CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

CONTENTS

Annexes

A. General description of project activity

A.1 Title of the project activity:

Jiaozishan Landfill Gas Recovery and Utilisation Project

Version: 02
Date: 8th April 2006

A.2. Description of the project activity:

This proposed project is designed to set up a that uses landfill gas from the Jiaozi Mountain landfill in boilers to provide hot water to Nanjing City. The project will supply hot water to hotels, bathhouses, and other hot water consumers in Nanjing city. The principal benefit of the project is the reduction of greenhouse gases in the form of CH4 that are currently being released from the landfill to the atmosphere. This project will additionally benefit the Nanjing by reduction the demand for coal that would normally be used as fuel in heating coal production of hot water. However, this substitution of coal for fuel is not currently claimed by this project. Moreover, the development of a landfill gas recovery system at the site will help to improve the overall safety of the site an minimize the risk of explosions.

The proposed project will consist of five separate activities including:

1. Construction of a landfill gas collection system

2. Installation of a 100 meter deep well for water with a flow of 20 tons per hour

3.. Installation of up to 4 3T/H boilers (Germany and Switzerland). The installation of the boilers will be phased to follow the increasing volumes of landfill gas, of which the standard consumption of a landfill gas shall be 548 m3/h.

4. Installation of one 2000 will also be installed so that the balance of the gas not destroyed by the boilers either in times of high gas production or when the boilers are down for maintenance. The total lifespan of the project is expected to be 25 years.

The Jiaozi Mountain landfill is the main household waste disposal site in Nanjing. The site was put into operation in August, 1992. By May 2005, the accumulated gross volume of buried and disposed waste in the landfill reached 2.8 million tonnes, averaging about 800 tonnes of household waste per day. The Jiaozi landfill consists of three storage areas or cells, the volumes of which are 0.4 (Cell Number 3 Storage Area), 2.5 (Cell Number 2 Storage Area), and 3.3 million m3 (Cell Number 1 Storage Area). This is predicted to be sufficient until 2021.

The No.3 area, which has taken more than 0.5 million tonnes of waste has been closed for many years and has been equipped with exhaust vents. The gas that is emitted from this area of the landfill is not technically viable for utilisation due to the concentrations and volumes of gas that are emitted. Under the Jiaozi Landfill Gas project, gas recovery will occur in areas 1 and 2.

According to the statistic data[1], the amount of waste buried in the Number 2 Storage Area is approximately 2.3 million tonnes. This area will have to be closed in the middle of 2006. The number 1

[1] Nanjing Jiaozishan Landfill Gas Recovery and Utilization Project Feasibility Study Report

storage area, with a total capacity of 3 million tons, will begin to be filled in July 2006. also It is estimated that the amount of collectable landfill gas in the landfill will be about 1,200 m^3/hour at commissioning and this will peak in 2022, at about 5,498 m^3/hour.

Total investment in the first phase is RMB14.46 million, of which about RMB 10 million is from the will come from the project developer. The project developer is currently seeking a pre-payment from CDM revenue in order to complete the project. And will be further invested by stages accompanying process of the project, among which the first half year of 2006 shall be the construction period, 2006 to 2021 being project operation period.

Emissions reductions have been estimated according to ACM0001 1,143,031 tonnes CO_2e over the 7 year period 2006 – 2013, which equates to an average annual emission reduction of 147,881 tonnes CO_2e. The amount of collected CO_2e within the crediting period of twenty one years will total 5,072,036 tonnes, 241,525.5 tonnes per year.

This project falls into the scope of the CDM priority areas presented in the *Administrative Regulations of Clean Development Mechanism of China*: recycling and utilisation of methane. The project has the following additional sustainable development benefits.

1. **Reduction of local environmental pollution** in the city of Nanjing. The project will install a heat supply system that will decrease the dependency of the city on heating systems using coal, oil or electricity. As such the heat provided will be more efficient than the alternative options and will directly reduce local pollution from the burning of fossil fuels.
2. **Technology transfer** The project will make use of international technology (the heat exchangers are the German brand, Weishanpt and boilers imported from are the Swiss brand) The integrated system is able to utilise landfill gas that has a relatively low heat value relative to other fuels as well as adapt to the varying concentrations of methane. This project will act as a demonstration to other municipal landfill sites across China that could make use of new technologies in the reduction of global greenhouse gases.
3. **Accelerate the uptake of landfill gas recovery and utilisation in China.** Jiaozi Mountain landfill was constructed in the early 1990s and is one of the earliest sanitary landfills, it represents a typical medium sized landfill in China. Projects to utilise landfill gas in China have not been economically viable in recent years and the CDM presents an opportunity for energy generation from landfill gas sites a real investment opportunity. This project will be a good demonstration for other medium and/or small scale landfills in China and as such will contribute to knowledge for the sector on how to successfully manage and utilise landfill gas.
4. **Improvements to safety and the site environment.** The project will reduce danger from fire or explosion on the landfill by recovering the gas as well as decreasing the odours on site.

In summary the Jiaozi mountain project will not only benefit the global reduction of greenhouse gas emissions, but it will also facilitate technology transfer and landfill management experience to China. Additionally the project will improve impacts of the landfill site and current energy systems on the local environment thus facilitating local sustaining development.

A.3. Project participants:

Table 1 Information of Project Participants

Title of host party ((Host party) present host party)	*Project participant of enterprises and/or public institutions (*) (If applicable)*	*Declaration whether want to be project participant (Yes/No)*
China (Host)	*The Administrative Office of Landfills of Nanjing City, project owner/developer*	*YES*
.K.	*CAMCO International Lt, buyer*	*YES*
(*)According to the M&P of CDM, the host party would render or not render the project approval letter during the notification period of CDM-PDD attestation The host party is required to submit approval, when apply for project registration.		

Project Owner and Developer:

The Administrative Office of Landfills of Nanjing City was founded in 1995. The office is responsible for construction and operation of landfill disposal sites for Nanjing city. It is an independent legal entity under the jurisdiction of the City Appearance Administrative Bureau of Nanjing City. The primary business is operational management of municipal landfills, integrated recycling and utilising of waste, sales of environmental protection facilities.

