CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Title: Domestic organic waste composting project in Hai Duong, Viet Nam
Version: 1
Date 6th ,January 2010

A.2. Description of the small-scale project activity:

Objective of the project activity

The objective of this project is to avoid the release of methane gas which generated through anaerobic fermentation by direct landfill, in place by aerobic treatment of organic matters among municipal solid wastes. The baseline of this project continues the use of direct landfill.

Explanation of GHG emission reductions

In the project activity, organic wastes will be separated by hand and machine from mixed municipal solid wastes collected and will be treated under the supply of rich oxygen (aerobic condition) at the composting line of the new waste treatment facility. The decomposable organic carbon will be decomposed into CO2 (and H2O) under this aerobic condition.

In the baseline scenario, the organic wastes will not be separated from the mixed municipal waste, and it will be directly dumped in a deep landfill site, which not much enough oxygen will be supplied (anaerobic condition). Under anaerobic condition, decomposable organic carbon will be decomposed to CH4, which gives bigger Green house effect than CO2.

The project activity converts CH4 emission to CO2 emission by implementing a new waste treatment facility including composting line, instead of continuing the direct land filling of organic waste.

Proposed project activity

The site of this project is located in Thanh Ha prefecture, Hai Duong province, and the project is a new waste treatment facility construction and operational project including composting facility, waste plastics and constructional waste treatment facilities (treatment capacity of the plant is 200t/d) which is to be done by the investor of this project APT-Seraphin–Hai Duong.
The composting facility will aerobically treat organic wastes contained in the municipal solid waste which discharged from Hai Duong city and also from surrounding prefectures within Hai Duong province. The starting date of plant operation will be end of 2010.

Contribution of the project to sustainable development of Viet Nam

(i) Social
-Composting will realize the reduction of volume of waste to be sent to landfill and the prolonging of lifetime of landfill.
-Appropriate intermediate treatment implementation would be able to prevent using limited land, and environmental stress to the residential area.
-Awareness rising from citizens on global warming.
-Workers for this project will be technically trained especially about monitoring (including perpetuation of data measurement and management) and calibration of machines and equipments

(ii) Economic
-employment creation by project implementation (direct employment: 140, other indirect employment opportunities such as plant construction related jobs, other services providing jobs will be given).

-Additional income by selling CER generates possibility of re-investment to the society (by investor, province and country).
-If the compost made by this project would be applied on the grounds, improvement effect of lands should occur, which lead to better growth of plants/trees.

(iii) Environment

-Composting avoids odor problem around the landfill.
-Recyclables such as plastics and construction materials will be utilized by other bodies and will support avoidance of natural resource consumption.
-Composting will avoid groundwater pollution problem.
-Soil remediation/improvement will be done when the compost product is utilized.

A.3. Project participants:

Name of Party involved	Private and/or public entity project participants
Social Republic of Viet Nam	APT-Seraphin–Hai Duong (private)
Japan	Ichikawa Kankyo Engineering (private)

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

>>

A.4.1.1. Host Party(ies):

>> Social Republic of Viet Nam

A.4.1.2. Region/State/Province etc.:

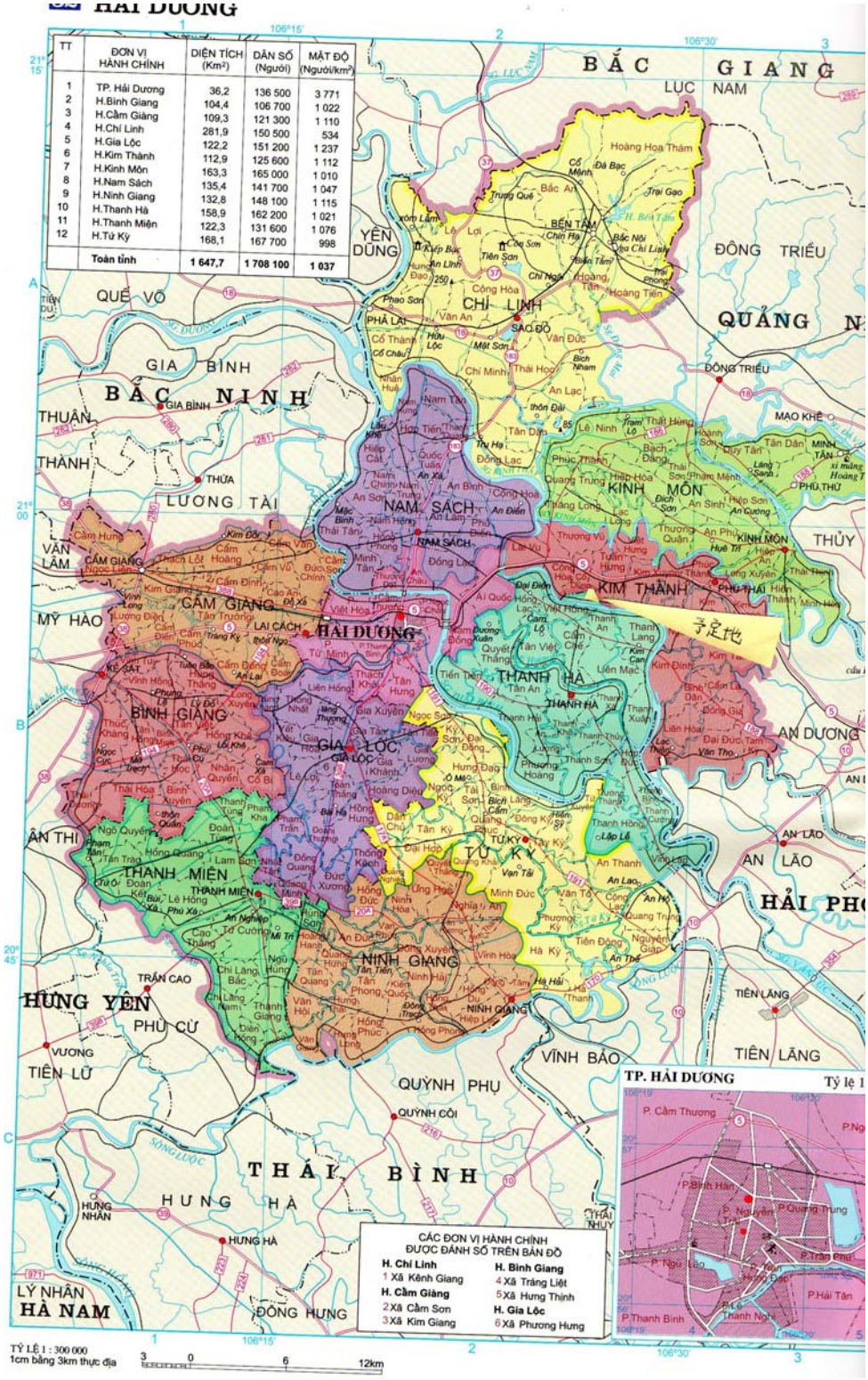
>>Hai Duong Province

A.4.1.3. City/Town/Community etc:

>>Thanh Ha prefecture, Viet Hong town, Co Cham community, district No.6

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

>> The physical location of the project activity site is shown in Figure 1. The project will be hosted by the APT-Seraphin Hai Duong in Hai Duong Province, Viet Nam, where is located in latitude 21° N、longitude 106° 20′ E。



TT	ĐƠN VỊ HÀNH CHÍNH	DIỆN TÍCH (Km²)	DÂN SỐ (Người)	MẬT ĐỘ (Người/km²)
1	TP. Hải Dương	36,2	136 500	3 771
2	H.Bình Giang	104,4	106 700	1 022
3	H.Cẩm Giàng	109,3	121 300	1 110
4	H.Chí Linh	281,9	150 500	534
5	H.Gia Lộc	122,2	151 200	1 237
6	H.Kim Thành	112,9	125 600	1 112
7	H.Kinh Môn	163,3	165 000	1 010
8	H.Nam Sách	135,4	141 700	1 047
9	H.Ninh Giang	132,8	148 100	1 115
10	H.Thanh Hà	158,9	162 200	1 021
11	H.Thanh Miện	122,3	131 600	1 076
12	H.Tứ Kỳ	168,1	167 700	998
	Toàn tỉnh	1 647,7	1 708 100	1 037

