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:

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Composting of organic waste in Wuzhou

Version 1

1 December 2006

A.2. Description of the project activity:

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The Proposed Project applies composting technology to treat organic waste on a site in the Wuzhou Municipal of the People's Republic of China. The Project comprises the design and building of a composting plant for organic waste of Wuzhou Municipal, with a maximum yearly input capacity of 73,000 tonnes. Apart from compost the project will reduce methane emissions by diverting organic wastes from dumping at a landfill (where the anaerobic process occurs) to a composting plant (aerobic process).

The great majority of landfills in China are poorly controlled sites with no coverage or landfill gas extraction. Hence, the baseline is crude waste disposal without any precautions to avoid the emission of methane.

Based on investigations and calculations the project will generate some 46,274 tCO_2/a equivalents over the 21-years period 2007 – 2027. Delivery of CERs will start from May, 2007 onwards.

Like other low-income cities of developing countries, waste generated in Wuzhou is mostly organic in nature. The waste has high moisture content and density and is suitable for aerobic composting. So composting of this waste is an attractive option for resource recovery and environmental improvement. Uncontrolled dumping is prevented and compost is generated that combats soil degradation in Wuzhou. The Project therefore contributes to a sustainable development. The plant will be semi-mechanised and will create jobs, in particular for less educated women.

The Project will be the first composting site in Guangxi Province on a commercialized basis and will contribute to the sustainable development of Wuzhou Municipal. The following environment, economic and social benefits are achieved by executing the project:

1. Environmental benefits: Assistance in preventing uncontrolled GHG generation and emission from waste that would have been disposed at the landfill; reduction of land using for waste dumping; preventing air and water pollution. The emission reduction from displacing fertilizers by the produced compost of the Project and the emissions in the fertilizer production process are not claimed. The CERs related to the increased crop production (CO_2 fixing) thanks to the use of compost are not claimed neither.

2. Economical benefits: Production of soil improver (compost) to battle soil degradation[1], boosting the farm crop production, thus promotion of the incomes of local farmers and contributing to the economic sustainable development of Wuzhou Municipal.

3. Social benefits: 85 jobs for locals and staff training to improve skills of locals; promotion sustainable development competition of Wuzhou Municipal by improving the environment quality. It demonstrates the commercialized practice of composting that could assist Chinese western regions and the other countries in meeting the objectives regarding re-use of waste.

[1] Summary version of the final Hunger report: Http://www.unmillenniumproject.org/documents/HTF-SunVers_FINAL.pdf; Page 13 box 1.

Besides, the project proponent will build a 300-meter motor way in place neighbourhood, improving the local fundamental establishment.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public 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)	Teresa Environmental Industry Co., Ltd., Wuzhou (the project proponent)	No
Germany	RWE Power AG	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>>
People's Republic of China

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

>>
Guangxi Province

A.4.1.3. City/Town/Community etc:

>>
Wuzhou Municipal

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

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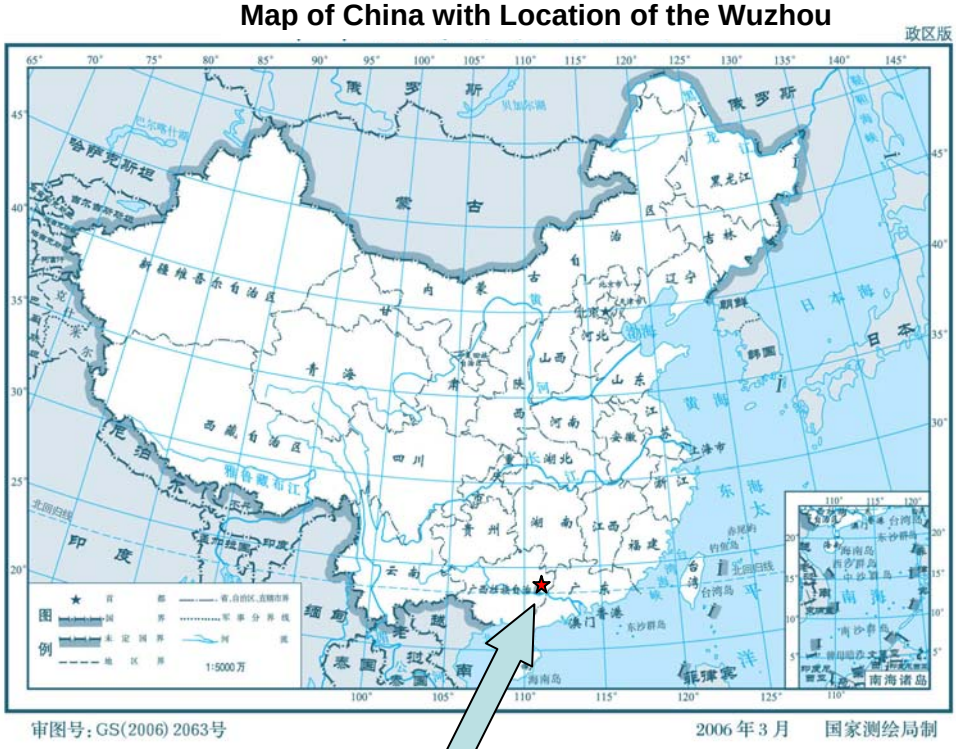
Longxincun, Changzhou District, Wuzhou Municipal

The composting plant for organic waste will be erected at a site near the previous landfill site, with 11 kilometers apart from the downtown, as the following diagram shows. The longitude of the plant is E111°20′，the latitude is N23°30′.

Map of China with Location of the Wuzhou



Location of Proposed Composting Plant: Longxincun, Changzhou District, Wuzhou Municipal (About 11 kilometers apart from the downtown)

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

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Project activity: 13 – Waste handling and disposal

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

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The technology proposed for the composting plant can be regarded as proven technology but new to Guangxi Province. The chosen process can be characterized as follows:

- the composting plant is designed for a processing capacity of 73,000 tons of organic waste input per year. The waste input is estimated as 54,750 tons in the beginning year(2007), yearly scaled up to its final capacity of 73,000 tons of organic waste per year input (from 2011 onwards);
- the organic waste after filter system is transported to the deep composting slot, adding microorganism germ;
- type of aeration: machine to turn over the waste and aerators with forced blowing to increase oxygen content inside the composting slot where aerobic composting process occurs;
- integrated parameters control inside the composting slot, such as: oxygen content >10%, temperature in 50~60^{o}C, humidity content in 50%~60%, etc.;
- One ton of organic waste net input will result in approximately 330 kg of compost (These figures are continuously monitored. See monitoring plan).

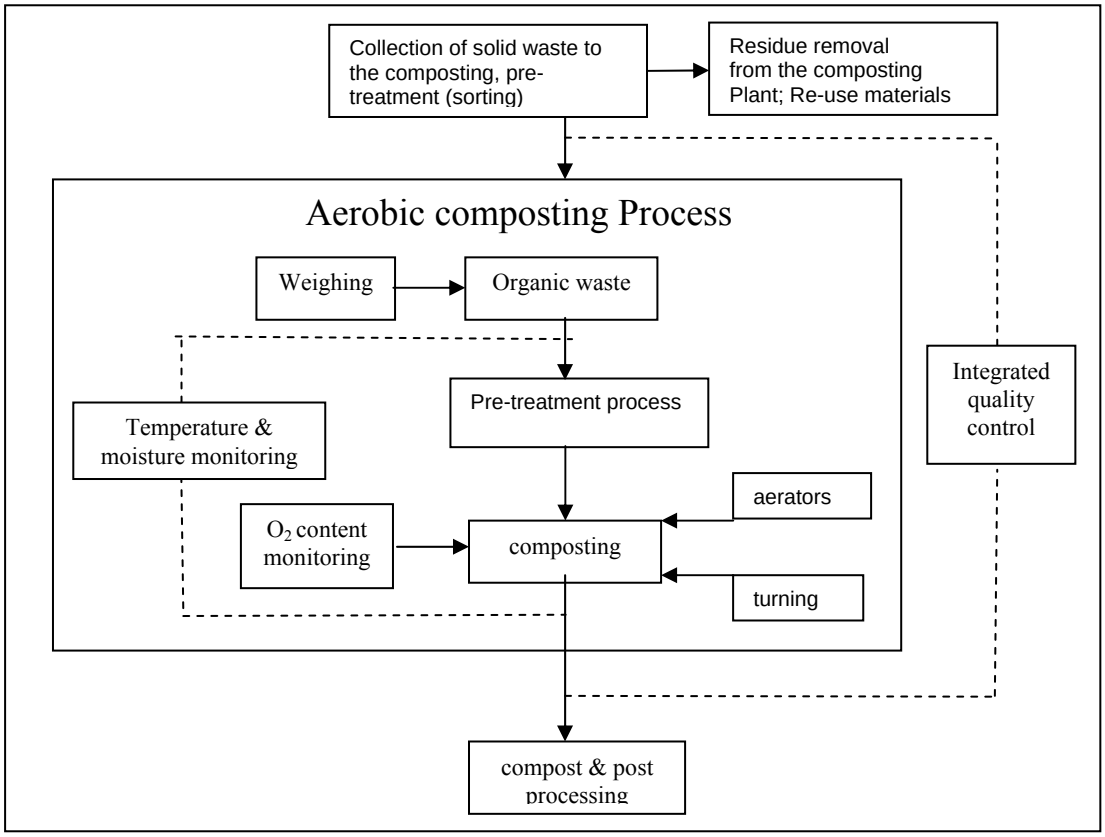

Figure A.4 Different steps in the composting process

China Agricultural University has extensive knowledge of composting. Main part of the composting plant will be constructed and operated by the Project Proponent. The know-how related to the applied technology and to the operation of the plant will be transferred to the proponent party.