Project Operation Manager:

Nanjing Yunsheng New Energy Developing Co., Ltd has extensive experience in the waste management sector and has done a great deal of research into utilisation of landfill gas for energy purposes. This will be the first such project in their portfolio and will be financed as 100% equity from the company. . Nanjing Yunsheng New Energy Developing Co will build and operate the project with technical support from the Southeast University who have design expertise in landfill and also the Jiangsu Institute of Geological Exploration and Design Engineering which is experienced in landfill gas collection equipment.

CER buyer:

A first-mover in the rapidly emerging sector of greenhouse gas emissions trading, CAMCO International draws on over 20 years experience in sustainable energy project development worldwide and on over 6 years experience in JI and CDM project development. CAMCO is leveraging this experience to assist partners in optimising opportunities and in overcoming risks associated with securing and developing carbon assets.

CAMCO is now engaged on a growing portfolio of CDM and JI projects from all around the world. Project sponsors in Bulgaria, Poland, China and East Africa have recognised the benefits of working with CAMCO to secure and maximise opportunities presented by new international emissions trading markets. CAMCO is now a recognised industry leader with a growing international reputation.

Detailed contact information of project participants can be found in Annex 1

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.:

Jiangsu Province

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

Dou County and Jiangning district of Nanjing City

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

The proposed project is located in the Jiaozi Mountain landfill in Dou county, 15 miles from the urban centre of Jiangning District, eastern Nanjing City . The landfill site lies in a hilly region, with a total area of 280,000 m^2, a total capacity of 6,200,000 m^3 available for 5,500,000 tonnes waste. Figure 1 below shows the geographical location of the project site relative to the city of Nanjing.

Figure 2 provides detail on the layout of the landfill site and shows the living area, entrance area, landfilling area, leachate pond, surface water deposition pond, sewerage treatment factory, and other accessory facilities.

The site is divided into three cells. Cell Number 3 is full and no more waste goes to this area and as such has been closed. Cell Number 2 will stop being used at the beginning of 2006 and Cell Number 1 will be put into operation. To date approximately 2,900,000 m^3 of waste has been land filled in cell 2 and 3. The proposed heat supply plant will be located in the south of the number 3 storage area, separated from number 2 storage area by a road.

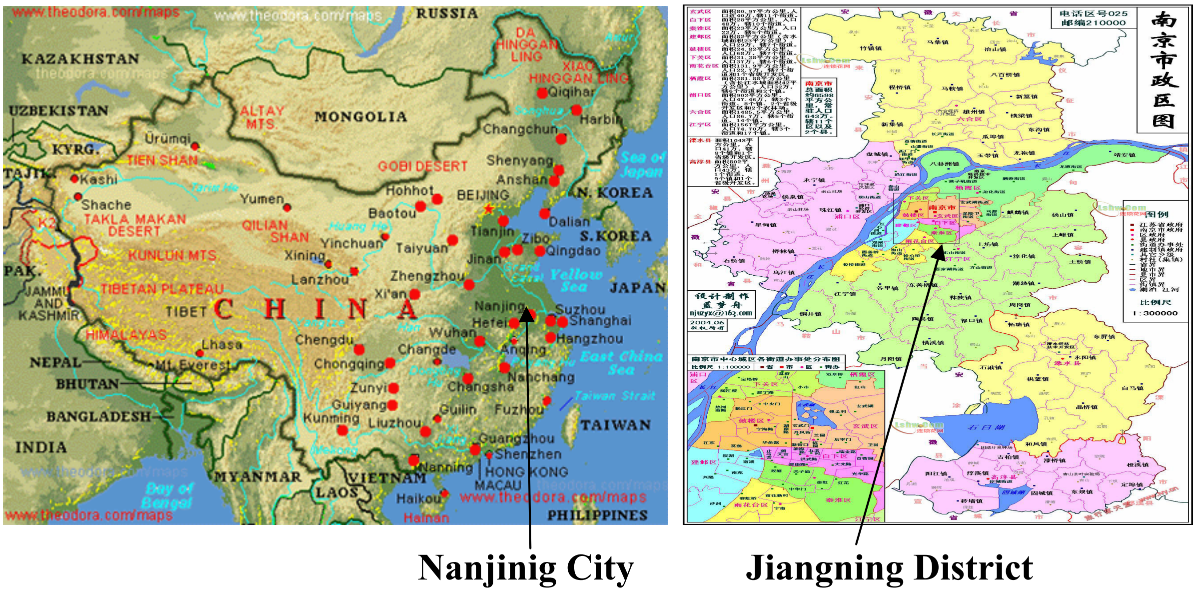

Figure 1 Geographical location of the Jiaozi Mountain landfill

Figure 2 Location of the Jiaozi Mountain Landfill Gas Heating Plant

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

Sectoral Scope 13: Waste Handling and Disposal

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

The Jiaozi landfill gas project covers landfill gas collection, landfill gas pre-treatment, heat generation and heat transmission and hot water distribution. The landfill gas will be captured and piped to the pre-treatment system, which will remove moisture and impurities from the landfill gas, under pump pressure.

Gas will subsequently be delivered to the boilers.

The project will additionally be equipped with a flare to burn the balance of gas the project will be equipped with a flare and a burner for combustion of excess landfill gas quantities. An overview of the system is presented in Figure 3 below and each step is described in more detail below.

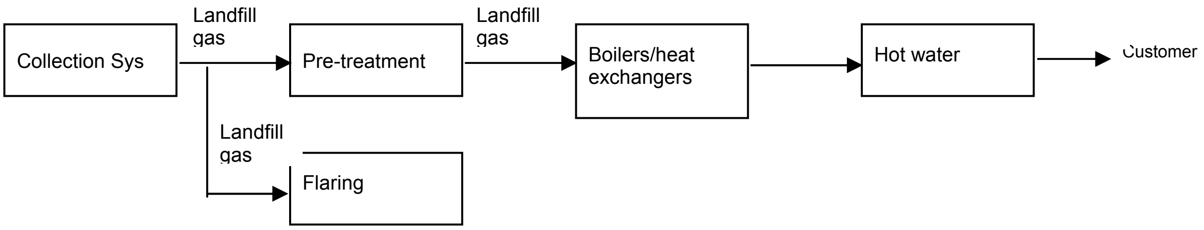

Chart2 Work flow of landfill gas heating

Landfill Gas Collecting System:

The landfill gas collection system is a gas transportation network, consisting of gas collection wells, lateral gas collection sub-pipes and a main pipe, which cover all of the landfill. The landfill gas collected from the gas wells will be delivered to the main pipe through sub-pipes. The operating pressure of the gas collecting system will be maintained with fans, ensuring the landfill gas to be continuously collected from the gas wells.