CÁC ĐƠN VỊ HÀNH CHÍNH ĐƯỢC ĐÁNH SỐ TRÊN BẢN ĐỒ

H. Chí Linh
1 Xã Kênh Giang

H. Cẩm Giàng
2 Xã Cẩm Sơn
3 Xã Kim Giang

H. Bình Giang
4 Xã Tráng Liệt
5 Xã Hưng Thịnh

H. Gia Lộc
6 Xã Phương Hưng

Figure 1: Location of the Project activity

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

>Avoidance of methane emissions through controlled biological treatment of biomass
Aerobic treatment by compost and proper soil application of the compost

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO2e
Year 1 (2011)	5,850
Year 2 (2012)	12,159
Year 3 (2013)	17,629
Year 4 (2014)	22,552
Year 5 (2015)	26,289
Year 6 (2016)	29,022
Year 7 (2017)	31,070
Year 8 (2018)	32,647
Year 9 (2019)	33,896
Year 10 (2010)	34,915
Total estimated reductions (tonnes CO2e)	246,030
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period of (tonnes CO2e)	24,603

A.4.4. Public funding of the small-scale project activity:

>>The project is not expecting public funding.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

As in Appendix C of Simplified Modalities and Procedures for Small-scale CDM project activities, a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity;

- With the same project participants
- In same project category and technology/measure: and
- Registered with in the previous two years; and
- Whose project boundary is within 1km of the project boundary of the proposed small scale activity at the closest point.

According to the above definition, this project activity is not debundled.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

The project applies following approved baseline and monitoring methodology:

AMS - III.F "Avoidance of methane emissions through controlled biological treatment of biomass" version 08 sectoral scope 13 (EB48)

"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" version 04(EB41)

B.2 Justification of the choice of the project category:

According to following reasons, this project activity introduces type (iii), especially AMS-III.F of approved methodology of small-scale CDM, not type (i) or (ii).

-This project activity, which avoids generation of methane gas by composting organic waste, does not recover energy, and is not applicable to a renewable energy project in the field of energy industry.

-This project does not promote activities of generating energy or energy efficiency neither at supply side or demand side, promote energy saving or fuel transformation for industrial facilities, buildings, agricultural equipment and activities, and promote improvement of energy efficiency by centralizing utilities of factories, but separate and treats organic waste from MSW (Municipal Solid Waste).

-This project is in the field of waste treatment and disposal. Besides the method of avoiding CH_4 is composting, and none of controlled incineration or gasification, methane recovery, and controlled heat decomposition are not introduced.

B.3. Description of the project boundary:

In "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories: AMS - III.F ", the project boundary is the physical, geographical site:

(a) Where the solid waste would have been disposed and the methane emission occurs in absence of the proposed project activity;
(b) In the case of projects co-composting wastewater, where the co-composting wastewater would have been treated under anaerobic condition in the absence of the project activity;
(c) Where the treatment of biomass through composting or anaerobic digestion takes place;
(d) Where the residual waste from biological treatment or products from those treatments, like compost and slurry, are handled, disposed, submitted, to soil application, or treated thermally/mechanically;
(e) Where biogas is burned/flared or gainfully used;
(f) And the itineraries between them (above a, b, c, and d), where the transportation of waste, wastewater, where applicable manure, compost/slurry/products of treatment or biogas occurs.

Based on above, the project boundary will be:
(A1) Landfill site of Hai Duong city
(C1) Composting treatment line and storage (located inside the new waste treatment facility)
(D2) Landfill site (located inside the new waste treatment facility)
(F1) Transportation between (C1) and Compost product user, (C1) and (D2)

The project activity boundary includes fuel and electricity consumption of entire new waste treatment facility. Therefore, all of the fuel and electricity consumption for the transportation between lines within the new waste treatment facility is included. In addition, there are some possibilities to dispose compost/products due to some reasons. Thus landfill site should be included in the project activity boundary (D2).

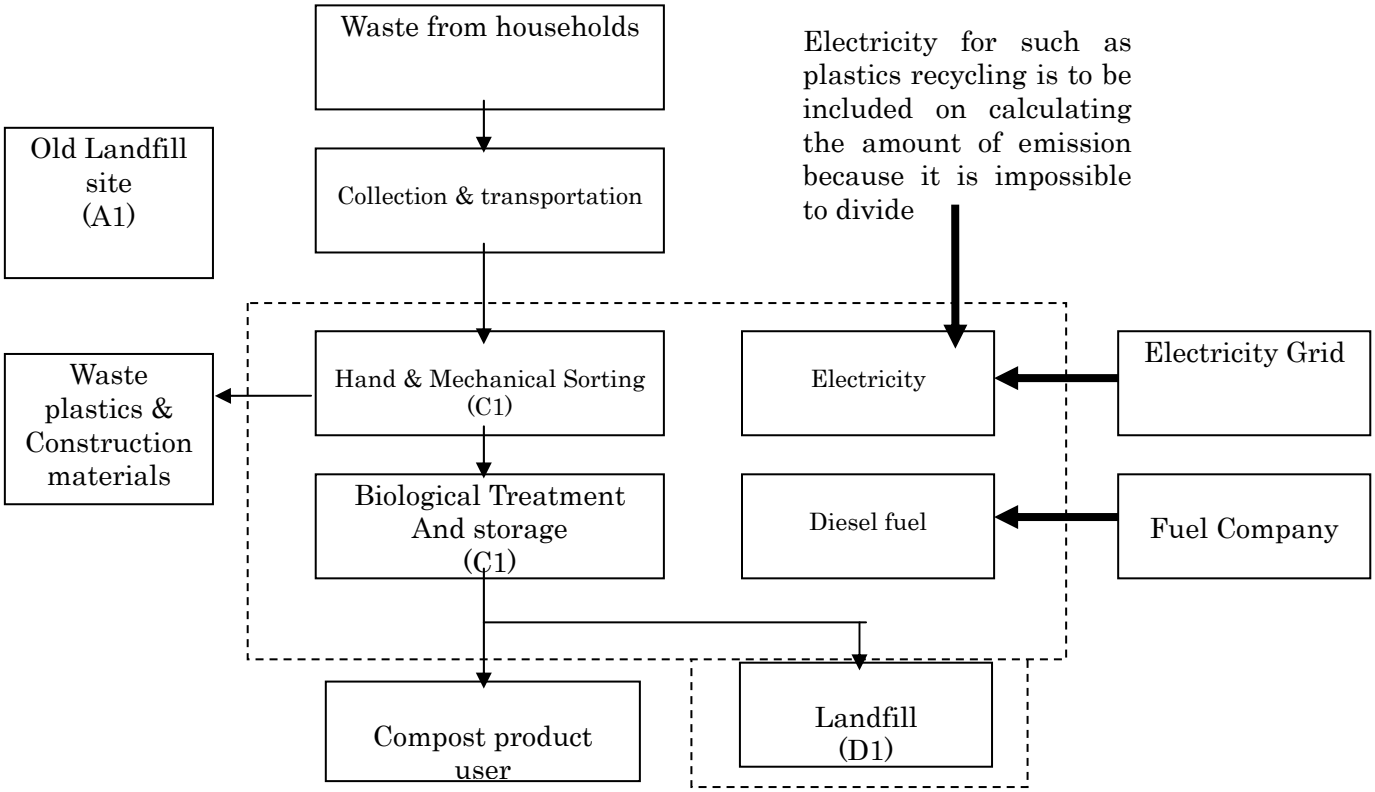


Figure 2 : Project Boundary

B.4. Description of baseline and its development:

>>①Baseline scenario

MSW of Hai Duong city will be dumped directly to the new sanitary landfill site which will be located next to the project site.

②the way of thinking baseline scenario

Scenario: continuation of direct landfill into sanitary landfill site (the status quo)

In general, MSW in Vietnam is transported and dumped directly into landfill sites. Governments' budget for waste management are limited in nation-wide (4-8USD/t as treatment fee), therefore, landfill is introduced because of its cheapness in investment and operation cost. There are a few cities which have been producing compost or RDF, but none of these treats entire amount of MSW of each city, and many cases of them acquired equipments by utilizing Official Development Assistance (ODA) to reduce the economical burdens.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

Identification of alternatives to the project activity consistent with current laws and regulations

Alternative scenario:

①Step1 : Identification of alternatives to the project activity consistent with current laws and regulations

Sub-Step 1a: Define alternatives to the project activity:

（case1）Landfill to the sanitary landfill site (the status quo)

（case2）Composting（without being registered as a CDM project activity）

（case3）RDF

（case4）Incineration

（case5）Methane fermentation

（case6）Organic waste recycling becomes popular among the objective households

Sub-Step 1b: consistency with necessary regulations

There is no regulation other than the guideline to reduce volume of waste for prolonging the life of landfill site in Viet Nam.

