CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Organic Waste Treatment and Methane Power Generation Project in Anhui, China

Version 1

dd/mm/yyyy (completed) (**currently incomplete*)

A.2. Description of the project activity:

The proposed project involves construction and operation of a municipal waste treatment plant in Guoyang, Anhui Province. The project includes utilization of methane produced from waste treatment process for power generation.

Municipal waste generated in Guoyang is currently all brought to landfill sites. Those landfill sites are poorly managed and methane generated from the wastes is emitted directly to the air without any treatment. Hence the baseline is waste disposal to the landfill sites without any extraction, destruction or utilization of methane.

In the project, municipal wastes are collected and sent to the waste treatment plant where wastes will go through sorting process. Organic wastes separated from other wastes will be treated anaerobically to produce methane. Methane will be used for generation of electricity which will be sold to the local grid. The plant is designed to treat 400 tons of wastes per day.

The project will thus contribute to reduce emission of GHG through following two activities;
1) Avoidance of emission of methane from the landfill sites
2) Displacement of fossil fuel-based grid electricity generation with Project's carbon-neutral electricity

The project will contribute to sustainable development of China in several ways;

- **Management of Municipal Solid Waste**
  Municipal waste generated in Guoyang has been landfilled and now the capacity of existing landfill sites is reaching their limit. However, once municipal wastes are sent to the project site, those wastes will be sorted through the advanced separation system and recycled. Project will thus greatly contribute to reduction of wastes sent to the landfill sites and therefore solve the problem of lack of landfill site.

- **Recycle of Resources**
  The advanced separation system is able to classify the wastes into metal, soil, plastic, glass, organic wastes etc. All the recyclable materials will be sold to recycling manufacturers. Residual waste from anaerobic treatment of organic wastes are dried and used to produce compost which will be used by local farmers.

- **Improvement of Local Environment**

Current landfill sites are situated in the middle of Guoyang and the wastes are piled up without any coverage or treatment. Therefore, there is a concern about environment hazards and health hazards including damage to the air, soil and water, odour, damage to the landscape etc. The project would contribute to the reduction of such landfill site and thus improve the local environment.

- **Economic Benefits**
  The project will contribute to creation of new jobs. About 100 local workers are going to be employed for operation of the project plant and other related facilities such as separation process.

A.3. Project participants:

Table 1: Project participants

Name of Party involved ((host) indicates a Host Party)	Private and/or pubic entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Nanjing Linhui Environment Protection Tec.Co.,Ltd	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party (ies):

People's Republic of China

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

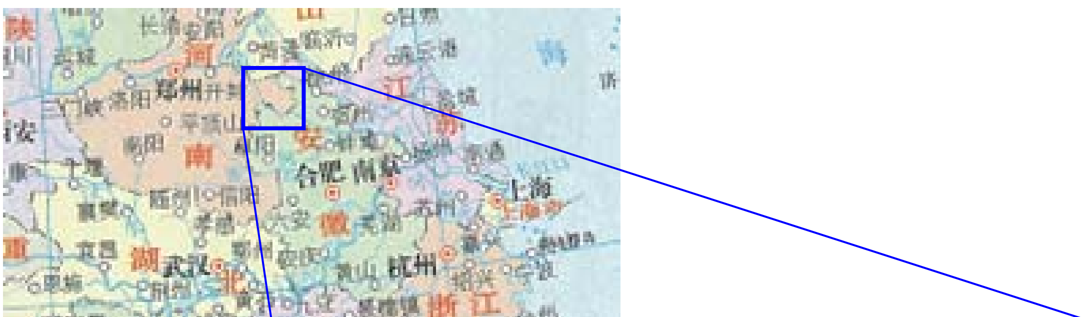
Anhui Province

A.4.1.3. City/Town/Community etc.:

Guoyang

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project site is located in Wang xiao zhuang, Wang qiao cun, Chu dian zhen, Guoyang. This area is located about 9km apart from the center of Guoyang, which is located in North part of Anhui Province. Please refer to the map shown below;



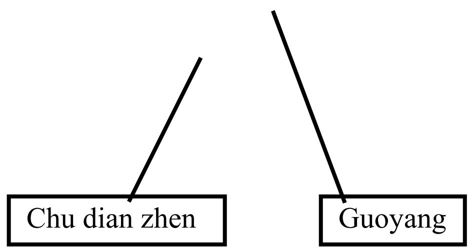


Figure 1: Location of Guoyang and map around the project site

A.4.2. Category (ies) of project activity:

Sectoral scope 1: Energy industries (renewable - / non-renewable sources)
Sectoral scope 13: Waste handling and disposal

A.4.3. Technology to be employed by the project activity:

Currently all municipal waste produced in Guoyang is brought to the landfill sites where wastes are simply piled up without coverage. Landfill gas emitted from such wastes are not collected, destroyed or utilized. Hence the baseline scenario is waste disposal to landfill sites without management.

The host company (Nanjing Linhui Environment Protection Tec.Co.,Ltd) is a specialty company for R&D, production and implementation of environment protection technologies. They have developed technology and system employed by the project activity including "All-in-one two-phase organic municipal waste anaerobic drying treatment system", "Municipal waste water separation system", "All-in-one organic municipal waste biodegradation machine", "Natural circulation waste water biodegradation reactor", "Organic waste detoxifying treatment system". The host company has acquired patent for those five technology and they are recommended from Chinese government.

- **Waste Sorting**
  Arriving waste is sorted into several different materials; (1) rubber, paper, fabric, metal and glass, (2) rubble and sand, (3) battery and fluor lamp, (4) plastic, (5) organic waste. The sorting will be carried out using combination of vibration, magnetic attraction, buoyancy (water separation), wind force, manual sorting etc. Organic wastes will be left after taking out all the other wastes. Organic waste will be separated by size. The small-sized wastes will be directly sent to the anaerobic digester together with wastewater. The large-sized wastes will be gathered and broken into smaller pieces which will then be fed to the anaerobic digester.

- **Anaerobic Digester**
  In the anaerobic digester, anaerobic bacteria decompose organic wastes into methane, carbon dioxide as well as minor quantities of other gases. The anaerobic digester accelerates the rate of decomposition of waste as compared to what would happen in the natural environment, allowing rapid reduction in waste volume. Collected methane is dehydrated and desulfurized, and then sent to a gas storage tank. Anaerobic digester can produce 45m^3 of methane from 1 ton of organic compounds, and the produced methane has a concentration of approximately 55-60%. Project will install four anaerobic digesters.

  Gas leakage detector will be installed to the anaerobic digester. When it detects leakage, operation of the anaerobic digester will be stopped manually to avoid leakage. The gas leakage detector is also installed to the gas storage tank. When there was leakage from the gas tank, supply of gas from the anaerobic digester to the gas tank will be stopped and the gas will be flared.

  Residue of organic wastes deposited at the floor of the anaerobic digester is also collected, dehydrated and sent to composting process.

- **Wastewater Treatment System**
  Wastewater treated in the anaerobic digester is sent to aerobic treatment and then fed back to sorting system to be reused for water separation process.

- **Electricity Generation**
  Methane gas stored in the gas storage tank will be sent to a gas engine through a pipeline. On the way to the gas engine, there is a gas flow meter to check the amount of methane fed into the engine. Project will use two 500kW gas engines with efficiency of 36%. All electricity generated will be sold to the grid. Waste heat produced from the gas engine will be sent to compost production process and reused for drying compost.

- **Compost Production Facility**

The residual waste from the anaerobic digestion will be sent to compost production process where rotary dryers are used to treat the residual waste aerobically. The dried compost will be mixed with fertilizer (N, P and K) and will be made into pellets.

Technology used in the project activity is summarized in Figure 2.

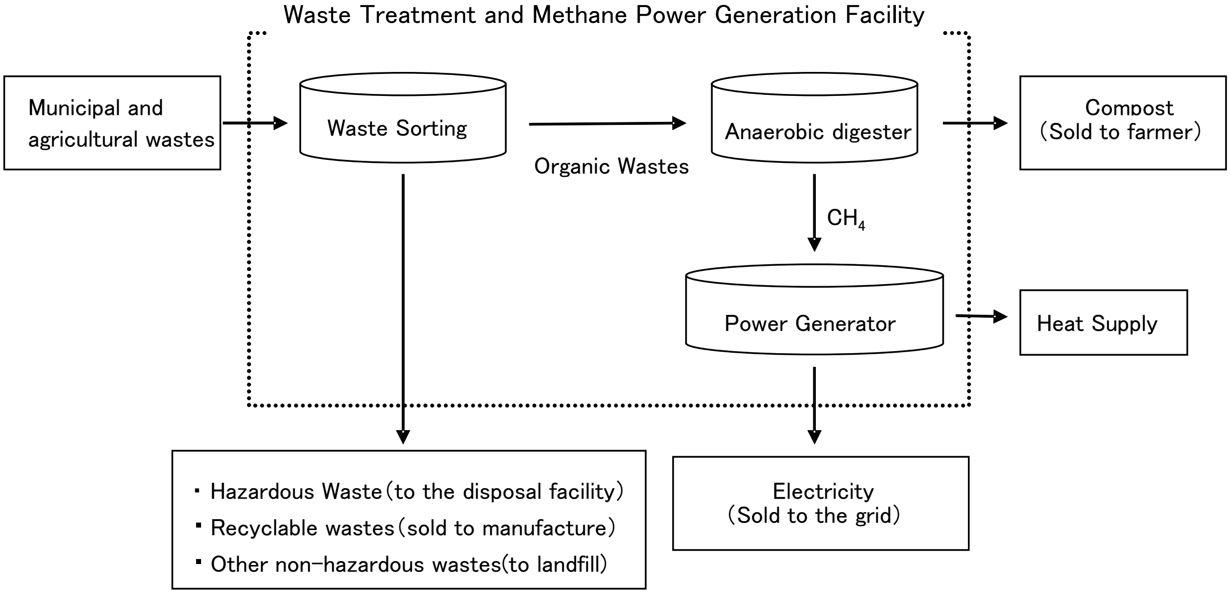


Figure 2: Outline of technology to be employed by the project activity

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

Table 2 shows the estimated amount of emission reduction over the crediting period (2011-2020).