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

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Estimated amount of emission reductions over the period 2007-2013 (first crediting period) :

Years	Annual estimation of emission reductions in tCO_2e
2007（from May to Dec.）	8,174
2008	19,472
2009	28,597
2010	35,605
2011	41,171
2012	44,949
2013	47,480
2014（from Jan. to Apr.）	16,393
Total estimated reductions	241,841
Total number of crediting years (First Crediting Period)	7 years
Annual average over the crediting period of estimated reductions	34,549
Total estimated reductions （from May 1, 2007 to Dec. 31, 2012）	177,968

A.4.5. Public funding of the project activity:

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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:

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The approved methodology AM0025 for "Avoided emissions from organic waste through alternative waste treatment processes" (Version 05s)[2] is applied. Article 48b of the Marrakech agreement states: "Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment". Therefore it applies to this project as significant investments are involved that would not be made without CER revenue.

According to the methodology AM0025, (1) Tool for the demonstration and assessment of additionality (Version 2)[3], (2) Methodology version 06 of ACM0002:"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"[4], and (3) "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" (estimate the emission reductions of the baseline scenario according to the Annex 14 of EB's 26th meeting report)[5] are cited.

[2] http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_KSUL76BS5PK5VBYDAQSCHSMGF9QX29

[3] http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

[4] http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763

[5] http://cdm.unfccc.int/EB/026/eb26_repan14.pdf

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

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This methodology "Avoided emissions from organic waste through alternative waste treatment processes" is applicable to the following situations in regards to composting activities:

- The project activity involves a composting process in aerobic conditions for the fresh waste that in a given year would have otherwise been disposed of in a landfill;
- 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.
- Waste handling in the baseline scenario shows a continuation of current practice of disposing the waste in a landfill;
- The compliance rate of the environmental regulations during (part of) the crediting period is below 50%.

The project activity meets the applicability criteria set out above and is therefore applicable. Since there are no regulatory requirements in China at present, the baseline scenario is that the waste will be disposed at the landfill and will generate landfill-gas that will be released to the atmosphere (see B.4).

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

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The project boundary is the composting-site where waste will be brought in and treated.

The flow chart in figure B.3 shows the main components and connections including system boundaries of the project. The flowchart excludes processes beyond control or influence of the project, but includes the relevant beyond control processes to generate secondary energy carriers.

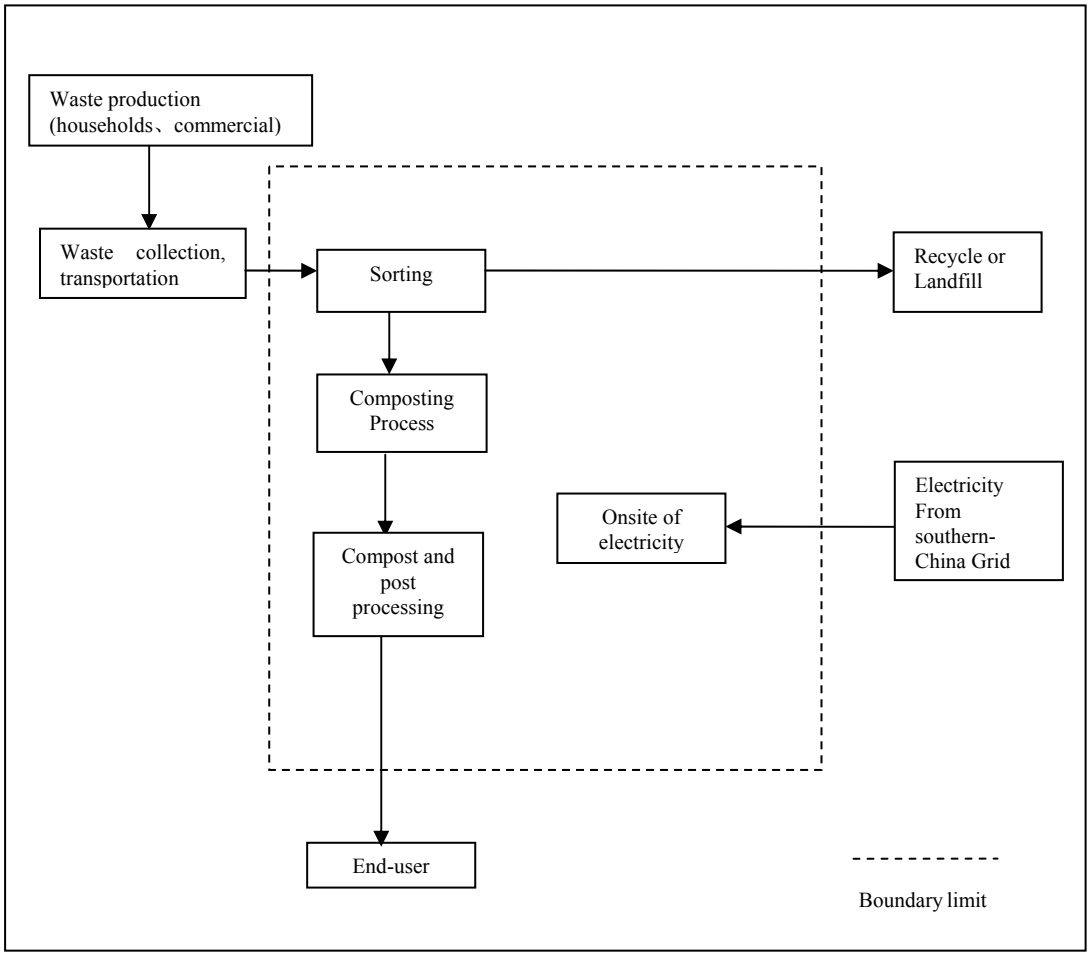

Figure B.3: System boundaries of composting project

Table B.3: Overview of emissions sources included or excluded from project boundary and baseline

	Source	Gas		Justification / Explanation
Baseline	*Emissions from decomposition of waste at the landfill site*	CH_4	*Included*	*The major source of emissions in the baseline.*
		N_2O	*Excluded*	*N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of 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	*Excluded*	*No electricity consumption in the baseline.*
		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 on due to the project activity*	CO_2	*Excluded*	*No on-set fossil fuel consumption in the baseline.*
		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*	*An emission source for composting activities.*
		CO_2	*Excluded*	*Not included by the methodology.*
		CH_4	*Included*	*The composting process may not be complete and result in anaerobic decay.*

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

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The proposed project uses the version 02 of "Tool for the demonstration and assessment of additionality" approved by EB to identify and describe the baseline scenario.

With the same purpose of waste treatment, there would be 6 alternatives if the proposed CDM project is not acceptable.

Alternative 1: Organic waste composting identical to the proposed project but not undertaken as a CDM project activity. Methane production would be avoided by breaking down organic matter through aerobic processes. Composting activity includes processes of municipal waste classification, composting and automation monitoring which requires high technology. It demands high initial capital investment and operational & maintenance costs, and the sales of generated compost faces marketing risks, the ROI (return on investment) cannot reach the minimum expectations. The steps 2 and 3 of the following section B.5 will show that the IRR without CDM revenue is only 5.47%. Taking the investment, technical, market and operation barriers, this alternative without CDM support is not practical.

Alternative 2: Waste incineration without RDF. Waste incineration is suitable for low humidity and high caloric value wastes. So incineration is not an efficient process at present for waste disposal in Wuzhou. Besides it requires reliable technology and additional investment without any benefits. Therefore it is not economically practice as a business operation.

Alternative 3: Disposal of the waste on a landfill with electricity generation using the landfill gas captured from the landfill site. It requires vast investment. And there are many uncertainties on the electricity market, which may make it not profitable if the price is not high enough. Projects in the same situation of Meizhou, Nanjing and the other projects in China have operated as CDM activities[6]. The PDDs of these projects have proved that this alternative – without CDM support is seen as not feasible.

Alternative 4: Disposal of the waste on a landfill with thermal energy generation using the landfill gas captured from the landfill site. The site of the proposed project locates in Wuzhou with semitropical climate. There is not enough demands for thermal energy, thus it is not economically practical.

Alternative 5: Disposal of the waste on a landfill with landfill gas capture and flaring systems. There is technical and safety risks and additional investments but without any economic return. Thereby this alternative – without CDM support is seen as not feasible.

Alternative 6: Continuation of the current situation, where organic matter is broker down through uncontrolled anaerobic processes, releasing all produced methane into the atmosphere. There are not any

[6] http://cdm.unfccc.int/Projects/registered.html

additional technical and investment barriers. It is the economically feasible one for the project proponent.

The most relevant parts of the legal framework for disposal of waste in China are:

- Environmental Protection Law of the People's Republic of China.
- Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste. (screening for the need of a detailed)

All the alternatives comply with the laws and regulatory requirements for the project location. According to the above laws, even though there is a general policy to simulate re-use of wastes in China, there is no legislation enforcing landfill gas extraction, organic waste composting or what-so-ever.

The implementation of the legal framework is also determined by the availability of securing necessary financial resources. The China waste sector is fully municipality driven. Municipalities do not have sufficient knowledge and financial resources to provide the necessary investments into separate collection and subsequent processing (composting) and marketing. The main reasons for this are waste fee that is still too low and do not generate sufficient income to the municipalities. (Besides, local governments in China will need additional financial resources for the set up of proper waste management systems and for remediation and/or closure of existing and partly illegal landfills).