②Step3：Barrier analysis

The existence of following barriers must be analysed in order to implement the proposed project:

A) Existence of a barrier which avoids the implementation of this type of proposed activity; and

B) Do not avoid the implementation of at least one of the alternatives.

Sub-Step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

a) Investment barrier

＜from the aspect of project's feasibility＞

As the result of feasibility study, internal rate of return (IRR) is 10.79%, which slightly exceeds the baking rate of 5-year fixed account of private bank in Vietnam, which is difficult to invest in general, considering the operational risk and the sales risk of recycled materials.

＜from the aspect of revenue＞

The compost products which produced in this project are organic waste separated out of MSW collected in the urban area, and their quality is unstable. Thus, the compost product might not stably meet the quality standard of products as fertilizer, so the selling price might be lower than present estimation. As the result, it is probable that the revenue by selling compost will be lower than assumption.

The main revenue source of this project activity is the tipping fee from Hai Duong Province which is about 7 USD/ton. In addition, revenue by selling waste plastics and other materials from the MSW can be expected. However, the selling market of waste plastics depends on oil price which is unstable. Also the sales price of construction materials recycled from waste is expected to be lower because of the difficulty of quality control.

＜from the aspect of operational management＞

If the situation would be difficult to keep stable and sufficient revenue, it would be also

difficult to raise fund for operational management including plant maintenance. As the result, operational time would be reduced or operation itself would be even stopped.

b) Technological barrier

Maintenance technology is possible barrier. In order to keep a plant operational at any time, it is necessary to train workers.

In addition, chemical substances such as dish washing detergents are also possibly included in final product of compost which leads to the limitation of the place where compost will be sent for sales, because the waste is collected without segregation.

Sub-Step 3b : Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

As the result of following investigation, the identified barriers would not prevent case 1: Landfill to the sanitary landfill site (the status quo).

(case1) Landfill to the sanitary landfill site (the status quo)

a) Investment barrier

Budget for waste management are limited nation-wide, therefore, landfill is introduced as the cheapest way (4-8USD/t as treatment fee). There are only 5 cities out of 63 cities/provinces in Vietnam which have introduced other treatment methods than landfill, and all of these cities have larger population than 2 hundred thousand. Therefore, there is no barrier to investment in sanitary landfill.

b) Technological barrier

It is common and general that MSW is directly dumped in the landfill site after collection in Vietnam. Thus, there is no barrier to it.

(case2) Composting (without being registered as a CDM project activity)

a) Investment barrier

There are 5 composting facilities in Vietnam, and 3 of these were constructed by ODA scheme (either grant or loan). Some of these facilities have difficulties to secure sufficient budget for operation and maintenance due to low treatment fee and unstable sales market of products. Therefore, there would be some investment barriers if the analysis was based only on market principle.

b) Technological barrier

There is no technological barrier because both mechanical composting facilities and manual ones are available in Vietnam.

(case3) RDF

a) Investment barrier

It is still in demonstration stage in Vietnam.

b) Technological barrier

It is still in demonstration stage in Vietnam, but the producers are aiming to use it for fuel switching to coal, such as paper mill boilers, etc. There are 2 facilities in operation, but both are in demonstrating level. In addition, its calories are between

2,000 and 2,700 kcal, and its ash containing ratio is over 60%. It needs three times more calories to be competitive with coal, and the way to deal with ash generated through incineration is also an issue. Therefore, RDF shall not be so convenient for users.

(case4) Incineration

a) Investment barrier

According to a incinerator constructing plan which calculated in Ha Noi in the past, unit price for construction was 3,800,000,000VND/t(≒215,730USD/t, also approximately 20,000,000yen/t), and unit price for composting facility including equipments given by ODA was 600,000,000VND/t(≒33,707USD/t, and also approximately 3,100,000yen/t). Additionally, the cost for operation and maintenance of incineration is higher than composting. Therefore, it is not realistic to introduce an incinerator for budgetary reason (it is also easy to expect another cost of supplementary fuel due to its lower calories).

b) Technological barrier

There are no skills in incineration operation and maintenance technology in Vietnam because it has no experience of introducing large incinerators.

(case5) Methane fermentation

a) Investment barrier

It is assumable that the cost to construct and operate methane fermentation facilities is higher than that of sanitary landfill, although it is lower than that of incinerator. Considering the budget situation, it is quite difficult to invest to methane fermentation system comparing to sanitary landfill.

b) Technological barrier

Methane fermentation is more suitable for hydrated waste than incinerator, however, there is no experience or feasibility study of methane fermentation whose subject is MSW in Viet Nam. In addition, there are some cases introducing methane fermentation method regarding small facilities at piggeries, but their operational rate is low and they lack operational technology.

(case6) Organic waste recycling becomes popular among the objective households

a) Investment barrier

Tipping fee for MSW collection and treatment collected from each household in Hanoi is now 2,500VND/head/month. There is no incentive to promote organic waste recycling at least they receive monetary or non-monetary benefit of more than 2,500VND/head/month. Therefore, MSW treatment will be handled by municipalities as present, until law/regulation or subsidy will be in effect to make each household to recycle organic waste.

b) Technological barrier

Establishment of the custom of separation at source of waste requires a few year in general. The model project of separation at source that was demonstrated by Japan International Cooperation Agency (JICA) in Ha Noi is already 3 years since starting the activity but not yet a custom. It needs time and education, and it will not be done

by the starting date of ASH project.

③Step 4: Common practice analysis

In order to complement the result of Step3, analyze the extent to which the proposed project type has already diffused in the relevant sector and region.

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

There are 5 composting facilities in operation in Viet Nam. They were introduced in cities which have over 200,000 populations and many of these have 100t/d level of treatment capacity. And 3 of these have received equipments by ODA.

As for business operation, the entrustment fees for waste management paid by local governments are not sufficient, and sales market of recycled materials is unstable. Thus, it is difficult to fulfil the necessary budget for operation and maintenance, and there are some facilities whose operational rate is very low. Therefore, the introduction of composting facilities is difficult if analysis does not have any additional support.

Sub-step 4b: Discuss any similar Options that are occurring:

If the analysis of Sub-Step 4a as mentioned above was considered, it would be difficult to maintain and diffuse composting as far as the source of revenue for stable operation would not be ensured.

As discussed above, a similar project to this project activity is not likely to be implemented, and being registered as a CDM project is necessary to implement this project activity. Therefore, this proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to following reasons, this project can apply approved methodology AMS-III.F, "Avoidance of methane emissions through controlled biological treatment of biomass".

-This project will introduce aerobic treatment by composting and proper soil application of the compost
-This project will treat only the organic fraction of municipal solid waste
- This project will result in emission reductions of approx. 25kt CO_2 equivalent annually, and it is less than the annual reduction volume of 60 kt CO_2 equivalent, which this approved small-scale methodology is applicable.
-The baseline of this project, which is the continuous use of the landfill site which will be newly constructed by government of Hai Duong city is planned to be operated for more than 10 years from the end of 2010. Thus, landfill will be used throughout the crediting period of ASH project.
-All of MSW collected from Hai Duong city is dumped in the landfill in present, and direct landfill is confirmed as a common method of waste treatment in Hai Duong.
-The collection points of MSW are within 20km radius of the project site, and the location where compost will be sold are also located within a radius of 20km. Thus it is not more than 200km stipulated in the approved methodology.
-This project will supply sufficient oxygen at any time during the compost production process and keep the ratio of oxygen over 10%, so there will be no possibility of causing anaerobic

fermentation at points of using composts as products.