Pre-treatment System:

The pre-treatment system will ensure that the landfill gas meets the following operational standards prior to delivery to the heat generation system or flare.:

- Stable gas feeding pressure (50-200mbar),
- Relative humidity ≤80%
- Gas temperature at outlet of 10-50 ^{0}C
- Filtration of particulates above 3μm),
- Pumped flow rate of 2000 m^3/h.

Landfill Gas Flare:

All excess landfill gas will be automatically delivered to the flare for combustion. The flare will be designed and constructed with a maximum capacity of 2000 m^3/hr and a centrifugal blower will be installed at the inlet of the flare. The flare burner will be equipped with an automatic safety switch, an electronic flow meter and other measuring devices in order to monitor the whole combustion process.

Boilers and auxiliary equipment:

Boilers will be provided by the Swiss supplier, Hoval. In accordance with expected landfill gas volume and methane concentration, and in order to ensure reliability of landfill gas combustion, imported gas boilers have been selected with nominal steam generation capacity of 3000kg/h and 0.6-1.0 MPa operating pressure.

In accordance with the steam characteristics below the capacity of the boiler will be 3-4.5MW

- Flow rate = 3 t/h
- Pressure = 0.4MPa
- Seam temperature at the inlet of the hot water heater = 158 ^{0}C
- Water temperatures = 15 ^{0}C at the inlet and 95 ^{0}C at the outlet

The boiler will be equipped with electrical control circuit, water pump, temperature controller and pressure meter.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

The Jiaozi project is designed to recover and utilise landfill gas. Methane is an anthropogenic greenhouse gas with a global warming potential 21 times that of CO_2. Methane is produced by anaerobic digestion of organic matter in the landfill and is therefore 21 times as potent as the CO_2 that was originally taken up. By combusting the gas to CO_2 only there is a significant additional benefit to the reduction of anthropogenic greenhouse gases. The CO_2 emitted from the combustion of methane is not subtracted from the total project amount as methane is as it is derived from organic biomass matter and therefore considered carbon neutral.

The emission reductions will therefore be achieved by preventing direct emission of landfill gas to the atmosphere. There will be additional benefits of the project through the substitution of coal combustion for local heating in Nanjing city, but this effect has not been quantified for the purposes of this PDD and the CDM application.

Emission reductions would not occur ion the absence of the project as methane would continue to be vented to the atmosphere rather than being captured, utilised and ultimately destroyed. There are a number of reasons why this project would not happen in the absence of the CDM project activity; these have been summarised below.

The Chinese government national standard for landfills does not require that landfills utilize or capture emitted methane, but rather only that they are safe for operation. The Nanjing landfill has shown to be compliment with the government’s standards for safety in landfills, and therefore is not affected by the regulations. Total costs for the landfill gas project are 14.46 million RBM, which are three times greater than the annual municipal investments made in Nanjing in 2005. However, the return on the project in the best case scenario is less than 8% This return is only marginal for a commercial investment. Additionally, the project faces a number of prohibitive barriers in the area of investment, management, water supply, and technology pose considerable risk to the project ever attaining the high return. Taking all of these factors into consideration, it is unlikely that the project would go forward without CDM financing.

The points raised above clearly illustrate the case for additionality of the Jiaozi mountain landfill project and the case is further demonstrated by application of the CDM Additionality Tool in section B.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

The total CO_2e emission reductions of this project during the first seven-years crediting period (2006-2012) is estimated to be 1,035,164 tonnes, with an annual average of 147,880.6 tonnes CO_2e. The cumulative amount of CO_2e emission reductions in twenty one years' crediting period of the project could reach 5,072,036 tonnes, with an annual average of 241,525.5 tonnes per year. For detailed calculations, please refer to E.6.

Table 2 CERs arising from the project activity (2006-2012):

Year	Annual estimation of emission reductions in tonnes of CO_2 e
2006[2]	42,032 (6 months)
2007	112,791
2008	150,675
2009	163,611
2010	176,043
2011	188,538
2012	201,474
2013	107,867
Total estimated reductions over first crediting period (tonnes of CO_2e)	1,143,031
Total number of crediting years	21
Total over the crediting period of estimated reductions (tonnes of CO_2e)	4,808,528

Note that the project starts in June, 2006

A.4.5. Public funding of the project activity

There is no public funding for the proposed project.

[2] Part year correction for start date of crediting period of 1st July 2006 and half year in 2013

B. Application of a baseline methodology

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

The approved consolidated baseline methodology **ACM0001**: "Consolidated baseline methodology for landfill gas projects" is used for the Jiaozi Landfill Gas Recovery and Utilisation Project.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity::

In accordance with the consolidated Baseline methodology (ACM0001), this methodology is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include situations such as:

a) The captured gas is flared; or
b) The captured gas is used to produce energy (e.g. electricity/thermal energy), but no emission reductions are claimed for displacing or avoiding energy from other sources; or
c) The captured gas is used to produce energy (e.g. electricity/thermal energy), and emission reductions are claimed for displacing or avoiding energy generation from other sources. In this case a baseline methodology for electricity and/or thermal energy displaced shall be provided or an approved one used, including the ACM0002 "Consolidated Methodology for Grid-Connected Power Generation from Renewable". If capacity of electricity generated is less than 15MW, and/or thermal energy displaced is less than 54 TJ (15GWh), small-scale methodologies can be used.

In the case of the Jiaozi Landfill Gas Project the captured gas is being used for providing hot water heating to Nanjing City. The balance of the gas not used for hot water will be flared. No emission reductions are being claimed for displacing or avoiding energy from other sources. This project will indeed be a combination of a) and b) above. Therefore the consolidated baseline methodology (ACM0001) will be taken as the baseline methodology of this project.

According to the consolidated Baseline methodology ACM0001, it will be used in conjunction with the consolidated monitoring methodology.

