CDM – Executive Board

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

CONTENTS

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 Solid Waste (MSW) composting project for Hung Yen City
Version: 1.01
Date: February 28th 2011

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

>>
This CPA is being proposed under the Vietnam MSW composting PoA and represents the MSW composting activity in Hung Yen city, Hung Yen province of Social republic of Vietnam. The CPA implemented as per the same implementation framework as described in the Vietnam MSW composting PoA-DD.

MSW management is an important responsibility of Hung Yen city people's committee (PC) which is the local administrative authority. MSW collected in Hung Yen city is primarily land filled in sanitary landfill, as result of which significant amount of methane is emitted to them atmosphere. The purpose of this CPA is to avoid such methane emissions by processing the organic fractions of the waste (which are reason of the methane emissions from the landfill site) aerobically in a composting facility. This CPA proposes to set up an aerobic composting facility in Hung Yen city for processing the MSW in an environmentally friendly and sustainable way. The project would also generate local employment.

It is proposed to handle 50 tons of MSW per day or 18,250 tons of MSW per annum at the composting facility. About 3,650 tons of compost product would be generated per annum resulting in an average of about 7,535 t CO2e per year of emission reduction for the first 7 year crediting period.

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

>> Here the information on the entity/individual responsible of the CPA shall be included, hence forth referred to as CPA implementer(s). CPA implementers can be project participants of the PoA, under which the CPA is submitted, provided their name is included in the registered PoA.

General Manager of Business Innovation Division, Ichikawa Kankyo Engineering Co., LTD (IKE)

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 Hung Yen city of Vietnam.

A.4.1.1. Host Party:

>>
Social republic of Vietnam

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

>>Geographic reference or other means of identification[3], Name/contact details of the entity/individual responsible for the CPA, e.g. in case of stationary CPA geographic reference, in case of mobile CPAs means such as registration number, GPS devices.

Table A.4.1 Identification of CPA

Component	Details
Name of City	**Hung Yen City**
Type of City	Thanh Pho (City under Province level)
Latitude and longitude of composting plant	N20° 41'9" / E106° 04'08"
District	DB Song Hong (Red River Area, North VN)
Nearest airport	Noi Bai International Airport (Hanoi)

Vietnam is located in the east coast of Indo-China peninsula and next to Cambodia, Lao and south end of China. The map is showing the location of Vietnam. **Hung Yen city** is located in **Hung Yen province** which is located in **Northern** part of Vietnam. It is about **60** km far in **south east** direction of capitol city of Hanoi. The composting facility is located in the **middle of three** districts **(Bao Khe, An Tao, Trung Nghia)** of **Hung Yen city**. The latitude is **E106° 04'08"** , and the longitude is **N20° 41'9"** .
CPA will be constructed next to the present landfill site, which no incremental transportation of waste will occur in this CPA.

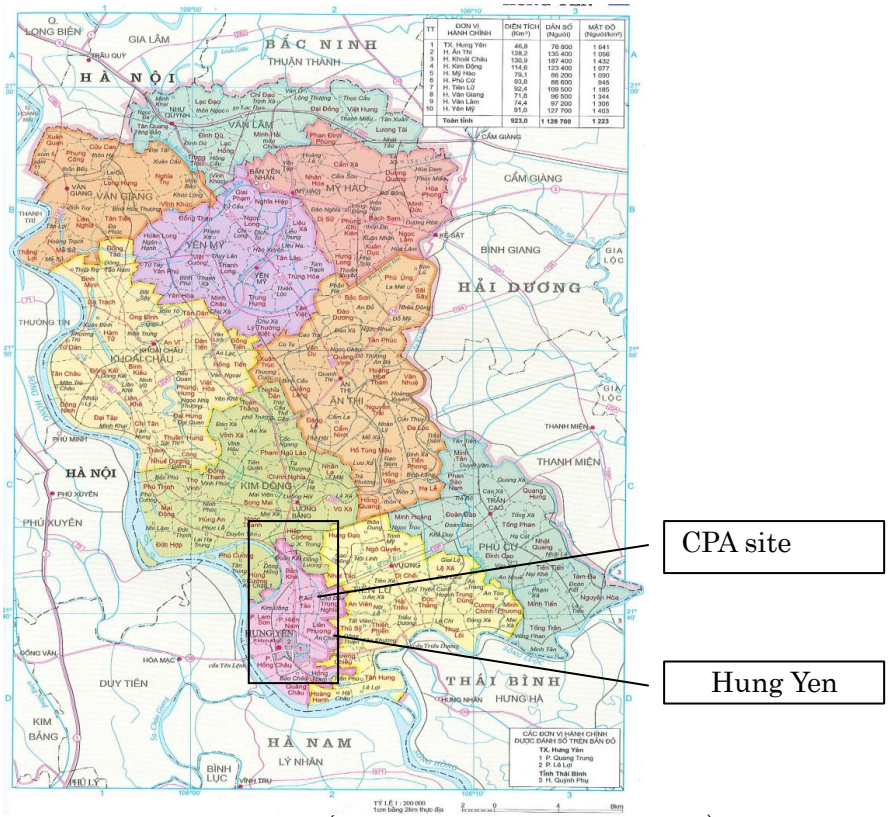

Figure A.4.1 Map of CPA location (Hung Yen Province, Vietnam)

[3] E.g. in case of stationary CPA geographic reference, in case of mobile CPAs means such as registration number, GPS devices.

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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 composting plant)

DD/MM/YY

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

>>
The lifetime as CDM project is 15 years. (The activity itself would have a life span of 50 years, based on land lease contract between the project implementer and Hung Yen Province People's Committee.)

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

Renewable crediting period; 7 years x 2 = 14 years

(i)

A.4.3.1. Starting date of the crediting period:

>>
DD/MM/YY (completion of construction) or 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:

>>

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.

7 years

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

>>
52,739 t CO2e (over the first crediting period of 7 years)

A.4.5. Public funding of the CPA:

>>
No public fund is expected for this CPA.

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

>>

1. For the purposes of registration of a Programme of Activities (PoA)[4] a proposed small-scale CPA of a PoA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity[5], which:

[4] Only those POAs need to be considered in determining de-bundling that are: (i) in the same geographical area; and (ii) use the same methodology; as the POA to which proposed CPA is being added

(a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same sectoral scope, and;

(b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

2. If a proposed small-scale CPA of a PoA is deemed to be a debundled component in accordance with paragraph 2 above, but the total size of such a CPA combined with a registered small-scale CPA of a PoA or a registered CDM project activity does not exceed the limits for small-scale CDM and small-scale A/R project activities as set out in Annex II of the decision 4/CMP.1 and 5/CMP.1 respectively, the CPA of a PoA can qualify to use simplified modalities and procedures for small-scale CDM and small-scale A/R CDM project activities.

Similar projects do not exist in the geographical boundary of **Hung Yen city**. This is the first such project in **Hung Yen city**. The CPA implementer which is **IKE** in this case, has neither been involved in any other PoA of the same sectoral scope, nor have the assumed the role of any CME.

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

The cooperation agreement signed between **Hung Yen city PC**, CPA implementer **(IKE)** and VUREIA (CME) confirms that the proposed **Hung Yen city** CPA project is not included in any other CDM program of activities or CDM project activities. Further, the Vietnam MSW composting program is the first PoA in Vietnam 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 Cooperation agreement and subsequent amendments to the cooperation agreements signed between VUREIA, CPA implementer **(IKE)**, and **Hung Yen City PC** confirm the above statement. The **Hung Yen City PC** has signed a declaration that the composting facility which will implemented by **IKE** and will be located in their geographical boundary is neither the 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:

>>

[5] Which may be a (i) registered small-scale CPA of a PoA, (ii) an application to register another small-scale CPA of a PoA or (iii) another registered CDM project activity

Vietnam MSW composting programme. This CPA is part of the request for registration of the above mentioned PoA.

The CPA implementer is basically responsible and has rights on all business activities within the CPA boundary but necessary to accept following conditions;

- The CPA implementer has responsibility to submit operation and monitoring information to CME based on 4 party agreement
- The CPA implementer also accepts the support and direction in operation management of composting production from IKE, based on cooperation agreement concluded between CPA owner, Local administrative body and IKE.

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.

TableB.1.1 Eligibility criteria and CPA's compliance

	Eligibility criteria as defined in the PoA	CPA's compliance with the eligibility criteria
1	The CPA would be located in the local administrative body under provincial level and/or cities directly under central government of Vietnam. Only one CPA can belong to one local administrative body.	The CPA is located in one of the city (Hung Yen City) under Hung Yen Province in Vietnam, and there are no other CPA existing in the city.
2	The local administrative body should be able to provide a land and infrastructure for the CPA facility.	Hung Yen city PC has designated land for waste processing and disposal. The composting facility proposed in the CPA is planned to be located at the same designated land.
3	The local administrative body, CPA implementer, VUREIA and IKE shall sign a cooperation agreement in order to; - Participate to the program including transferring all the emission reduction rights to VUREIA, - Have CPA implementer to operate the facility in good manners by evaluation from IKE.	(Not Yet signed)
4	The local administrative body shall sign a cooperation agreement with CPA implementer on delivering MSW to the composting facility, pay agreed MSW treatment fee, accept residues (in some case, compost product) discharged from the composting facility to landfill site operated by the local administrative body.	(Not Yet signed)
5	"Investment Report", which is necessary to start investment activities under the	The project has not provided investment report yet.

	Vietnam law is not yet approved by the provincial/ cities directly under central government level nor the local administrative body level on the proposed CPA project.	