Table 2: Estimated emission reduction over the crediting period

Years	Annual estimation of emission reductions in tonnes of CO_2e
2011	1,001
2012	5,850
2013	10,700
2014	15,462
2015	20,250
2016	25,044
2017	29,793
2018	34,468
2019	39,141
2020	43,754
Total estimated reductions (tonnes of CO_2e)	225,461
Total number of crediting years	10 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	22,546

A.4.5. Public funding of the project activity:

No public funding from Annex I countries is involved in the project

SECTION B. Application of a baseline and monitoring methodology

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

The approved methodology AM0025 (Version 10.1) “Avoided emissions from organic waste through alternative waste treatment processes” is applied to the project.

AM0025 (Version 10.1) refers to the following tools;

- Tool for the demonstration and assessment of additionality (Version 05.2)
- Tool to calculate the emission factor for an electricity system (Version 0.1.1)
- Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (Version 4)
- Tool to determine project emissions from flaring gases containing methane

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

AM0025 is applicable to the project for the following reasons;

a. The project involves anaerobic digestion with biogas collection and its use for the fresh waste that in a given year would have otherwise been disposed of in a landfill;
b. The residual waste from anaerobic digestion is aerobically composted;
c. The proportions and characteristics of different types of organic waste processed in the project activity can be determined, in order to apply a multiphase landfill gas generation model to estimate the quantity of landfill gas that would have been generated in the absence of the project activity;
d. The project activity includes electricity generation from the biogas from the anaerobic digester and the electricity is exported to the grid.
e. The baseline scenario is that continuation of current practice of disposing the waste in a landfill

In China, there are following legislation and technical rule regarding the use of landfill gas;

- Standard for pollution control on the landfill site for domestic waste (GB16889-1997)[1]
- Technical Specification for sanitary landfill of domestic wastes (CJJ17-2004)

These legislations require landfill operators to collect and if possible utilize landfill gas, and to flare if landfill gas cannot be used. However, such law is not adequately enforced and common practice in China is that landfill gas is rarely captured, flared or utilized.

According to the "National Action Plan for Recovery and Utilization of Landfill Gas (12/2001)"[2]:
"*At present, in China the municipal refuse is disposed using the technology of traditional landfill without consideration of recovery and utilization of landfill gas. Almost all landfills do not have landfill gas recovery systems, except for a few newly built landfills, and the landfill gas is emitted to the atmosphere openly….About 10 sanitary landfills have been set up in a few cities. However, there was no landfill gas recovery system in those sanitary landfill…However, there is no mechanism and policy to guide the whole country to have landfill gas recovery and utilization systems. Therefore it is still a blank paper for landfill management to establish landfill gas recovery and utilization systems.*"

It is clear that the project meets the criterion "The compliance rate of the environmental regulations during the crediting period is below 50%". This can also be proven by the registered CDM project both "Nanjing Tianjingwa Landfill Gas to Electricity Project"[3] and "Composting of organic waste in Wuzhou"[4] in China.

Moreover, as a result of several site visits and interview with the Environmental Protection Department of Guoyang Government, it was revealed that Guoyang currently do not have fixed landfill site and municipal wastes are simply piled up in the holes generated by mining or ponds where equipment for collection of landfill gas is not installed. Thus it is clear that compliance rate of regulation around the project site is 0%.

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[1] Ministry of Environmental Protection, China and State Bureau of The Technology Supervision, 1997

[2] Energy Research Institute, National Development and Reform Commission, China, 2001

[3] http://cdm.unfccc.int/Projects/DB/DNV-CUK1129289693.13/view

[4] http://cdm.unfccc.int/Projects/DB/SGS-UKL1176710485.82/view

B.3. Description of the sources and gases included in the project boundary:

AM0025 defines project boundary as the site of the project activity where the waste is treated. This includes the facilities for processing the waste, onsite electricity generation and/or consumption, onsite fuel use, thermal energy generation, wastewater treatment plant and landfill site. The project boundary does not include facilities for waste collection, sorting and transport to the project site. The project boundary based on this definition is shown in Figure 3.

The flow chart below shows the main components and connections including system boundaries of the project.

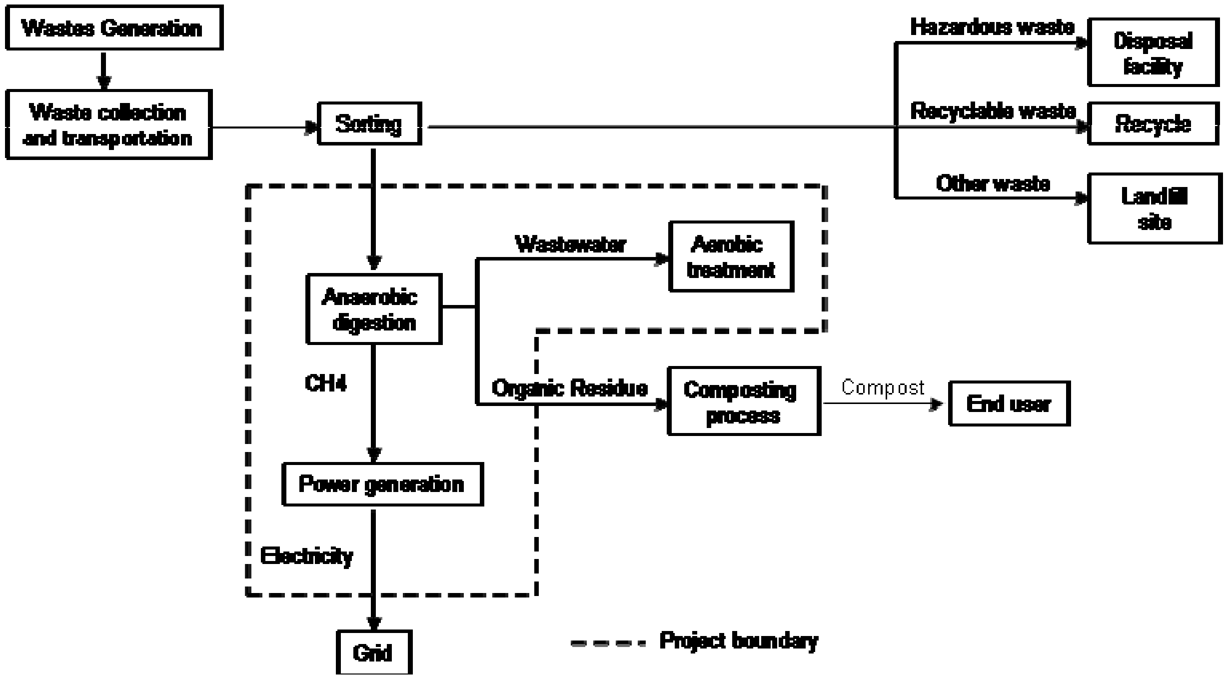

Figure 3: Outline of the project boundary of the project

The gases and sources related to the project are listed below.

Table 3: The gases and sources related to the project

Source	Gas	Included	Justification/Explanation

			?	
Baseline	Emissions from decomposition of waste at the landfill site	CH_4	*Included*	*The major source of emissions in the baseline.*
		N_2O	*Excluded*	*N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative.*
		CO_2	*Excluded*	*CO_2 emissions from the decomposition of organic waste are not accounted.*
	Emissions from electricity consumption	CO_2	*Included*	*Emission from fossil-based grid electricity generation*
		CH_4	*Excluded*	*Excluded for simplification. This is conservative.*
		N_2O	*Excluded*	*Excluded for simplification. This is conservative.*
	Emissions from thermal energy generation	CO_2	*Excluded*	*No thermal energy consumption in the baseline.*
		CH_4	*Excluded*	*Excluded for simplification. This is conservative.*
		N_2O	*Excluded*	*Excluded for simplification. This is conservative.*
Project Activity	On-site fossil fuel consumption due to the project activity other than electricity generation	CO_2	*Included*	*An emission source (on-site vehicle use).*
		CH_4	*Excluded*	*Excluded for simplification. This emission source is assumed to be very small.*
		N_2O	*Excluded*	*Excluded for simplification. This emission source is assumed to be very small.*
	Emissions from on-site electricity use	CO_2	*Included*	*An emission source*
		CH_4	*Excluded*	*Excluded for simplification. This emission source is assumed to be very small.*
		N_2O	*Excluded*	*Excluded for simplification. This emission source is assumed to be very small.*
	Direct emissions from the waste treatment processes	N_2O	*Included*	*N_2O may be emitted from stacks from electricity generation with methane.*
		CO_2	*Excluded*	*CO_2 emissions from the decomposition of organic waste are not accounted.*
		CH_4	*Included*	*CH_4 leakage from the anaerobic digester. CH_4 may be emitted from stacks from electricity generation with methane.*
	Emissions from waste water treatment	CO_2	*Excluded*	*CO_2 emissions from the decomposition of organic waste are not accounted.*
		CH_4	*Excluded*	*Wastewater is treated aerobically and therefore assumed to be zero.*
		N_2O	*Excluded*	*Excluded for simplification. This emission source is assumed to be very small.*

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

Step1. Identification of alternative scenarios

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

AM0025 sets alternative scenarios for (1) Waste disposal/treatment, (2) Power generation and (3) Heat generation as follows;

(1) Waste disposal/treatment

M1: The project activity not implemented as a CDM project;
M2: Disposal of the waste at a landfill where landfill gas captured is flared;
M3: Disposal of the waste on a landfill without the capture of landfill gas.

(2) Power Generation

P1: Power generated from waste treatment, not undertaken as a CDM project activity;
P2: Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant;
P3: Existing or Construction of a new on-site or off-site renewable based cogeneration plant;
P4: Existing or Construction of a new on-site or off-site fossil fuel fired captive power plant;
P5: Existing or Construction of a new on-site or off-site renewable based captive power plant;
P6: Existing and/or new grid-connected power plants.