B.2. Description of how the methodology is applied in the context of the project activity:

The LFG captured in this project will be used primarily to supply heat energy and any remaining gas will be flared, for example during periods of boiler maintenance. Therefore, this is applicable to the baseline methodology ACM0001 under options a and options c.

Specifically, emissions reductions from the project will be calculated as follows:

$$ER_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} \quad (1)$$

where：

ERy , GHG emission reductions (t-CO_2e) achieved by the project activity in given year "y"；

MDproject,y is the amount of methane destroyed/combusted by proposed project activities during given year "y";

MDreg,y: is the amount of methane that destroyed/combusted during given year "y" subject to no existence of the proposed project. (Note 1)

$GWPCH_4$: approved global warming potential value for methane (21 t-CO_2e/t-CH_4)；
So, the greenhouse gas emission reduction achieved by the project activities during given year "y" (

For the calculation of the volume of LFG in this project, this project uses the FOD formula in the second rank method of the *Revised 1996 IPCC Guideline for National Greenhouse Gas Inventory*, along with the onsite test in the Jiaozi Mountain landfill, and amends the gas generation parameter. Based on which, comes the project estimated amount of combustible methane (MDproject,y). Under this baseline situation of the project, generated methane 100% emitted into atmosphere, the destroyed/combusted methane (MDreg,y)shall be zero.

The emission reductions from this project have been estimated ex-ante however the actual emission reductions will be monitored ex-post. Emission reductions will be claimed for the reduction of greenhouse gases through the combustion of landfill gas collected either to supply heat or through the burning of excess gases in controlled flares.

In accordance with the methodology the project is consistent with paragraph 48b of the CDM Modalities and Procedures that states that the baseline methodology uses the approach of the "Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment."

As set out in the methodology, the Tool for the Demonstration of Additionality has been applied in a transparent and conservative manner to show that the project requires assistance from the CDM in order to go ahead with the investment.

B.3. 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

According to ACM0001, the Tool for Demonstration of Additionality has been applied to prove that the project is additional because anthropogenic emissions of greenhouse gases are reduced below those that would occur in the absence of the registered CDM project activity. This section sets out the steps that are applied in the Additionality Tool according to the project activity.

Step 0: Preliminary Screening based on the starting date of the project activity

This project had obtained approval for construction, being in stage of goods-ordering and constructing, activity of which will start on 30th June 2006.

The project developer fully took the impacts of CDM on the project implementation into consideration, and set it as an important precondition to project implementation.

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

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

In the absence of the proposed project, there will be 3 alternatives to the project activity.

Alternative 1:

The landfill operator could continue with current practices under a business as usual scenario. This would mean that landfill gas would not be collected and either flared or utilised for energy purposes. Under current Chinese legislation only new landfill sites are required to manage their landfill gas emissions and it would therefore be expected that the landfill would continue to produce methane through the anaerobic decomposition of the organic fraction of municipal waste. This scenario would be expected to continue throughout the project lifetime and beyond.

Alternative 2:

The project could use its own capital to invest in systems of LFG collection and utilization (such as for power generation, heat, or production of hot water). This is the same as the current project scenario without CDM funding. The implementation of this alternative option would require the project developer to install the gas collection system and flaring systems.

Alternative 3:

Alternative three is the same as alternative 2 with CDM revenue.

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

According to updated *Criterion of Sanitary Technological land filling for Household Waste* issued in 2004 (CJJ17-2204), new built landfills are required to,

8.0.1 Set up effective facilities for LFG evacuation and transportation, to strictly forbid undiscovered gas gathering and moving for avoiding fire and explosion. Take action to actively evacuate gas and gather it for flaring, when the landfill is not in condition of utilizing landfill gas.

In the case of the Jiaozi landfill, the site was constructed in 1992 and at that time, there were no standards for LFG collection and utilisation issued in China. Moreover, the law does not explicitly stipulate what is considered to be a “safe or stable” landfill, therefore the Jiaozi landfill is considered to be compliant with with the law and not required to implement any changes. The three alternatives identified above are therefore all in line with the current laws and regulations.

Step 3. Barrier Analysis

Sub-step 3a. Identify those barriers that would prevent the implementation of type of the proposed project activity

This step is used to demonstrate that the project faces real barriers that would prevent the implementation of the project without the CDM. For the Jiaozi Mountain landfill there principal barriers to project implementation are investment, technology, heat supply risk,. These are presented below.

Investment Barriers

This project faces significant barriers in securing both equity and debt. The project owner, the Nanjing municipal government, does not have a history in investing in projects of this size. Total investment costs for the project are 14,466,000 RMB, three times total investments of the project owner in 2005. The project owner does not have sufficient equity to put finance this project. Even if it did, the return is not attractive enough for the project to undergo the investment.

Additionally, this project confronts significant barriers in receiving bank financing. This is only the fifth landfill gas project in China and the first of its kind in China to use landfill gas to power boilers for hot water. Banks still perceive these projects as high risk projects and due to their lack of familiarity with the technology and risks involved highly averse to lending to landfill gas projects.

Scenario 1: Business as usual scenario

The business as usual scenario, which would require no additional investment in the landfill gas project, would not be affected by these barriers. Financing barriers are irrelevant under this scenario.

Scenario 2: Project activity without CDM investment

Without CDM investment, the project would not have sufficient equity or debt financing for this project to move forward. Therefore, under scenario 2, financing is a prohibitive barrier.

Scenario 3: Project activity with CDM financing

In the presence of CDM financing, the return on the project would be higher by a minimum of 8%. This increased return on the project would provide an extra safety margin that would mitigate perceived risk by the banks of financing an untested project. Additionally, the implicit guarantee provided by CDM financing would provide sufficient incentive for the project to put forward its own equity financing for the project and additionally allow the project to secure a pre-payment to assist it with additional capital and operating costs. Therefore, under scenario 3, financing is not a prohibitive barrier.