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

>>

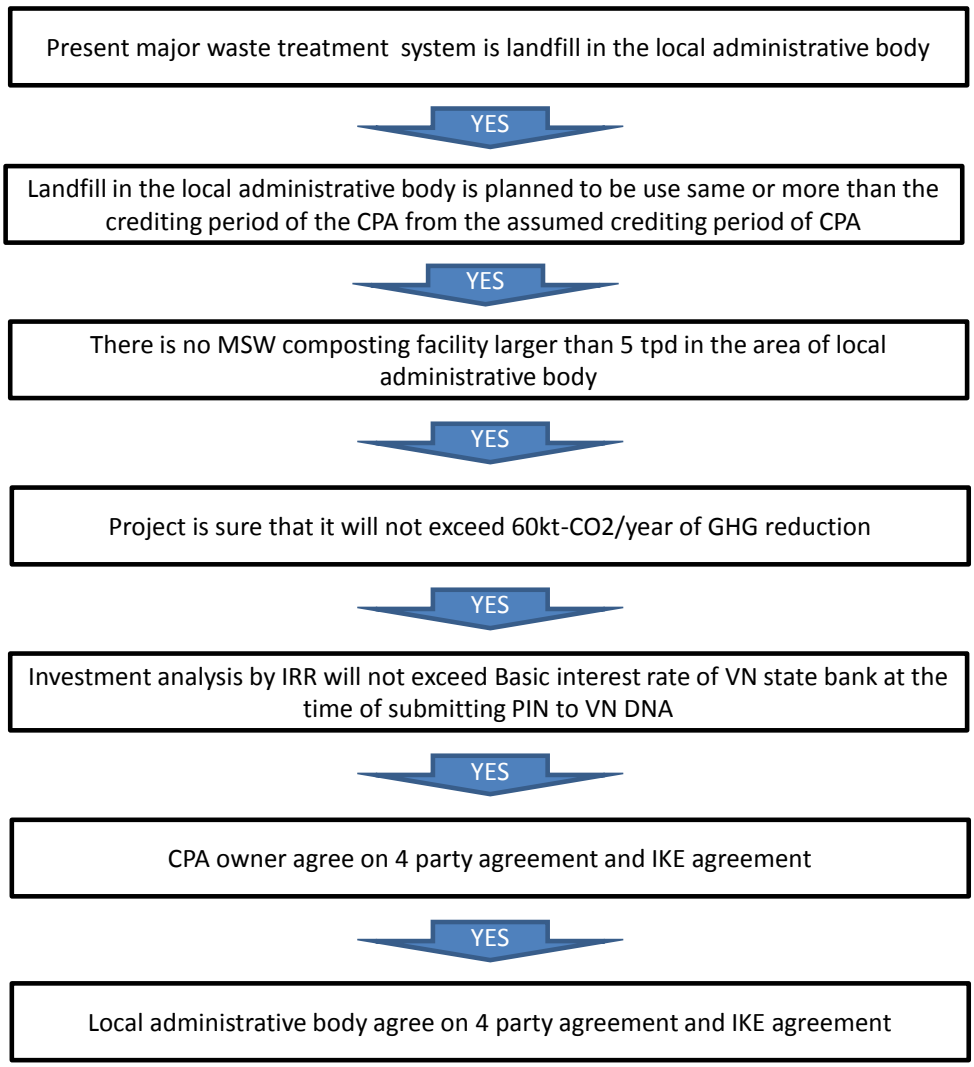
Table B.3.1 Eligibility criteria and Situation in proposed CPA

	Eligibility criteria as per PoA	Situation in **Hung Yen city**
1	There should not be any existing composting operations of capacity greater than 5tons per day (input amount) of MSW handled per day in the local administrative body geographical boundary where the proposed CPA will be located in.	There is no other composting facility greater than 5 tons per day in **Hung Yen city**.
2	The common practice for MSW disposal in the geographical boundary of local administrative body should be disposal of MSW at landfill sites.	Landfill is the only treatment method for MSW which is not able to be recycled in **Hung Yen city**.
3	The financial analysis of composting operations should prove the Programme to be unviable without carbon revenues, if the facility is designed for a different capacity than the standard 50tpd considered in the program.	IRR during the first crediting period (7years) will be **12.12%** with CER sales, comparing to **3.73%** without CER. Benchmark (Base interest rate, State Bank of Vietnam) is 9.75%*.

*…Source: State Bank of Vietnam, http://www.sbv.gov.vn/en/

<Barrier analysis of CPA>

If the CPA passes the above barrier analysis, CPA is proved to be additional.



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.

>>

Hung Yen city is located within the geographical boundary of Vietnam, which is the boundary of PoA. MSW that would have otherwise been, within Hung Yen city area, in the absence of the CDM project, will be composted and the compost product will be used within Vietnam and the rejects will be disposed of at the landfill located adjacent to the composting facility site in Hung Yen city. The CPA is thus located within the geographical boundary of the PoA. There is only one set of regulation pertaining to MSW management that applies across Vietnam (Decree No.59/2007/NĐ-CP). The CPA boundary includes the physical boundary of the composting facility, landfill site and the transportation of the recyclables (compost, others) to the buyer/user. Incremental transportation of MSW will **not** be included in this CPA case. Gases and sources relevant to the project are listed below.

Table B.4.1 Gases and sources relevant to the project

	Source	Gas		Justification/Explanation
Baseline	Emissions from decomposition of waste at the landfillsite	CH4	Included	The major source of emissions in the baseline
		N2O	Excluded	N2O emissions are small compared to CH4 emissions from landfills. Exclusion of the gas is conservative.
		CO2	Excluded	CO2 emissions from decomposition of organic waste are not accounted
	Emissions from electricity consumption	CO2 N2O CH4	Excluded	Electricity is not consumed or generated in the baseline scenario
	Emissions from thermal energy generation	CO2 N2O CH4	Excluded	Thermal energy is not consumed or generated in the baseline scenario
Project activity	Fossil fuel consumption due to the CPA activity	CO2	Included	May be an important emission source
		CH4	Excluded	Excluded for simplification. The emission source is assumed to be very small
		N2O	Excluded	Excluded for simplification. The emission source is assumed to be very small
	Emissions from on-site electricity use	CO2	Included	May be an important emission source
		CH4	Excluded	Excluded for simplification. The emission source is assumed to be very small
		N2O	Excluded	Excluded for simplification. The emission source is assumed to be very small
	Direct emissions from the waste treatment process	CO2	Excluded	CO2 emissions from decomposition of organic waste are not accounted
		CH4	Included	Included for composting, run off and residual disposal processes.
		N2O	Excluded	Excluded as the activity is a small scale

B.5. Emission reductions:

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

>>

Parameters related to Project emission

(Copy this table for each data and parameter)

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 Aquarium science and technology journal no.01/2008 of Nha Trang University IEA Energy statistics, 2004
Value applied:	0.455
Justification of the choice of data or	Default CO2 emission factor for diesel used in road transportation is 74,100 kg CO2/TJ.

description of measurement methods and procedures actually applied :	Calorific value of diesel used in Vietnam is 10,478kcal/kg (or 43.8Mj/kg) and weighted average density of diesel oil is 839.7g/Litre, which means 36.78Mj/Litre. The above data results in emission coefficient of 2.73 kgCO2/litre for diesel considering an average efficiency of transport vehicle as 6 km/litre, the emission factor will be 0.455kgCO2/km.
Any comment:	

Data / Parameter:	**EF fuel**
Data unit:	kg CO2 / litre
Description:	Emission factor for diesel used in on-site vehicles
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Aquarium science and technology journal no.01/2008 of Nha Trang University IEA Energy statistics, 2004
Value applied:	2.73
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default CO2 emission factor for diesel used in road transportation is 74,100 kg CO2/TJ. Calorific value of diesel used in Vietnam is 10,478kcal/kg (or 43.8Mj/kg) and weighted average density of diesel oil is 839.7g/Litre, which means 36.78Mj/Litre. The above data results in emission coefficient of 2.73 kgCO2/litre for diesel oil.
Any comment:	

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	tCO_2e/MWh
Description:	Carbon emission factor of electricity in Vietnam
Source of data used:	Official sources
Value applied:	**0.58015** See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**EF m, ipcc2006**
Data unit:	kg CO2/TJ
Description:	Emission factor of diesel fuel Emission factor for heavy oil
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Diesel: 74,100 kgCO2/TJ Heavy Oil: 77,400kg CO2/TJ
Justification of the choice of data or description of measurement methods and	

procedures actually applied :	
Any comment:	

Data / Parameter:	EF composting
Data unit:	Kg CH4/ ton waste
Description:	Methane emission per ton wet waste composted
Source of data used:	table 4.1, chapter 4, Volume 5,2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	4kg/ton wet waste
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	B o, ww
Data unit:	Kg methane / kg COD
Description:	Methane producing capacity of waste water
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.25
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	MCF ww, treatment
Data unit:	Factor
Description:	Methane correction factor for waste water treatment plant
Source of data used:	As per table III.H.1 of AMS III.H
Value applied:	0.2
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 the 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 "Anaerobic shallow lagoon (depth less than 2 meters)"is adopted.
Any comment:	
Monitoring frequency	Anually check if any run off exists.

Data / Parameter:	UF b

Data unit:	Factor
Description:	Model correction factor to account for uncertainties
Source of data used:	AMS III.F Version 9
Value applied:	1.12
Justification of the choice of data or description of measurement methods and procedures actually applied :	
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 emissions avoided from disposal of waste at a solid waste disposal site (version 05)
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**OX**
Data unit:	Factor
Description:	Oxidation factor
Source of data used:	Tool to determine emissions avoided from disposal of waste at a solid waste disposal site (version 05)
Value applied:	0.1
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 MSW disposal site in order to assess the type of covering method and materials. Use IPCC 2006 guidelines for national greenhouse gas inventories for the choice of value to be applied. 2) Use 0.1 for managed MSW disposal site that are covered with oxidizing material such as soil or compost, Use 0 for other materials.
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 emissions avoided from disposal of waste at a solid waste disposal site (version 05)
Value applied:	0.5

Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**DOC f**
Data unit:	Factor
Description:	The fraction of DOC that can decompose
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories and "Tool to determine emissions avoided from disposal of waste at a solid waste disposal site (version 05)"
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**MCF**
Data unit:	Factor
Description:	Methane correction factor
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	1.0
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 (waste directed to specific decomposition 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; (iii) levelling of the waste. - 0.8: for unmanaged MSW 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. - 0.5: for semi aerobic managed MSW 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 pndage; (iv) gas ventilation system. - 0.4: for unmanaged shallow MSW disposal sites. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5meters.
Any comment:	

Data / Parameter:	DOC j
Data unit:	%
Description:	Percent of degradeable organic carbon (by weight) in the waste type j
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories (volume 5 table 2.4 and 2.5)
Value applied:	

Waste type	DOC (%)
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 choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	kj
Data unit:	Factor
Description:	Decay rate of the waste stream type j
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories (volume 5 table 3.3)
Value applied:	