(3) Heat generation

H1: Heat generated from waste treatment, not undertaken as a CDM project activity;
H2: Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant;
H3: Existing or Construction of a new on-site or off-site renewable based cogeneration plant;
H4: Existing or new construction of on-site or off-site fossil fuel based boilers;
H5: Existing or new construction of on-site or off-site renewable energy based boilers;
H6: Any other source such as district heat;
H7: Other heat generation technologies (e.g. heat pumps or solar energy).

AM0025 is only applicable when the following condition is met:

(1) The disposal of the waste in a landfill without capture of landfill gas (M3) or the disposal of the waste in a landfill where the landfill gas is partially captured and subsequently flared (M2)
(2) The electricity is obtained from an existing/new fossil based captive power plant or from the grid
(3) The heat is obtained from an existing/new fossil fuel based boiler

Therefore, only plausible baseline scenarios are following two scenarios:

a. M2/M3 + P4/P6 + H4 Equation (1)
b. M2/M3 + P2 + H2 (in case of cogeneration) Equation (2)

(1) Waste disposal/treatment

- *M1: The project activity not implemented as a CDM project*

Emission of methane would be avoided by anaerobic treatment of organic waste and utilization of methane for electricity generation. However, the treatment of organic waste including sorting, anaerobic digestion, wastewater treatment, and electricity generation with methane requires advanced technology. It also demands large initial capital investment and running cost. Revenue of the project, excluding CDM revenue is sum of waste treatment fee paid by Guoyang government and income from sale of electricity to the grid. However, these revenues are not sufficient to make project profitable and therefore the project is economically unattractive to investors. The step 2 and 3 of the section will show that the IRR without CDM revenue is only 7.38%. Taking into account the technical and investment barrier, the project activity without CDM is not practical.

- *M2: Disposal of the waste at a landfill where landfill gas captured is flared*

  Although there is legislation in China stipulating installation of gas collection system at the landfill site, Guoyang does not own properly managed landfill sites and all wastes are simply piled up on the ground. Noncompliance of such legislation is also common practice in most part of China. In addition, this scenario has technical and safety risks and requires additional investments for installation of gas collection system and flaring equipment without any revenue. Thereby this alternative scenario is seen as not feasible.

- *M3: Disposal of the waste on a landfill without the capture of landfill gas.*

  There are no additional technical and investment barriers. It is the economically feasible one for the project proponent.

(2) Power Generation

- *P1: Power generated from by-product of one of the options of waste treatment, not undertaken as a CDM project activity;*

As explained in (1) M1, anaerobic digestion and methane gas power generation are advanced technology and they require large initial capital investment while revenue is not sufficient. Therefore, generation of electricity with biogas without CDM revenue is not economically feasible.

- *P2: Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant;*
- *P3: Existing or Construction of a new on-site or off-site renewable based cogeneration plant;*
- *P4: Existing or Construction of a new on-site or off-site fossil fuel fired captive power plant;*
- *P5: Existing or Construction of a new on-site or off-site renewable based captive power plant;*

For P2-P5, There is currently no such on-site or off-site plant and construction of such plant requires vast amount of investment, and thus they are not feasible options.

- *P6: Existing and/or new grid-connected power plants.*

Electricity supply from grid is available around the project site and electricity can be supplied without large facility and therefore there is no technical and financial barrier to this alternative scenario.

(3) Heat generation

The proposed project will not use heat and thus heat generation was excluded from the baseline scenario.

As above, the baseline scenario for the proposed project is an Equation (1) without heat utilization:

M3 + P6

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 CDM project activity (assessment and demonstration of additionality):

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

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

As described in Section B4. the only plausible alternative is the continuation of current practice of untreated disposal.

Sub-step 1b: Consistency with mandatory laws and regulations:
In China, there are following legislation and technical rule regarding the use of landfill gas;

- Standard for pollution control on the landfill site for domestic waste (GB16889-1997)[5]
- Technical Specification for sanitary landfill of domestic wastes (CJJ17-2004)

These legislations require landfill operators to collect and if possible utilize landfill gas, and to flare if landfill gas cannot be used. However, such law is not adequately enforced and the common practice in China is that landfill gas is rarely captured, flared or utilized.

According to the "National Action Plan for Recovery and Utilization of Landfill Gas (12/2001)"[6]: "*At present, China the municipal refuse is disposed using the technology of traditional landfill without consideration of recovery and utilization of landfill gas. Almost all landfills do not have landfill gas recovery systems, except of a few newly built landfills, and the landfill gas is emitted to the atmosphere openly….About 10 sanitary landfills have been set up in a few cities. However, there was no landfill gas recovery system in those sanitary landfill…However, there is no mechanism and policy to guide the whole country to have landfill gas recovery and utilization systems. Therefore it is still a blank paper for landfill management to establish landfill gas recovery and utilization systems.*"

Moreover, as a result of several site visits and interview with the Environmental Protection Department of Guoyang Government, it was revealed that Guoyang currently do not have fixed landfill site and municipal wastes are simply piled up in the holes generated by mining or ponds where equipment for collection of landfill gas is not installed. Thus around this area, incompliance of the concerned regulation is common.

Step2. Investment Analysis

Sub-step 2a: Determine appropriate analysis method
The project generates income from electricity sale in addition to the expected CDM revenue. Consequently, Option I (Simple Cost Analysis) is not appropriate. Option II (Investment Comparison Analysis) is also not appropriate as there is no credible alternative to the Project available. Option III (Benchmark Analysis) is therefore deemed as the most appropriate analysis method.

Sub-step 2b: Option III. Apply benchmark analysis
The IRR was chosen as the relevant financial indicator for the Project. In 2006, Chinese National Development and Reform Commission and Ministry of Construction have jointly published "Economic Evaluation Codes and Parameters for Construction Projects". It says that permission can be given to the proposed project as long as its FIRR is higher than the sectoral benchmark. Sectoral benchmark IRR against the total investment for electricity generating industry is 8%. Therefore, benchmark of 8% is employed as a benchmark.

Sub-step 2c: Calculation and comparison of financial indicators

[5] Ministry of Environmental Protection, China and State Bureau of The Technology Supervision, 1997 http://www.sepa.gov.cn/image20010518/2521.pdf

[6] Energy Research Institute, National Development and Reform Commission, China, 2001

Table 4 below shows the data and assumptions used to calculate the project's IRR. The basis of the calculation will be made available to the DOE during validation on request.

Table 4: Financial results of the Project with and without carbon finance

Total Investment (RMB)	32,187,000
Operational Lifetime (Year)	15
Annual Running Cost (RMB)	4,792,000
Price of Electricity (RMB/kWh)	0.62
Waste Fee (Subsidy from local government) (RMB/t)	60
Benchmark Rate of IRR	8.0 %
Project IRR (Without CDM)	7.38 %
Project IRR (With CDM)	13.69 %
Assumed price of CER (EURO/ton of CO_2e)	9

(Assumed: 1EURO = 10 RMB)

The project IRR (without CDM) of 7.38% indicates that the project is not financially feasible by itself.

Sub-step 2d: Sensitivity analysis

Sensitivity analysis was conducted by altering the following parameters:

- Total investment
- Running cost (Operational and Maintenance Cost)
- Electricity tariff
- Waste fee

Those parameters were selected as being most likely to fluctuate over time. Financial analyses were performed by altering each of these parameters by 10%, and assessing what the impact on the project IRR would be (see table 5 below).

Table 5: Sensitivity analysis of the project IRR (without CDM revenue)

	-10%	-5%	0%	5%	10%
Total Investment	9.48%	8.39%	7.38%	6.44%	5.56%
Running Cost	9.35%	8.37%	7.38%	6.37%	5.34%
Electricity Tariff	6.40%	6.89%	7.38%	7.86%	8.34%
Waste Fee	4.29%	5.86%	7.38%	8.84%	10.26%

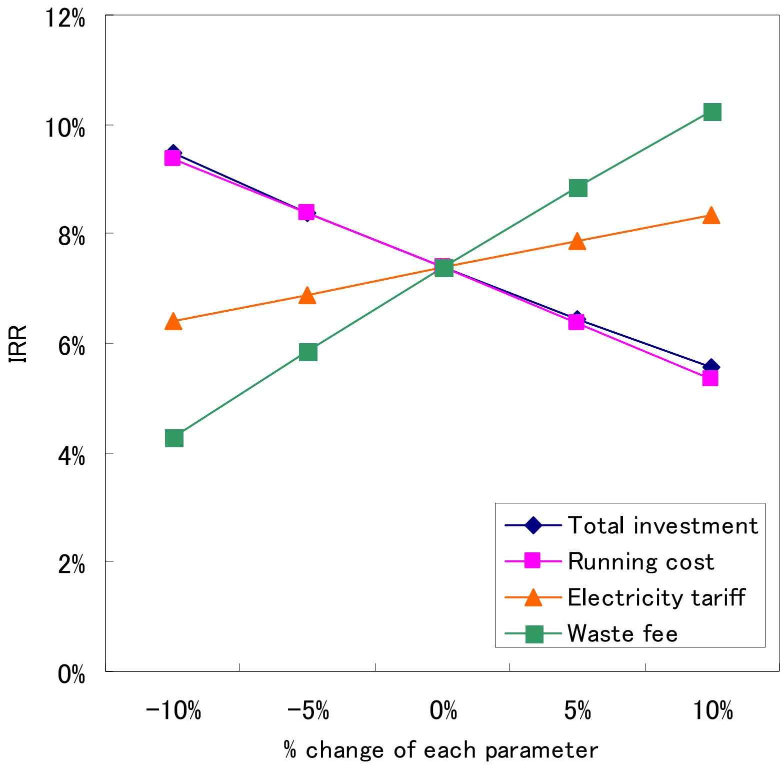

Figure 4: Sensitivity analysis of project IRR (without CDM revenue)

Although above result of sensitivity analysis shows that in some cases IRR exceeds benchmark IRR of 8.0%, it is unlikely that Total Investment and Running Cost will be smaller than estimated amount as those costs are the minimum estimation.
For the electricity tariff, 0.62RMB/kWh consists of 0.37RMB, which is sales price of electricity generated from coal-fired power plant plus 0.25RMB, which is subsidy for electricity generation with wastes provided by local government. However, local government has not approved the provision of subsidy to the project and thus 0.62RMB/kWh is the highest electricity tariff possibly expected.
Waste fee is also provided from local government though this price of 60 RMB is not yet fixed. As a reference, waste fee of Nanjing city is 45RMB/t.