Technology barriers

This landfill will be the first in China to use boilers to provide hot water for the city. Due the fact that the methane content of the LGF from the landfill averages between 40% and 50%. Due ot the low methane content, the project is forced to procure boilers from abroad that can safely operate in on 30%-70% methane gas. No such boiler is currently available in China. Therefore, the project is ordered Swiss Boilers from Hoval at a cost of roughly 5 times greater than domestically procured boilers. The need to import equipment means that the project faces both increased capital and increased maintenance costs as international travel will be required until the management team for the Nanjing landfill is properly trained.
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As this technology will be operated for the first time by a landfill with little experience, there will be increased costs to the owner in terms of equipment maintenance and training. Given the marginal economic returns on the project, the technology risk and the increased risk and investment in terms of training gives lessens the incentive of the project owner to invest in the project.

Scenario 1: Business as usual scenario

Under the business as usual scenario the project owner will not have to consider technology risk.

Scenario 2: Project activity without CDM investment

Without CDM investment, project developer would have to take on the risk of being the first landfill operator in China to run a LFG-hot water boilers. The increased investment costs combined with the lack of understanding of the management team for the operation of the technology would make the project extremely hard to run.

Scenario 3: Project acitivty with CDM investment

The CDM investment will lowers the risk of the project by making it possible for the project both to pay the initial capital costs through the prepayment and to repay the costs in a reasonable period of time, thus lessoning their exposure. Moreover, the even that the equipment does experience operating difficulties the CDM financing will allow for a broader O&M budget that would be possible in the absence of CDM.

Regulatory Barriers

The Chinese government had issued a national standard that requires landfills to avoid dangers from fires and explosions, and encourages recycling and utilizing of landfill gas, the proposed landfill was built in 1992, when there were no requirements for landfill sites to use landfill gas recycling and utilisation systems. Furthermore environmental monitoring that has been undertaken demonstrates that levels of both CO_2 and CH_4 in the atmosphere at ground levels Conform with the standards specified in the *Sanitary Criteria of Technological Land filling of Household Waste*.

Scenario 1: Business as usual scenario

It has already been demonstrated above that, as the landfill constructed before the enactment of the law and is considered by the government to be safe for operating purposes, the current situation would not be affected by regulatory barriers.

Scenario 2: Project activity without CDM revenue

This project will also not be affected by regulatory barriers. Construction of the project is also in compliance with regulations. However, as the regulations are currently written they do not require the landfill to alter the business as usual scenario. Therefore, under the current regulations the landfill has a disincentive to select option to.

Scenario 3: Project activity without CDM revenue

Construction of the project with CDM revenue will not conflict with any regulatory barriers.

Barriers in Water Demand

Without the CDM, all revenue from this project is dependent on sales of hot water to the city of Nanjing. However, compared with competitors, hot water sales face a number of barriers including an unstable contracting structure, higher sales price, and transportation. Each of these barriers is discussed below.

The Nanjing landfill has negotiated purchase contracts with 20 consumers of hot water purchase price of water of 15 RMB per ton. However, the project has not been successful in negotiating long term supply contracts, and the current arrangement will have to be negotiated at the end of each year with the risk that it will not be able to obtain the same purchase price for water.

Additionally, price at which the project is currently selling water to industrial suppliers if 5 RMB per ton higher than the price offered by hot-water suppliers in Nanjing. Additionally, the landfill project is disadvantaged as it is located 20 km outside of Nanjing. According to the current supply contract, customers purchasing water from the landfill also have to assume the costs of transporting the water into the from the landfill site to the city by truck. This will add an additional 10 RMB per ton to the cost of the hot water supply, increasing the overall cost of purchasing water from the landfill to 25 RMB per ton.

Industries in the Nanjing area are willing to purchase water from the landfill because they have been convinced by the project and the government to support an environmental project. However, as the total cost of purchasing water from the landfill is 2.5 times greater than the cost of the next best alternative, and contracts are negotiated on a yearly basis, this project faces considerable risk that its consumers will be unwilling to renew their contracts in the upcoming years.

Moreover, the supply demand for hot water is seasonal. Demand for hot water decreases by 30% from the summer to the winter months.

Scenario 1: Business as usual scenario

Under the business as usual scenario, the landfill will continue to vent gas into the atmosphere at water supply will not be an issue. Therefore, this barrier has no effect on the continuation of the business-as-usual scenario.

Scenario 2: Project activity without CDM revenue

In the absence of CDM revenue, the above barrier clearly shows that hot water sales, the only source of revenue for the project, faces considerable instability. It is possible that both the price of water, and the number of industrial consumers for the water could be highly variable from year to year. For this reason it is difficult for the project to provide a realistic projection of the return on the project and make any investment based solely on the revenue from hot water. Uncertainty in water supply would provide a prohibitive barrier for Scenario 2.

Scenario 3: Project activity with CDM revenue

CDM revenue from the project help to provide another source of income for the project. CDM revenue is fixed based on gas destruction, and this not subject to the same uncertainties as water sales. CDM revenue allows for the project to have a reliable source of income which it came use to do budgetary planning and projects. CDM will help to mitigate supply risk by provide a source of revenue to the project during times when water demand is low and a bulk of the gas is going to the flare. In times when the gas is not going to the flare, CDM will still increase the IRR of the project by augmenting the income from water sales. Therefore, under scenario 3 the project is able to overcome the prohibitive barrier of variable water supply.

Management Barriers

Though the Nanjing Landfill has considerable experience in the operations and management of landfills, however has no experience in the operation of landfill gas collection system, flare, or hot water system. Proper installation, operation and maintenance of such a system will require that the project staff be carefully trained. In addition to the monetary costs of training, lack of experience is operating and managing a landfill gas system also presents significant risks. The profitability of the project could be compromised in the initial months of operation as the project works to overcome the learning curve presented by lack of landfill gas collection and hot water system operation and management experience.

Scenario 1: Business as usual scenario

In the business as usual scenario, the project will stay with its core business which is the management of landfills. Therefore, this barrier has no affect on the business as usual scenario.

Scenario 2: Project activity without CDM revenue:

In the event that the project activity is undertaken without CDM financing, the project would consider the hiring and training of management staff too much of a departure from its core competence without sufficient incentive for a high return.

Scenario 3: Project activity with CDM:

CDM revenue would provide sufficient incentive and operating budget for the project to hire and train staff to man the project. Moreover, the project will be able to pay to bring maintenance from abroad in the event that there is a problem with the project.