B.6.2. Data and parameters that are available at validation:

Baseline Emissions

There will be no energy generated from this project. The volume of methane which emitted from landfill site without this proposed project will be the baseline emissions. All of methane gas generated from this project will be recognized as it is to be emitted into the air. The baseline emission will be calculated by using the formula below. As for MEPy, ww, it is necessary to take it into account if waste water as nutriment would be added from other waste water in the project. However, this project will not do it and it will not be taken into account.

BEy = $BE_{CH4,SWDS,Y}$ -(MDy,reg*GWP_CH4)+(MEPy,ww*GWP_CH4)+BECH4,manure,y

MDy,reg	=Amount of methane that would have to be captured and combusted in the year *y* to comply with the prevailing regulations (tonne)
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)

$BE_{CH4,SWDS,Y}$=

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

$BE_{CH4, SWDS,y}$	=Yearly methane generation potential of the solid waste composted or anaerobically digested by the project activity during the year y (t-CO2)
φ	=Model correction factor to account for model uncertainties（0.9）
f	=Fraction of methane captured at the SWDS and flared, combusted or used in another manner(0)
GWP_{CH4}	=Global Warming Potential (GWP) of methane, valid for the relevant commitment period（21）
OX	=Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)（0.1）
F	=Fraction of methane in the SWDS gas (volume fraction)（0.5）
DOC_f	=Fraction of degradable organic carbon (DOC) that can decompose（0.5）
MCF	=Methane correction factor（0.8）
$W_{j,x}$	=Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x* (tons)
DOC j	=Fraction of degradable organic carbon (by weight) in the waste type *j*（% wet waste=food, food waste, beverages and tobacco 15, pulp, paper and cardboard 40, textiles 24）
k j	=Decay rate for the waste type *j*（=food, food waste, beverages and tobacco 0.4, pulp, paper and cardboard 0.07, textiles 0.07）
j	=Waste type category (index)
x	=Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y) (= each year from the first year to 10^{th} year as for this project activity)
Y	=Year for which methane emissions are calculated

Project Activity Emissions

Project activity emissions consists of (1)emissions regarding fuel consumption for project activity, (2)emissions regarding electricity consumption, (3)emissions regarding composting process, (4)emissions regarding waste water treatment (composting), and (5)emissions regarding landfill of compost products. Project activity emissions will be calculated using the formula below.

ER y＝BE y - (PE y + LEy)

PE y＝PE y, transp + PE y, power + PE y, composting + PE y, runoff + PE y, landfill

・Emissions regarding fuel consumption for project activity

PE y, transp ＝((Q y sw/CT y sw)* DAF w* EFCO2)+((Q y pl/CT y pl) * DAF w * EFCO2) + (Qy, treatment, i/CT y,treatment,i) * DAF treatment, i * EFCO2

Q y sw	＝Quantity of raw waste/manure treated and/or wastewater co-treated in the year *y*
Q y pl	＝Quantity of plastics among raw waste/manure treated and/or wastewater co-treated in the year *y*
CT y sw	＝Average truck capacity for transportation
DAF w sw	＝Average incremental distance for raw solid waste/manure and/or wastewater transportation
DAF w pl	＝Average incremental distance for waste plastics among raw solid waste/manure and/or wastewater transportation
EF_{CO2}	＝CO_2 emission factor from fuel use due to transportation ($kgCO_2$/km, IPCC default values or local values may be used)
I	＝Type of residual waste/products and or compost
Q y,treatment, I	＝Quantity of residual waste/products and/or compost *i* produced in year *y* (tonnes)
CT y,treatment, I	＝Average truck capacity for residual waste/products/compost *i* transportation (tonnes/truck)
DAF treatment, I	＝Average distance for residual waste/products/compost *i* transportation (km/truck)

・Emissions regarding electricity consumption

PE y, power = EC y * EF power + DC y * EF diesel

EC y	＝Electricity consumption in the composting plant in year
EF power	＝Emissions factor for grid electricity
DC y	＝Diesel fuel consumption in the composting plant in year
EF diesel	＝Emissions factor for diesel fuel

・Emissions regarding composting process

PE y, composting = Q y * EF composting * GWP_CH4

Q y	＝Quantity of raw waste/manure treated and/or wastewater co-treated in the year *y* (tonnes)
EF composting	＝Emission factor for composting of organic waste and/or manure (t CH4/ton waste treated). Emission factors can be based on facility/site-specific measurements, country specific values or IPCC default values
GWP_CH4	＝Global Warming Potential (GWP) of methane, valid for the relevant commitment period（21）

・Emissions regarding waste water treatment (composting)

PE y, runoff = Q y, ww, runoff * COD y. ww, runoff * B o, ww * MCF ww, treatment * UF b * GWP_CH4

Q y, ww, runoff	＝Volume of runoff water in the year *y* (m3)
COD y, ww, runoff	＝Chemical oxygen demand of the runoff water leaving the composting facility in the year *y* (tonnes/m3)
B o, ww	＝Methane producing capacity of the wastewater (IPCC default value of 0.21 kg CH4/kg.COD), as described in footnote 1
MCF ww, treatment	＝Methane correction factor for the wastewater treatment system where the runoff water is treated (MCF value as per Table III.F.1)
UF b	＝Model correction factor to account for model uncertainties (1.06)4
GWP_CH4	＝Global Warming Potential (GWP) of methane, valid for the relevant commitment period（21）

・Emissions regarding landfill of compost products

PEy,landfill =

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

φ	=Model correction factor to account for model uncertainties (0.9)
F	=Fraction of methane captured at the SWDS and flared, combusted or used in another manner (0)
GWP_{CH4}	=Global Warming Potential (GWP) of methane, valid for the relevant commitment period (21)
OX	=Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (0.1)
F	=Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f decompose	=Fraction of degradable organic carbon (DOC) that can (0.5)
MCF	=Methane correction factor (0.8)
$W_{j,x}$	=Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x* (tons)
DOC j	=Fraction of degradable organic carbon (by weight) in the waste type *j* (% wet waste=food, food waste, beverages and tobacco 15,pulp, paper and cardboard 40, textiles 24)
k j	=Decay rate for the waste type *j* (=food, food waste, beverages and tobacco 0.4, pulp, paper and cardboard 0.07, textiles 0.07)
j	=Waste type category (index)
x	=Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y) (= each year from the first year to 10th year as for this project activity)
Y	=Year for which methane emissions are calculated

Leakage

The methodology AMS-III.F. says that if the project technology is the equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage effects are to be considered. However, this project activity will not be promoted applying the technology from another activity, and the existing equipment is not transferred to another activity. Thus leakage effects are not be considered.

Parameters listed blow are existing parameters. Parameters of $PE_{y, landfill}$ are omitted because they are the same as these of $BE_{CH4, SWDS, y.}$

Data / Parameter:	*DAF w sw*
Data unit:	km/truck
Description:	Average incremental distance for raw solid waste/manure and/or wastewater transportation
Source of data used:	investment plan of ASH
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value will be 0 in the baseline scenario because raw solid waste will be transferred to the landfill site which is located next to the site of this project.
Any comment:	-

Data / Parameter:	*I*
Data unit:	-
Description:	Type of residual waste/products and/or compost
Source of data used:	investment plan of ASH
Value applied:	5
Justification of the choice of data or description of measurement methods and procedures actually applied :	5 types of waste (compost, waste plastic (of better quality, worse quality), construction materials, and residue) are to be emitted from the plant concerned.
Any comment:	-

Data / Parameter:	*EF diesel*
Data unit:	kgCO2/L
Description:	Emissions factor for diesel fuel
Source of data used:	A default value of IPCC
Value applied:	2.83
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no official datum on diesel fuel consumed in Viet Nam.
Any comment:	—

Data / Parameter:	*GWP_CH4*
Data unit:	-
Description:	Global warming potential for CH4
Source of data used:	A default value of IPCC
Value applied:	21
Justification of the choice of data or description of	—

measurement methods and procedures actually applied :	
Any comment:	－

Data / Parameter:	$B_{o,ww}$
Data unit:	kgCH4/kg COD
Description:	Methane producing capacity of the wastewater, as described in footnote 1
Source of data used:	AMS-III.F
Value applied:	0.21
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is applied because the default value of IPCC is given in the approved methodology, and parameter $BOD_{5,20}$ which determines the quantity of waste water will not be used in the project activity.
Any comment:	－