Waste type		kj (%) MAT>20Celsius MAP>1000mm
Slowly degrading	Pulp, paper and cardboard (other than sludge), textiles	0.07
	Wood and wood products	0.035
Moderately degrading	Other (non-food) organic	0.17
Rapidly degrading	Food, food waste, beverages and tobacco (other than sludge)	0.4

Justification of the choice of data or description of measurement methods and	MAT for **Hung Yen** city is 24.18 C (2009) MAP for **Hung Yen** city is 1,564 mm (2009)

procedures actually applied :	
Any comment:	

Data / Parameter:	**Solid waste composition (percentage of waste type *j*)**
Data unit:	
Description:	
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 2.3) regional default values for South-Eastern Asia
Value applied:	Food: 43.5% Paper, cardboard: 12.9% Wood: 9.9% Textile: 2.7% Inorganic: 31.0%
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

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

>>

The emission reductions are calculated according to methodology AMS-III.F version 9 and "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site version 5", which are referred to the PoA-DD. The ex-ante calculation of emission reductions are completed with the following steps:

Project Emissions (PEy)

The project emissions in year y for each CPA will be calculated as below:

PEy = PE y, transp + PE y,power + PE y.comp + PE y, runoff + PE y,reswaste (1)

1. Emission due to incremental transport

Emission due to incremental transportation is calculated using the formula below:

PE y, transp = (Q y /CT y) * DAF w * EF co2 + (Q y,treatment / CT y,ttreatment) * DAF treatment *EF co2 (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 fossil fuel use due to transportation (kgCO2/km)

Q y,treatment Quantity of compost product produced in the year y (tonnes)
CT y,treatment Average truck capacity for compost product transportation (tonnes/truck)
DAF treatment Average distance for compost product transportation (km/truck)

IPCC default values will be used for the net calorific value and CO2 emission factor for diesel fuel.
CPA facility will be constructed adjacent to the present landfill site, so the incremental transportation of raw waste is not considered for this CPA project (DAFw=0).
The estimated fuel consumption for transportation of compost is estimated here. The compost production is estimated 20 % of the input waste. All the compost will either be sold or distributed for demonstration. About 3,650 tons of compost is transported out every year. 100% of the compost marketed would be within an average travel distance (both ways) of 200 km. The compost transported per truck is conservatively assumed at 6 tonnes.

Table B.5.2.1 Emission due to incremental transportation

Parameters	Value
Q y	18,250
CT y	6
DAF w	0
EF co2	0.455
Q y,treatment	3,650
CT y,treatment	6
DAF treatment	200
PE y, transp	55.36

2. Emission due to electricity or fossil fuel consumption on site

The composting process involves electricity consumption for lighting and water pumping, and blowers. Emissions associated with consumption of electricity and fossil fuel is calculated using the following formulae:

PE y, power = PE electricity, y + PE fuel, onsite, y (3)

PE electricity, y = MWh e,y * EF co2, grid,y (4)

Where:

MWh e,y is the amount of electricity consumed from the grid in the project activity, measured using an electricity meter (MWh)
EF co2, grid,y is the emission factor for electricity generation of the national grid (tCO2/MWh). EF co2, grid,y shall be calculated annually using either of following method in AMS-I.D ver16.

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system"

OR

(b) The weighted average emissions (in t CO_2/MWh) of the current generation mix. The data of the year

in which project generation occurs must be used. Calculations shall be based on data from an official source (where available) and made publicly available.

The project selected (a) to calculate the emission factor or electricity generation of the national grid, therefore **$EF_{grid,CM,y}$** take place for EF co2, grid,y **.** The calculation procedure is noted on Annex 3. As a result,

$EF_{grid,CM,y}$ = 0.58015 tCO_2/MWh

The feasibility study for the composting facility indicates that the total electric power consumption by the facility is for waste/composting sorting equipments, blowers, lighting and air condition operations. The power requirement would be a maximum of 100 kW on average of 10 hrs operation of the facility per day, 365 days per year. This is equivalent to and electricity consumption of 365 MWh per annum.

The following data is therefore used to calculate the emission associated with consumption of electricity in the composting facility.

Table B.5.2.2 Emission due to electricity consumption on site

Parameter	Value
MWh e,y	365
$EF_{grid,CM,y}$	0.58015
PE electricity, y	211.75475

PE fuel, onsite, y = F cons, y * EF fuel
(5)

The estimated fuel consumption for from the loaders for the composting operation is estimated at 4 litres per hour and 2 vehicles will daily operate 5 hours. So the diesel fuel consumed per year will be 14600 litres.

With and emission factor of 2.73 kgCO2/litre, the emissions from fuel is estimated to be 39.853 t CO2/year.

Table B.5.2.3 Emission due to fuel consumption on site

Parameter	Value
F cons, y	14600
EF fuel	2.73
PE fuel, onsite, y	39.853

3. Emissions from composting process

Emissions from composting process is calculated using the following formula:

PE y, comp = Qy * EF composting * GWP_CH4
(6)

Where:

EF composting is the methane emission factor of composting waste taken at 4 kg

methane / ton
wet waste

The following date is used to calculate the emissions.

Table B.5.2.4 Emission from composting process

Parameter	Value
Qy	18,250
EF composting	4
GWP_CH4	21
PE y, comp	1,533

However, $EF_{composting}$ can be set to zero for the portions of *Qy* for which the monitored oxygen content of the composting process in all points within the windrow are above 8%, so the project will consider $EF_{composting}$ as zero.

4. Emission from run-off water

Methane emission from run-off water is calculated using the following formula:

PE y, runoff = Q y, ww, runoff * COD y, ww, runoff * B o, ww * MCF ww, trteatment * UF b * GWP_CH4 (7)

Where:

Q y, ww, runoff is volume of runoff water in year y (m3)
COD y, ww, runoff is chemical oxygen demand of runoff water leaving the composting facility in year y (tonnes/m3)
B o, ww is methane producing capacity of waste water taken at IPCC default value of 0.25kg/kgCOD
MCF ww, trteatment is methane correction factor for waste water treatment plant as per table III H.1 in the methodology AMS III.H/version16
UF b is model correction factor to account for uncertainties default of 1.12

The following date is used to calculate the emissions.

Table B.5.2.5 Emission from runoff water

Parameters	Values
Q y, ww, runoff	1,095
COD y, ww, runoff	0.05
B o, ww	0.21
MCF ww, trteatment	0.2
UF b	1.12
GWP_CH4	21
PE y, runoff	54

5. Emission from anaerobic storage/disposal or residual waste

The emission from landfill of residuals from composting process PE y, rewaste are calculated using the following formula:

BE CH4, swds,y =

$$\psi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot 16/12 \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-kj \cdot (y-x)} \cdot (1-e^{-kj}) \quad (8)$$

The quantity of waste and the composition of waste in the above formula correspond to the residual waste. "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" version 5 is used.

Compost and inert material are the two types of residual wastes expected to be generated in the project activity. Only the inert material will be disposed of in the landfill site 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 facility is not intended to be disposed of in the landfill. If necessary, compost may be sold at a low or no price in initial years when the market is still being developed. Therefore emission 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 waste that would be disposed of at the landfill and calculate the emission if relevant.

The following date is used to calculate the emissions.

Table B.5.2.6 Ex-ante waste composition

Waste type	Composition by weight (%)
Wood and wood products	0.83%
Pulp, paper and cardboard (other than sludge)	2.29%
Food, food waste, beverages and tobacco (other than sludge)	15.24%
Textiles	3.29%
Garden, yard and park waste	59.28%
Glass, plastic, metal other inert waste	19.08%

Table B.5.2.7 Parameters values used to calculate ex-ante baseline emissions

Parameter	Value
ϕ	0.9
f	0
GWP_CH4	21
OX	0.1
F	0.5
DOC f	0.5
MCF	1
DOC j: wood and wood products	43%
DOC j: Pulp, paper and cardboard (other than sludge)	40%
DOC j: Food, food waste, beverages and tobacco (other than sludge)	15%
DOC j: Textiles	24%

DOC j: Garden, yard and park waste	20%
DOC j: Glass, plastic, metal other inert waste	0%
k- Pulp, paper and cardboard (other than sludge), textiles	0.07
k- wood and wood products	0.035
k- other (non-food) organic	0.17
k- Food, food waste, beverages and tobacco (other than sludge)	0.4

Table 5.2.8 Ex-ante estimates of emission from landfill of residual organic wastes

Year	emissions (tCO2e/year)
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0

6. Summary of ex-ante Project emissions

Table B.5.2.9 Summary of ex-ante project emissions in the first crediting period

Year	PE y, transp	PE y, power	PE y, comp	PE y, runoff	PE y, rewaste	Total
2013	55	229	0	54	0	339
2014	55	229	0	54	0	339
2015	55	229	0	54	0	339
2016	55	229	0	54	0	339
2017	55	229	0	54	0	339
2018	55	229	0	54	0	339
2019	55	229	0	54	0	339

<u>Baseline emissions</u>

The baseline emission for the composting activity is calculated using the following formula:

$BE_y = BE_{CH4,swds,y} - (MD_{y,reg} * GWP\_CH4) + (MEP_{y,ww} * GWP\_CH4)$ (8)

Where:

BE_y is the baseline emission in year y (tCO_2e)

$BE_{CH4,swds,y}$ is 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 a solid waste disposal site" (version

5).

MD y, reg is methane emissions that would be captured and destroyed to comply with national or local safety requirement or legal regulations in the year "y" (tCO2e).

In Vietnam there is no requirement or regulation to capture and destroy methane and this value is zero and not considered further.