The above barrier analysis shows that under the there are prohibitive barriers for Scenario 2; undergoing the project in without CDM funding. Only scenarios 1, the baseline scenario, and scenario 3, the project activity with CDM financing do not face prohibitive barriers. Therefore, scenario 3 is the project activity.

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)

Analysis of three alternatives to the proposed project in sub-step 1a, 1b indicates that alternative 1 to the proposed project is the only feasible Baseline choice, i.e. keep existed, and not collect and evacuate and flare LFG. Alternative 1 is in compliance with laws and regulations in China, and without investment and technological barriers.

Step 4 ：Common practice analysis

There are nearly one thousand landfills taking and disposing wastes in 600 cities in China, annual amount of waste treated is about 100 million tonnes. Up to now, there is no official investigative stat. data on the recycle of LFG. However, it is known that there are as a few as 10 facilities of utilizing LFG in business oriented mode. More than 90% landfills simply evacuate the LFG, rather than recycle and utilize LFG.

By end of 2004, less than 10 known projects of LFG collection and utilization that function normally, most of these projects are located in the developed coastal region with higher electricity price and government subsidies, such as Guangzhou, Shanghai, Jiangsu, Zhejiang, and so on. Among which, the LFG electricity generation project in Nanjing Shuige landfill, as a paradigmatic project, utilized the donation of “GEF”; The first LFG electricity project founded by the investment of enterprises in China is the Tianzi mountain LFG electricity plant in Hangzhou, the project received the financial support of joining into the electric network. The financial analysis delivered by the expert group consisted of the department of agriculture of China/Department of Energy of USA indicated that the IRR of the project is only 8.37%, much more lower than the benchmark internal yield, 12.5%。 The operation of the Taohua mountain LFG electricity generation plant in Wuxi, which was put into operation in 2004, is not well, largely due to the fluctuation of LFG collection. At present, other projects under designing are mostly in application and preparing stage, all developed as CDM project same as the proposed project.

Step5: Impacts of CDM registration

The increased revenue from CER revenue will provide the project owner with incentive to undergo the project in the absences of regulatory requirements. Moreover, the CDM revenue will allow the project to overcome prohibitive barriers in the areas of investment, technology, water demand, gas concentration, and management, and exchange risk.

If the proposed project cannot be registered as CDM project activity by EB, then (1) because the income from CDM is a significant supplementary income source for the proposed project, lack income from CDM would lead to lower IRR on proposed project. In lieu of the barriers and risks that the project is currently face, the lower IRR would be sufficient to block the project from going forward; (2)the owner of the project might postpone or give up the proposed project due to the high technological risk caused by the lack of necessary reserve for required technological operation and maintaining, and training.

In sum：

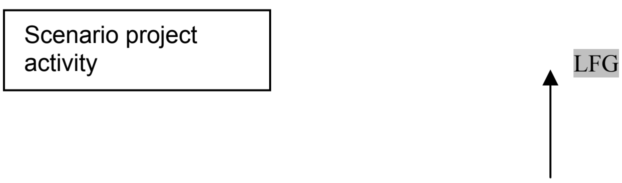
The proposed project activity does not belong to the Baseline scenario. The proposed project activity would not occur in the absence of income from CDM, the owner will keep the existed and not collect, evacuate and flare LFG. As stated in step 2 and step 3, the proposed project has strong additionality and can reduce the GHG emission. If the proposed project cannot be registered as CDM project activity, the emission reduction would not be able to achieve. The analysis above can demonstrate that the environmental benefit, investment and technological aspects of the proposed project is consistent with the additionality assessment regulations of CDM. The analysis of additionality above provides sufficient and necessary evidences, which could demonstrate that approval of the proposed project to be registered and implemented as CDM projects can help the proposed project to overcome the barriers that prevent the LFG collection and utilization project from implementing.

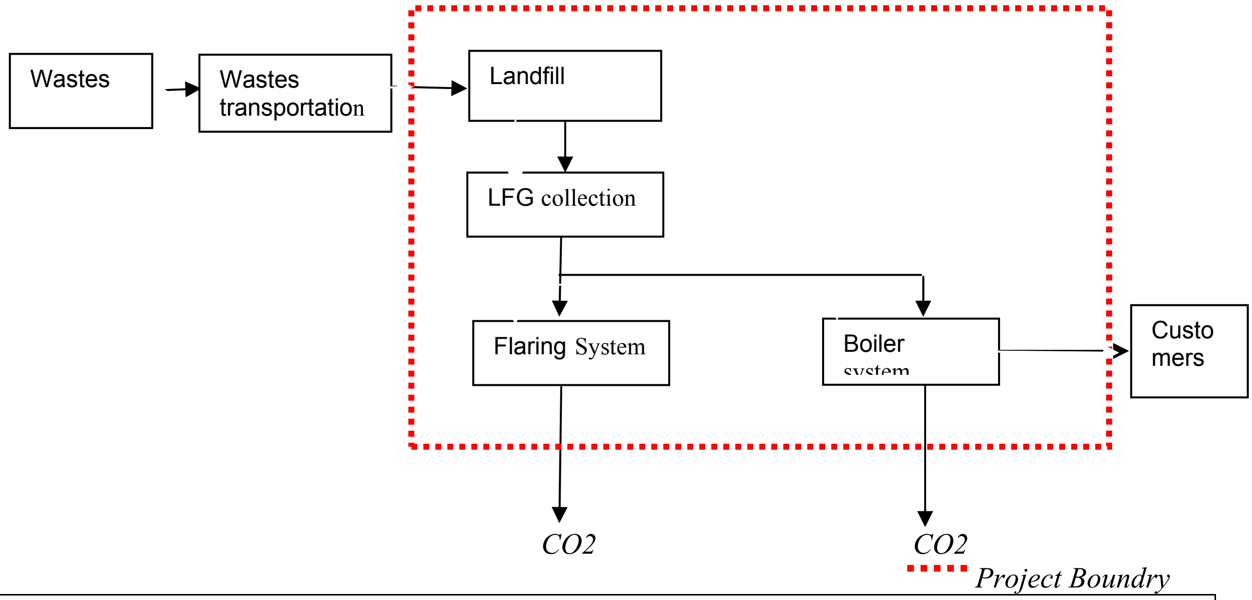
B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity

The project boundary includes all evident sources of anthropogenic GHG emission that can be reasonably attribute to the proposed CDM project. According to the Baseline methodology ACM0001, The project boundary is the site of the project activity where the gas is collected and destroyed/used.