Given the current of government (incl. the municipalities) finances, it is unlikely that the national or local government will be able to provide considerable subsidies for the implementation of separate collection systems for (green) organic wastes and composting. The tasks of most municipalities is only limited to the resolve of the pollution issues through applying for the national debt or loan from the foreign banks. That is the current situations in China.

As above, among the 6 alternatives, alternatives 1-5 require additional investment. In China, the waste treatment is generally operated by the local governments who suffer from the lack of budgets. For the investors, the alternatives 1-5 are not acceptable if without the CDM revenue. Thus they can not be used as the baseline scenario. In comparison, alternative 6 continuing the current disposal of waste and allowing the emission of landfill gas does not require any additional investments, thus is the most economically practicable choice. In conclusion, continuation of the current situation is the baseline scenario.

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):

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Step 0. Preliminary screening based on the starting date of the project activity

The emission reduction crediting period will be accounted from the form the date of the project registration for this project, so the Step 0 is not applicable.

The project is only expected to start operation after registration with the UNFCCC. In any case, as it will be demonstrated in the following steps, CDM revenue has been considered from the early stages of development of the project, and it is an integral part of the financial package of the project. It can be proved by the following document (Details made available to the Operational Entity validating the Project):

- The meeting minutes of the board of directors of Guangdong Guoguang Investment Co., Ltd.
- The approval document from the Development and Reform Commission of Wuzhou Municipal of Guangxi Province: The approval document regarding the engineering project of the comprehensive treatment of the municipal wastes.
- The confirmation letter for the loan cooperation, issued by Wuzhou Branch of China Communication Bank.

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

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

Alternative 1: Organic waste composting identical to the proposed project but not undertaken as a CDM project activity.

Alternative 2: Waste incineration without RDF. Waste incineration is suitable for low humidity and high caloric value wastes.

Alternative 3: Disposal of the waste on a landfill with electricity generation using the landfill gas captured from the landfill site.

Alternative 4: Disposal of the waste on a landfill with thermal energy generation using the landfill gas captured from the landfill site.

Alternative 5: Disposal of the waste on a landfill with landfill gas capture and flaring systems.

Alternative 6: Continuation of the current situation, where organic matter is broker down through uncontrolled anaerobic processes, releasing all produced methane into the atmosphere. There are not any additional technical and investment barriers. Therefore it is the most economic and practical operation.

Sub-step 1b. Enforcement of applicable laws and regulations:

The most relevant parts of the legal framework for disposal of waste in China are:

- Environmental Protection Law of the People's Republic of China.
- Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste.

As above, there is no legislation in China enforcing landfill gas extraction, organic waste composting or what-so-ever.

As seen in B.4, among the 6 alternatives, alternatives 1-5 without CDM support can not be used as the baseline scenario. In comparison, alternative 6 continuing the current disposal of waste and allowing the emission of landfill gas is the baseline scenario.

Step 2. Investment Analysis

Sub-step 2a: Determine appropriate analysis method

According to the methodology for determination of additionality, the Project Proponent has to select one of three alternative financial analysis for this step. If the project does not generate any financial or economic benefit other than CDM-related, than Option I should be used. Option 1 is not applicable to this project because it does generate compost-sales revenue. Option II is based on the comparison of returns of the project investment with the investment required for an alternative to the project. In this case, the alternative to the CDM project activity does not involve investments of comparable scale to the project. Consequently, Option II is not applicable to this project. Therefore, Option III must be used, where the returns of the investment in the project activity is compared to benchmark returns that are available to any investors in the country.

Sub-step 2b: Option III - Application of benchmark analysis

The likelihood of development of the Project, as opposed to the continuation of current activities will be determined by comparing its IRR with the benchmark of interest rates available to a local investor. In November 2006, interest rates for a five-year term of local banks in China are 6.39%[7]. In China, there is not a generally acceptable benchmark rate of IRR for this project. The benchmark rate of return on construction or similar risks is commonly set at 8%. The average returns from stock market and private equity funds are higher, which are about 13% and 15% respectively. As far as this Project, the benchmark rate is set at 8% which is conservative.

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

The Tables below show the financial analysis for the project activity.

As shown, the project IRR (without carbon) is 5.47%, lower than the benchmark rate 8%. Clearly, without carbon revenue, the project will face substantial financial hurdles, i.e. the project is unattractive. This is even more evident if we compare these returns with the returns from stock market and private equity funds in China (see above).

Table B.5-1: Financial results of the Project (Alternative 2) with and without carbon finance.

Total Investment (RMB Yuan)	67,325,500
Operational Lifetime (Year)	30
Waste Fee (RMB Yuan/ton Waste)	54
Annual Price of Compost(RMB Yuan/ton Compost)	100
Organic Waste Quantity of Composting Process(t/day）	See table B.5-2
Project IRR (Without Carbon Finance)	5.47%
Benchmark Rate of IRR	8%

Summary of the results of project analysis. Details made available to the Operational Entity validating the Project

Table B.5-2: Organic Waste Quantity of Composting Process

Years	2007	2008	2009	2010	2011 onwards
Organic Waste Quantity(t/a）	36,500	60,225	65,700	69,350	73,000

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by altering the following parameters:

- Total investment
- Composting sales revenue
- Waste fee
- Running costs (Operational and Maintenance costs)

[7] Website of The People's Bank of China: http://www.pbc.gov.cn/detail.asp?col=100&ID=1785

Those parameters were selected as being the 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 below).

Table B.5-3: Sensitivity analysis of project IRR (with carbon finance)

	-10%	-5%	Original (0%)	5%	10%
Total Investment	6.70%	6.06%	5.47%	4.93%	4.42%
Composting Sales Revenue	5.17%	5.32%	5.47%	5.61%	5.76%
Waste Fee	4.41%	4.96%	5.47%	5.91%	6.43%
Running Costs	6.78%	6.14%	5.47%	4.75%	3.97%

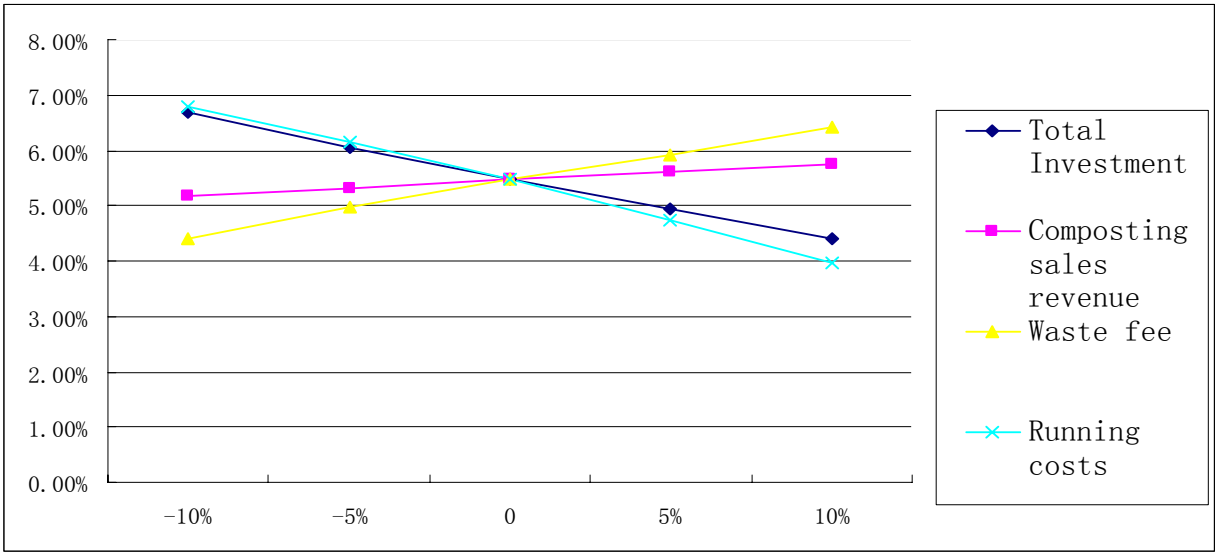

Figure B.4-1: Sensitivity analysis of project IRR (with carbon finance)

In conclusion, the project IRR remains low even in the case where these parameters change in favour of the Project, and are still too low for a risky enterprise such as the construction and operation of a composting plant. Consequently, the Project cannot be considered as financially attractive.

Step 3. Barrier Analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the Proposed Project activity:

Hereafter the relevant key factors are discussed. Each of the factors described below indicates how it influences the baseline development for the composting project and the GHG emissions at project activity level.

Key factor 1 –Investment Barriers

The Proposed Project is the first commercialized composting project for organic waste in Guangxi province. It faces the risk of the investment and high operational & maintenance costs. There is of risk in selling the

compost generated in the market place. Without CDM revenue, the project proponent would face the actual financing problem because of difficulties to get the loans from commercial banks. In fact, it is under the detailed explanation to the commercial banks regarding extra CDM revenue, the project proponent solved the financing problem (refer to "The confirmation letter for the loan cooperation", issued by Wuzhou Branch of China Communication Bank. Details made available to the Operational Entity validating the Project.).

Key factor 2 –Technical barriers

Although some of the R&D activities have been carried out in the field of waste composting process in China, the composting technology is not well developed. The lower level of the technology is the root cause of the low efficiency, high investment and poor product quality in the composting process, which has limited the development of the composting industry in China[8].