MEP y, ww is methane emission potential in the year y of the wastewater co-composted. The value of this term is zero as co-composting of waste water is not included in the absence of the project activity (tonne)

Hence:

BEy = BE CH4, swds, y (9)

Where:

BE CH4, swds,y =

$$\psi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot 16/12 \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-kj \cdot (y-x)} \cdot (1-e^{-kj}) \quad (10)$$

Where:

ϕ is model correction factor (default 0.9) to correct the model uncertainties

f is fraction of methane captured at the SWDS and flared combusted or used in another manner

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

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

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

MCF is methane correction factor (fraction)

W j, x is amount of organic waste type j prevented from disposal in the SWDS in the year x (tonnes/ year)

DOC f is fraction of degradable organic carbon that can decompose

kj is decay rate for the waste stream type j

j waste type category

x is year during the crediting period: x runs for the first year of the first crediting period (x=1) to the year y for which avoided emissions are calculated (x=y)

y is 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 samples, as

follows:

$$W_{j,x} = W_x \cdot \frac{\sum_{n=1}^{z} P_{n,j,x}}{z} \quad (11)$$

Where:

W j, x (tonnes)	is amount of organic waste type j prevented from disposal in the year x
W x (tonnes/year)	is total amount of organic waste prevented from disposal in the year x
P n,j,x year x	is weight fraction of the waste type j in the sample n collected during the
Z	is number of samples taken during the year x

The percentage of organic waste type j prevented from disposal are shown in Table B.5.2.10, the other parameter values used are shown in table B.5.2.11. The calculated results are shown in table B.5.2.12. The actual quantity of organic waste will be monitored according to the monitoring methodology for ex-post CER calculations.

B.5.2.10 Ex-ante waste composition

Waste type	Composition by weight (%)
Wood and wood products	0.83%
Pulp, paper and cardboard (other than sludge)	2.29%
Food, food waste, beverages and tobacco (other than sludge)	15.24%
Textiles	3.29%
Garden, yard and park waste	59.28%
Glass, plastic, metal other inert waste	19.08%

B.5.2.11 Parameters values used to calculate ex-ante baseline emissions

Parameter	Value
ϕ	0.9
f	0
GWP_CH4	21
OX	0.1
F	0.5
DOC f	0.5
MCF	1
DOC j: wood and wood products	43%
DOC j: Pulp, paper and cardboard (other than sludge)	40%
DOC j: Food, food waste, beverages and tobacco (other than sludge)	15%
DOC j: Textiles	24%
DOC j: Garden, yard and park waste	20%
DOC j: Glass, plastic, metal other inert waste	0%

k- Pulp, paper and cardboard (other than sludge), textiles	0.07
k- wood and wood products	0.035
k- other (non-food) organic	0.17
k- Food, food waste, beverages and tobacco (other than sludge)	0.4

B.5.2.12 Ex-ante estimates of emission from landfill of residual organic wastes

Year	Base line emissions (tCO2e/year)
2013	2,830
2014	5,094
2015	6,925
2016	8,420
2017	9,650
2018	10,671
2019	11,522
First 7 crediting years	55,112

Leakage:

There is no leakage.

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

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Table 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)	CER income (US$)
2013	339	2,830	0	2,491	
2014	339	5,094	0	4,756	
2015	339	6,925	0	6,587	
2016	339	8,420	0	8,081	
2017	339	9,650	0	9,312	
2018	339	10,671	0	10,332	
2019	339	11,522	0	11,183	
Total (tonnes of CO_2 e)	2,373	55,112	0	52,739	

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

B.6.1. Description of the monitoring plan:

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The monitoring plan as described in section E.7 of the Vietnam MSW composting PoA-DD, under which this CPA is being proposed will be followed.

Description of the Monitoring Plan and System for the SSC-CPA:
Parameters for MSW composting activity is monitored using Field Instruments, Hardware & Software installed at Project site and/or Manual data recording in the log book. Monitoring items consist with information from periodical activity and daily activity. Electronic information such as truck scale measurement can directly be collected as data in Hung Yen city CPA Database, and also there is information collected by manual basis.

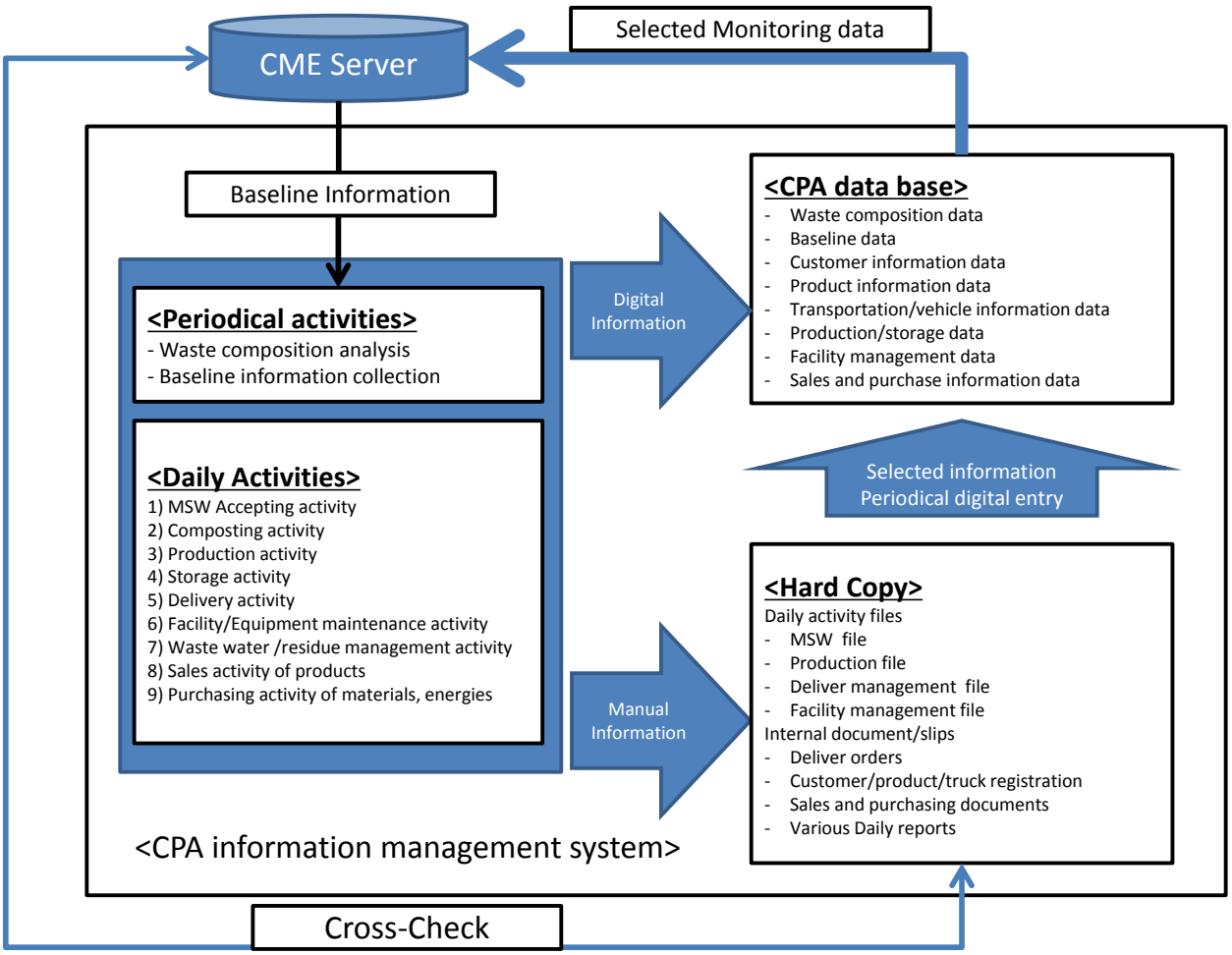


Figure B.6.1.1: Monitoring system for SSC-CPA

Hard copies from manually collected information will be filed and kept by management of each responsible unit in the Hung Yen city CPA, and periodically (at least once a week) will be converted to data and stored also into Hung Yen city CPA database. All monitoring data and information, including original photographs, will be kept at least for two years after the end of the last crediting period or two years after the last issuance of CERs, whichever occurs later.

Electronic data and information of Hung Yen city CPA will be finally kept in the database system developed and managed by CME. CME will be able to access Hung Yen city CPA database and collect necessary data for monitoring and preparation for verification. An

independent server has been bought by CME for the database system for weekly backup of data and information.

Refer Annex 4 which is the list for monitoring activities.

Table B,6.1.1: Hard copy file and responsible unit

Class A document and manager	Class B document	Class B document manager
Production file (Production Unit Manager)	MSW/ residue composition report	Line manager
	Baseline information report	Line manager
	Line manager daily report	Line manager
	Product list	Production Unit Manager
	Product register form	Line manager
	Storage manager daily report	Storage manager
Facility management file (Facility Management Unit Manager)	Copy of fuel/electricity consumption notice (copy)	Utility Division Chief Administrative division chief
	Maintenance/repair report	Maintenance Division chief
Deliver management file (Delivery Management Unit Manager)	Storage manager daily report (copy)	Storage manager
	Delivery truck report	Truck scale operator
	Driver daily report	Truck driver
	Truck fuel receipt (copy)	Truck driver Administrative Division Chief
MSW file (Production Unit Manager)	MSW/ residue composition report	Line manager
	MSW information sheet	Truck scale operator
Sales information file (Sales Unit Manager, Deliver management Unit manger)	Contracts	Sales Unit
	Order forms	Sales Unit.
	Sales Notes	Sales Unit(copy)
	Internal ordering slips	Deliver management Unit
	Delivery slips	Sales Unit (copy)
	Receipt	Sales Unit(copy)
Purchase information file (Administrative Unit Manager)	Contracts	Administrative Unit
	Internal ordering slips	Administrative Unit(copy)
	Order forms	Administrative Unit (copy)
	Sales Notes	Administrative Unit (copy)
	Delivery slips	Administrative Unit(copy)
	Consumption notice	Administrative Unit
	Receipt	Administrative Unit

<Activities>
The work flow of each activity, monitoring parameters which van be collected from the work, how it is measured and recording methods are shown below.

(A) Periodical activity

a) Waste composition analysis

(i) Inflow MSW composition

This activity will be operated once in 3 months at the open yard within the CPA facility.