Data / Parameter:	$MCF_{ww, treatment}$
Data unit:	-
Description:	Methane correction factor for the wastewater treatment system where the runoff water is treated
Source of data used:	A default value of IPCC （Chapter 6 of volume 5)
Value applied:	0.2
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is applied because the measure of waste water corresponds to Anaerobic shallow lagoon (depth less than 2 meters).
Any comment:	－

Data / Parameter:	UF_b
Data unit:	-
Description:	Model Correction factor to account for model uncertainties
Source of data used:	Reference: FCCC/SBSTA/2003/10/Add.2 page 25
Value applied:	1.06
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is given as a default value of IPCC in the approved methodology as for project emissions.
Any comment:	

Data / Parameter:	Φ
Data unit:	-

Description:	Model correction factor to account for model uncertainties
Source of data used:	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is given as a default value of IPCC in the approved methodology.
Any comment:	—

Data / Parameter:	***F***
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data used:	Investment plan of ASH
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is 0 because this project not a project which recovers and uses methane gas generated from a landfill site.
Any comment:	—

Data / Parameter:	***F***
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	A default value of IPCC. "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Chapter 3. page15.
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is applied because the waste at SWDS was the subject in baseline scenario, and it is said that almost all waste generates 50% of methane gas. Besides, the value is what is recommended by IPCC.
Any comment:	

Data / Parameter:	***DOC f***
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	A default value of IPCC. "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Chapter 3. page13.
Value applied:	0.5
Justification of the choice of data or description of	The value is applied because wastes at SWDS are in anaerobic condition, and it is also assumable that they contain lignin.

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	***MCF***
Data unit:	-
Description:	Methane correction factor
Source of data used:	A default value of IPCC. "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	The landfill site is not controlled and deep type in baseline scenario. And the default value 0.8 is given by IPCC.
Any comment:	

Data / Parameter:	***DOC j***
Data unit:	%
Description:	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data used:	A default value of IPCC. "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Value applied:	Foods:15, papers:40, textiles:24
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is applied because the subject of This project is wet waste.
Any comment:	

Data / Parameter:	***K j***
Data unit:	-
Description:	Decay rate for the waste type j
Source of data used:	IPCC 2006
Value applied:	Foods:0.4, papers:0.07, textiles:0.07
Justification of the choice of data or description of measurement methods and procedures actually applied :	The values are applied because the waste which is the subject of this project is in the conditions of tropical, wet（MAP＞1000mm）, and temperature is over 20℃.
Any comment:	

Data / Parameter:	***J***
Data unit:	-

Description:	Waste type category (index)
Source of data used:	
Value applied:	6
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>CO_2 reduction during project activity was calculated as follows.

ER y = BE y － (PE y + LE y)= 273,487 – (27,457 + 0) = 246,030t-CO2／decade

ER y＝ The amount of GHGs which reduced in the year y
BE y＝ Baseline emissions of GHGs in the year y
PE y＝ Project activity emissions of GHGS in the year y
LE y＝ Leakage emissions of GHGs in the year y

The amount of GHGs which reduced are shown in the chart below according to fiscal year and item.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
$BE_{CH4,SWDS,Y}$	7,874	14,472	20,232	25,445	29,181	31,915	33,963	35,539	36,788	37,807	273,216
$MEP_{y,ww}$	20	23	26	29	29	29	29	29	29	29	271
Baseline Emission	7,895	14,496	20,258	25,473	29,210	31,943	33,991	35,568	36,817	37,836	273,487
PEy,transp	168	192	216	240	240	240	240	240	240	240	2,257
PEy,power	1,757	2,008	2,259	2,510	2,510	2,510	2,510	2,510	2,510	2,510	23,596
PEy,runoff	119	136	154	171	171	171	171	171	171	171	1,604
PEy,landfill	0	0	0	0	0	0	0	0	0	0	0
Project Emission	2,045	2,337	2,629	2,921	2,921	2,921	2,921	2,921	2,921	2,921	27,457
Leakage	0	0	0	0	0	0	0	0	0	0	0
CO2 Reduction amount	5,850	12,159	17,629	22,552	26,289	29,022	31,070	32,647	33,896	34,915	246,030

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Baseline emissions

Baseline emissions were calculated as 273,487t-CO2/decade, and 27,349 t -CO2/y in average.

year	$BE_{CH4,SWDS,Y}$	MEP y, ww	Sub total
1st year	7,874t	20t	7,895t
2nd year	14,472t	23t	14,496t
3rd year	20,232t	26t	20,258t
4th year	25,445t	29t	25,473t
5th year	29,181t	29t	29,210t
6th year	31,915t	29t	31,943t
7th year	33,963t	29t	33,991t

8th year	35,539t	29t	35,568t
9th year	36,788t	29t	36,817t
10th year	37,807t	29t	37,836t
Grand total	273,216t	271t	273,487t

Project activity emissions

The amount of project activity emissions are 27,457t-CO2/decade, and 2,760 t -CO2/y in average.

year	PE y, transp	PE y, power	PE y, runoff	PE y, landfill	Sub total
1st year	168t	1,757t	119t	0t	2,045t
2nd year	192t	2,008t	136t	0t	2,337t
3rd year	216t	2,259t	154t	0t	2,629t
4th year	240 t	2,510t	171t	0t	2,921t
5th year	240 t	2,510t	171t	0t	2,921t
6th year	240t	2,510t	171t	0t	2,921t
7th year	240t	2,510t	171t	0t	2,921t
8th year	240t	2,510t	171t	0t	2,921t
9th year	240t	2,510t	171t	0t	2,921t
10th year	240t	2,510t	171t	0t	2,921t
Grand total	2,257t	23,596t	1,604t	0t	27,457t

The amount of CO_2 reduction

The total amount of CO2 reduced in this project was calculated as 246,030t-CO2/decade, and 24,603t-CO2/y in average.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
$BE_{CH4,SWDS,Y}$	7,874	14,472	20,232	25,445	29,181	31,915	33,963	35,539	36,788	37,807	273,216
$MEP_{y,ww}$	20	23	26	29	29	29	29	29	29	29	271
Baseline Emission	7,895	14,496	20,258	25,473	29,210	31,943	33,991	35,568	36,817	37,836	273,487
PEy,transp	168	192	216	240	240	240	240	240	240	240	2,257
PEy,power	1,757	2,008	2,259	2,510	2,510	2,510	2,510	2,510	2,510	2,510	23,596
PEy,runoff	119	136	154	171	171	171	171	171	171	171	1,604
PEy,landfill	0	0	0	0	0	0	0	0	0	0	0
Project Emission	2,045	2,337	2,629	2,921	2,921	2,921	2,921	2,921	2,921	2,921	27,457
Leakage	0	0	0	0	0	0	0	0	0	0	0
CO2 Reduction amount	5,850	12,159	17,629	22,552	26,289	29,022	31,070	32,647	33,896	34,915	246,030

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$Q_{y\,sw}$
Data unit:	T
Description:	Quantity of raw waste/manure treated and/or wastewater co-treated in the year y
Source of data to be used:	On-site measurement
Value of data	
Description of measurement	This amount will be measured at the truck scale which will be located at the entrance of the facility by comparing the difference of amounts before

methods and procedures to be applied:	and after unloading.
QA/QC procedures to be applied:	Periodical calibration will be done.
Any comment:	

Data / Parameter:	***Q y pl***
Data unit:	T
Description:	Quantity of raw waste/manure treated and/or wastewater co-treated in the year y
Source of data to be used:	On-site measurement
Value of data	
Description of measurement methods and procedures to be applied:	This amount will be measured at the truck scale which will be located at the entrance of the facility by comparing the difference of amounts before and after unloading.
QA/QC procedures to be applied:	Periodical calibration will be done.
Any comment:	

Data / Parameter:	***CT y sw***
Data unit:	t/truck
Description:	Average truck capacity for transportation
Source of data to be used:	Vehicles (confirmation by eye)
Value of data	
Description of measurement methods and procedures to be applied:	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, visual check will be done for cross check.
QA/QC procedures to be applied:	Periodical confirmation of vehicles will be done; 1) when vehicles with unregistered number plate enters into facility 2) once a year with owners of vehicles
Any comment:	