The whole project boundary is showed in the Figure 3, the project activity and sources of GHG emission within the project boundary include:

- Methane in the landfill freely penetrate, sub-area landfill mode shall be adopted in the landfill, and operational area occupy the landfill 10% of the total area, according to conservative estimate, the efficiency when the LFG collection system functions normally is between 50%-75%, in other words, some of the LFG still penetrate into the atmosphere.
- The CO_2 emission caused by the flaring The CO_2 emission generated by the combustion of the methane of LFG The methane generated from the anaerobic fermentation process of organic matter, therefore, the CO_2 emission generated by the combustion of the methane is the same as the CO_2 that fixed during the formation of the organic matter, and the CO_2 emission is carbon neutral. This part of emission will not be calculated into the emission of project.
- The CO_2 emission caused by the operation of activity facilities does not generate emission.





B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline

The baseline methodology completed in 31/03/2006

Company name: Clearworld Energy Ltd.
Address: Room 906 Lucky Tower A, No.3 North Road, East Ring Road,
Chaoyang district, Beijing
Zip code: 100027
Country: China
Contact person: Dr. Alex Westlake
Telephone number: +86 10 8448 3025
Fax number: +86 10 8448 2499
E-mail: alex@clearworld.com.cn

Company name: The administrative office of landfills of Nanjing City
Address: Shuige Landfill site, Dongshan Township, Jiangning District, Nanjing
Zip code: 211153
Country: China
Contact person: Mr. Chen Mingdong
Telephone number: +86 25 52741184
Fax number: +86 25 52741176
E-mail: zhou_feng@126.com

C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

30/06/2006

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

25 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 :

30/06/2006

C.2.1.2. Length of the first crediting period :

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

ACM0001/Version 02 "Consolidated monitoring methodology for landfill gas project activities"

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

ACM0001 is the monitoring methodology to be used in conjunction with the approved baseline methodology ACM0001. This methodology is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include situations such as:

a) The captured gas is flared; or

b) The captured gas is used to produce energy (e.g. electricity/thermal energy), but no emission reductions are claimed for displacing or avoiding energy from other sources[7]; or
c) The captured gas is used to produce energy (e.g. electricity/thermal energy), and emission reductions are claimed for displacing or avoiding energy generation from other sources.

As reported in Section B of this PDD, the current project will install a LFG collection system and partly flare the collected gas, partly generate heat through the use of boilers. As such the Nanjing landfill project meets the requirements expressed in point b) above and the monitoring methodology ACM0001 is applicable.

D.2.1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

The project directly monitors and calculates CERs, so Option 1 is not applicable.

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Not applicable

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :								
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

D. 2.2. Option 2: Direct monitoring emission reductions from the project activity (values should be consistent with those in section E)

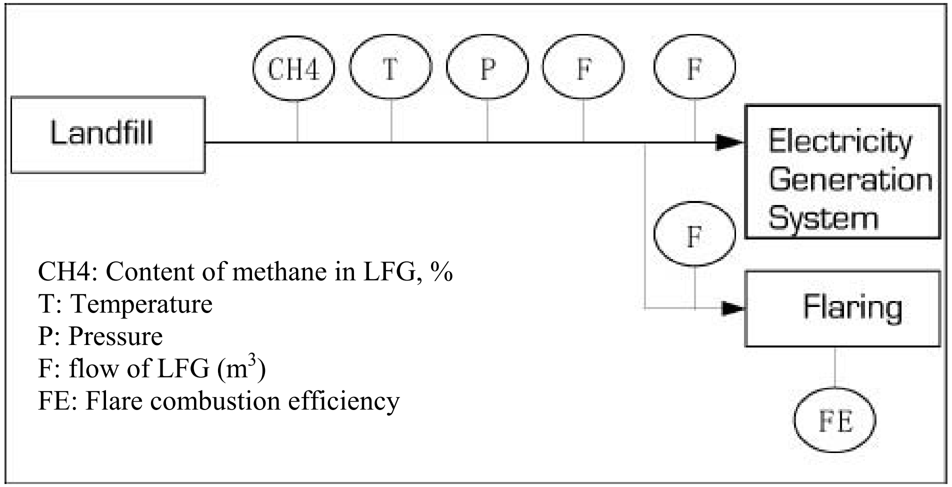


Chart D.1 Monitoring Plan

For the current project, this option is adopted and the emission reduction achieved by the project activity will be monitored directly. The monitoring plan sets out the parameters required to continuously measure and record the quantity and quality of collected LFG and methane as shown in Figure D.1. The required monitoring parameters are reported in table D.2.2.1

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1. $LFG_{total,y}$	Total amount of landfill gas captured	Air flow meter	m^3	m	continuously	100%	electronic	Measured by a flow meter. Data to be aggregated monthly and yearly
2. $LFG_{flare,y}$	Amount of landfill gas flared	Air flow meter	m^3	m	continuously	100%	electronic	Measured by a flow meter. Data to be aggregated monthly and yearly
3. $LFG_{boiler,y}$	Amount of landfill gas to boiler	Air flow meter	m^3	m	continuously	100%	electronic	Measured by a flow meter. Data to be aggregated monthly and yearly
4. FE	Flare/combustio n efficiency	Gas quality analiser	%	m and c	continuously	n/a	electronic	Determined as fraction of the methane destroyed using the operation hours (1) and the methane content in the LFG (2). Methane content of LFG (2) will be measured periodically, while operational time of flare (1) will be monitored continuously.
5. $w_{CH_4,y}$	Methane fraction in the landfill gas	Gas quality analiser	m^3CH_4/m^3LFG	m	continously	100%	electronic	Average values in operating years.
6. T	Temperature of landfill gas	Online temperature sensor	ºC	m	continuously	100%	electronic	Measured to determine the density of methane
7. P	Pressure of landfill gas	Online pressure sensor	Pa	m	continuously	100%	electronic	Measured to determine the density of methane

8.	Regulatory requirements relating to landfill gas projects	China Environment Standard online at www.es.org.cn	N/A	m	annually	100%	electronic	Required to update the adjustments factor (AF)

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

In accordance with this methodology, possible CO_2 emissions resulting from combustion of other fuels than the methane recovered should be accounted as project emissions.