	Work flow	Parameters	Measuring and Recording method
A1	Collect one hand cart of MSW from each	No. of collection points	- Indicate collection points in map.

	collection point by truck.		
A2	Dump the collected MSW in open yard, spread MSW flat	-	-
A3	Divide the MSW in 6 areas, again dived 6 areas in 4 pieces.	-	- Visual confirmation
A4	Collect 50kg of MSW from random selected one pieces of each 6 area and gather it as 300kg samples.	-weight of total MSW sample	- Manual weigh
A5	300kg sample will be spread in another open yard, and will be separated in 8 types manually	- Number of type of waste	- Visual confirmation
A6	Weigh each item by manual weigh	- Weight of item I of MSW sample	- Manual weigh
A7	Provide report	-	- Summarize activity and result to MSW/ residue composition report - Obtain approval from Production unit manager and CPA general director - File the report to MSW file

(ii) Outflow MSW composition

This activity will be operated once in 3 months at the open yard within the CPA facility.

	Work flow	Parameters	Measuring and Recording method
A8	Spread residue flat at the residue pit	-	-
A9	Divide residue in 6 areas, again dived 6 areas in 4 pieces.	-	- Visual confirmation
A10	Collect 50kg of residue from random selected one pieces of each 6 area and gather it as 300kg samples.	-weight of total MSW sample	- Manual weigh - MSW/ residue composition report
A11	300kg sample will be spread in another open yard, and will be separated in 8 types manually	- Number of type of waste	- Visual confirmation of type of waste. - MSW/ residue composition report

A12	Weigh each item by manual weigh	- Weight of item I of MSW sample	- Manual weigh - MSW/ residue composition report
A13	Provide report	-	- Summarize activity and result to MSW/ residue composition report - Obtain approval from Production unit manager and CPA general director - File the report to MSW file

b) Baseline information collection

Baseline information such as legal document, CO2 emission factor of fuel and electricity grid, IPCC defaults and others will be annually confirmed by CME and will be informed to Hung Yen city CPA Production Management Unit via Hung Yen city CPA General Director. Hard copies will be kept attached to the "Baseline information report" and filed in "Production file".

Refer Annex 4 which is the list for monitoring activities.

(B) Daily activity

a) MSW Accepting activity

MSW will be delivered to the Hung Yen city CPA facility by the transportation truck owned by local administrative body.

	Work flow	Parameters	Measuring and Recording method
B1	Weighing the entering truck at the truck scale	1.Car number 2.Weighed amount 3.Category: MSW	- Truck scale measurement - Direct digital entry to database - Immediate manual entry to "MSW information sheet" - Daily filing of "MSW information sheet" to "MSW file"
B2	Unload MSW to waste pit	-	
B3	Weighing the exiting truck at the truck scale	1.Car number 2.Weighed amount	

b) Composting activity

Composting activity has 4 sub-activities as follows:

(i) Pre-treatment activity

	Work flow	Parameters	Measuring and Recording method
B4	Take out large size wastes, weighing each categorized wastes	-Type of waste -Weight of categorized waste	- Visual segregation and manual weighing of organic-categorized wastes. -Immediate manual record to line manager daily report - Daily manual entry to "Production file" - Periodically digital

			recording to database
B5	MSW will be transported by conveyers to the sorting line	Electricity consumption	-Visual confirmation by electricity meter - Daily manual entry to "Facility Management file" - Periodically digital recording to database - Cross check by "invoice" or "consumption notice" from the power company - File the copy of the invoice to "Facility Management file" - Periodically digital recording to database
B6	Sorted by trammel (80mm)		
B7	Bag opening and sorting by hand		
B8	Magnetic separation		
B9	Sorted by trammel (60mm)		
B10a	Transport composting materials to primary fermentation area	Fuel consumption	-Visual confirmation by "invoice" or "consumption notice" from the contracting fuel company - File the copy of the invoice to "Facility Management file" - Periodically digital recording to database
B10b	Transport other product materials to production line		
B10c	Transport residues to residue storage area		

(ii) Primary Fermentation activity

	Work flow	Parameters	Measuring and Recording method
B11	Pile up the composting material by Wheel loaders	- Fuel consumption	Same as work flow 10
B12a	Ventilation of air by blower system	- Electricity consumption	Same as work flow 5-9
		- Fermentation Temperature	-Visual confirmation by thermometer, minimum 6times/day -Immediate manual record to line manager daily report -Daily manual entry to "Production file" -Periodically digital recording to database
		- Oxygen (more than 8%)	-Visual confirmation by O2 meter, minimum 6times/day -Immediate manual record to line manager daily report - Daily manual entry to

			"Production file" -Periodically digital recording to database
B12b	Mix the composting material periodically by Wheel loaders	- Fuel consumption	Same as work flow 10
B13	Transport composting materials to secondary fermentation area	- Fuel consumption	Same as work flow 10

(iii) Secondary Fermentation activity

	Work flow	Parameters	Measuring and Recording method
B14	Pile up the composting material by Wheel loaders	- Fuel consumption	Same as work flow 10
B15a	Secondary fermentation	- Fermentation Temperature	Same as work flow 12a
		- Oxygen (more than 8%)	Same as work flow 12a
B15b	Mix the composting material periodically by Wheel loaders	- Fuel consumption	Same as work flow 10
B16	Transport composting materials to tentative storage area	- Fuel consumption	Same as work flow 10

(iv) Tentative storage activity

	Work flow	Parameters	Measuring and Recording method
B17	Pile up the composting material by Wheel loaders	- Fuel consumption	Same as work flow 10
B18	Keep suitable oxygen condition	- Oxygen (more than 8%)	Same as work flow 12a
B19	Transport composting materials to production area	- Fuel consumption	Same as work flow 10

c) Production activity

Production activity has 2 sub-activities as follows:

(i) General production management activity

	Work flow	Parameters	Measuring and Recording method
B20	Provide initial product list	Type of products	-Record to "Product list" which is kept in "Production file"
B21	Confirm specification of ordered product	-	-Visual confirmation of "order document"
B22	Provide new product	-	-

B23	Approve new product in the list by: -Fulfil product register form -Obtain approval of Director	Type of products	- Add new product into "Product list" - Hardcopy of "product register form" will be kept in "Production file".

(ii) Compost product producing activity

Compost product producing activity consist with 3 stages

(1) Final sorting

	Work flow	Parameters	Measuring and Recording method
B24	Transport composting materials to trammel	Fuel consumption	Same as work flow 10
B25	Sorted by trammel (6mm and 25mm)	Electricity consumption	Same as work flow 5-9
B26a	Case1: Transport to Storage (to work flow B33)	Fuel consumption	Same as work flow 10
B26b	Case2:Transport to Production/mixing activity (to work flow B27)		

(2) Production/mixing (Occasionally, depending on demand)

	Work flow	Parameters	Measuring and Recording method
B27	Weigh necessary compost	Weight of compost	-Manual weigh -Immediate manual entry to line manager daily report - Daily manual entry to "Production file" -Periodically digital recording to database
B28	Weigh necessary additives	Weigh of additives	
B29	Mix compost and additives using manual mixer	-	-

(3) Packaging (directly from final sorting or from production/mixing procedure)

	Work flow	Parameters	Measuring and Recording method
B30	Weigh necessary compost	Weight of compost	Same as work flow 27
B31	Manually packing and sealing of compost product	- Package size - Number of package used	-Visual confirmation -Immediate manual entry to line manager daily report -Daily manual entry to "Production file" -Periodically digital

			recording to database
B32	Transport to storage	Fuel consumption	Same as work flow 10

d) Storage activity

Storage activity has 2 sub-activities as follows:

(i) Storage management activity

	Work flow	Parameters	Measuring and Recording method
B33	Identify compost product by type	- Type of product - Lot number - Date of production - Packed/Un-packed - No. of packages	-Visual confirmation -Immediate manual entry to storage manager daily report - Daily manual entry to "Production file" , and copy to "Deliver management file" - Periodically digital recording to database
B34	Store compost product at location designated by product type		
B35	Bookkeeping of stored product		

(ii) Product loading activity

Product loading has following 2 cases

(1) Case1: Un-packed product loading

	Work flow	Parameters	Measuring and Recording method
B36	Find product at storage based on storage report	-	-
B37	Measurement of empty truck weight	Weight of delivery truck	-Truck scale measurement (no recording)
B38a	Load major amount of compost product to delivery truck by wheel loader	Fuel consumption	Same as work flow 10
B38b	Measurement of loaded truck weight	Weight of truck	-Truck scale measurement (no recording)
B38c	Manually adjust the product amount	-	-
B39	Finalize delivery amount by measurement of delivery truck weight	Weight of truck including compost products	-Truck scale measurement -Direct digital entry to database -Immediate manual entry to "Deliver management file"
B40	Issue "Product measurement report" for customer	-	
B41	Bookkeeping of loaded product	- Type of product - Lot number - Date of production - Date of delivery	-Visual confirmation -Immediate manual entry to storage manager daily report - Daily manual entry to

		- Delivery amount - Customer	"Production file", after cross check with "Deliver management file" -Periodically digital recording to database
(to work flow B45)			

(2) Packed product loading

	Work flow	Parameters	Recording method
B42	Find product at storage based on storage report	-	-
B43	Load necessary amount of product to the delivery truck	Fuel consumption	Same as work flow 10
B44	Bookkeeping of loaded product	- Type of product - Lot number - Date of production - Date of delivery - Delivery amount - Customer	Same as work flow 40
(to work flow B45)			

e) Delivery activity

Delivery activity has 3 sub-activities as follows:

(i) Delivery management activity

	Work flow	Parameters	Recording method
B45	Issue "Delivery slip" and hand to truck driver. If unpacked products, "Product measurement report" will also handed to driver.	- Type of product - Lot number - Date of delivery - Delivery amount - Customer	
B46	Measurement of loaded delivery truck weight at facility exit	Weight of truck including compost products	-Truck scale measurement -Direct digital entry to database -Immediate manual entry to "Delivery truck report" - Daily manual entry to "Deliver management file"
B47	Unload product at customer's site	-	
B48	Obtain stamp/signature of customer to "Delivery slip"		
B49	Measurement of empty delivery truck	Weight of truck	-Truck scale measurement -Direct digital entry to

	weight at facility exit		database -Immediate manual entry to "Delivery truck report" - Daily manual entry to "Deliver management file"

(ii) Distance management activity

	Work flow	Parameters	Recording method
B50	Confirm trip meter of delivery truck before loading products	-Accumulated distance -Trip distance	- Trip meter on truck -Visual confirmation -Immediate manual entry to "Driver daily report" - Daily manual entry to "Deliver management file" -Periodically digital recording to database
B51	Confirm trip meter of delivery truck after its delivery is completed and returned to CPA facility	-Accumulated distance -Trip distance	--Trip meter on truck -Visual confirmation -Immediate manual entry to "Driver daily report" - Daily manual entry to "Deliver management file" -Periodically digital recording to database