Step 3. Barrier Analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the Proposed Project activity.
Barriers for the implementation of the project are listed below.

(1) Investment barriers
The project uses several advanced technology equipments, such as sorting system of waste, anaerobic digester, biogas collection facility, electricity generation unit, composting system, and therefore requires large initial investment cost. Incomes from the sale of electricity and subsidy from government are not sufficient to make the project economically attractive and therefore it would be hard to expect investment.
(2) Technical barriers

Technology of biogas collection from anaerobically treated organic waste is highly advanced and still uncommon in China. Examples of utilization of such technique can be found in animal waste treatment at small-scaled livestock farms, however, example of use of technique for the treatment of large amount of waste cannot be found.
In addition, anaerobic treatment of organic waste requires the waste sorting technology which can sort organic waste from mixture of municipal waste. Sorting system like this project is advanced technique and has no other examples. The same thing can be said for the landfill gas collection. In China, certainly such technique is not developed and the performance has not been proven.

(3) Common practice barriers
As mentioned in (2) Technical barriers, example of sorting system for large amount of waste and anaerobic digestion or example of landfill gas collection without CDM could not be found in China.

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 described in section B.4 and in this section, alternative (M1) through (M3) and alternative (P1) through (P6) are possible alternatives to the project activity, and, of these, all except for combination of Alternative (M3) and (P6) face technological, investment and common practice barriers. Therefore, Alternative (M3) + (P6) is the only option that does not face the barriers.

Step 4. Common practice analysis
Sub-Step 4a. Analyze other activities similar to the proposed project activity:
The current common situation of landfill site in China is that they do no meet international standard of construction or environmental standard due to lack of capital and technology. Thus, anaerobic treatment of the organic waste with biogas electricity generation is fist of its kind in waste treatment in China. In particular in the project area, wastes are commonly landfilled and there is no waste treatment plant like the project.

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

There are no any similar activities occurring in Anhui. The project is fist of its kind.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Default value, unless otherwise stated, are sourced from the relevant methodologies and the most recently published IPCC Guidelines for National Greenhouse Gas Inventories (“IPCC Guidelines”).

1. Baseline emissions
The baseline emissions (BE_y) are calculated using the following equation:

$BE_y = (MB_y - MD_{reg,y}) + BE_{EN,y}$ (1-1)

Where:

BE_y	=	Is the baseline emissions in year *y* (tCO_2e)
MB_y	=	Is the methane produced in the landfill in the absence of the project activity in year *y* (tCH_4)
$MD_{reg,y}$	=	Is the methane that would be destroyed in the absence of the project activity in year *y* (tCH_4)
$BE_{EN,y}$	=	Baseline emissions from generation of energy displaced by the project activity in year *y* (tCO_2e)

Equation 1-1 can be converted into Equation 1-2 by assigning equation (18), (20) and (21) in AM0025.

- Equation (18): $MD_{reg,y} = MB_y * AF$
- Equation (20): $MB_y = BE_{CH4,SWDS,y}$
- Equation (21): $BE_{EN,y} = BE_{elec,y} + BE_{thermal,y}$

$BE_y = BE_{CH4,SWDS,y} * (1-AF) + BE_{elec,y} + BE_{thermal,y}$ (1-2)

Where:

$BE_{CH4,SWDS,y}$	=	Is methane generation from the landfill in the absence of the project activity at year *y*, calculated as per the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site”
AF	=	Is percentage of methane that would be destroyed if the project was not implemented (Adjustment Factor) (%)
$BE_{elec,y}$	=	Is the baseline emissions from electricity generated utilizing methane and exported to the grid or displacing onsite/offsite fossil fuel captive power plant (tCO_2e)
$BE_{thermal,y}$	=	Is the baseline emissions from thermal energy produced utilizing methane displacing thermal energy from onsite/offsite fossil fuelled boiler (tCO_2e)

<u>(1) Methane generation from the landfill in the absence of the project activity ($BE_{CH4,SWDS,y}$)</u>

$BE_{CH4,SWDS,y}$ is the amount of methane emitted from landfill site in absence of the project. The amount of methane emission depends on the amount of organic waste sent to the landfill site, length of accumulation time of wastes at the landfill site and climatic condition. $BE_{CH4,SWDS,y}$ can be estimated using equation (1) in “Tool to determine methane emissions avoided from disposal of waste at a landfill site” which is shown below:

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x-1}^{y} \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k \cdot (y-x)} \cdot \left(1-e^{-k_j}\right) \quad (1\text{-}3)$$

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 (f = AF)
GWP_{CH4}	=	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	=	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)

F	=	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	=	Fraction of degradable organic carbon (DOC) that can decompose
MCF	=	Methane correction factor
$W_{j,x}$	=	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*
k_j	=	Decay rate for the waste type *j*
j	=	Waste type category (index)
x	=	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)
y	=	Year for which methane emissions are calculated

(2) Adjustment Factor (AF)

AM0025 states that "*In cases where regulatory or contractual requirements do not specify $MD_{reg,y}$, an Adjustment Factor(AF) shall be used and justified, taking into account the project context. In doing so, the project participant should take into account that some of the methane generated by the landfill may be captured and destroyed to comply with other relevant regulations or contractual requirements, or to address safety and odour concerns.*"

"The parameter AF shall be estimated as follows:

- *In cases where a specific system for collection and destruction of methane is mandated by regulatory or contractual requirements, the ratio between the destruction efficiency of that system and the destruction efficiency of the system used in the project activity shall be used;*
- *In cases where a specific percentage of the "generated" amount of methane to be collected and destroyed is specified in the contract or mandated by the regulation, this percentage divided by an assumed efficiency for the collection and destruction system used in the project activity shall be used.*

The 'Adjustment Factor' shall be revised at the start of each new crediting period taking into account the amount of GHG flaring that occurs as part of common industry practice and/or regulation at that point in the future."

(3) Emission from generation of electricity which is displaced the project ($BE_{elec,y}$)

The baseline emissions from electricity generated utilizing methane and exported to the grid is calculated using the following equation:

$$BE_{elec,y} = EG_{d,y} * CEF_d \quad (1\text{-}4)$$

Where:

$EG_{d,y}$	=	Is the amount of electricity generated utilizing biogas in the project activity and exported to the grid (MWh)
CEF_d	=	Is emission factor for the displaced electricity source in the project scenario (0.90465 tCO_2/MWh)

(4) Emission from generation of thermal energy which is displaced the project ($BE_{thermal,y}$)

The project will utilize heat generated from methane power generation for composting process. However, use of heat from power generation is not the displacement of heat generated from existing or new fossil fuel fuelled boiler. The proposed project therefore does not include $BE_{thermal,y}$ in baseline emissions.
Consequently, baseline emission of the project is summarized as shown in the equation below:

$BE_y = BE_{CH4,SWDS,y} * (1-AF) + BE_{elec,y}$ (1-5)

2. Project emissions
As the project use anaerobic digestion for the treatment of organic waste, the project emissions in year y (PE_y) are calculated using the following equation:

$PE_y = PE_{elec,y} + PE_{fuel, on-site,y} + PE_{a,y} + PE_{w,y}$ (2-1)

Where:
PE_y = Is the project emissions during the year *y* (tCO_2e)
$PE_{elec,y}$ = Is the emissions from electricity consumption on-site due to the project activity in year *y* (tCO_2e)
$PE_{fuel, on-site,y}$ = Is the emissions on-site due to fuel consumption on-site in year *y* (tCO_2e)
$PE_{a,y}$ = Is the emissions from the anaerobic digestion process in year *y* (tCO_2e)
$PE_{w,y}$ = Is the emissions from wastewater treatment in year *y* (tCO_2e)

(1) Emissions from electricity use ($PE_{elec,y}$)
Electricity used in the project site will be supplied by the project activity from biogas. Thus emission from electricity use is assumed to be zero.

(2) Emissions from onsite fossil fuel use ($PE_{fuel, on-site,y}$)
There is no onsite fuel use expected for the project and thus $PE_{fuel, on-site,y}$ is assumed to be zero in *ex ante* calculation. However, if there was any use of fossil fuel onsite, it will be monitored according to the monitoring method in AM0025 and calculated using the following equation:

$PE_{fuel, on-site,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel}$ (2-2)

Where:
$F_{cons,y}$ = Is the fuel consumption on site in year *y* (l or kg)
NCV_{fuel} = Is the net calorific value of the fuel (MJ/l or MJ/kg)
EF_{fuel} = Is the CO_2 emissions factor of the fuel (tCO_2e/MJ)

Composting process of the residual waste might use coal for drying the compost. However, composting process is outside of the project boundary and thus not counted as project emission.