Data / Parameter:	***CT y, pl***
Data unit:	t/truck
Description:	Average truck capacity for transportation
Source of data to be used:	Vehicles (confirmation by eye)
Value of data	
Description of measurement methods and procedures to be applied:	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, visual check will be done for cross check.
QA/QC procedures to	Periodical confirmation of vehicles will be done;

be applied:	1) when vehicles with unregistered number plate enters into facility 2) once a year with owners of vehicles
Any comment:	

Data / Parameter:	***DAF w pl***
Data unit:	km/truck
Description:	Average incremental distance for raw solid waste/manure and/or wastewater transportation
Source of data to be used:	Entrance of the facility
Value of data ,	
Description of measurement methods and procedures to be applied:	-After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, confirmation on drivers will be done for cross check. In case the check reveals that there are any registered collection points which have been missed to be collected, these points will be registered by confirmation of place for loading. -The number of vehicles and provinces are linked together. -Data of basic distances between each province will be put into database. -the distance which is 1.5 time longer than actual basic distance will be regarded as the 1 time distance.
QA/QC procedures to be applied:	Run test will be done once a year.
Any comment:	

Data / Parameter:	***EF CO_2***
Data unit:	kg/CO_2/km
Description:	CO_2 emission factor from fuel use due to transportation
Source of data to be used:	IPCC database
Value of data	-
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	Baseline scenario confirmation of IPCC default value will be done once a year
Any comment:	-

Data / Parameter:	***Q y, treatment, i***
Data unit:	T
Description:	Quantity of residual waste/products and/or compost i produced in year y
Source of data to be used:	1) Entrance of the facility 2) Shipping Section
Value of data	
Description of measurement methods and procedures to be applied:	The quantity concerning each type of waste will be confirmed through comparing the difference of the weight of truck both before and after shipping (when a truck is empty and when it is filled with products). After confirming the amount of shipping products by inventory management, then the weight of plastic bags will be deducted from entire amount.

QA/QC procedures to be applied:	Periodical confirmation of the truck scale
Any comment:	

Data / Parameter:	***CT y, treatment, i***
Data unit:	t/truck
Description:	Average truck capacity for residual waste/products/compost i transportation
Source of data to be used:	Entrance of the facility
Value of data	
Description of measurement methods and procedures to be applied:	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made in the phase of practical business. Additionally, visual check will be done for cross check. The quantity will be confirmed through comparing the difference of the weight of truck both before and after shipping (when a truck is empty and when it is filled with products. Total amount of loading will be divided by the total number of trucks).
QA/QC procedures to be applied:	Periodical confirmation of truck scale
Any comment:	

Data / Parameter:	***DAF treatment, i***
Data unit:	km/trucks
Description:	Average distance for residual waste/products/compost i transportation
Source of data to be used:	1) Entrance of the facility 2) Shipping Section
Value of data	
Description of measurement methods and procedures to be applied:	1) After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, confirmation on drivers will be done for cross check. In case the check reveals that there are any registered collection points which have been missed to be collected, these points will be registered by confirmation of place for loading. 2) The place of sales will be kept in the shipping record (according to sales slips).
QA/QC procedures to be applied:	Run test will be done once a year.
Any comment:	

Data / Parameter:	***EC y***
Data unit:	MWh
Description:	Electricity consumption in the composting plant in year
Source of data to be used:	The record written in the electricity bills
Value of data	
Description of measurement methods and procedures to be	The record written in the electricity bills will be checked per payment.

applied:	
QA/QC procedures to be applied:	Check will be done on each payment.
Any comment:	

Data / Parameter:	***EF power***
Data unit:	tCO2/MWh
Description:	Emissions factor for grid electricity
Source of data to be used:	Home Page of EVN research institute
Value of data	
Description of measurement methods and procedures to be applied:	Confirmation of CO2 emission factor by Calculation, where using electricity in northern area of Viet Nam
QA/QC procedures to be applied:	Annual confirmation of operational rate of new power plant will be done.
Any comment:	

Data / Parameter:	***DC y***
Data unit:	L/Y
Description:	Diesel fuel consumption in the composting plant in year
Source of data to be used:	Investment plan of ASH
Value of data	
Description of measurement methods and procedures to be applied:	Confirmation of fuel charge will be done on each payment by checking the bills.
QA/QC procedures to be applied:	Cross check by both a statement of delivery and the bill.
Any comment:	

Data / Parameter:	***EF diesel***
Data unit:	$kgCO_2/L$
Description:	Emissions factor for diesel fuel
Source of data to be used:	The default value of IPCC
Value of data	
Description of measurement methods and procedures to be applied:	Annual confirmation of CO_2 emission factor concerning diesel fuel will be done.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	***Q y***
Data unit:	t

Description:	Quantity of raw waste/manure treated and/or wastewater co-treated in the year y
Source of data to be used:	Investment plan of ASH
Value of data	
Description of measurement methods and procedures to be applied:	The quantity will be measured by using a truck scale to compare the weight of truck both before and after unloading.
QA/QC procedures to be applied:	Periodical calibration of the truck scale will be done (once a year).
Any comment:	

Data / Parameter:	***EF composting***
Data unit:	tCH_4/ton (waste treated)
Description:	Emission factor for composting of organic waste and/or manure. Emission factors can be based on facility/site-specific measurements, country specific values of IPCC default values.
Source of data to be used:	The default value recommended by IPCC
Value of data	
Description of measurement methods and procedures to be applied:	The database of IPCC will be checked whether or not any change has been made once a year (about the amount of CO_2 emissions per unit concerning the organic waste composting).
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	***GWP_CH4***
Data unit:	
Description:	Global warming potential for CH_4
Source of data to be used:	The default value recommended by IPCC
Value of data	
Description of measurement methods and procedures to be applied:	The database of IPCC will be checked whether or not any change has been made once a year.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	***Q y ww, runoff***
Data unit:	m^3
Description:	Volume of runoff water in the year y
Source of data to be used:	The exit part of the measure of runoff water
Value of data	

Description of measurement methods and procedures to be applied:	The equipment for measuring the quantity of flow will be used and measured.
QA/QC procedures to be applied:	Frequent cleaning of measuring equipment and periodical calibration will be done.
Any comment:	

Data / Parameter:	***COD y, ww, runoff***
Data unit:	t/M^3
Description:	Chemical oxygen demand of the runoff water leaving the composting facility in the year y（COD）
Source of data to be used:	The exit part of the measure of runoff water
Value of data	
Description of measurement methods and procedures to be applied:	Simple COD measuring equipment will be used and measured after sampling has been done.
QA/QC procedures to be applied:	Periodical calibration will be done.
Any comment:	

Data / Parameter:	***B o, ww***
Data unit:	$kgCH_4/kg$ COD
Description:	Methane producing capacity of the wastewater, as described in footnote 1, p5 of AMS-III.F.
Source of data to be used:	The default value recommended by IPCC
Value of data	
Description of measurement methods and procedures to be applied:	The database of IPCC will be checked whether or not any change has been made once a year.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	***MCF ww, treatment***
Data unit:	
Description:	Methane correction factor for the wastewater treatment system where the runoff water is treated
Source of data to be used:	The default value recommended by IPCC （Chapter 6 of volume 5) Anaerobic shallow lagoon (depth less than 2meters)
Value of data	
Description of measurement methods and procedures to be	The database of IPCC will be checked whether or not any change has been made once a year.

applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	***UF b***
Data unit:	
Description:	Model Correction factor to account for model uncertainties
Source of data to be used:	FCCC/SBSTA/2003/10/Add.2 page 25
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	***PE y, landfill***
Data unit:	
Description:	Methane producing capacity of the compost where compost/products is landfilled/disposed
Source of data to be used:	Exit of the facility
Value of data	
Description of measurement methods and procedures to be applied:	Compost which will be transported for landfilling. The quantity will be measured by using the truck scale on the occasion of carrying out.
QA/QC procedures to be applied:	The numbers written in the measuring slips are periodically checked. And also periodical calibration of the truck scale will be done (once a year).
Any comment:	

B.7.2 Description of the monitoring plan:

>>the monitoring system of this project activity is shown in detail as the chart below. All of measured data will be transformed into electronic data and saved as electronic files. As for the way of calculating raw data and the amount of emission reductions will be verified by DOE annually. DOE will issue the validation report on the result and submit it to EB to promote CER issuing procedure.