The entire technology of the aerobic composting process developed by the China Agricultural University is considered as reliable. Yet the project is the first commercialized attempt for the technology and equipment in China. There is no reference of the historical data from the practical facility operation and the commercialized operations. So it faces a number of technical barriers, such as the lack of technical know-how and lack of availability of equipment. Further technical development would be expected because of the emerged problems during the operation, maintenance, monitoring and trouble shooting.

Key factor 3 – Market barriers

The market barriers include composting sales, economic unattractiveness, etc. The Proposed Project, as an independent commercialized development project, has no favourite conditions and counter measures in policy to offset those above risks. But as the pioneer of the commercialization of the waste composting technology, the Project Proponent would like to take the risks to promote the composting industry in China and contribute to such a cause.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the Proposed Project activity):

The above identified barriers do not affect **Alternative 6** (Continuation of the current situation). It faces no barriers in the respect of investment, technology and market as the sub- step 3a says. Therefore, it is the economically feasible one for the project proponent, i.e. Continuation of the current situation is the baseline.

Step 4. Common Practice Analysis

Sub-step 4a. Analyse other activities similar to the proposed activity

To date there has been limited development of composting projects in the Host Country. Up to date the composting treatment mainly adopts the low cost composting system, most of which are the static composting process (anaerobic process). For the aerobic composting process (aerobic process), it requires high investment and operational cost. With the limitation of the current economic and social conditions, the aerobic composting process is difficult to be promoted. The scale of the waste composting plant is also limited by the compost market, the sales of the compost in China market is weak currently[9].

[8] Academic Paper: "The Assessment of Municipal Waste Treatment and Analysis of the Harmless Treatment Rate in China" by Zhang Yi, Lu Yinfang. http://www.cdhb.gov.cn/huanbao/news_view.asp?newsid=26
[9] Academic Paper: "Status and Problems of MSW Composting in Beijing", by Li Yu-chun. http://www.bswad.org.cn/JLKJ/model.asp?id=108

The location of the Proposed Project is in Guangxi, there are 2 composting plants known to us. The plants are sectors of Municipal Administration. None of them are commercialized operated. The 2 plants are: Nanning Shixi waste treatment plant[10] and Qingzhou waste treatment plant[11].

No other commercialized composting activities are known.

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

There are not any similar activities that are occurring in Guangxi.

Step 5. Impact of CDM registration

As shown in Step 2 above, the project is unlikely to move forward without the support of the CDM. If the Proponent was able to sell emission reduction credits from the project activity at an assumed price of EURO $ 8.5 per ton of CO^2e, the additional revenue generated by carbon sales would be sufficient to make the project go ahead. The IRR of the project will rise to 8.89% from 5.47%.

Table B.5-3: Sensitivity analysis of project IRR (with carbon finance)

	Without CDM	Benchmark rate of IRR	With CDM
IRR	5.47%	8%	8.89%

The impact of CDM registration includes:

- CDM revenue will improve the liquidation ability of the project;
- Help to raise the ability to overcome the investment and technology barriers, providing the guarantee for the smooth implementing of the project.
- Successful practice and lessons of this project drawing on new participants to commercially develop composting plants.

Without the CDM revenue, the ROI cannot reach the minimum expectations. It is very likely that the project proponent may turn in to directly landfilling of the organic waste, thus can't bring to the reduction of GHG.

According to the **Tool for the demonstration and assessment of additionality (version 2)**, the baseline and Proposed Project are discussed in details in the B.4 section.

As above, since in China there is no legislation enforcing the composting of organic waste, the approach is to continue disposal of waste and as a consequence landfill gas will be generated and emitted directly into the atmosphere. So continuation of the current situation is the baseline.

Commercialized composting projects have not been implemented to date in Guangxi Province, because the initial barriers are too hard to overcome and there are not sufficient incentives to justify the risk involved in building composting plants. And the project may not be viable unless CDM assistance is acquired. So the Proposed Project is additional in that emission reductions would not occur in the absence of the proposed

[10] Website of Nanning Municipal Administration: http://www.nnszgl.gov.cn/huanwei/bszn/index.asp
[11] Website of Chongzuo Municipal Development and Reform Committee: http://czfgw.gov.cn/index.php3?file=detail.php3&kdir=2163335&nowdir=871027&id=754098&detail=1

CDM activity.

The Proposed Project will divert organic waste from landfilling towards a composting plant. Instead of anaerobic conversion, resulting in – amongst others – methane production, the organic waste is aerobically degraded, producing only non-fossil CO2, into a reusable product (compost). The prevented methane emission from the landfill that otherwise would occur is claimed as emission reductions (ER's).

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

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The emission reductions caused by the proposed project are calculated according to the approved methodology Version 05 of AM0025 "Avoided emissions from organic waste through alternative waste treatment processes", and the cited methodology version 06 of ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" and Annex 14 of EB's 26th meeting report "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".

The calculation will be completed with the following steps:

1. Project emissions (PE_y)

The Proposed Project uses composting process to treat the organic waste, so the project emissions in year y are calculated using the following formula:

$$PE_y = PE_{elec,y} + PE_{c,y} \quad (1)$$

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)
$PE_{c,y}$	is the emissions during the composting process in year y (tCO_2e)

(1) Emissions from electricity consumption on-site ($PE_{elec,y}$)

The project activity will consume electricity that is taken from the South China Grid. The GHG emission of electricity generation is therefore relevant.

$$PE_{elec,y} = MWh_{e,y} * CEF_{elec} \quad (2)$$

Where

$MWh_{e,y}$:	is the amount of electricity consumed from the grid in the project activity, measured using an electricity meter (MWh). Estimated values are used to *ex-ante* calculate the emission reduction. The actual emission reduction will be replaced by the *ex-post* measured values.
CEF_{elec}:	is the carbon emissions factor for electricity generation in the project activity (tCO_2 e/MWh). For determination CEF_{elec}, the Approved Consolidated Baseline Methodology ACM0002:

"Consolidated baseline methodology for grid-connected electricity generation from renewable sources" is applied.

(2) Emissions from composting ($PE_{c,y}$)

$$PE_{c,y} = PE_{c,N2O,y} + PE_{c,CH4,y} \quad (3)$$

where

$PE_{c,N2O,y}$: is the N_2O emissions during the composting process in year y (tCO_2e)

$PE_{c,CH4,y}$: is the CH_4 emissions during the composting process due to methane production through anaerobic conditions in year y (tCO_2e)

N_2O emissions ($PE_{c,N2O,y}$)

$$PE_{c,N2O,y} = M_{compost,y} * EF_{c,N2O} * GWP_{N2O} \quad (4)$$

Where

$M_{compost,y}$ is the total quantity of compost produced in year y (tonnes/a). Estimated values are used to *ex-ante* calculate the emission reduction. The actual emission reduction will be replaced by the *ex-post* measured values.

$EF_{c,N2O}$ is the emission factor for N_2O emissions from the composting process (tN_2O/t compost), use the approved value for N_2O (0.000043 tN_2O/t compost.)

GWP_{N2O} is the Global Warming Potential of nitrous oxide (tCO_2/tN_2O), use the approved global warming potential value for N_2O($310tCO_2/tN_2O$)

CH_4 emissions ($PE_{c,CH4,y}$)

$$PE_{c,CH4,y} = MB_{compost,y} * GWP_{CH4} * S_{a,y} \quad (5)$$

Where

$MB_{compost,y}$ is the quantity of methane that would be produced in the landfill in the absence of the composting activity in year y (tCH_4). According AM0025 and Annex 14 of EB's 26th meeting report "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", $MB_{compost,y}$ is calculated as follows:
$BE_y = MB_{compost,y} * GWP_{CH4}$
Where
BE_y is the Baseline Emissions, calculated by equation 6.

$S_{a,y}$ is the share of the waste that degrades under anaerobic conditions in the composting plant during year y (%). Currently no data is available. *Ex ante* a S_a 2% will be applied in this PDD. *Ex post* this value will be replaced by the result of actual measurements on site.

GWP_{CH4} is the Global Warming Potential of methane (tCO_2/tCH_4), use the approved global warming potential value for methane (21 tCO_2/tCH_4)

2. Baseline Emissions (BE_y)

The methodology AM0025 declares that if approved, project participants shall calculate baseline emissions

using the latest approved version of the ***"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"***. Therefore the equation in the Annex 14 of EB 26th Meeting report, instead of the equation provided by the methodology AM0025, is used for this calculation. The calculation equation is as following:

$$BE_y = BE_{CH4,SWDS,y} = \varphi*(1-f)*GWP_{CH4}*(1-OX)*16/12*F*DOC_f*MCF*\sum_{x=1}^{y}\sum_{j=A}^{D} W_{j,x}*DOC_j*(1-e^{-k_j})*e^{-k_j(y-x)} \quad (6)$$

Where

φ	is the model correction factor to account for model uncertainties, use default value 0.9.
f	is the fraction of methane captured at the SWDS and flared, combusted or used in another manner. The baseline scenario is that waste is directly dumped without any landfill gas collection, destruction or reuse system. Therefore f is 0.
OX	is the oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste), Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites. Since the landfill in baseline scenario can be considered as an unmanaged landfill without cover, the OX in this case is 0.
F	is the fraction of methane in the SWDS gas (volume fraction),use default value 0.5
DOC_f	is the fraction of degradable organic carbon (DOC) that can decompose, use default value 0.5
MCF	is the methane correction factor, use value 0.8
$W_{j,x}$	is the amount of organic waste type j prevented from disposal in the SWDS in the year x(tons), using the following formula for calculating: $W_{j,x} = W_x*(\sum_{n=1}^{z}*P_{n,j,x})/z$ where， W_x is the total amount of organic waste prevented from disposal in year x (tons), $P_{n,j,x}$ is the weight fraction of the waste type j in the sample n collected during the year x, z is the number of samples collected during the year x
DOC_j	is the fraction of degradable organic carbon (by weight) in the waste type j
k_j	is the Decay rate for the waste type j
j	is the waste type category: Wood and wood products; Pulp, paper and cardboard (other than sludge); Food, food waste, beverages and tobacco(other than sludge); Textiles; Garden, yard and park waste; Glass, plastic, metal, other inert waste
x	is the 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	is the year for which methane emissions are calculated