(3) Emission from the anaerobic digestion process ($PE_{a,y}$)
The project uses anaerobic digester to treat organic wastes. The GHG emission from the anaerobic digester is calculated using the following equation:

$PE_{a,y} = PE_{a,l,y} + PE_{a,s,y}$ (2-3)

$PE_{a,l,y}$ = Is the CH_4 leakage emissions from the anaerobic digesters in year *y* (tCO_2e)
$PE_{a,s,y}$ = Is the total emissions of N_2O and CH_4 from stacks of the anaerobic digestion process in year *y* (tCO_2e)

(a) CH_4 leakage emissions from the anaerobic digesters ($PE_{a,l,y}$)

According to AM0025, fraction of CH_4 leakage emissions from the anaerobic digesters ($PE_{a,l,y}$) is selected from following options:

Option1: Monitoring the actual quantity of the gas leakage;

Option 2: Applying an appropriate IPCC physical leakage default factor which is 15%:

$$PE_{a,l,y} = P_l * M_{a,y} \quad (2\text{-}4)$$

Where:

P_l = Is the physical leakage factor from a digester (15%)

$M_{a,y}$ = Is the total quantity of methane produced by the digester in year *y* (tCO_2e)

Option 3: Applying a physical leakage factor of zero where advanced technology used by the project activity prevents any physical leakage

(b) Total emissions of N_2O and CH_4 from stacks of the anaerobic digestion process ($PE_{a,s,y}$)
AM0025 requires monitoring the final stack emissions (either from flaring or energy generation process) and estimated using the following equation:

$$PE_{a,s,y} = SG_{a,y} * MC_{N2O,a,y} * GWP_{N2O} + SG_{a,y} * MC_{CH4,a,y} * GWP_{CH4} \quad (2\text{-}5)$$

Where:

$SG_{a,y}$ = Is the total volume of stack gas from the anaerobic digestion in year y (m^3/yr)

$MC_{N2O,a,y}$ = Is the monitored content of nitrous oxide in the stack gas from anaerobic digestion in year y (tN_2O/m^3)

GWP_{N2O} = Is the Global Warming Potential of nitrous oxide (tCO_2e /tN_2O)

$MC_{CH4,a,y}$ = Is the monitored content of methane in the stack gas from anaerobic digestion in year y (tCH_4/m^3)

GWP_{CH4} = Is the Global Warming Potential of methane (tCO_2e /tCH_4)

(4) Emissions from wastewater treatment ($PE_{w,y}$)

AM0025 states that *"If the wastewater is treated using aerobic treatment process, the CH4 emissions from wastewater treatment are assumed to be zero"*. As the project treat wastewater aerobically, the CH_4 emission from wastewater treatment ($PE_{w,y}$) is assumed to be zero.

Consequently, project emissions for the project is summarized as shown in the equation below:

$$PE_y = PE_{fuel,\ on\text{-}site,y} + PE_{a,l,y} + PE_{a,s,y} \quad (2\text{-}6)$$

3. Leakage

Leakage (L_y) is calculated using the following equation:

$$L_y = L_{t,y} + L_{r,y} + L_{s,y} \quad (3\text{-}1)$$

Where:

$L_{t,y}$ = Is the leakage emissions from increased transport in year *y* (tCO_2e)

$L_{r,y}$ = Is the leakage emissions from the residual waste from the anaerobic digester in year *y*

(tCO_2e)
$L_{s,y}$ = Is the leakage emissions from end use of stabilized biomass

The proposed project does not involve use of stabilized biomass, so that $L_{s,y}$ is irrelevant. Equation 3-1 is thus summarized as below;

$$L_y = L_{t,y} + L_{r,y} \qquad (3\text{-}2)$$

(1) Leakage emissions from increased transport ($L_{t,y}$)

AM0025 states that *"When it is likely that the transport emissions will increase significantly, such emissions should be incorporated as leakage"*. The CO_2 emissions are calculated from the quantity of fuel used and the specific CO_2-emission factor of the fuel for vehicles i to n, as follows:

$$L_{t,y} = \sum_{i}^{n} NO_{vehicles,i,y} * DT_{i,y} * VF_{cons,i} * NCV_{fuel} * D_{fuel} * EF_{fuel} \qquad (3\text{-}3)$$

Where:

$NO_{vehicles,i,y}$ = Is the number of vehicles for transport with similar loading capacity
$DT_{i,y}$ = Is the average additional distance travelled by vehicle type i compared to baseline in year *y* (km)
VF_{cons} = Is the vehicle fuel consumption in litres per kilometre for vehicle type i (l/km)
NCV_{fuel} = Is the Calorific value of the fuel (MJ/Kg or other unit)
D_{fuel} = Is the fuel density (kg/l), if necessary
EF_{fuel} = Is the Emission factor of the fuel (tCO_2/MJ)

For transport of compost to the users, the same formula applies.

(2) Leakage emissions from the residual waste from the anaerobic digester ($L_{r,y}$)

AM0025 requires that if the residual waste is aerobically treated through composting, emissions shall be estimated as follows:

(a) N_2O ($L_{N2O,y}$) emission shall be estimated using Equation 5 in AM0025 replacing $M_{compost,y}$ by the sum of the weights of different waste types ($A_{ci,x}$):

$$L_{N2O,y} = A_{ci,x} * EF_{c,N2O} * GWP_{N2O} \qquad (3\text{-}4)$$

Where:

$A_{ci,x}$ = Is the amount of residual waste produced from anaerobic digester (ton)
$EF_{c,N2O}$ = Emission factor of N_2O (0.043kgN_2O ton^{-1})
GWP_{N2O} = Global Warming Potential of N_2O (310 times of CO_2） (tCO_2/tN_2O)

(b) Emission of CH_4 from residual waste ($L_{CH4,y}$) shall be estimated using Equation 1-4. The value of variable $W_{j,x}$ is $A_{ci,x}$. The result should be multiplied by S_{LE} factor.

$$L_{CH4,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x-1}^{y} \sum_j A_{ci,x} \cdot DOC_j \cdot e^{-k \cdot (y-x)} \cdot (1-e^{-k_j}) \cdot S_{LE} \quad (3\text{-}5)$$

$$S_{LE} = S_{OD,LE} / S_{LE,total} \quad (3\text{-}6)$$

Where

$A_{ci,x}$	=	Is weight of each of the waste type *i* in year *x* (t)
S_{LE}	=	Is share of samples that are anaerobic
$S_{OD,LE}$	=	Is the number of samples per year with an oxygen deficiency (i.e. oxygen content below 10%)
$S_{LE,total}$	=	Is the total number of samples taken per year, where S_{total} should be chosen in a manner that ensures the estimation of S_a with 20% uncertainty at a 95% confidence level

4. Emission Reduction

Emission reduction is calculated using the following formula;

$ER_y = BE_y - PE_y$

ER_y	=	Is the emission reductions in year *y* (tCO_2e)
BE_y	=	Is the emissions in the baseline scenario in year *y* (tCO_2e)
PE_y	=	Is the emissions in the project scenario in year *y* (tCO_2e)

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

Data / Parameter:	CEF_{elec} / CEF_d
Data unit:	tCO_2/MWh
Description:	Emission factor for the generation of electricity in the in the project activity / Emission factor for displaced electricity by project activity
Source of data used:	Official utility document
Value applied:	0.90465
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the "Tool to calculated the emission factor for an electricity system" The project activity will consume electricity taken from the East China Grid. China DNA has calculated the 6emission factor of East China Grid as shown in table below; Emission factor of East China Grid[7] OM (tCO_2e/MWh): 0.9421 BM (tCO_2e/MWh): 0.8672 Therefore CEF_{elec} / CEF_d is: CEF_{elec} / CEF_d = 0.9421*0.5 + 0.8672*0.5 = 0.90465 (tCO_2e/MWh)
Any comment:	

Data / Parameter:	P_l
Data unit:	Fraction (%)
Description:	Leakage of methane emissions from anaerobic digester
Source of data used:	IPCC or project participant
Value applied:	15
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC physical leakage default factor of 15% is applied – This is conservative
Any comment:	

Data / Parameter:	φ

[7] China Energy Statistical Year Book 2007

Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	Methodological tool "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"(Version 04)
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per Methodological tool "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"(Version 04)
Any comment:	

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	A site visit was conducted in April 2008 to determine type of cover of the SWDS
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default value of 0 for other types of SWDS is used.
Any comment:	

Data / Parameter:	F
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per Methodological tool "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"(Version 04)
Any comment:	

Data / Parameter:	DOC_f
Data unit:	-

Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per Methodological tool "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"(Version 04)
Any comment:	

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	In the proposed project, the landfill in the baseline scenario is unmanaged landfill and the waste at the landfill generally has a height of more than 10 meters, hence the default value of 0.8 is used.
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:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from

	Volume 5, Tables 2.4 and 2.5)
Value applied:	**Waste type *j*** / **DOCj (% dry waste)**: Wood and wood products – 50; Pulp, paper and cardboard (other than sludge) – 44; Food, food waste, beverages and tobacco (other than sludge) – 38; Textiles – 30
Justification of the choice of data or description of measurement methods and procedures actually applied :	In Guoyang (the site of the project), the mean annual temperature (MAT) is lower than 20 ℃, and mean annual precipitation (MAP) is 819.3mm $year^{-1}$. [8] Therefore a dry climate is applied.
Any comment:	

Waste type *j*	DOCj (% dry waste)
Wood and wood products	50
Pulp, paper and cardboard (other than sludge)	44
Food, food waste, beverages and tobacco (other than sludge)	38
Textiles	30

Data / Parameter:	k_j
Data unit:	-
Description:	Decay rate for the waste type *j*
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
Value applied:	(see table below)
Justification of the choice of data or description of measurement methods and procedures actually applied :	In Guoyang (the site of the proposed project), the mean annual temperature (MAT) is lower than 20 ℃, and mean annual precipitation (MAP) is 819.3mm $year^{-1}$. Therefore boreal dry climate (MAP/PET is blow 1) is applied.
Any comment:	

Waste type *j*	k*j*
Wood and wood products	0.02
Pulp, paper and cardboard (other than sludge)	0.04
Food, food waste, beverages and tobacco (other than sludge)	0.06
Textiles	0.04

B.6.3. Ex-ante calculation of emission reductions:

The *ex ante* estimation of emission reductions is described below.

1. Baseline emissions

[8] Data observed between 1986 and 2006 at Guoyang meteorological weather station. Potential Evapotranspiration (PET) data provided by "GRID - Tsukuba" which is produced by AHN Chung-Hyun and Prof. Ryutaro Tateishi shows that annual PET of Guoyang area is 918 mm $year^{-1}$(http://www-cger.nies.go.jp/grid-j/gridtxt/tateishi.html).

