B. The Mean annual Temperature data for _____ is presented below.

S.NO	Month	Mean temperature (^{o}C)
1	January	
2	February	
3	March	
4	April	
5	May	
6	June	
7	July	
8	August	
9	September	
10	October	
11	November	
12	December	
	Annual average	

C. CO2 Emission Factor of the Grid.

The CO2 emission factor of the grid has been calculated using the weighted average method calculation as per the AMS ID using the following formula. This would be done every year and used for calculating project emission due to electricity use.

$CEFelec = \Sigma EG_{m,y-1} \times EF_m / \Sigma EG_m$

Where

EGm,y-1 Expressed in MWh is the energy generated in year prior to consideration by the fuel type m in the National Grid. This data would be obtained from Uganda Electricity Transmission Company Limited.

EFm Expressed in TCO2 / MWh is the emission factor of the fuel type m

m type of the fuel used.

Where

$EFm = EF\ fuel \times 3.6 / \eta m / 1000000$

EF fuelm expressed in kg CO2 / TJ is the default emission factor of the specific fuel value as per IPCC 2006.
EF fuel diesel = 74100 kg CO2 / TJ
EF fuel heavy fuel oil = 77400 kg CO2 / TJ

ηm is the efficiency of the fuel generating station and for station set up after 2000 the default value as per IPCC 2006 is 39.5 %

Data used

EGm This data is sourced from the Uganda Electricity Transmission Company limited. For the ex ante calculation the data for the year 2006-07 is used. Uganda has Hydro and Diesel generation capacity and the same has been used.

EFm This data has been calculated for diesel and heavt fuel oil below using procedure described above. . The data for Hydro and Biomass is taken as 0 as per IPCC 2006 guidelines.

EF diesel = 0.68
EF heavy fuel oil = 0.71

S.No	Fuel Source	EG_m (MWh)	EF_m	$EG_m \times EF_m$	
1	Hydro	1009440	0	0	
2	Diesel	269096	0.68	182985.3	
3	Heavy Fuel Oil	0	0.71	0	
4	Biomass	0	0	0	
	Sum	1278536		182985.3	

CEF elec = Σ EG_m x EF_m / Σ EG_m = 0.14

Annex 4
MONITORING INFORMATION

Table 4.1 : Details of data to be collected in order to monitor emission from Programme activity

ID No.	Data variable	Data Source	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived (electronic/ paper)	For how long is archived data to be kept?	Comment
1.1	$F_{Cons.}$ (Fuel Consumption)	Fuel Purchase Records as the primary source of data..	Kilo litres	Measured or estimated	Monthly	100%	Paper	Crediting period + 2 years	Aggregated monthly & annually. Duration of operation of the equipments and their fuel rating may be used as alternative method.
1.2	$Q_{y,comp}$ (Compost Produced and Transported).	Compost Production and Sales Register.	M3	Estimated	Monthly	100%	Paper	Crediting period + 2 years	Based on records maintained at each facility
1.3	$CT_{y,comp}$ (Average Truck Capacity).	Production and Sales Register	Tons/ Truck	Estimated	Annually	100 %	Paper	Crediting period + 2 years	Averaged annually
1.4	DAF_{comp}	Compost Production	km	Estimated	Annually	100 %	paper	Crediting	Averaged annually

	(Average distance for compost transportation)	and Sales Register.						period + 2 years	
1.5	MWH_{ey} (Electricity consumed)	Meter Readings at the facility as primary source. The bills from the power utility may also be used as an alternative source.	MWH	Measured or estimated	Monthly	100 %	paper	Crediting period + 2 years	Aggregated annually
1.6	$CEF_{electricity}$ (CO2 emission factor of the grid)	Fuel wise electricity generation data from UETCL combined with fuel specific emission factors specified in the PDD.	tCO2/ MWh	Calculated	Annually	100%	paper	Crediting period + 2 years	Weighted average emission factor calculated for the grid.
1.7	$EG_{m,y-1}$ (Annual electricity generation from fuel type m)	Fuel wise electricity generation data from UETCL for the previous year.	MWh	Measured (by UETCL)	Annually	100%	paper	Crediting period + 2 years	Data reported by UETCL to be used