3. Leakage (L_y)

The Proposed Project uses composting process to treat the organic waste, so the Leakages in year y are calculated using the following formula:

$L_y = L_{t,y}$ （7）

Where

L_y: is the leakage in year y(tCO_2e)

$L_{t,y}$: is the leakage emissions from increased transport in year y (tCO_2e)

The compost produced by the proposed project will be treated in site adjacent to the project site, thus there is no additional transportation and leakage. Therefore:
$L_y = L_{t,y} = 0$

4. Emission reductions(ER_y)

To calculate the emission reductions the project participant shall apply the following equation:

$ER_y = BE_y - PE_y$ (8)

Where:

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 (CO_2e)

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

Data / Parameter:	*OX*
Data unit:	%
Description:	is the oxidation factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	*OX* is determined by the following two ways: (1) Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied. (2) Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites. Since the landfill in baseline scenario can be considered as an unmanaged landfill without cover, the *OX* in this case is 0.
Any comment:	

Data / Parameter:	*MCF*
Data unit:	-
Description:	is the methane correction factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	Use the following values for MCF: • 1.0 for **anaerobic managed solid waste disposal sites**. These must have controlled placement of waste (i.e., waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste. • 0.5 for **semi-aerobic managed solid waste disposal sites**. These must have controlled placement of waste and will include all of the following structures for introducing air to waste layer: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system. • 0.8 for **unmanaged solid waste disposal sites – deep and/or with high water table**. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. Latter situation corresponds to filling inland water, such as pond, river or wetland, by waste. • 0.4 for **unmanaged-shallow solid waste disposal sites.** This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 metres. In the proposed project, the landfill in baseline scenario can be considered as an unmanaged landfill, since most of the criteria indicated in the note of table Annex 3.1 are lacking. However the waste at the landfill generally has a height of more than 10 meter and thus can be considered as a deep landfill, hence the MCF in this case should be 0.8.
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:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	In Wuzhou (the site of proposed project), the mean annual temperature (MAT) in city is 21°C, and mean annual precipitation (MAP) is 1485mm[12]. Therefore a wet climate is applied, and the values of DOC_j is:

	<table><tr><td>Waste Type</td><td>DOC_j （%）</td></tr><tr><td>Wood and wood products</td><td>43</td></tr><tr><td>Pulp, paper and cardboard (other than sludge)</td><td>40</td></tr><tr><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>15</td></tr><tr><td>Textiles</td><td>24</td></tr><tr><td>Garden, yard and park waste</td><td>20</td></tr><tr><td>Glass, plastic, metal, other inert waste</td><td>0</td></tr></table>
Any comment:	

Data / Parameter:	k_j
Data unit:	-
Description:	is the 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:	<table><tr><td colspan="2">Waste Type</td><td>k_j （%） Tropical(MAT>20°C) Wet (MAP>1000mm)</td></tr><tr><td rowspan="2">Slowing degrading</td><td>Pulp, paper and cardboard (other than sludge), textiles</td><td>0.07</td></tr><tr><td>Wood and wood products</td><td>0.035</td></tr><tr><td>Moderately degrading</td><td>Other (non-food) organic putrescible garden and park waste</td><td>0.17</td></tr><tr><td>Rapidly degrading</td><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>0.40</td></tr></table>
Justification of the choice of data or description of measurement methods and procedures actually applied :	In Wuzhou (the site of proposed project), the mean annual temperature (MAT) in city is 21°C, and mean annual precipitation (MAP) is 1485mm. Therefore a tropical wet climate is applied.
Any comment:	

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

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As described in section B.6.1, the emission reductions are calculated according to **methodology AM0025** and cited **methodology AM0002** and **"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"** therein. The ex-ante calculation of emission reductions are completed with the following steps:

Step 1: Project emissions

(1) Emissions from electricity consumption on-site ($PE_{elec,y}$)

The GHG emission of electricity generation is therefore relevant.

$PE_{elec,y}=MWh_{e,y}*CEF_{elec}$ (2)

The constitution of on site electricity consumed in this case is listed in Table B.6.3-1

Table B.6.3-1: The constitution of on site electricity consumed of the proposed project

	Sorting	**Water supply**	**Composting**	**Office**	**Daily living**
Electricity	2.29 KWh/t organic waste	1.35 KWh/t organic waste	3.585 KWh/t organic waste	126 KWh/day	80 KWh/day

The project activity will consume electricity that is taken from the South China Grid. China DNA has calculated the emission factor of South China Grid[13] according to the methodology version 06 of ACM0002 and the result is shown in the following table:

Table B.6.3-2 Emission factor of South China Grid

OM (tCO_2e/MWh)	0.9853
BM (tCO_2e/MWh)	0.5714

Therefore, the CEF is:

$CEF_{elec}=0.9853*0.5+0.5714*0.5=0.77835$ (tCO_2e/MWh)

The proposed project uses 1.0 as the CEF_{elec} value. Thereby this calculation is conservative.

The estimated electricity consumption and the emissions are shown in Table B.6.3-3. The actual electricity consumption will be monitored according to the Monitoring Methodology for *ex-post* CER calculations.

Taking the emissions in year 2007 as example:
$PE_{elec,y}=MWh_{e,y}*CEF_{elec}$ = 580*1 = 580 tCO_2e /a

Table B.6.3-3. Data used for the ex-ante calculation of $PE_{elec,y}$ and the ex-ante calculation result

Parameter	**Value**
$MWh_{e,y}$	2007: 580 MWh 2008: 949 MWh 2009: 1028 MWh 2010: 1081 MWh 2011 onwards: 1134 MWh
CEF_{elec}	1
$PE_{elec,y}$	2007: 580 tCO_2e/a 2008: 949 tCO_2e/a 2009: 1028 tCO_2e/a 2010: 1081 tCO_2e/a 2011 onwards: 1134 tCO_2e/a

***(2)* Emission from the composting process ($PE_{c,y}$)**

***(a)* Emission form N_2O ($PE_{c,N2O,y}$)**

$PE_{c,N2O,y} = M_{compost,y} * EF_{c,N2O} * GWP_{N2O}$ (4)

The estimated quantity of compost and the emissions are shown in Table B.6.3-4. The actual quantity of compost ($M_{compost,y}$) will be monitored according to the Monitoring Methodology for *ex-post* CER calculations.

Taking the emissions in year 2007 as example:
$PE_{c,N2O,y} = M_{compost,y} * EF_{c,N2O} * GWP_{N2O} = 12045 * 0.000043 * 310 = 161$ tCO_2e /a

Table B.6.3-4. Data used for the ex-ante calculation of $PE_{c,N2O,y}$ and the ex-ante calculation result

Parameter	Value
$M_{compost,y}$	2007: 12045 t/a 2008: 19874 t/a 2009: 21681 t/a 2010: 22886 t/a 2011 onwards: 24090 t/a
$EF_{c,N2O}$	0.000043 tN_2O/tcompost
GWP_{N2O}	310 tCO_2/tN_2O
$PE_{c,N2O,y}$	2007: 161 tCO_2e /a 2008: 265 tCO_2e /a 2009: 289 tCO_2e /a 2010: 305 tCO_2e /a 2011 onwards: 321 tCO_2e /a

***(b) $PE_{c,CH4,y}$:* emission form CH_4**

$PE_{c,CH4,y} = MB_{compost,y} * GWP_{CH4} * S_{a,y}$ (5)

Currently no data is available. Ex ante a S_a 2% will be applied in this PDD. Ex post this value will be replaced by the result of actual measurements on site.

The calculated results are shown in Table B.6.3-5. The *ex-post* value will be replaced by the result of actual measurements on site.

Table B.6.3-5. Parameter values used for CH_4 emission from composting

Parameter	Value
$MB_{compost,y}$	calculated by $BE_y = MB_{compost,y} * GWP_{CH4}$ Where BE_y is calculated using first-oder decay model (equation 6).
$S_{a,y}$	2%
GWP_{CH4}	21 tCO_2/tCH_4
$PE_{c,CH4,y}$	2007: 182 tCO_2e /a 2008: 422 tCO_2e /a 2009: 610 tCO_2e /a 2010: 755 tCO_2e /a 2011: 870 tCO_2e /a

	2012: 947 tCO_2e /a 2013: 999 tCO_2e /a (see Table Annex 3-1)

Therefore the value of $PE_{c,y}$ is calculated according to equation (3)

$$PE_{c,y} = PE_{c,N2O,y} + PE_{c,CH4,y} \quad (3)$$

And the project emission is calculated according to equation (1)

$$PE_y = PE_{elec,y} + PE_{c,y} \quad (1)$$

The result is shown in Table B.6.3-6.