subjects for implementation	the person in charge/ organization	Notes
arrangement of monitoring plan	IKE	Establishment of implementation procedure of plan, training of employees are to be done.
Implementation of data monitoring	APT-Seraphin-Hai Duong	All data will be saved as electronic files of database. Yet

(including fuels and electricity consumed in this project, the amount of produced compost, and the concentration of O_2 and CH_4 throughout composting process)		a part of these are preserved in papers.
Monitoring of required matter such as laws and regulations on waste management	IKE	The person in charge will make reports on related regulations periodically.
Calibration of equipments for measurement (a truck scale, watt-meters, O2 and CH4 measuring instruments, COD analysers, etc.)	Organization in charge of calibration	Organization which implements calibration will issue certificate of calibration. Compost producer will preserve the certificate.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>Yasuhiro Shimada
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SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>1st January 2011

C.1.2. Expected operational lifetime of the project activity:

>> 10 years 0 month

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

(i)

C.2.1.1. Starting date of the first crediting period:

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>1st January 2011

C.2.2.2. Length:

>>10years 0 month

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>> The laws on Environmental Impact Assessment are, Law on PC on (People's Committee) and PC organization on November 26th, 2003, Law on Environmental Protection on Nov. 29th, 2005, and its Decree no. 80/2006 on Aug. 9th, 2006.
The application for EIA certification by this project activity was made on September 4th, 2007.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>> Environmental Impact Assessment was approved and signed in the decision letter no. 4447/QD-UBND by People's Committee of Hai Duong province on December 14, 2007.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

This project is to develop a waste treatment facility including composting line within the on the project site. Therefore the local stakeholders in the project area are;

- Hai Duong Province Peoples Committee
- Hai Duong City Peoples Committee
- Hai Duong City Urban Environmental Company

The project participants already had a pre-meeting with above stakeholders. General plan of the project activities were introduced to the stakeholders, although the final stakeholder's comments and approval are not given yet. It will be obtained before the project implementation.

E.2. Summary of the comments received:

All participants expressed their satisfaction towards the implementation of the proposed project because this project will contribute to improving the efficient use of landfill and organic resources, as well as reducing the GHG emissions by composting instead of sanitary landfilling.

E.3. Report on how due account was taken of any comments received:

The project have not received any comments which against the implementation, for the time being.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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E-Mail:	
URL:	http://www.ike.co.jp/
Represented by:	
Title:	Secretary to the president
Salutation:	
Last Name:	Shimada
Middle Name:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

ANNEX 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION

Chart5.1-1　Monitoring items and implementation structure (project emissions)

frequency of monitoring	monitoring items				monitoring location		monitoring method				responsibility personnel	
							how to use	QA/QC measure	QA/QC procedure			manager
frequency	parameter	content(definition)	unit	way of calculation, etc.	position/name	data preservation	way of measurement	What	who	How	person in charge	frequency
	$PE_{y,transp} = ((Q_{y\,sw}/CT_{y\,sw}) * DAFw * EFCO2) + ((Q_{y\,pl}/CT_{y\,pl}) * DAF_{w} * EF_{CO2}) + (Q_{y,treatment,i}/CT_{y,treatment,i}) * DAF_{treatment,i} * EF_{CO2}$											
every time when delivered to the facility	$Q_{y\,sw}$	Quantity of raw waste/manure treated and/or wastewater co-treated in the year y (miscellaneous MSW emitted from Hai Duong	t	on-site weighing by truck scale	On-site measurement	documents and electronic data	This amount will be measured at the truck scale which will be located at the entrance of the facility by comparing the difference of amounts before and after unloading.	the truck scale	truck scale manufacturer	Periodical calibration will be done.	the person in charge of weighing	once a year
every time when delivered to the facility	$Q_{y\,pl}$	Quantity of raw waste/manure treated and/or wastewater co-treated in the year y (waste plastics emitted from outside of Hai	t	on-site weighing by truck scale	Entrance of the facility	documents and electronic data	This amount will be measured at the truck scale which will be located at the entrance of the facility by comparing the difference of amounts before and after unloading.	the truck scale	truck scale manufacturer	Periodical calibration will be done.	the person in charge of weighing	once a year
every time when delivered to the facility	$CT_{y\,sw}$	Average truck capacity for transportation	t/truck	visual test by whom in charge of monitoring	Entrance of the facility	documents and electronic data	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, visual test will be done for cross check.	items shown left are to be confirmed	the person in charge of weighing	1) every time the vehicle with unregistered number enters into the facility 2) confirmation will be done with the owners of vehicles (once a year)	the person in charge of weighing	once a year
every time when delivered to the facility	$CT_{y\ \ pl}$	Average truck capacity for transportation	t/truck	visual test by whom in charge of monitoring	Entrance of the facility	documents and electronic data	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, visual test will be done for cross check.	items shown left are to be confirmed	the person in charge of weighing	1) every time the vehicle with unregistered number enters into the facility 3) confirmation will be done with the owners of vehicles (once a year)	the person in charge of weighing	once a year
once a year	$DAF_{w\,sw}$	CO2 emission factor from fuel use due to transportation	km/truck	This value will be 0 in the baseline scenario because raw solid waste will be transferred to the landfill site which is located next to the site of this project.		-		baseline scenario	project manager	confirmation whether or not any change has been made in baseline scenario (see the items for monitoring additionality).	the person in charge of technology	once a year
every time when delivered to the facility	$DAF_{w\,pl}$	Average incremental distance for raw solid waste/manure and/or wastewater transportation	km/truck	confirmation by the person in charge of monitoring	Entrance of the facility	documents and electronic data	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, confirmation on drivers will be done for cross check. In case the check reveals that there are any registered collection points which have been missed to be collected, these points will be registered by confirmation of place for loading.	distance for transportation	the person in charge of collection	Run test will be done.	the person in charge of weighing	once a year
once a year	EF_{CO2}	CO2 emission factor from fuel use due to transportation	kg/CO2/km	confirmation of IPCC default value	IPCC database	documents and electronic data		the truck scale	project manager	confirmation of IPCC default value	the person in charge of technology	once a year
once a year	i	Type of residual waste/products and/or compost	-	confirmation of the numbers of kinds for shipping products (into ones which itemized as large items)				distance for transportation	project manager	every time that a change has been made	the person in charge of technology	once a year
every time when products are shipped	$Q_{y,treatment,i}$	Quantity of residual waste/products and/or compost i produced in year y	t	1)weighing by the truck scale 2)cross check by confirmation of shipping slips	Entrance of the facility Shipping Section	the truck scale: electronic inventory management: electronic (connection between delivery points and the	The quantity concerning each type of waste will be confirmed through comparing the difference of the weight of truck both before and after shipping (when a truck is empty and when it is filled with products). After confirming the amount of shipping products by inventory management, then the weight of plastic bags will be deducted from entire amount.	the truck scale	truck scale manufacturer	Periodical calibration will be done (once a year).	the person in charge of weighing the person in charge of shipping management	once a year
every time when shipped	$CT_{y,treatment,i}$	Average truck capacity for residual waste/products/compost i transportation	t/truck	1)visual test on information by the person in charge of monitoring 2)weighing by the truck scale	Entrance of the facility	documents and electronic data	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made in the phase of practical business. Additionally, visual test will be done for cross check. The quantity will be confirmed through comparing the difference of the weight of truck both before and after shipping (when a truck is empty and when it is filled with products. Total amount of loading will be divided by the total number of trucks).	the truck scale	truck scale manufacturer	Periodical calibration will be done(once a year).	the person in charge of weighing	once a year
every time when shipped	$DAF_{treatment,i}$	Average distance for residual waste/products/compost i transporatation	km/trucks	1)visual test on information by the person in charge of monitoring 2)weighing by the truck scale	Entrance of the facility	documents and electronic data	After registering numbers of licence plate and other data of vehicles (company name, car sizes, approximate location of parking lots) on the first delivery, connection between these data and electronic database will be made. Additionally, confirmation on drivers will be done for cross check. In case the check reveals that there are any registered collection points which have been missed to be collected, these points will be registered by confirmation of place for loading.	distance for transportation	the person in charge of collection	Run test will be done.	the person in charge of weighing	once a year
					Shipping Section	shipping management: electronic (connection between delivery points and the numbers of vehicles)	The place of sales will be kept in the shipping record (according to sales slips).	distance for transportation	the person in charge of collection	Run test will be done.	Shipping Section	once a month