1.8	$W_{x,residual}$ (Quantity of residual organic waste landfilled)	Records at Compost Plant	M3	Estimated	Monthly	100 %	Paper	Crediting period + 2 years	Calculated using procedures similar to determination of quantity of incoming wastes
1.9	$P_{n,j,x,residual}$ (Weight fraction of waste type j in the residual waste)	Residual Waste Composition Analysis carried out once in a month	%	Measured	Monthly	One sample every month	Paper	Crediting period Plus 2 years	Measured using procedures similar to composition analysis of incoming waste
1.10	$Q_{y,ww,runoff}$ (Volume of runoff water)	Records at Compost Plant	M^3	Measured	Monthly	One sample in a month	paper	Crediting period Plus 2 years	
1.11	$COD_{y,ww,runoff}$ (COD of runoff water	COD Test Report	g/m^3	Measured	Monthly	One sample every month	paper	Crediting period Plus 2 years	Analysed at government recognised laboratory.

Table 4.2 :Details of data to be collected in order to monitor baseline emission from Programme activity

ID No.	Data variable	Data Source	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived (electronic/ paper)	For how long is archived data to be kept?	Comment

2.1	W_x (Total Quantity of organic waste prevented from disposal)	Incoming Waste Register	M3	Estimated	Monthly	100 %	Paper	Crediting period + 2 years	As the towns are small and managing weighbridge is expensive low cost method is proposed to have vehicle counting and skips (of known capacity) as the basis of estimate.
2.2	$P_{n,j,x}$ (Weight Fraction of waste type j in the incoming waste sample)	Waste Composition Analysis	%	Measured	Monthly	One sample every month	Paper	Crediting period Plus 2 years	Sampling as per the guidelines provided in the Tool "Tools to determine methane emissions avoided from disposal of wastes at a solid waste disposal site" version 04.
2.3	f (Fraction of Methane captured at the SWDS and flared , combusted or used in another manner)	Site Visits to SWDS sites	Fraction	Estimated	Annually	100%	Paper	Crediting period Plus 2 years	To be reported based on observations and discussions with SWDS operators
2.4	GWP_{CH4} (Global Warming Potential of Methane)	Decisions under UNFCCC and Kyoto Protocol	tCO2/tCH4	Estimated	Annually	100%	Paper	Crediting period Plus 2 years	To be reported based on UNFCCC decisions

Table 4.3 : Details of Procedures for data collection

No	Data	Procedure for collection	Physical process and calibration	Alternative data Source
3.1	Fuel Consumption	Fuel purchased for the plant shall be recorded on a monthly basis in the Purchase Register.	The fuel purchased by the operator shall be recorded.	The hours of operations of the turning equipment would be maintained and the fuel consumption per hour stated by manufacturer of equipment shall be used as reference.
3.2	Compost Produced and transported	The no. of trips/loads of compost taken out and the volume per trip will be recorded in the daily log, and the data will be reported on a monthly basis. Density of compost will be measured once in a month. The aggregated annual volume of compost taken out of the plant shall be multiplied with the average density of compost to calculate the quanity of compost transported out of the plant in tons..	The weighing scale to be used for weighing the compost for the purpose of determining the density shall be calibrated. The volume of compost used for the purpose of determining the density shall be measured using a standard 5 cft box. The volume of each types of carriers such as trucks and tractors used for transporting wastes shall be determined at least once by measuring the length breadth and depth of the carrier through a standard tape and kept as reference.	Compost produced can be estimated by applying a factor of 22% to the incoming waste (design parameter) for the purpose of cross checking.
	Average Truck Capacity	Total quantity of compost transported shall be divided by the total no. of trips to calculate the average truck capacity for the purpose of calculating transport related emissions.		Standard capacity of the carriers used for transporting compost can be collected by talking to the drivers of the carriers
3.3	Average distance for compost transportation	The destination and distance of transport for each trip/load of compost shall be recorded. The average distance shall be calculated by dividing the total		A data base of the large buyers could be maintained. As an alternative method, the average distance of transport could be determined by interviewing these