Table B.6.3-6. ex ante project emissions in the first crediting period

Year	PE_{elec} (tCO_2e)	$PE_{c,y}$ (tCO_2e)	Emissions (tCO_2e)
2007(from May to Dec.)	580	343	923
2008	949	687	1,636
2009	1,028	899	1,927
2010	1,081	1,060	2,141
2011	1,134	1,191	2,325
2012	1,134	1,268	2,402
2013	1,134	1,320	2,454
2014(from Jan. to Apr.)	378	451	829
the first crediting period (from May 2007 to Apr. 2014)	7,418	7,219	14,637

Step 2: Baseline emissions

The emissions in the baseline scenario are calculated using the following formula:

$$BE_y = BE_{CH4,SWDS,y} = \varphi*(1-f)*GWP_{CH4}*(1-OX)*16/12*F*DOC_f*MCF*\sum_{x=1}^{y}\sum_{j=A}^{D} W_{j,x}*DOC_j*(1-e^{-k_j})*e^{-k_j(y-x)} \quad (6)$$

According to section B.6.1 and B.6.2, the amount of organic waste type *j* prevented from disposal are shown in Table B.6.3-7, the other parameter values used are shown in Table B.6.3-8. The calculated results are shown in Table B.6.3-9. The actual quantity of organic waste will be monitored according to the Monitoring Methodology for *ex-post* CER calculations.

Table B.6.3-7 The amount of organic waste type *j* prevented from disposal ($W_{j,x}$)

Year	The total amount of organic waste prevented from disposal（t/a）	Waste streams（t/a）					
		Wood and wood products	Pulp, paper and cardboard (other than sludge)	Food, food waste, beverages and tobacco (other than sludge)	Textiles	Garden, yard and park waste	Glass, plastic, metal, other inert waste
2007(from May to Dec.)	36500	0	0	36500	0	0	0

2008	60225	0	0	60225	0	0	0
2009	65700	0	0	65700	0	0	0
2010	69350	0	0	69350	0	0	0
2011 onwards	73000	0	0	73000	0	0	0

Table B.6.3-8 the parameter values used for the baseline emissions

φ	0.9
f	0
OX	0
F	0.5
DOC_f	0.5
MCF	0.8
DOC_j (food waste)	15%
k_j (food waste)	0.4

Table B.6.3-9 *ex ante* baseline emissions in the first crediting period

Year	**baseline emissions tCO_2/year**
2007(from May to Dec.)	9,097
2008	21,108
2009	30,524
2010	37,746
2011	43,496
2012	47,351
2013	49,934
2014(from Jan. to Apr.)	17,222
the first crediting period (from May 2007 to Apr. 2014)	256,479

Step 3: Project emission reductions

The project emission reductions are calculated using the following formula:

$ER_y = BE_y - PE_y$ (8)

The result of first crediting period is summarized in section B.6.4

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

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Ex ante project emission reductions in the first crediting period

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2007(from May to Dec.)	923	9,097	0	8,174
2008	1,636	21,108	0	19,472
2009	1,927	30,524	0	28,597
2010	2,141	37,746	0	35,605
2011	2,325	43,496	0	41,171
2012	2,402	47,351	0	44,949
2013	2,454	49,934	0	47,480
2014(from Jan. to Apr.)	829	17,222	0	16,393
Total (tonnes of CO_2e)	14,637	256,479	0	241,841

Note: Refer to the Annex 3 for detail information of the estimation of emission reductions.

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

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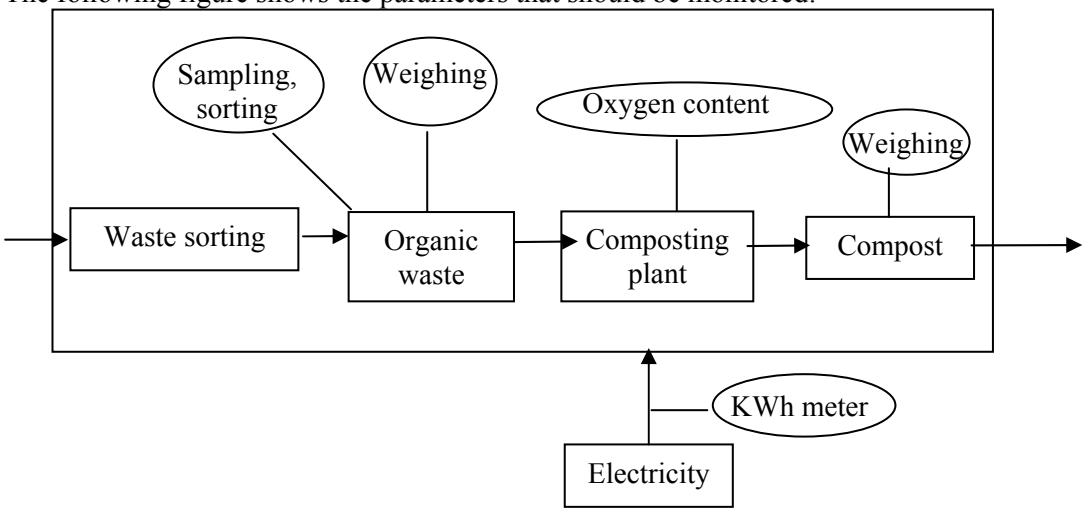
The proposed project is monitored according to the approved methodology Version 05 of AM0025 "Avoided emissions from organic waste through alternative waste treatment processes". Because baseline emissions is calculated using the equation of the ***"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"***, some parameters such as f 、 W_x、 $P_{j,x}$ in the equations should be monitored too.

The following figure shows the parameters that should be monitored:



B.7.1. Data and parameters monitored:.

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Data / Parameter:	$MWh_{e,y}$
Data unit:	*MWh*
Description:	*Electricity consumption*
Source of data to be used:	*KWh meter*

Value of data applied for the purpose of calculating expected emission reductions in section B.5	*2007: 580 MWh* *2008: 949 MWh* *2009: 1028 MWh* *2010: 1081 MWh* *2011 onwards: 1134 MWh*
Description of measurement methods and procedures to be applied:	*The electricity consumption is monitored by six calibrated KWh meters (DTSD341). The meters is controlled, operated and maintained by Wuzhou Electricity Company. The data is recorded monthly. The total electricity consumption is accumulated yearly.*
QA/QC procedures to be applied:	*The KWh meters have to be checked and sealed by both sides of the project sponsor and Wuzhou Electricity Company. Either of them should not unseal the meters without the presence of the other side (or its authorized representative). The meters should be calibrated half a year by the measurement centre of Wuzhou Electricity Company. The calibration certificate must be offered and reserved by the project sponsor.* *Establishing relative institutional to ensure the accuracy and validity of monitoring procedures.*
Any comment:	

Data / Parameter:	$M_{compost,y}$
Data unit:	*t*
Description:	*Compost produced*
Source of data to be used:	*Plant records*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*2007: 12045 t/a* *2008: 19874 t/a* *2009: 21681 t/a* *2010: 22886 t/a* *2011 onwards: 24090 t/a*
Description of measurement methods and procedures to be applied:	*All the produced compost from the composting plant is weighed by calibrated belt balance (GGP-87). The data are aggregated monthly. The total quantity of compost produced is accumulated yearly.*
QA/QC procedures to be applied:	*The belt balance must be calibrated half year by Wuzhou Administration of Quality Supervision. The calibration certificate must be offered and reserved by the project sponsor.* *Establishing relative institutional to ensure the accuracy and validity of monitoring procedures.*
Any comment:	

Data / Parameter:	$S_{a,y}$
Data unit:	*%*
Description:	*Share of samples anaerobic (samples with oxygen content <10%)*
Source of data to be used:	*oxygen sensor*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*2%*
Description of measurement methods and procedures to be applied:	*The oxygen content is measured by calibrated oxygen sensor (MF420-0-M).The total number of samples should ensure 20% uncertainty at 95% confidence level. The sensors are controlled by computer for on-line*

	measurement. The measurement is conducted three times daily. The data are aggregated monthly but accumulated once per year. (See Annex 4)
QA/QC procedures to be applied:	*The oxygen sensors must have enough accuracy to satisfy the requirements of project. The sensors should be calibrated half year by Wuzhou Administration of Quality Supervision. The calibration certificate must be offered and reserved by the project sponsor.* *Establishing relative institutional to ensure the accuracy and validity of monitoring procedures.*
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 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:	*yearly*
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	W_x
Data unit:	*t*
Description:	*Total quantity of waste supplied to compost plant in the year y*
Source of data to be used:	*Weighbridge*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*2007: 36500 t/a* *2008: 60225 t/a* *2009: 65700 t/a* *2010: 69350 t/a* *2011 onwards: 73000 t/a*
Description of measurement methods and procedures to be applied:	*All the organic wastes entering the compost plant are weighed by calibrated electronic weighbridge (SCS-30DN). The data are aggregated monthly. The total compost produced is accumulated yearly.*
QA/QC procedures to be applied:	*The electronic weighbridge should be calibrated half year by Wuzhou Administration of Quality Supervision. The calibration certificate must be offered and reserved by the project sponsor.* *Establishing relative institutional to ensure the accuracy and validity of monitoring procedures.*
Any comment:	

Data / Parameter:	$P_{j,x}$
Data unit:	-
Description:	*Share of different types of organic waste*
Source of data to be used:	*Sampling, sorting, weighing*
Value of data applied for the purpose of calculating expected	*Food waste 100%, others: 0*

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	*The organic waste sample will be taken monthly, sorted according to the methodology AM0025, and weighed. The share of each type will be calculated yearly. (See Annex 4)*
QA/QC procedures to be applied:	*Establishing relative institutional to ensure the accuracy and validity of monitoring procedures.*
Any comment:	

B.7.2. Description of the monitoring plan:

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The monitoring plan defines a standard against which the performance in terms of the project's ERs will be monitored and verified, in conformance with all relevant requirements of the CDM of The Kyoto Protocol. This MP will become an integral part of the Operational Manual. It will be subject to verification procedures.