(iii) Fuel management activity

	Work flow	Parameters	Recording method
B52	Receive receipt with fuel amount when filling up the fuel tank of vehicles	Amount of fuel purchased	-Visually check receipt - Keep the copy of receipt in "Deliver management file" -Periodically digital recording to database

f) Facility/Equipment maintenance activity

	Work flow	Parameters	Recording method
B53	Provide report on maintenance/repairing of facility and equipment	-Date -Event -Countermeasures	-Digitally provide report -Accumulate reports to "facility management file"

g) Waste water /residue management activity

	Work flow	Parameters	Recording method
B54	Volume of wastewater accumulated will be measured	Volume of run-off water	- Wastewater pit level scale markings -Visual confirmation - Immediate manual entry to line manager daily report -Manual entry of report to "Production file" -Periodically digital

			recording to database
B55	Quality of wastewater at wastewater pit	COD of run-off water	-COD meter - Immediate manual entry to line manager daily report -Manual entry of report to "Production file", together with digital output from COD meter -Periodically digital recording to database
B56	Residue volume measurement	Residue volume	- Truck scale measurement - Direct digital entry to database - Immediate manual entry to "MSW file"

h) Sales activity of products

Activity cycle and related documents (Manual data) are as follows

Work flow	Flow	Document and managing unit
Basic Contract	Sales-Unit-Customer-Sales Unit.-Administrative Unit-Sales Unit	-Contract -Sales Unit
Receive order	Customer-Sales Unit	-Order form -Sales Unit
Accept order	Sales Unit(copy)-Customer	-Sales note(copy) -Sales Unit
Internal order	Sales Unit-Production Unit-Deliver management Unit	-Internal ordering slips -Deliver management Unit
Deliver product	Deliver Management Unit (copy)-Customer(original), Sales Unit (copy)	-Delivery slip -Sales Unit (copy)
Receive payment	Sales Unit(copy)-Customer	-Receipt, Bank account -Sales Unit (copy), Administrative Unit (copy)

i) Purchasing activity of materials, energies

(i) Purchasing Materials(including fuel)

Work flow	Flow	Document and managing unit
Contract	Vendor-Any Unit(copy)-Administrative Unit (original)	-Contract -Administrative unit
Order material	Any unit-Vendor(original), Administrative Unit(copy)	-Order form -Administrative unit
Order accept	Vendor-Any Unit(original)-Administrative Unit(copy)	-Sales note -Administrative unit
Product Delivery	Vendor-Any Unit(original)-Administrative Unit(copy)	-Delivery slip -Administrative unit
Payment	Vendor-Any	-Receipt, Bank account

	Unit-Administrative Unit(original)	-Administrative unit

(ii) Purchasing Utilities(Electricity, water)

Work flow	Flow	Document and managing unit
Contract	Vendor-Facility Management(copy)-Administrative Unit (original)	-Contract -Administrative unit
Consumption notice (invoice)	Vendor-Facility Management Unit-Administrative Unit (original)	-Consumption notice (invoice) -Administrative unit
Payment	Vendor-Facility Management Unit(copy)-Administrative Unit(original)	Receipt, Bank account

Education of Employees

Based on cooperation agreement between 3 parties (Hung Yen city CPA implementer, Local Administrative body, IKE), the staff responsible of monitoring and operation will be initially educated by IKE staff, and also periodically inspected by IKE staff. IKE staff will discuss with the Hung Yen city CPA staff to provide better result in the common purpose, which is the best mix of maximization of green-house gas emission reduction and better result for surrounding environment.

In case of emergency occurred at the facility of during the delivery of products, person on duty will contact directly to Hung Yen city CPA facility manager, besides public fire protection, police and necessary contacts required in common sense. Hung Yen city CPA facility manager will inform CPA implementer and also CME. The report of emergency shall be issued by the name of Hung Yen city CPA facility manager to Hung Yen city CPA general director and also CME. This report will be filed in facility management file.

Review of reported results/data

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.

<Not yet implemented>

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

>>

<Not yet implemented>

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 the same has been carried out for

the sites as per Vietnam 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.

Stakeholder consultation process is not required by regulation/laws in the host country.

As indicated in the proposed PoA, interviews with the stakeholders at the PoA level were conducted. They were given the opportunity to discuss and provide comments to the PoA. In addition to the interviews at the PoA level, comments from responsible persons of local administrative authorities and citizens who are specifically related to the Project will be collected at a later date through interviews at the CPA level.

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

>>

Stakeholders are selected by local administrative body. Comments will be received from the stakeholders through 1) Stakeholder meeting which will be held in the local administrative area at least once, with announcement to the selected stakeholders by one month before, and 2) Comment will be collected through the comment form, which will be delivered to all stakeholders together with announcement of stakeholder meeting and the form will be collected by CPA implementer during 2 weeks after the stakeholder meeting.
Comments received which needs to be replied to the stake holders must be replied by CPA implementers by one month or less. It has to mention about how the CPA implementers will handle to the comment received.
The summary of above procedure will be reported to each stakeholder before the project implementation.

The report on how the comments are received will be described here.

D.3. Summary of the comments received:

>>

Comments from local citizens and related agencies are summarized here.
Summary of the comments received from the interviewees will be .described here.

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

>>

The report on how the comments are received will be described here.

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE small-scale CPA

Organization:	Ichikawa Kankyo Engineering Co., LTD.
Street/P.O.Box:	2-11-25 Tajiri
Building:	-
City:	Ichikawa city
State/Region:	Chiba Prefecture
Postfix/ZIP:	272-0014
Country:	Japan
Telephone:	+81-47-376-1711
FAX:	+81-47-370-3749
E-Mail:	
URL:	http://ike.co.jp/
Represented by:	
Title:	
Salutation:	
Last Name:	Kurasawa
Middle Name:	
First Name:	Soji
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	soji.kurasawa@ike.co.jp

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

ANNEX 3

BASELINE INFORMATION

DETERMINATION OF THE GRID EMISSION FACTOR IN VIETNAM ($EF_{grid\ y}$)

The methodological *Tool to calculate the emission factor for an electricity system* is applied to

determine the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "operating margin" (OM) and "build margin" (BM) as well as the "combined margin" (CM).

STEP 1 Identify the relevant electricity systems

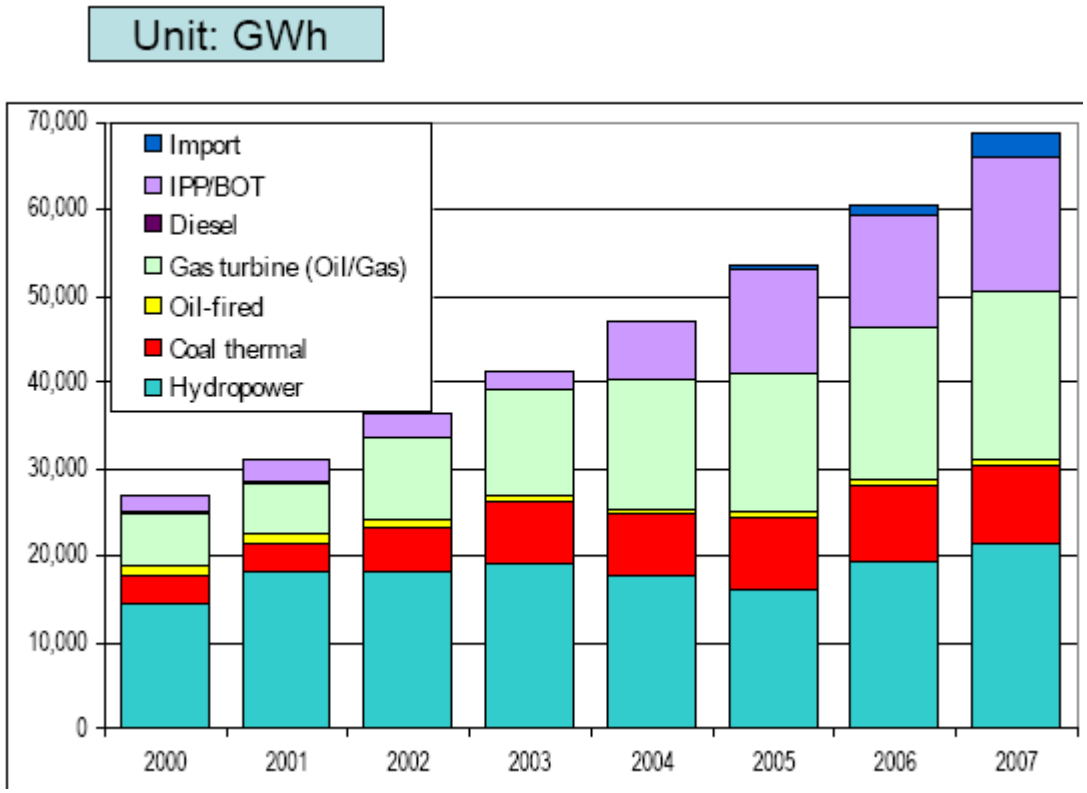
The relevant electricity system is identified as the Vietnamese national grid: the Electricity of Vietnam or EVN. The EVN is a state-owned utility which plans and controls generation, transmission and distribution of electricity in the whole country.

STEP 2 Choose whether to include off-grid power plants in the project electricity system (optional)

We choose Option I: only grid power plants are included in the calculation.

STEP 3 Select a method to determine the operating margin (OM)

As shown on the diagram below, low cost/must-run resources constitute less than 50% of total grid generation in the five most recent years. Thus we will use the simple OM method. We choose to apply the ex-ante option: the emission factor is determined once at the validation stage.