Chart5.1-2 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/Qcmeasure What	QA/QC procedure who	QA/QC procedure How	person in charge	manager frequency
	$PE_{y,power} = EC_y * EF_{power} + DC_y * EF_{diesel}$											
every time collecting fees	EC_y	Electricity consumption in the composting plant in year	MWh	confirmation of the bill of electric power company	general affairs section	slips and electronic data	confirmation of the record written in the bill of electric power consumption	watt-hour meters	electric power company	Periodical calibration	general affairs section technolocical section	once a month
once a year	EF_{power}	Emissions factor for grid electricity	tCO_2/MWh	confirmation of the record written in	Home page of EVN research institute	documents and electronic data	Confirmation of CO2 emission factor by Calculation, where using electricity in northern area of Viet Nam	items shown left are to be confirmed	electric power company	periodical updating	the person in charge of technology	once a year
every time collecting fees	DC_y	Diesel fuel consumption in the composting plant in year	L/Y	confirmation of fuel company's bill	general affairs section	slips and electronic data	Confirmation of quantity of purchased fuel by checking the record of the bills				general affairs section technolocical section	once a month
once a year	EF_{diesel}	Emissions factor for diesel fuel	kgCO2/L	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of CO2 emissions factor for diesel fuel				the person in charge of technology	once a year

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
	$PE_{y,composting} = Q_y * EF_{composting} * GWP\_CH4$											
once a year	Q_y	Quantity of raw waste/manure treated and/or wastewater co-treated in the year y	t	on-site weighing by truck scale	-	documents and electronic data	The quantity will be measured by using a truck scale to compare the weight of truck both before and after unloading.	the truck scale	truck scale manufacturer	calibration will be done once a year.	the person in charge of weighing	once a year
once a year	$EF_{composting}$	Emission factor for composting of organic waste and/or manure. Emission factors can be based on facility/site-specific measurements, country specific values of IPCC default values.	tCH4/ton waste treated)	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value(the unit amount of CO2 emissions through composting organic waste)				the person in charge of technology	once a year
once a year	GWP_CH4	Global warming potential for CH4	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	once a year

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
	$PE_{y,runoff} = Q_{y,ww,runoff} * COD_{y,ww,runoff} * B_{o,ww} * MCF_{ww,treatment} * UF_b * GWP\_CH4$											
once a day	$Q_{y,ww,runoff}$	Volume of runoff water in the year y	m3	on-site measurement by integrating flowm	exit of the measure of runoff water	documents and electronic data	the record of the value shown in the quantity indicator of integrating flowmeter	integrating flowmeter	manufacturer of integrating flowmeter	Periodical calibration	the person in charge of technology	once a month
once a month	$COD_{y,ww,runoff}$	Chemical oxygen demand of the runoff water leaving the omposting facility in the year y (COD)	t/M3	on-site measurement by simple COD measure	exit of the measure of runoff water	documents and electronic data	the record of the value indicated in the simple COD measure	simple COD measure	manufacturer of COD measure	Periodical calibration	the person in charge of technology	once a month
once a year	$B_{o,ww}$	Methane producing capacity of the wastewater, as described in fottnote 1	kgCH4/kg COD	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	once a year
once a year	$MCF_{ww,treatment}$	Methane correction factor for the wastewater treatment system where the runoff water is treated	-	confirmation of IPCC default value (Chapter6 of volume 5) Anaerobic shallow lagoon (depth less than 2meters)	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	once a year
once a year	UF_b	Model Correction factor to account for model uncertainties	-	Reference: FCCC/SBSTA/2003/10/Add.2 page 25	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	once a year
once a year	GWP_CH4	Global warming potential for CH4	-	confirmation of IPCC default value (Chapter6 of volume 5) Anaerobic shallow lagoon (depth less than 2meters)	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	once a year

Chart5.1-3　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
	$PE_{y,landfill} = \varphi \cdot (1-f) \cdot GWPCH4 \cdot (1-OX) \cdot 16/12 \cdot F \cdot DOCf \cdot MCF \cdot \Sigma\Sigma j Wj,x \cdot DOCj \cdot e^{-kj} \cdot (y-x) \cdot (1-e^{-kj})$											
once a year	φ	Model correction factor to account for model uncertainties (0.9)	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value	baseline scenario	project manager	confirm weather or not any change has been made（see monitoring items of additionality）	the person in charge of technology	
once a year	$GWPCH4$	Global Warming Potential (GWP) of methane, valid for the relevant commitment period（21）	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	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	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	F	Fraction of methane in the SWDS gas (volume fraction) (0.5)	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	$DOCf$	Fraction of degradable organic carbon (DOC) that can decompose（0.5）	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	MCF	Methane correction factor	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	Wj,x	Amount or organic waste type j prevented from disposal in the SWDS in the year x	tons	on-site weighing by truck scale	the exit of facility	documents and electronic data	This amount will be measured at the truck scale which will be located at the facility by comparing the difference of amounts before and after unloading.	the truck scale	truck scale manufacturer	calibration will be done once a year.	the person in charge of weighing the person in charge of technology	
once a year	DOC_j	Fraction of degradable organic carbon (by weight) in the waste type j	-	IPCC Guidelines for National Greenhouse Gas Inventories	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	kj	Decay rate for the waste type j	-	IPCC Guidelines for National Greenhouse Gas Inventories	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	j	Waste type catetgory (index)	-	IPCC Guidelines for National Greenhouse Gas Inventories	IPCC database	documents and electronic data	confirmation of the content. The analysis will be done if needed.					
once a year	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)	-	–								
once a year	y	Year for which methane emissions are calculated	-	–								

Chart5.2 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)											
once a year	*φ*	Model correction factor to account for model uncertainties (0.9)	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*f*	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value	baseline scenario	project manager	confirm weather or not any change has been made (see monitoring items of additionality)	the person in charge of technology	
once a year	*GWPCH4*	Global Warming Potential (GWP) of methane, valid for the relevant commitment period(21)	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*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	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*F*	Fraction of methane in the SWDS gas (volume fraction) (0.5)	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*DOC f*	Fraction of degradable organic carbon (DOC) that can decompose(0.5)	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*MCF*	Methane correction factor	-	confirmation of IPCC default value	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*Wj,x*	Amount of organic waste type j prevented from disposal in the SWDS in the year x	tons	on-site weighing by truck scale	the entrance of facility	documents and electronic data	This amount will be measured at the truck scale which will be located at the facility by comparing the difference of amounts before and after unloading.	the truck scale	truck scale manufacturer	Calibration will be done once a year.	the person in charge of weighing the person in charge of technology	
once a year	*DOC j*	Fraction of degradable organic carbon (by weight) in the waste type j	-	IPCC Guidelines for National Greenhouse Gas Inventories	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*kj*	Decay rate for the waste type j	-	IPCC Guidelines for National Greenhouse Gas Inventories	IPCC database	documents and electronic data	confirmation of the value				the person in charge of technology	
once a year	*j*	Waste type catetgory (index)	-	IPCC Guidelines for National Greenhouse Gas Inventories	IPCC database	documents and electronic data	confirmation of the content. The analysis will be done if needed.					
once a year	*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)	-	–								
once a year	*y*	Year for which methane emissions are calculated	-	–								

Chart5.3　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
once a year		existence or nonexistence of the way to reduce GHG emission	-	hearing with the person who addressed the information	Ministry of Natural Resource and Environment	documents and electronic data	research of laws and regulations at MONRE				the person in charge of technology	once a year
twice a year		diffusion rate of composting	-	hearing with the person who addressed the information	MOC, division of science and technology	documents and electronic data	research about business permits to develop composting business will be conducted at MOC.				the person in charge of technology	once a year
four times a year		Legislating of collection after sorting at households, subsidy, and the start of sorting and collection by relevant government	-	hearing with the person who addressed the information	Natural Resource and Environment Division of Hai Duong province	documents and electronic data	Studying about laws, regulations and decree will be done at MONRE, and if possible, it includes confirmation of the customs, voluntary agreement by conducting hearings.				the person in charge of technology	once a year

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