The monitoring plan includes the responsibilities for and institutional arrangement for data collection and archiving. The project operator must implement the monitoring plan in order to monitor and offer real, measurable, long-term emission reductions generated by the project.

Purpose

The purpose is to establish a reliable, transparent and comprehensive emission reduction monitoring system with the function of data estimating, monitoring, collection and tracing. It should provide real, reliable, transparent emission reduction monitoring and calculating processes, and thus a result to ensure that the DOE will approve the operation of the project. And it should ensure that the emission reduction is real and reliable for the CERs buyer.

Organizational Structure

(1) Monitoring Principal

Monitoring principal is taken by the vice general manager of the project. He should define the obligation of the monitoring staff, and ensures all the staffs have provable professional capability for the assigned monitoring work.

(2) Monitoring Secretary

Monitoring secretary is taken by an engineer with the capability of computer using and database maintaining. The obligation includes the establishing installation and maintenance plan of monitoring system, making monitoring schedule and supervising the its progress, collecting and archiving monitoring data, and calculating the project CERs.

(3) Monitoring Operator

Monitoring operators should have an education of at least senior high school and professional background. They should take professional training for the monitoring work and be quantified. The obligation includes operating measurement activities and making original records.

(4) Equipment Maintainer

Equipment maintainer should be senior electric mechanics with enough experiences in relative field. The obligation is the ordinary maintenance of measurement equipment and repair in case of abnormality.

Table B.7.2-1 Information of monitoring staff

Name	Gender	Education	Obligation	Rank
Rong Zhang	male	M.S.	Monitoring Principal	Senior engineer
Linwei Huang	male	Associate degree	Monitoring Secretary	engineer
Zhilin Yuan	male	Associate degree	Monitoring Operator	Assistant engineer
Qinghui Zhou	male	Associate degree	Monitoring Operator	Assistant engineer
Weifeng Long	male	Technical school	Equipment Maintainer	Senior technologist

(5) Training Plan

Monitoring principal should provide staff with enough professional training, evaluate and record the validity of training.

Monitoring principal should contact the CDM consulter to make training about the documents specific to the project:

- Monitoring plan
- Version 05 of AM0025 for "Avoided emission from organic waste through waste treatment processes"
- Version 06 of ACM0002 for "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
- Annex 14 of EB's 26th meeting report for "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", etc..

Obligation Institution

(1) Management Obligation

- Strict management responsibility should be established to ensure every monitoring activity is charged by a specific staff.
- Monitoring principal is responsible for the overall monitoring plan and monitored ERs.
- Monitoring secretary charges daily management on the monitoring activity and is directly responsible to monitoring principal.
- Monitoring operator is responsible for specific monitoring activity and ensures the validity of obtained data.
- Equipment maintainer ensures that each measurement equipment work properly.

(2) Relay Institution

- For the case that product line has to be continuously run day and night. Relay institution should be conducted to ensure the operation of project and accuracy of measurement.
- Reliever should be ready for the position ahead by 15 minutes, check the measurement record and working status of measurement equipment to ensure the measurement has been properly conducted.
- In case the reliever does not arrive in time, the operator on-duty should continue the duty until the reliever arrives and takes on the duty.
- The staff on-duty should hand the measurement record to the reliever with clear description on the working status, troubles and measurement has been taken to solve them.
- In case of abnormality, the staff on-duty should deal with it, and should not leave without the permission and written signature of reliever.
- The reliever should be responsible for any abnormality after the relay.

Measurement Procedure

(1) Measure equipments

KWh meter

Type	DTSD341
Manufacturer	Weisheng Electronic Company, Changsha
Working conditions	Voltage range: 0.8Un-1.2Un，temperature: -25ºC~55 ºC
Function	Data collection and transport
Accuracy grade	1
Calibration	Wuzhou electricity company
Calibration frequency	Half year

Oxygen sensor

Type	MF420-O-M
Manufacturer	J. DITTRICH ELEKTRONIC GmbH & Co. KG
Measurement range	Oxygen content: 0.1~25Vol% with ± 2% MBE,
Temperature range	0 ºC~100 ºC
Function	Computer controlled on-line measurement
Calibration	Wuzhou Administration of Quality Supervision
Calibration frequency	Half year

Electronic weighbridge

Type	SCS-30DN
Manufacturer	METTLER-TOLEDO (Changzhou) Balance System Company,
Weighting range	10~30000kg
Maximum loading	125%FS
Accuracy	±0.3‰
Function	Weighting, data screening, saving and printing
Calibration	Wuzhou Administration of Quality Supervision
Calibration frequency	Half year

Electronic belt balance

Type	GGP-87
Manufacturer	Shanghai sec-Sipai Automation Instrument Engineering Ltd
Weighting range	10t/h~1000t/h
Accuracy	±0.5%
Function	Weighting, data screening and printing
Calibration	Wuzhou Administration of Quality Supervision
Calibration frequency	Half year

(2) Measurement method

See tables in chapter B7.1

(3) Measurement record

Electricity consumed should be recorded monthly. Organic waste entering the composting plant and compost produced should be measured with real-time mode. Oxygen content should be measured three times each day. Composition of organic waste should be measured quarterly. The aggregation record should cover the quantity of organic waste, the quantity of compost, the oxygen concentration, and the composition of organic waste with corresponding measurement time and name of operator. The written record should be input into computer database with backup weekly.

The operator should fill and sign the measurement sheet according to the regulation. The sheet should be submitted to monitoring secretary for supervision and archive.

The measurement secretary should aggregate the result monthly and annually, sign and submit them to monitoring principal for supervision and archive.

The documents should be kept in written and electronic documents during the crediting period and two years later.

QC/QC procedure

(1) Monitoring equipment

- Monitoring equipments including KWh meters, electronic weighbridge, belt balance and oxygen sensors should have enough precise satisfying the measurement requirements. Monitoring equipments should be calibrated by national authorized institutes half a year. The calibration certificate should be provided and kept by the project sponsor.
- KWh meters should be checked and sealed by both sides of the project sponsor and Wuzhou Electricity Company. Either of them should not unseal the meters without the presence of the other side (or its authorized representative). The meters should be calibrated half a year by the measurement centre of Wuzhou Electricity Company. The calibration certificate must be offered and reserved by the project sponsor.
- Monitoring equipments should be installed with duplicate to ensure their stability and accuracy.
- Monitoring equipments should be maintained by the equipment maintainer according to the maintaining plane, and turn to the manufacture for technical support in case of trouble.

(2) Management

Obligation institution should be established as described above to ensure the operation of project and accuracy of measurement.

The awards and punishment regulation should be established. Staff with good monitoring performance should be awarded.

Emergency Program

In case the measurement accuracy beyond the allowable value or equipments out of work, the following

emergency program should be taken:

1. Using the duplicate equipments

2. Checking the master equipment, contacting the manufacture for reparation, and send it to national authorized institute for re-calibration.

3. In case of both master and duplicate equipments in trouble, taking the smallest monitored value in the same month as the value during the repairing and calibrating period. If it occurs at the beginning of the month, taking the smallest monitored value of previous month as the value. The project sponsor should inform the DOE to get written agreement.

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)

>>

Date of Completion: 1/12/2006

Name of Entity: Redox International Consulting (Peking) Co. Ltd.

Address: Unit 420, Baihuayuan Building, No.11 South Zhongguanchun Street, Beijing 100081, P.R.China

Name of the Responsible Person: Ms. Helen Jia / Mr. Raimin Leo (Not project participant)
Phone: +86 10 6847 2411

Fax: +86 10 6847 2421

E-Mail：Redox.cdm@gmail.com

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:

>>

01/05/2007

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

>>

30 Years

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

>>

C.2.1. Renewable crediting period

>>

7*3

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

>>

01/05/2007

C.2.1.2. Length of the first crediting period:

>>

7 years

C.2.2. Fixed crediting period:

>>
Not applicable.

C.2.2.1. Starting date:

>>
Not applicable.

C.2.2.2. Length:

>>
Not applicable.

SECTION D. Environmental impacts

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

>>
An environmental impact assessment (EIA) was completed in accordance with Chinese regulation as part of the feasibility study for the Project and was approved by Environmental Protection Bureau of Wuzhou Municipal in 2005. The objective of this EIA was to identify the effects of the Project activities on both the biophysical components of the environment and socio-economical aspects of local community and provide measure and procedures to mitigate the possible effects.

The outcome of the EIA was favourable and the Project was found to have no significant environmental impacts. The Project not only reduces the hidden danger caused by uncontrolled release of landfill gas, but also reduces the pollution caused by the landfill to the air, soil and water quality in the local area. From environmental protection perspectives, the Project was in compliance with national industry policy, promoting sustainable development and utilisation of waste.

During the Project design and construction, all the mitigation measures proposed by EIA report will be implemented and the following key aspects will be addressed:

- Air Quality

The composting plant is constructed in the location of the original waste dumping site, so the project will significantly reduce odour and greenhouse gas emissions.

To reduce the concentration of the stench gases, the waste sorting process and composting process will all be carried out in the sealed space, and the de-stench gas facility will also be equipped. The emissions of stench gases are regarded as significantly less harmful than the continued uncontrolled release of landfill gas.

- Water Quality

The water recirculation measures will be taken to reduce its impact on ground water quality. Constructed wetland and other treatment system will be also equipped. Therefore the potential problems of wastewater should be avoided.