Source : http://www.adb.org/documents/events/2009/Climate-Change-Energy-Workshop/VIE.pdf or http://www.bionersis.com/links/24 ADB 2009: Workshop on Climate and Energy March 2009, Country Report,
Energy and Climate Change in Vietnam

STEP 4 Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

It will be calculated according to Option B, i.e. based on the total net electricity generation of all power plants serving the system and fuel types and total fuel consumption of the project electricity system.
Option B can be used as the necessary data for Option A is not available.
Hence, the simple OM emission factor is calculated as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}}$$

Where:

$EF_{EL,m,y}$ CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)

$FC_{i,m,y}$ Amount of fossil fuel type *i* consumed by power plant / unit *m* in year *y* (mass or volume unit)

$NCV_{i,y}$ Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)

$EF_{CO2,i,y}$ CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/GJ)

$EG_{m,y}$ Net electricity generated and delivered to the grid by power plant / unit *m* in year *y* (MWh)

m All power plants / units serving the grid in year *y* except low-cost/must-run power plant /units

i All fossil fuel types combusted in power plant / unit *m* in year y

y The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

The source used to calculate the OM is the "CDM Baseline construction for Vietnam National Electricity Grid" report by Tran Minh Tuyen and Axel Michaelowa. (Source: http://ageconsearch.umn.edu/bitstream/26393/1/dp040295.pdf table V.4 page 16 or http://www.bionersis.com/links/23 Tuyen T.M., Michaelowa A. 2004: CDM Baseline Construction for Vietnam National Electricity Grid.)

This report makes reference to official sources (government statistics). Although this report has been published in 2004, it provides projections up to the year 2010 by using sources such as the expansion plan of the state-owned power company 'Electricity of Vietnam', EVN). Thus, the source used to calculate the grid emission factor for the proposed project activity can be deemed applicable.

Fuel type		2006	2007	2008
Hydropower	GWh	19,502	21,602	24,139
Coal	GWh	8813	11692	14958
5700 kcal/kg-Vietnam	kt	4129	5493	6946
26.8 TC/TJ – IPCC	kt CO_2	9,498	12,636	15,978
Gas	GWh	29180	30438	35894
8500 kcal/m^3 – VN	Million m^3	6418	6667	7934
15.3 TC/TJ – IPCC	kt CO_2	12,697	13,189	15,696
DO	GWh	155	152	153
10200 kcal/kg – VN	kt	45	45	45
20.2 TC/TJ – IPCC	kt CO_2	141	141	141
FO	GWh	2284	3431	127
9900 kcal/kg – VN	kt	524	782	36
21.1 TC/TJ – IPCC	kt CO_2	1,665	2,485	114
Total CO_2 emission from Vietnam grid, kt CO_2		24,001	28,451	31,929
Total thermal output generated, GWh		40,432	45,713	51,132
OM: Weighted thermal average, gCO_2/kWh		**594**	**622**	**624**

Hence, **$EF_{grid,OM,2006-2008}$ = 0.6135 tCO_2/MWh**

STEP 4 Identify the group of power units to be included in the build margin

According to the *Tool to calculate the emission factor for an electricity system*, the sample group of power units m used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

The same report stated above has been used as a source to identify the group of power units to be included in the build margin. The set of power units that comprises the larger annual generation is identified as option (b) and is listed below:

End of year	Grid cap., MW		Last five plants		Last 20% plants	
	Total	20%	Plant	MW	Plant	MW

2008	16,627	3325.4	1. Ban La, hdropower	300	1. Ban La, hdropower	300
			2. PleiKrong, hydropower	110	2. PleiKrong, hydropower	110
			3. Cua Dat, hydropower	97	3. Cua Dat, hydropower	97
			4. Srepok 3, hydropower	90	4. Srepok 3, hydropower	90
			5. Dai Ninh, hydropower	300	5. Dai Ninh, hydropower	300
					6. Nhon Trach, gas	600
					7. Expansion Ninh Binh, coal	300
					8. Quang Ninh, coal	600
					9. Hai Phong, coal	600
					10. A Vuong, hydropower	170
					11. Tuyen Quang, hydropower	342
			Total	**897**	**Total**	**3509**

Source: http://ageconsearch.umn.edu/bitstream/26393/1/dp040295.pdf table V.3 page 15, Tuyen T.M., Michaelowa A. 2004: CDM Baseline Construction for Vietnam National Electricity Grid.

We choose to apply the ex-ante option (option 1): the build margin emission factor is determined once at the validation stage, without requirement to monitor and recalculate it during the crediting period.

STEP 6 Calculate the build margin emission factor

The build margin emission factor BM is calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year y (tCO_2/GJ)
m	Power units included in the build margin
y	Most recent year for which power generation is data available

According to the report, the 2008 BM is calculated as following:

Name of power plant	Type of fuel	Capacity (MW)	$EG_{m,y}$ (GWh)	CO_2emissions ($ktCO_2$)	$EF_{EBM,2008}$ (tCO_2/MWh)
1. Ban La	hydro	300	328	0	
2.PleiKrong	hydro	110	175	0	
3. Cua Dat	hydro	97	165	0	
4. Srepok 3	hydro	90	198	0	
5. Dai Ninh	hydro	300	1 143	0	
6. Nhon Trach	gas	600	3 512	1389	
7. Expansion Ninh Binh	coal	300	334	342	
8. Quang Ninh	coal	600	1 878	1 922	
9. Hai Phong	coal	600	3 512	3 595	
10. A Vuong	hydro	170	715	0	
11. Tuyen Quang	hydro	342	1 296	0	
Total		3,509	13 256	**7,248**	**0.5468**

Hence, **$EF_{grid,BM,y}$ = 0.5468 tCO_2/MWh**

STEP 6 Calculate the combined margin emission factor

The combined margin emission factor CM is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$$

Where:

$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emission factor (%)
w_{BM}	Weighting of build margin emission factor (%)

Using default values set in the *Tool to calculate the emission factor for an electricity system:*

$w_{OM} = w_{BM} = 50\%$
$EF_{grid,OM,y} = 0.6135$
$EF_{grid,BM,y} = 0.5468$

Hence, $EF_{grid,CM,y} = 0.58015\ tCO_2/MWh$

Annex 4

MONITORING INFORMATION

Chart Annex 4.1-1 Monitoring items and implementation structure (project emissions)

frequency of monitoring	monitoring items				monitoring location		monitoring method				responsibility personnel	
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	how to use way of measurement	QA/QC measure What	QA/QC procedure who	QA/QC procedure How	person in charge	manager frequency
	$PE_{y,transp} = (Q_y/CT\,y)* DAFw* EFCO2 + (Q_{y,comp,i}/CT_{y,comp,i}) * DAFcomp,i * EF_{CO2}$											
annual accumulation of daily monitoring	Q_y	Quantity of raw waste treated in the year y	t	Sum of inflow MSW weighed by the truck scale	Entrance of the facility	Paper and electronic data	The weight difference before and after unloading MSW is measured at the truck scale which will be located at the entrance of the facility. The data will be also noted in paper (Date, car number, in coming time and weight, out going time and weight).	Truck scale	truck scale manufacturer	Periodical calibration	Truck management Division	Weekly
annually	$CT\,y$	Average truck capacity for waste transportation	t/truck	(Sum of inflow MSW weighed by the truck scale) / (sum of MSW transportation truck entered)	Entrance of the facility	Electronic data	Llicence plate number and other data of vehicles (company name, car sizes) will be registered initially. Truck scale operator will visually confirm and enter the licence plate number to the database each time when the truck delivers MSW. Weight data will be recorded in the database.	1) Truck scale 2) Registrated Information	1) Truck scale manufacturer 2) Truck scale operater	1) Periodical calibration 2) Annual confirmation of information to the truck owner	Truck management Division	Annually
annual accumulation of daily monitoring	DAF_w	Average incremental distance for raw solid waste	km/truck	If the CPA facility is build adjacent to present landfill, it will be zero. If not: (Sum of transportation distance after CPA) / (sum of truck numbers after CPA) – (sum of MSW transportation distance before CPA) / (sum of truck numbers before CPA)	Truck management dicvision	Paper and electronic data	Driver will note the distance meter amount everyday when starting and after working. Data will be accumulated in computer database on weekly basis.	1) Truck distance meter 2) Daily driver report	Truck management dicvision	1) Run test 2) Weekly meeting with drivers	Truck management Division	1) Annually 2) Weekly
annually	EF_{CO2}	CO2 emission factor from fossil fuel use due to transportation	kg/CO2/km	Calorific value * Density * CO2 emission amout	Technical Division	Paper and electronic data	Value will be calculated	Calculated result	More than 2 people re-calculate	excel, calculater	Technical Division	Annually
Periodically	i	Type of items shipped out from the facility	-	count number of types	Sales division	Paper and electronic data	Count numbers of shipping items from shipping list				the person in charge of technology	Anually
annual accumulation of daily monitoring	$Q_{y,comp,i}$	Quantity of residual waste, recycled products and compost produced in the year y	t	Sum of outflow residual waste, recycled product and compost weighed by the truck scale	Entrance of the facility Sales Division Truck Management Division	Paper and electronic data	The weight difference before and after loading residual waste, recycled products and compost is measured at the truck scale which will be located at the entrance of the facility. The data will be also noted in paper (Date, car number, in coming time and weight, out going time and weight).	Truck scale	truck scale manufacturer	Periodical calibration	Truck management Division	Anually
annually	$CT_{y,comp,i}$	Average truck capacity for residual waste, recycled products and compost transportation	t/truck	(Sum of out flow residual waste, recycled products and compost weighed by the truck scale) / (sum of residual waste, recycled products and compost transportation truck entered)	Entrance of the facility	Electronic data	Llicence plate number and other data of vehicles (company name, car sizes) will be registered initially. Truck scale operator will visually confirm and enter the licence plate number to the database each time when the truck ships residual waste, recyclable products and compost. Weight data will be recorded in the database.	Truck scale	truck scale manufacturer	Periodical calibration	Truck management Division	Anually
annual accumulation of daily monitoring	$DAF_{comp,i}$	Average distance for residual waste, recycled products and compost transportation	km/truck	(Sum of transportation distance of residual waste, recycled products and compost) / (sum of truck numbers)	Truck management dicvision	Paper and electronic data	Driver will note the distance meter amount everyday when starting and after working. Data will be accumulated in computer database on weekly basis.	1) Truck distance meter 2) Daily driver report	Truck management dicvision	1) Run test 2) Weekly meeting with drivers	the person in charge of weighing	Anually
					Sales division	Paper and electronic data	The place of sales will be kept in the shipping record (according to sales slips).	Location of the desitnation	Sales division	confirm map information	Sales division	Periodically