		distance by no. of trips/loads.		large buyers once in a year.
	Electricity consumed	Meter Readings at the facility as primary source.	Meters provided by UETCL are expected to have been calibrated.	The bills from the power utility may also be used as an alternative source.
	CO2 emission factor of the grid	Fuel wise electricity generation data from UETCL combined with fuel specific emission factors specified in the PDD shall be used to calculate the grid emission factor following the weighted average method.	NA	Published emission factors for Ugandan grid by the DNA or any other agency could be used as alternative source of data if available.
	Annual electricity generation from fuel type m	Fuel wise electricity generation data for the previous year shall be collected from UETCL. If available in UETCL's annual report the same should be used. .	NA	NA
3.4	Quantity of residual organic waste landfilled	No. of trips and volume per trip of residual waste will be recorded in the daily log. The data will be compiled and reported on a monthly basis. Density will be measured once a month. The aggregated annual volume will be multiplied with the average density to calculate the quantity of residual organic waste landfilled in tons.	Daily data log will be maintained.	The percentage of inerts present in the waste can be used as a proxy to determine the quantity of residual waste transported to the landfill for the purpose of crosschecking..
3.6	Weight fraction of waste type j in the	Composition analysis would be carried out for the residual waste once in a	ASTM 5231-92 (reapproved 2003) would be used.	NA

	residual waste	month by a contracted laboratory.		
	Volume of runoff water	Leachate accumulated in the tank over a period of 24 hours shall be calculated (on volume basis) with measurements for the area of the tank and the depth of leachate accumulated in the tank using standard measuring scales and tapes. For this purpose, the tank would need to be emptied before starting the observation. The measurements will be carried out once in a month and the average leachate generation rate (m3/day) shall be converted to annual leachate generation.	Standard measuring scales and tapes to be used.	NA
	COD of runoff water	Analytical technique for COD measurement to be used by a contracted lab. Samples to be taken once in a month.	Only recognised/certified labs to be used.	NA
	Total Quantity of organic waste prevented from disposal	No. of trips and volume of each trip for different waste carriers (trucks/tractors/skips) will be recorded in the daily log. The data will be compiled and reported on a monthly basis. Density of waste shall be measured once in a month. The aggregated annual volume will be multiplied with the average density to calculate the total quantity in tons.	Calibrated weighing scales shall be used for measuring the weight of a given volume of waste for the purpose of calculating the density.	Weights of different types of vehicles with and without waste can be measured once in a year and the no. of trips recorded in the register can be used as an alternative method of calculation.

	Weight Fraction of waste type j in the incoming waste sample	Standard procedures for determining the waste composition shall be used. The composition of incoming waste will be determined by sampling and analysis. Samples will be taken once in a month, which translates to 12 samples in a year. The average composition will be used in all calculations	ASTM 5231-92 (reapproved 2003) would be used.	NA
	Fraction of Methane captured at the SWDS and flared , combusted or used in another manner	To be reported based on observations and discussions with SWDS operators	NA	Use 0 as the default
	Global Warming Potential of Methane	As per the decisions under UNFCCC and Kyoto Protocol	NA	Use standard value of 21 tCO2/tCH4
3.7	Common Practice Analysis report	New solid waste management projects being taken up in smaller municipalities of Uganda will be tracked to check if methane avoidance projects such as landfills with LFG capture and flare, composting and biomethanation are becoming common without the support of CDM. Otherwise disposal of waste at the landfills without LFG capture will be accepted as the common practice.	NA	Discussion with NEMA that provides environmental clearance to solid waste management projects could provide the required information. District State of Environment reports may be used for data on solid waste management
3.8	Aerobic Condition during Composting	Oxygen availability in the aerated piles will be monitored on a sample basis (once in a month) using standard	Standard acceptable methods will be used.	NA

		methods, such as use of oxygen meters.		
3.9	Aerobic conditions in compost use	A sample survey of the users to be carried out. A record of the purchasers of compost would be maintained and a random sampling would be done and the use assessed	Based on discussions and observations.	NA

- - - -