Baseline emissions can be calculated using the Equation 1-5 in B.6.1:

$BE_y = BE_{CH4,SWDS,y} * (1-AF) + BE_{elec,y}$

(1) $BE_{CH4,SWDS,y}$

$BE_{CH4,SWDS,y}$ is calculated using Equation1-3 in B.6.1:

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

Input values to the Equation1-3 are specified in Table 6.

Table 6: Value of parameters used for calculation of $BE_{CH4,SWDS,y}$

<table>
<tr><th>Parameter</th><th colspan="2">Value</th><th>Note</th></tr>
<tr><td>φ</td><td colspan="2">0.9</td><td>Model correction factor to correct for model uncertainty</td></tr>
<tr><td>f</td><td colspan="2">0</td><td>Fraction of methane captured at the SWDS and flared, combusted or used in another manner.</td></tr>
<tr><td>GWP_{CH4}</td><td colspan="2">21</td><td>Global Warming Potential (GWP) for methane</td></tr>
<tr><td>OX</td><td colspan="2">0</td><td>For unmanaged SWDS without coverage with oxidizing material.</td></tr>
<tr><td>F</td><td colspan="2">0.5</td><td>Fraction of CH_4 in landfill gas (default value)</td></tr>
<tr><td>DOC_f</td><td colspan="2">0.5</td><td>Fraction of degradable organic carbon (DOC) dissimilated to landfill gas</td></tr>
<tr><td>MCF</td><td colspan="2">0.8</td><td>Methane correction factor - the default value of 0.8 for unmanaged SWDS - deep and/or with high water table is used</td></tr>
<tr><td rowspan="5">DOC_j</td><td>Waste type j</td><td>DOCj</td><td rowspan="5">Fraction of DOC by weight in the wate type j</td></tr>
<tr><td>Wood and wood products</td><td>50</td></tr>
<tr><td>Pulp, paper and cardboard (other than sludge)</td><td>44</td></tr>
<tr><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>38</td></tr>
<tr><td>Textiles</td><td>30</td></tr>
<tr><td rowspan="3">k_j</td><td>Waste type j</td><td>kj</td><td rowspan="3">Decay rate for the waste stream type j</td></tr>
<tr><td>Wood and wood products</td><td>0.02</td></tr>
<tr><td>Pulp, paper and cardboard (other than sludge)</td><td>0.04</td></tr>
</table>

	Food, food waste, beverages and tobacco (other than sludge)	0.06	
	Textiles	0.04	
$W_{j,x}$	See Table 8	-	-

$W_{j,x}$ (the amount of different waste types)
The expected amount of waste generated in Guoyang during the project period (2010-2020) and its constituent is shown in Table 7.

Table 7: Amount of waste generated in Guoyang during the project period (2010-2020) and its constituent

Year	Annual waste generation (ton year^{-1})	Fraction of organic waste (%)				Fraction of inorganic waste (%)				
		food	paper	wood	textile	glass	ceramic /brick	plastic	coal ash	metal
2011	102,400	39.5	4.8	0.6	0.9	1.2	1.3	2.9	48.8	0.1
2012	106,400	39.6	4.6	0.6	1.0	1.2	1.3	3.5	48.2	0.1
2013	110,600	40.8	4.3	0.6	0.9	1.2	1.3	3.0	47.8	0.1
2014	114,800	40.1	4.1	0.6	1.1	1.3	1.3	3.8	47.6	0.1
2015	119,200	41.7	4.0	0.6	0.8	1.2	1.4	3.0	47.2	0.2
2016	123,700	41.7	4.0	0.6	0.9	1.3	1.4	3.2	47.0	0.1
2017	128,300	41.8	3.8	0.6	0.9	1.2	1.4	3.3	47.0	0.2
2018	133,100	41.4	3.7	0.6	1.0	1.4	1.5	3.6	46.8	0.2
2019	136,200	42.5	3.6	0.6	1.0	1.4	1.5	2.9	46.4	0.2
2020	139,100	42.7	3.3	0.6	0.9	1.4	1.5	3.3	46.2	0.2

It is expected that fraction of organic waste will increase year by year, this is however because of decrease in use of coal (i.e. decrease of coal ash) as use of gas will increase among residents. Guoyang has a plan to increase prevalence of gas use in houses to promote urbanization of the city.

According to the methodological tool, type of methane organic waste "*j*" is classified into (1) Wood and wood products, (2) Pulp, paper and cardboard (other than sludge), (3) Food, food waste, beverages and tobacco (other than sludge), (4) Textiles, and (5) Garden, yard, and park waste. Table 8 shows the weight of organic wastes classified into each type of waste ($W_{j,x}$).

Table 8: Amount of organic waste generated in Guoyang

Year x (2011-2020)	Amount of organic waste $W_{j,x}$ (ton year^{-1})				
	j=1	j=2	j=3	j=4	j=5

1	573	4,864	40,468	922	0
2	606	4,841	42,092	1,032	0
3	641	4,701	45,169	940	0
4	643	4,707	46,081	1,240	0
5	691	4,768	49,694	966	0
6	705	4,886	51,558	1,101	0
7	744	4,875	53,578	1,155	0
8	785	4,925	55,103	1,278	0
9	831	4,835	57,939	1,348	0
10	821	4,521	59,424	1,238	0

j= 1: Wood and wood products
2: Pulp, paper and cardboard（other than sludge）
3: Food, food waste, beverages and tobacco（other than sludge）
4: Textiles
5: Garden, yard and park waste

Methane avoided from SWDS through anaerobic digestion and electricity generation calculated with equation 1-4 ($BE_{CH4,SWDS,y}$) using parameters in Table 6 and Table 8 is summarized in Table 9. Figure 5 shows methane produced from organic waste disposed of in year x (x = 2011-2020). Disposed waste continuously produces methane during the crediting period, but the amount of methane produced will decrease year by year.

Table 9: Methane avoided from SWDS

Year	Total amount of waste（ton $year^{-1}$）	Amount of Organic waste（ton $year^{-1}$）	$BE_{CH4,SWDS,y}$ (tCO_2 $year^{-1}$)

2011	102,400	46,828	5,020
2012	106,400	48,572	9,945
2013	110,600	51,451	14,920
2014	114,800	52,670	19,735
2015	119,200	56,119	24,673
2016	123,700	58,250	29,560
2017	128,300	60,352	34,400
2018	133,100	62,091	39,151
2019	136,200	64,954	43,949
2020	139,100	66,003	48,607
Total	1,213,800	567,290	269,960

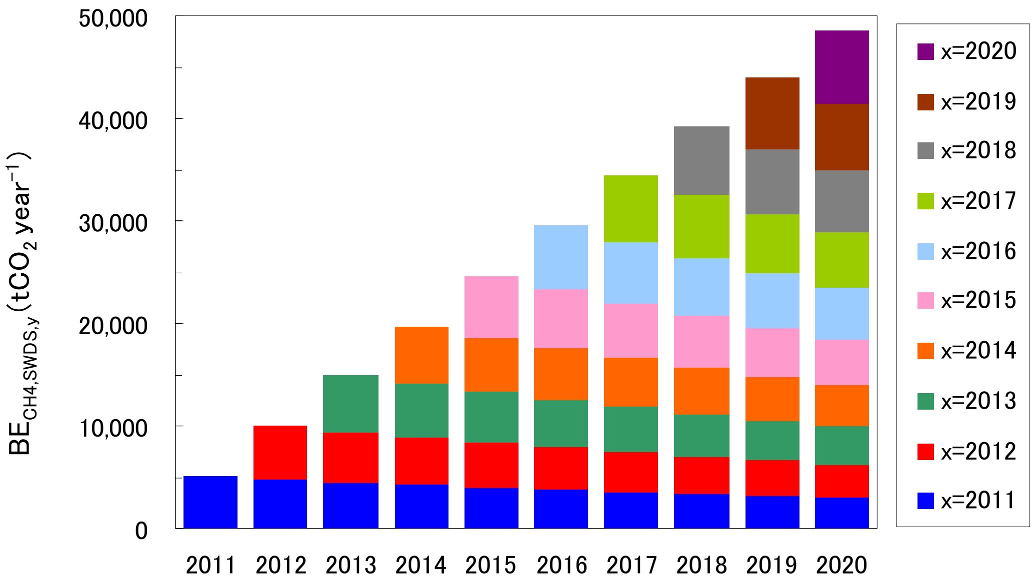

Figure 5: Methane produced from organic waste disposed in year x (x = 2011-2020)

(2) AF
In China, there are following legislation and technical rule regarding the use of landfill gas;

- Standard for pollution control on the landfill site for domestic waste (GB16889-1997)[9]
- Technical Specification for sanitary landfill of domestic wastes (CJJ17-2004)

These legislations require landfill operators to collect and if possible utilize landfill gas, and to flare if landfill gas that cannot be used. However, Guoyang does not have managed landfill sites and all the wastes are simply piled up on the land where gas is neither collected nor utilized (or destroyed). Therefore, "AF" is zero.

(3) $BE_{elec,y}$

The proposed project will sell electricity generated using methane to the grid. GHG emission from the electricity displaced in year "y" is calculated using the following equation;

$BE_{elec,y} = EG_{d,y} * CEF_d$

Where:

$EG_{d,y}$	=	Electricity displaced by the project (MWh)
CEF_d	=	Emission factor for the production of electricity in the project activity.(0.90465 tCO_2/MWh)

The project uses 500kW *2 gas engines which generate 1.5kWh of electricity from 1m^3 of methane. The anaerobic digester can produce 45m^3 of methane from 1ton of organic compounds. Emission factor (CEF_d) of the electricity provided by the local grid is 0.90465 (tCO_2e/MWh). $BE_{elec,y}$ is calculated by subtracting the amount of electricity used for project activity (expected to be 2,190MWh/year) from the total amount of electricity produced by project activity. Table 10 shows methane collected from anaerobic digestion of organic wastes shown in Table 8, electricity generated from methane, and estimation of $BE_{elec,y}$.