Chart Annex 4.1-2 Monitoring items and implementation structure (project emissions)

frequency of monitoring	monitoring items				monitoring location		monitoring method				responsibility personnel	
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	how to use / way of measurement	QA/QC measure: What	QA/QC procedure: who	QA/QC procedure: How	person in charge	manager / frequency
	PE y, power = PE electricity, y + PE fuel, onsite, y											
	PE electricity, y = MWh e,y * EF co2, grid,y											
Annual accumulation of monthly data	*MWh e,y*	Amount of electricity consumed from the grid in the project activity, measured using an electricity meter	MWh	Sum of purchased electricity amount stated on bill of the power company	General affairs division	Paper and electronic data	Confirmation of quantity of purchased electricity by checking the record of the bills	1) Watt-hour meter 2) Cross check between technical division	1) Power company 2) Technical division	1) Periodical calibration 2) Check operation report and compare with average power consumption data	General affairs division	monthly
Annually	*EF co2, grid,y*	Emission factor for electricity generation of the national grid	tCO_2/MWh	A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system"	Technical Division	Paper and electronic data	Collect necessary data from official database. Calculate the value based on the instruction of "Tool to calculate the Emission Factor for an electricity system"	Calculated result	More than 2 people re-calculate	excel, calculater	Technical Division	Annually
	PE fuel, onsite, y = F cons, y * EF fuel											
Annual accumulation of monthly data	*F cons, y*	Fuel consumption on the site in year y	L/Y	Sum of purchased fuel amount stated on bill of the fuel company	General affairs division	Paper and electronic data	Confirmation of quantity of purchased fuel by checking the record of the bills	Cross check between truck management division	Truck Management Division	Check driver report and compare with average consumption data	General affairs division	monthly
Annually	*EF fuel*	CO2 emissions factor of the fuel	kgCO2/L	Calorific value * Density * CO2 emission amout	Technical Division	Paper and electronic data	Value will be calculated	Calculated result	More than 2 people re-calculate	excel, calculater	Technical Division	Annually

frequency of monitoring	monitoring items				monitoring location		monitoring method				responsibility personnel	
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	how to use / way of measurement	QA/Qcmeasure: What	QA/QC procedure: who	QA/QC procedure: How	person in charge	manager / frequency
	PE y, comp = Qy * EF composting * GWP_CH4											
Annually	Q_y	Quantity of raw waste treated in the year y	t	Sum of inflow MSW weighed by the truck scale	Entrance of the facility	Paper and electronic data	The weight difference before and after unloading MSW is measured at the truck scale which will be located at the entrance of the facility. The data will be also noted in paper (Date, car number, in coming time and weight, out going time and weight).	Truck scale	truck scale manufacturer	Periodical calibration	Truck management Division	Weekly
Annually	$EF_{composting}$	methane emission factor of composting waste taken at 4 kg methane / ton wet waste	tCH4/ton wet	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	*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	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually

frequency of monitoring	monitoring items				monitoring location		monitoring method				responsibility personnel	
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	how to use / way of measurement	QA/Qcmeasure: What	QA/QC procedure: who	QA/QC procedure: How	person in charge	manager / frequency
	PE y, runoff = Q y, ww, runoff * COD y, ww, runoff * B o, ww * MCF ww, trteatment * UF b * GWP_CH4											
once in a week	$Q_{y,ww,runoff}$	Volume of runoff water in year y	m3	on-site measurement by waste water pit	Technical Division	Paper and electronic data	Check the amount of wastewater accumulated in waste water pit by level.	Wastewater pit	Technical Division	Periodically confirm the leak	Technical Division	Monthly
once in 2weeks	$COD_{y,ww,runoff}$	Chemical oxygen demand of runoff water leaving the composting facility in year y	t/m3	on-site measurement by simple COD measure	Technical Division	Paper and electronic data	Recorfing the value indicated in the simple COD measure	simple COD measure	manufacturer of COD measure	Periodical calibration	Technical Division	Monthly
Annually	$B_{o,ww}$	Methane producing capacity of waste water taken at IPCC default value of 0.25kg/kgCOD	kgCH4/kg COD	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	$MCF_{ww,treatment}$	Methane correction factor for waste water treatment plant	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	UF_b	Model correction factor to account for uncertainties default of 1.12	-	confirmation of methodology (AMS.III.F)	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	*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	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually

Chart Annex 4.1-3　Monitoring items and implementation structure（project emissions）

frequency of monitoring	monitoring items				monitoring location		monitoring method				responsibility personnel	
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	how to use way of measurement	QA/Qcmeasure What	QA/QC procedure who	 How	person in charge	manager frequency
	$PE_{y,landfill} = \varphi \cdot (1-f) \cdot GWPCH4 \cdot (1-OX) \cdot 16/12 \cdot F \cdot DOC_f \cdot MCF \cdot \Sigma\Sigma_j W_{j,x} \cdot DOC_j \cdot e^{-kj} \cdot (y-x) \cdot (1-e^{-kj})$											
Annually	φ	Model correction factor to account for model uncertainties (0.9)	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value	baseline scenario	Technical Division	confirm weather or not any change has been made（see monitoring items of additionality）	Technical Division	Annually
Annually	$GWPCH4$	Global Warming Potential (GWP) of methane, valid for the relevant commitment period（21）	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	OX	Oxidation factor (reflecting the amount of methane from SWDSthat is oxidised in the soil or other material covering the waste)	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	F	Fraction of methane in the SWDS gas (volume fraction) (0.5)	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	DOC_f	Fraction of degradable organic carbon (DOC) that can decompose（0.5）	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	MCF	Methane correction factor	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
once in 3months	$W_{j,x}$	Amount of organic waste type j prevented from disposal in the SWDS in the year x	t	(Composition analysis by weight) * (Q y)	Technical Division	Paper and electronic data	Annual average of composition of each organic fractions in mixed waste analyzed every 3 months multiplied by waste volume of 3 months.	Truck scale	truck scale manufacturer	Periodical calibration	Technical Division	Annually
Annually	DOC_j	Fraction of degradable organic carbon (by weight) in the waste type j	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	kj	Decay rate for the waste type j	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
once in 3months	j	Waste type catetgory (index)	-	Composition analysis by weight	Technical Division	Paper and electronic data	Composition analysis by weight				Technical Division	Annually
Annually	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)	-	–								
Annually	y	Year for which methane emissions are calculated	-	–								

Chart Annex 4.2 Monitoring items and implementation structure （baseline emissions）

frequency of	monitoring items				monitoring location		monitoring method				responsibility personnel	
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	how to use	QA/QC measure	QA/QC procedure		person in charge	manager
							way of measurement	What	who	How		frequency
BEy = BECH4,SWDS,Y-(MDy,reg*GWP_CH4)+(MEPy,ww*GWP_CH4)+BECH4,manure,y												
	BECH4,SWDS,Y	yearly methane generation potential of the solid waste composted or anaerobically digested by the project activity during the years "x" from the biginning of the project activity(x=1) up to the year y estimated as per the latest version of the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site(tCO2e)"	t	see items below								
	MDy,reg	Amount of methane that would have to be captured and combusted in the year y to comply with the prevailing regulations (tonne)	t	There is no regulation on this matter in Viet Nam, and methane gas will not be recovered or incinerated, thus the value of this parameter is 0 in the baseline scenario.								
	MEPy ww	Methane emission potential in the year y of the wastewater co-composted. The value of this term is zero if co-composting of wastewater is not included in the project activity (tonne)	t	The value is 0 because runoff waste water will not be co-composted.								
	BE CH4, manure, y	Where applicable, baseline emissions from manure composted by the project activities, as per the procedures of AMS-III.D		The value is 0 because this project will not treat manure.								
	BECH4,SWDS,Y=φ・(1-f)・GWPCH4・(1-OX)・16/12・F・DOC f・MCF・ΣΣJWj,x・DOCj・e-kj・(y-x)・(1-e-kj)											
Annually	φ	Model correction factor to account for model uncertainties (0.9)	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value	baseline scenario	Technical Division	confirm weather or not any change has been made（see monitoring items of additionality）	Technical Division	Annually
Annually	*GWPCH4*	Global Warming Potential (GWP) of methane, valid for the relevant commitment period（21）	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	*OX*	Oxidation factor (reflecting the amount of methane from SWDSthat is oxidised in the soil or other material covering the waste)	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	*F*	Fraction of methane in the SWDS gas (volume fraction) (0.5)	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	*DOC f*	Fraction of degradable organic carbon (DOC) that can decompose（0.5）	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	*MCF*	Methane correction factor	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Once in 3 months	*Wj,x*	Amount of organic waste type j prevented from disposal in the SWDS in the year x	t	(Composition analysis by weight) * (Q y)	Technical Division	Paper and electronic data	Annual average of composition of each organic fractions in mixed waste analyzed every 3 months multiplied by waste volume of 3 months.	Truck scale	truck scale manufacturer	Periodical calibration	Technical Division	Annually
Annually	*DOC j*	Fraction of degradable organic carbon (by weight) in the waste type j	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Annually	*kj*	Decay rate for the waste type j	-	confirmation of IPCC default value	Technical Division	Paper and electronic data	confirmation of the value				Technical Division	Annually
Once in 3 months	*j*	Waste type catetgory (index)	-	Composition analysis by weight	Technical Division	Paper and electronic data	Composition analysis by weight				Technical Division	Annually
Annually	*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)	-	–								
Annually	*y*	Year for which methane emissions are calculated	-	–								

Chart Annex 4.3　Monitoring items and implementation structure（additionality）

frequency of monitoring	monitoring items				monitoring points		way of monitoring				person who implements monitoring	
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	how to use way of measurement	QA/Qcmeasure What	QA/QC procedure who	 How	person in charge	manager frequency
Annually		Confirmation fo existence of legal documents directs to reduce GHG from MSW	-	Confirmation of legal documents	Technical Division	Paper and electronic data	research of laws and regulations at related ministries				Technical Division	Annually
every 6 months		diffusion rate of composting	-	(Number of MSW composting facility in city level) / (Number of city level local administration bodies)	Technical Division	Paper and electronic data	Update of information from Vietnam Urban Environment and Industrial Zone Assosiation(CME)				Technical Division	Annually

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