- Noise

There will be some increase in noise from the site although the engines will be strategically placed to reduce noise emissions. The equipment selected is state-of-art and has low noise levels. Noise of the project site will meet state standards. There is no resident around the plant, and the residents are 400 meters away and isolated by the mountain, so the noise of the plant has no impact on the nearest residents.

• Solid waste

The solid wastes generated that cannot be utilized are mainly ash dirt, clay, bricks and tiles, they will all be landfilled in the dumping sites, which has no negative impact on the environment.

There are not transboundary impacts.

A copy of EIA report will be provided to the Operational Entity validating the Project.

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:

>>
Not applicable.

The actual impact of the environment will be under the supervision of the Environment Protection Bureau.

SECTION E. Stakeholders' comments

>>

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

>>
The proposed project is located in Longxincun of Changzhou District of Wuzhou, 11km apart from the downtown. In the project area the major stakeholders are:

a. Local population - they comprise of the local people around the project area. The role of the local people is as a beneficiary of the project because a large number of (low-qualified) jobs will be created for them;
b. Citizens of Wuzhou – as they experience large amounts of wastes being dumped in the streets;
c. Local Municipality and City Appearance Bureau;
d. Environment agencies from the Local Authorities, environmental experts;
f. other potential stakeholders.

To collect the suggestions and comments of the stakeholders, the Project Proponent issued the "Announcement of collecting suggestions and comments of the stakeholders for composting project of Wuzhou Municipal" in the largest media in Wuzhou on October 28, 2006. Local stakeholders were invited through advertisement to join the meeting to raise their concerns and provide comments on the Project.

On November 4th, 2006, the Project Proponent held a meeting in the Wuzhou EPB office with the participation of the stakeholders. 28 participants from government offices, academics, non-governmental organizations, media groups, local residents, development partners and private sector were present in the meeting.

In addition, survey questionnaires were sent to some residents around the project area, Wuzhou Municipal. The content of the questionnaires include the following,

- Have you ever heard the composting project?

- Public opinion on the impact of the construction and operation of the project on the local natural and ecological environment (please list)
- In general, what do you think the impact of the composting project on the environment?
- What will be the impact of the project on the resident life and sustainable development of the local economy?
- Is there any concern for the construction of this project? Or any negative impact?
- In general, do you support the composting project?
- Any other suggestions and comments on the project?

50 sets of the questionnaires have been dispensed, and 50 sets were answered and returned. They are 100% valid. The entire process of carrying out the local stakeholder consultation has been done in a participatory manner.

E.2. Summary of the comments received:

>>

The Summary of the comments received from the stakeholders meetings and the questionnaires includes:

- The Project contributes to the local environmental protection;
- The Project promotes the local economy and sustainable development.
- The Project contributes to the improvement of local environment.

Overall there was agreement that the proposed project was a beneficial project from sustainability view point. All of stakeholders support the composting project.

西江都市報

2006年10月28日 星期六 农历丙戌年九月初七 总第1728期 国内统一刊号CN45-0033

梧州市城市生活垃圾堆肥项目征求利益相关意见公告

梧州德润环保实业有限公司关于梧州市城市生活垃圾堆肥项目已获得有关部门批准，拟申请清洁发展机制项目(Clean Development Mechanism)，现定于11月4日上午9:00在市环卫处三楼会议室召开征求利益相关方意见会议，特邀有关环保、市政、环卫等利益相关方参加。

联系人：于齐发，电话：0774-3835363

Figure E.2-1 Advertisement for suggestions and comments and for invitation to participate in the Stakeholders Assessment

Figure E.2-2 Photo's made during the Stakeholders assessment meeting


Figure E.2-3 Photo's made during the Stakeholders assessment meeting


Figure E.2-4 Photo's made during the Stakeholders onsite assessment

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

>>

All comments received from the stakeholders have been positive. There is no requirement to modify the composting project scheme of design and operation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Salutation:	Ms
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

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Table Annex 3-1: The ex-ante calculated results of project emissions

Fiscal Year	Emissions of N_2O tCO_2/year	Emissions of anaerobic decomposition tCO_2/year	Emissions of electricity comsumption tCO_2/year	Project emissions tCO_2/year
2007*	161	182	452	795
2008	265	422	739	1426
2009	289	610	801	1700
2010	305	755	843	1903
2011	321	870	884	2075
2012	321	947	884	2152
2013	321	999	884	2204
2014	321	1033	884	2238
2015	321	1105	884	2310
2016	321	1072	884	2277
2017	321	1083	884	2288
2018	321	1090	884	2295
2019	321	1094	884	2299
2020	321	1097	884	2302
2021	321	1099	884	2304
2022	321	1101	884	2306
2023	321	1102	884	2307
2024	321	1102	884	2307
2025	321	1103	884	2308
2026	321	1103	884	2308
2027	321	1103	884	2308
2028	321	1103	884	2308
2029	321	1104	884	2309
2030	321	1104	884	2309
2031	321	1104	884	2309
2032	321	1104	884	2309
2033	321	1104	884	2309
2034	321	1104	884	2309
2035	321	1104	884	2309

2036	321	1104	884	2309

*The year of 2007 is calculated from May to December.

Table Annex 3-2: The ex-ante calculated result of project emission reductions

Fiscal Year	Quantity of organic waste t/year	Baseline emissions tCO_2/year	Project emissions tCO_2/year	Project leakages tCO_2/year	Emission reductions tCO_2/year
2007*	36500	9097	795	0	8302
2008	60225	21108	1426	0	19682
2009	65700	30524	1700	0	28824
2010	69350	37746	1903	0	35843
2011	73000	43496	2075	0	41421
2012	73000	47351	2152	0	45199
2013	73000	49934	2204	0	47730
2014	73000	51666	2238	0	49428
2015	73000	55253	2310	0	52943
2016	73000	53606	2277	0	51329
2017	73000	54127	2288	0	51839
2018	73000	54477	2295	0	52182
2019	73000	54711	2299	0	52412
2020	73000	54869	2302	0	52567
2021	73000	54974	2304	0	52670
2022	73000	55044	2306	0	52738
2023	73000	55092	2307	0	52785
2024	73000	55124	2307	0	52817
2025	73000	55145	2308	0	52837
2026	73000	55159	2308	0	52851
2027	73000	55169	2308	0	52861
2028	73000	55175	2308	0	52867
2029	73000	55179	2309	0	52870
2030	73000	55182	2309	0	52873
2031	73000	55184	2309	0	52875
2032	73000	55185	2309	0	52876
2033	73000	55186	2309	0	52877
2034	73000	55187	2309	0	52878
2035	73000	55187	2309	0	52878
2036	73000	55187	2309	0	52878

* The year of 2007 is calculated from May to December.

Annex 4

MONITORING INFORMATION

1. Sampling plan for waste-composition

In accordance with the AM0025 and the Annex 14 of EB's 26th meeting report, the waste composition is measured quarterly. The purpose of these measurements is to determine the fraction of each waste stream within the total waste input going to the composting facility. The following waste-streams are to be distinguished:

A Paper and textiles
B Garden and park waste and other (non-food) organic putrescibles
C Food waste
D Wood and straw waste
E Inert

The sampling plan for determination of the share of different types of waste is based upon general statistical methods like the one describe by Salant and Rea (Salant, 1994, Rea 1997; handbook-2-Task_2_Community Assessment_050425.doc) and on the equation below:

$$n = [t_p^2 * p(1-p) * N] / [t_p^2 * p(1-p) + (N-1) * y^2]$$

in which
n = sample size
tp = 1.96 for 95% confidence level
N = population size
p = for the true proportion which in a most conservative is set as 0.5
y = sampling error

Table Annex 4-1: required sampling amounts for 95% confidence level and 20% sampling error

Amount of organic waste kg/day	Amount of sampling kg	
	20% error	10% error
100	20	49
250	22	70
500	23	81
750	23	85
1000	23	88
2500	24	93
5000	24	94
10000	24	95
25000	24	96

50000	24	96
100000	24	96
1000000	24	96
100000000	24	96

From the table (table Annex 4-1) above it is clear that the sample-size is independent from the size of the composting facility in case this exceeds the 150,000 kg input per day; a minimum of 24 kg is required in order to get a representative impression of the waste-input with a 20% sampling error.

In this case, the organic waste subjected for composting process is continuously introduced into the plant by transporting belt. To ensure the reliability of the data, a multi-sampling is conducted with sampling each hour with a size of 10 kg. If the belt runs 8 hours each day, the total sampling size is 8×10=80 kg.

2. Sampling plan of composting piles for determination of oxygen deficiency (Sa and Sod)

The sampling plan for determination of the possible anaerobic circumstances within the composting piles is based upon general statistical methods like the one describe by Salant and Rea (Salant, 1994, Rea 1997; handbook-2-Task_2_Community Assessment_050425.doc) and on the equation below:

$$n = [t_p^2 * p(1-p) * N] / [t_p^2 * p(1-p) + (N-1) * y^2]$$

Where:
n = sample size
tp = 1.96 for 95% confidence level
N = population size
p = for the true proportion which in a most conservative is set as 0.5
y = sampling error

For this case, the population is the "air-molecules within the garbage/composting piles". Therefore the population size is extremely high and it can be calculated that for y (sampling error) = 20%, the sample size should be 24. So the project proponent shall measure daily at 24 spots the O_2 –content (~ 9000 measurements/year). That is: 8 spots evenly distributed on the composting grooves and measured 3 times daily.

- - - - -