Table 10: Collected methane, electricity generated with methane and estimated $BE_{elec,y}$

Year	Amount of Methane($M_{a,y}$)	Electricity (MWh year^{-1})	$BE_{elec,y}$ (tCO_2 year^{-1})

[9] Ministry of Environmental Protection, China and State Bureau of The Technology Supervision, 1997

	(m^3 year-1)		
2011	2,107,238	3,161	878
2012	2,185,722	3,279	985
2013	2,315,300	3,473	1,161
2014	2,370,161	3,555	1,235
2015	2,525,371	3,788	1,446
2016	2,621,265	3,932	1,576
2017	2,715,854	4,074	1,704
2018	2,794,102	4,191	1,810
2019	2,922,920	4,384	1,985
2020	2,970,133	4,455	2,049
Total	25,528,067	38,292	14,829

(3) $BE_{y,a}$(Adjusted baseline emissions)
Baseline emissions (BE_y) need to be adjusted using following equation:

$BE_{y,a,} = BE_y * (1 – RATE^{compliance}_y)$

In cases where there are regulations that mandate the use of one of the project activity treatment options, annual baseline emission “BE_y” needs to be amended by compliance rate of such regulations “$RATE^{compliance}_y$”. As defined in the applicability of AM0025, if the “$RATE^{compliance}_y$” during the crediting period was higher than 50%, the project activity would receive no further credit. Data used for “$RATE^{compliance}_y$” must be published from national or local government.

In China, there are following legislation and technical rule regarding the use of landfill gas;

- Standard for pollution control on the landfill site for domestic waste (GB16889-1997)[10]
- Technical Specification for sanitary landfill of domestic wastes (CJJ17-2004)

These legislations require landfill operators to collect and if possible utilize landfill gas, and to flare if landfill gas that cannot be used.
Guoyang city where the project site is located currently have 4 waste relay points and 12 waste collection points, but do not have managed landfill sites. Wastes are simply piled up on the land. Thus around this area, incompliance of the concerned regulation is common. Therefore, “$Rate^{compliance}_y$” is zero and $BE_{y,a,}$ is equal to BE_y.
2. Project emissions
Project emission is calculated using Equation 2-7 in B6.1:

[10] Ministry of Environmental Protection, China and State Bureau of The Technology Supervision, 1997

$PE_y = PE_{fuel, on\text{-}site,y} + PE_{a,l,y} + PE_{a,s,y}$

(1) $PE_{fuel, on\text{-}site,y}$

In *ex ante* estimation, emissions from onsite fossil fuel use ($PE_{fuel, on\text{-}site,y}$) is assumed to be zero since the project will not use fossil fuel for the project activity.

(2) $PE_{a,l,y}$

In *ex ante* estimation, the project will employ IPCC physical leakage default factor of 15%. Therefore, $PE_{a,l,y}$ is the amount of methane presented in Table 10 multiplied by 15% as shown in Table 11.

Table 11: Leakage emission from anaerobic digester ($PE_{a,l,y}$)

Year	Amount of Methane ($M_{a,y}$) (m^3 year-1)	$PE_{a,l,y}$ (tCO_2 $year^{-1}$)
2011	2,107,238	4741
2012	2,185,722	4918
2013	2,315,300	5209
2014	2,370,161	5333
2015	2,525,371	5682
2016	2,621,265	5898
2017	2,715,854	6111
2018	2,794,102	6287
2019	2,922,920	6577
2020	2,970,133	6683
Total	25,528,067	38,292

(3) $PE_{a,s,y}$

According to AM0025, stack emissions produced by electricity generation using biogas may contain CH_4 and N_2O due to imperfect combustion. In *ex ante* estimation, it is assumed that there is no imperfect combustion and thus $PE_{a,s,y}$ is zero. However, once the project is started, concentration of CH_4 and N_2O in stack gas will be monitored according to AM0025 and $PE_{a,s,y}$ will be determined.

3. Leakage

Leakage of the project is calculated using Equation 3-2 in B6.1:

$L_y = L_{t,y} + L_{r,y}$

(1) $L_{t,y}$

It is expected that distance of transport of waste from waste collection point to the project area will be shorter than current transport distance of waste from waste collection point to landfill sites. $L_{t,y}$ therefore is assumed to be zero in *ex ante* calculation.

(2) $L_{r,y}$

Leakage emissions of N_2O and CH_4 from the residual waste are estimated as below.

(a) N_2O Leakage ($L_{N2O,y}$)

N_2O leakage in year *y* can be calcuted using Equation 3-4 in B6.1. According to AM0025, Emission factor of N_2O ($EF_{c,N2O}$) is 0.043 kg N_2O per tonne of compost and Global Warming Potential of N_2O (GWP_{N2O}) is 310 times of CO_2.

$L_{N2O,y} = A_{ci,x} * EF_{c,N2O} (0.043) * GWP_{N2O} (310)$

The project is planning to produce compost by aerobic treatment of residual waste and sell the compost to local farms. It is estimated that about 250kg of compost can be produced from 1 ton of organic waste through the process of anaerobic digestion and aerobic treatment. Consequently, amount of compost produced ($A_{ci,x}$) is 25% of organic waste shown in Table 9. Table 12 shows $A_{ci,x}$ and $L_{N2O,y}$ for the project.

Table 12: Amount of compost produced ($A_{ci,x}$) and N_2O emission from compost ($L_{N2O,y}$)

Year	Amount of Organic waste (ton year^{-1})	$A_{ci,x}$ (ton year^{-1})	$L_{N2O,y}$ (tCO_2 year^{-1})
2011	46,828	11707	156
2012	48,572	12143	162
2013	51,451	12863	171
2014	52,670	13168	176
2015	56,119	14030	187
2016	58,250	14563	194
2017	60,352	15088	201
2018	62,091	15523	207
2019	64,954	16238	216
2020	66,003	16501	220
Total	567,290	141,823	1,890

(b) CH_4 leakage ($L_{CH4,y}$)

The project use automatic rotary dryer for composting process, and the residual waste is constantly churned. It is therefore expected that the residual waste is sufficiently mixed with oxygen, so that anaerobic condition would not occur. Thus, in *ex ante* calculation, $L_{CH4,y}$ is assumed to be zero.

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

Table 13 shows *ex ante* estimation of the Project's emission reduction. Total GHG emission reduction during the crediting period is estimated to be 225,461 tCO_2.

Table 13: GHG emission reduction during crediting period (tCO_2)

Year	Baseline Emission	Project Emission	Leakage	Emission Reduction
2011	5,898	4,741	156	1,001
2012	10,929	4,918	162	5,850
2013	16,081	5,209	171	10,700
2014	20,970	5,333	176	15,462
2015	26,119	5,682	187	20,250
2016	31,136	5,898	194	25,044
2017	36,104	6,111	201	29,793
2018	40,962	6,287	207	34,468
2019	45,934	6,577	216	39,141
2020	50,656	6,683	220	43,754
Total	284,789	57,438	1,890	225,461

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

B.7.1 Data and parameters monitored:

Baseline Emission parameters:

Data / Parameter:	f
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data to be used:	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e / t CH_4
Description:	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data to be used:	Decisions under UNFCCC and the Kyoto Protocol
Value of data applied for the purpose of calculating expected emission reductions in section B.5	21 (to be applied for the first commitment period of the Kyoto Protocol)
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	W_x ($W_{j,x}$)
Data unit:	tons

Description:	Total amount of organic waste prevented from disposal in year *x*
Source of data to be used:	Measurements by Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Year / W_x (t): 2010: 46,828; 2011: 48,572; 2012: 51,451; 2013: 52,670; 2014: 56,119; 2015: 58,250; 2016: 60,352; 2017: 62,091; 2018: 64,954; 2019: 66,003; 2020: 46,828
Description of measurement methods and procedures to be applied:	Municipal waste brought into the project facility will be firstly measured with weighbridge and sorted into different type of waste. The weight of each sorted waste is also measured. After all inorganic waste is removed, organic waste will be left. Amount of organic waste is therefore calculated by subtracting all inorganic waste from total amount of municipal waste brought into the project site. Measurement will be carried out on a continuous basis and aggregated at least annually.
QA/QC procedures to be applied:	Weighbridge will be subject to appropriate maintenance and periodic calibration.
Any comment:	-

Year	W_x (t)
2010	46,828
2011	48,572
2012	51,451
2013	52,670
2014	56,119
2015	58,250
2016	60,352
2017	62,091
2018	64,954
2019	66,003
2020	46,828

Data / Parameter:	$p_{n,j,x}$
Data unit:	-
Description:	Weight fraction of the waste type *j* in the sample *n* collected during the year *x*

Source of data to be used:	Sample measurements by Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See "Table 7: Amount of waste generated in Guoyang during the project period (2010-2020) and its constituent" in B.6.3
Description of measurement methods and procedures to be applied:	The waste will be sampled using the waste categories *j* and each waste fraction will be weighed.
QA/QC procedures to be applied:	Monitoring will be carried out such that the size and frequency of sampling should be statistically significant with a maximum uncertainty range of 20% at a 95% confidence level. As a minimum, sampling should be undertaken four times per year.
Any comment:	-

Data / Parameter:	z
Data unit:	-
Description:	Number of samples collected during the year *x*
Source of data to be used:	Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Monitored continuously and aggregated annually.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	AF
Data unit:	%
Description:	Methane destroyed due to regulatory or other requirements
Source of data to be used:	Local and/or national authorities

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	N/A
Any comment:	Changes in regulatory requirements, relating to the baseline landfill(s) will be monitored in order to update the adjustment factor (AF), or directly MD_{reg}. This is done at the beginning of each crediting period.

Data / Parameter:	$EG_{d,y}$
Data unit:	MWh
Description:	Amount of electricity generated utilizing the biogas in the project activity displacing electricity in the baseline during the year ‘y’.
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See “Table 10: Collected methane, electricity generated with methane and estimated $BE_{elec,y}$” in B.6.3.
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$RATE^{Compliance}_{y}$
Data unit:	Number
Description:	Rate of compliance
Source of data to be used:	Municipal bodies
Value of data applied for the purpose of	0

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The compliance rate is based on the annual reporting of the municipal bodies issuing these reports. The state-level aggregation involves all landfill sites in the country. If the rate exceeds 50%, no CERs can be claimed.
QA/QC procedures to be applied:	Annual
Any comment:	

Project Emission parameters:

Data / Parameter:	$EG_{PJ,FF,y}$
Data unit:	MWh
Description:	Amount of electricity consumed from the grid as a result of the project activity
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2,190MWh/year
Description of measurement methods and procedures to be applied:	Monitored continuously
QA/QC procedures to be applied:	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. The readings will be double checked by the electricity distribution company.
Any comment:	-

Data / Parameter:	$F_{cons,y}$
Data unit:	mass or volume units of fuel
Description:	Fuel consumption on-site during year 'y' of the crediting period.
Source of data to be used:	Purchase invoices and/or metering.
Value of data applied for the purpose of calculating expected emission reductions in	0

section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	The amount of fuel will be derived from the paid fuel invoices (administrative obligation).
Any comment:	-

Data / Parameter:	NCV_{fuel}
Data unit:	MJ/mass or volume units of fuel
Description:	Net calorific value of fuel
Source of data to be used:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default values. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Annually or ex-ante
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	EF_{fuel}
Data unit:	tCO_2/MJ
Description:	Emission factor of the fuel
Source of data to be used:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default values. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Value of data applied for the purpose of calculating expected emission reductions in	0

section B.5	
Description of measurement methods and procedures to be applied:	Annually or ex-ante.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$M_{a,y}$
Data unit:	tCO_2/year
Description:	Total methane produced from anaerobic digester
Source of data to be used:	Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See "Table 10: Collected methane, electricity generated with methane and estimated $BE_{elec,y}$" in B.6.3
Description of measurement methods and procedures to be applied:	Monitored continuously
QA/QC procedures to be applied:	Data can be checked from usage records.
Any comment:	This quantity is necessary to calculate the leakage of methane from the digester which has a default leakage of 15%.

Data / Parameter:	$SG_{a,y}$
Data unit:	m^3/yr
Description:	Stack gas volume flow rate
Source of data to be used:	Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A (for the purpose of the ex ante estimation, a 99% conversion of C to CO_2 is assumed)
Description of measurement methods and procedures to be	(UFJ 参照) Monitoring will be carried out at least quarterly and SGy computed via the measurement of inlet biogas and air flow rates (V_F^N and V_A^N), stack temperature

applied:	(T_s) and operating hour of each power generator (OP_{gen}). Normalized Volumetric flowrate of exhaust gas (V_N) (Nm^3/yr) = Normalized feed gas flowrate, (V_F^N) (Nm^3/yr) + Normalized volumetric flowrate of air required for combustion, (V_A^N) (Nm^3/yr) Volumetric flow rate of stack gas, corrected to temperature TS (V_E) (m^3/yr) = Normalized Volumetric flowrate of exhaust gas (V_N) (Nm^3/yr) * $\frac{TS\ (°C) + 273.15}{273.15}$
QA/QC procedures to be applied:	Maintenance and calibration of equipment will be carried out according to internationally recognized procedures.
Any comment:	The stack gas flow rate is either directly measured or calculated from other variables where direct monitoring is not feasible. Where there are multiple stacks of the same type, it is sufficient to monitor one stack of each type. The stack gas volume flow rate may be estimated by summing the inlet biogas and air flow rates and adjusting for stack temperature. Air inlet flow rate should be estimated by direct measurement using a flow meter.

Data / Parameter:	$MC_{N2O,a,y}$
Data unit:	tN_2O/m^3
Description:	Concentration of N_2O in stack gas.
Source of data to be used:	Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Monitoring will be carried out at least quarterly

QA/QC procedures to be applied:	Maintenance and calibration of equipment will be carried out according to internationally recognized procedures. Where laboratory work is outsourced, one which follows rigorous standards shall be selected.
Any comment:	

Data / Parameter:	$MC_{CH4,a,y}$
Data unit:	tCH_4/m^3
Description:	Concentration of CH_4 in stack gas.
Source of data to be used:	Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Monitoring will be carried out at least quarterly
QA/QC procedures to be applied:	Maintenance and calibration of equipment will be carried out according to internationally recognized procedures. Where laboratory work is outsourced, one which follows rigorous standards shall be selected.
Any comment:	

Leakage parameters:

Data / Parameter:	$NO_{vehicles,i,y}$
Data unit:	Number
Description:	Vehicles per carrying capacity per year
Source of data to be used:	Counting
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be	Counter should accumulate the number of trucks per carrying capacity. Monitoring will be carried out annually.

applied:	
QA/QC procedures to be applied:	Number of vehicles must match with total amount of sold compost. Procedures will be checked regularly by DOE.
Any comment:	

Data / Parameter:	$DT_{i,y}$
Data unit:	km
Description:	Average additional distance travelled by vehicle type 'i' compared to the baseline in year 'y'
Source of data to be used:	Expert estimate
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	Assumption to be approved by DOE
Any comment:	

Data / Parameter:	VF_{cons}
Data unit:	l/km
Description:	Vehicle fuel consumption in liters per kilometer for vehicle type i
Source of data to be used:	Fuel consumption record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	D_{fuel}
Data unit:	kg/l
Description:	Density of fuel
Source of data to be used:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default values. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures to be applied:	
Any comment:	Not necessary if NCV_{fuel} is demonstrated on a per liter basis

Data / Parameter:	S_{LE}
Data unit:	%
Description:	Share of samples anaerobic
Source of data to be used:	See $S_{LE,total}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Weekly
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.

Any comment:	Used to determine percentage of compost material that behaves anaerobically.

Data / Parameter:	$S_{OD,LE}$
Data unit:	Number
Description:	Number of samples with oxygen deficiency
Source of data to be used:	Oxygen measurement device
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	See $S_{LE,total}$
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Samples with oxygen content <10%. Weekly measurements throughout the year but accumulated once per year only.
Data / Parameter:	$S_{LE,total}$
Data unit:	Number
Description:	Number of samples
Source of data to be used:	Oxygen measurement device
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Monitored weekly. Statistically significant.
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Total number of samples taken per year, where $S_{LE,total}$ should be chosen in a manner that ensures estimation of SLE with 20% uncertainty at 95% confidence

	level.

Data / Parameter:	$A_{j,x}$
Data unit:	Tonnes/yr
Description:	Amount of organic waste type j prevented from disposal in the landfill in the year *x* (tonnes/year)
Source of data to be used:	Measurements by Nanjing Linhui Environment Protection Tec.Co.,Ltd
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See "Table 8: Amount of organic waste generated in Guoyang" in B.6.3
Description of measurement methods and procedures to be applied:	Municipal waste brought into the project facility will be firstly measured with weighbridge and sorted into different type of waste. The weight of each sorted waste is also measured. After all inorganic waste is removed, organic waste will be left. Therefore, amount of organic waste is calculated by subtracting all inorganic waste from total amount of municipal waste brought into the project site. Measurement will be carried out on a continuous basis and aggregated at least annually.
QA/QC procedures to be applied:	Weighbridge will be subject to appropriate maintenance and periodic calibration.
Any comment:	-
Data / Parameter:	Amount of compost produced
Data unit:	Tons
Description:	Project Proponents shall monitor the amount of the compost produced from the composting treatment process.
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Sales invoices of the compost should be kept at the project site. They should contain customer contact details, physical location of delivery, type, amount (in tons) and the use of compost. A list of customers and delivered SD amount should be kept at the project site.
Description of measurement methods and procedures to be applied:	Weekly
QA/QC procedures to be applied:	-
Any comment:	-

In addition to the above, at the time of renewal of the crediting period, the following data will be updated:

- Oxidation factor (OX)
- Fraction of methane in the SWDS gas (F)

- Fraction of degradable organic carbon that can decompose (DOC_f)
- Methane correction factor (MCF)
- Fraction of degradable organic carbon (by weight) in each waste type *j* (DOC_j)
- Methane destroyed due to regulatory or other requirements (MD_{reg} or AF)
- Decay rate for waste type j (k_j)
- Operating margin emission factor ($EF_{OM,y}$)

B.7.2. Description of the monitoring plan:

Under investigation

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

The application of the methodology has been completed on *dd/mm/yyyy*. *(currently incomplete)*
The name of the responsible person and contact address are shown below.

JAPAN NUS CO.,LTD
9-15 Kaigan 3-chome, Minato-ku,
Tokyo 108-0022, JAPAN

CDM R&D Center, School of Public Policy & Management
Tsinghua University, Beijing 100084, P.R. China
Note: Neither JAPAN NUS CO.,LTD nor CDM R&D Center are project participants.

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:

01/03/2009 (start of construction)

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

15 years

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

C.2.1. Renewable crediting period:

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

This section is left intentionally blank.

C.2.1.2. Length of the first crediting period:

This section is left intentionally blank.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/01/2011

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Under investigation

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:

Under investigation

SECTION E. Stakeholders' comments

>>

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

Under investigation

E.2. Summary of the comments received:

Under investigation

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

Under investigation

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Nanjing Linhui Environment Protection Tec.Co.,Ltd
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Telephone:	+86(0)25-66675666
FAX:	+86(0)25-86990266
E-Mail:	lh-hb-kj-@vip.sina.com.cn
URL:	www.lhhbkj.com
Represented by:	Mr. Lu Lin
Title:	President
Salutation:	Mr.
Last name:	Lu
Middle name:	-
First name:	Lin
Department:	-
Mobile:	-
Direct FAX:	-
Direct tel:	-
Personal e-mail:	-

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

THIS SECTION IS NOT RELEVANT, AS NO PUBLIC FUNDS ARE INVOLVED IN THE PROJECT.

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION

- - -