The proposed project activity will directly flare a portion of the landfill gas (LFG_{flare}) while the remainder will be used to generate heat (LFG_{boiler}) thus generating CO_2 which will be released into the atmosphere. The methane contained in the landfill gas (combustible portion of the LFG) is generated from the anaerobic fermentation process of organic matter; therefore the CO_2 emission generated by the combustion of the methane is equivalent to the CO_2 that was fixed during the fermentation of the organic matter. Hence the process is carbon neutral. As a consequence this part of emission will not be accounted into the project emissions.

D.2.3. Treatment of leakage in the monitoring plan

According to ACM0001, no leakage needs to be accounted for.

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity								
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

N/A

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

The greenhouse gas emission reduction achieved by the project activity during a given year "y" (ER_y) is given by the difference between the amount of methane actually destroyed/combusted during the year ($MD_{project,y}$) and the amount of methane that would have been destroyed/combusted during the year in the absence of the project activity ($MD_{reg,y}$) according to the following equation:

$$ER_y \; (t\ CO_2/yr) = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} \qquad \text{Eq. 1}$$

Where:
$MD_{project,y}$ and $MD_{reg,y}$ are measured in tonnes of methane (tCH_4);
and GWP_{CH4} is the approved Global Warming Potential value for methane (for the first commitment period) that is 21 t CO_2 e/tCH_4.

$MD_{reg,y}$ is calculated using the following equation:

$$MD_{reg,y} = MD_{project,y} * AF \qquad \text{Eq. 2}$$

In the case where the $MD_{reg,y}$ is given/defined as a quantity that quantity will be used (this is not the case of the proposed project).

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. As stipulated in the Monitoring Plan (D.2.2.1-8; "regulatory requirements to landfill gas project"), the sites in China will be monitored on an annual basis and, if the situation changes for similar landfills, the AF will be increased to take the changed situation into consideration in the calculation of the CERs from this project.

The amount of methane destroyed by the project $MD_{project,y}$ can be determined by monitoring the amount of methane combusted by flaring and for heating supply.

$$MD_{projecty} = MD_{flared,y} + MD_{boiler,y} \qquad \text{Eq. 3}$$

Where $MD_{flared,y}$ is calculated using the following equation:

$$MD_{flared,y} = LFG_{flare,y} * w_{CH4,y} * D_{CH4} * FE \qquad \text{Eq. 4}$$

Where:
$MD_{flared,y}$ (m^3) is the quantity of methane destroyed by flaring;
$LFG_{flare,y}$ is the quantity of landfill gas flared during the year measured in cubic meters (m^3/yr);
$w_{CH4,y}$ is the average methane fraction of the landfill gas as measured during the year and expressed as a fraction;
FE is the flare efficiency (the fraction of the methane destroyed);
D_{CH4} is the methane density (tCH_4/m^3CH_4).

The quantity of methane destroyed for the generation of thermal energy is given by the following equation:

$$MD_{boiler,y} = LFG_{boiler,y} * w_{CH4,y} * D_{CH4} \qquad \text{Eq. 5}$$

Where:
$MD_{boiler,y}$ (m^3) is the quantity of methane destroyed for the generation of thermal energy;
$LFG_{boiler,y}$ is the quantity of landfill gas fed into the boiler (m^3/yr).

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.	How to plan and carry out the procedure of QA/QC?
D2.2.1-1. $LFG_{total.y}$	*Low*	*Yes*	Flow meter will be subject to a regular maintenance and calibration regime to ensure accuracy
D2.2.1-2 $LFG_{flare.y}$	*Low*	*Yes*	Flow meter will be subject to a regular maintenance and calibration regime to ensure accuracy
D2.2.1-3 $LFG_{boiler.y}$	*Low*	*Yes*	Flow meter will be subject to a regular maintenance and calibration regime to ensure accuracy
D2.2.1-4 FE	*Medium*	*Yes*	Regular maintenance will ensure optimal operation of flare. Flare efficiency should be checked quarterly, with monthly checks if the efficiency shows significant deviations from previous value.
D2.2.1-5. $w_{CH4,y}$	*Low*	*Yes*	The gas analyzer should be subject to a regular maintenance and testing regime to ensure accuracy.
D2.2.1-6 T	*Low*	*Yes*	The gas analyzer should be subject to a regular maintenance and testing regime to ensure accuracy.
D2.2.1-7 P	*Low*	*Yes*	The gas analyzer should be subject to a regular maintenance and testing regime to ensure accuracy.
D2.2.1.-8	*Low*	*N/A*	N/A

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The owner of the project is the operator of the project. The quality assurance practices that will be implemented by the operator will include the use of advanced automatic methane monitoring facility. The collected data will be aggregated and analyzed by a trained engineer on a monthly basis. The monitoring reports will be compiled into an annual report at the end of every year that will for the basis for the calculation of CERs and for verification. Mr. Zhou Feng will be in charge of monitoring works.

These include:

- Install monitoring equipment, such as flow meters, gas quality analyzers, and so on.

- Set up a central control system that links to all online monitoring equipment to collect and record all data relevant for monitoring the project activity. All data should be double checked before being archived.
- Designate qualified technical personnel to take charge of the monitoring work. All technical staff will receive appropriate training in order to operate the monitoring equipment.
- Deliver the monitoring and record data in accordance with monitoring plan. Mr. Zhou Feng will be responsible of double-checking the acquired data.
- All data, including electronic files, hardcopies of data and sale clips, will be kept in archives for transparency.
- Prepare annual report for the verifying Operational Entity and Carbon Credit Buyers, and take proper measures to ensure the quality of the reports according to the regulations of CDM and the requirements of ERPA.

The monitoring of emission reduction during the project activity, the operation plan and management framework will be designed in accordance with the guidelines reported in Annex 4: monitoring plan.

D.5 Name of person/entity determining the monitoring methodology:

Company name: Clearworld Energy Ltd.
Address: Room 906 Lucky Tower A, No.3 North Road, East Ring Road,
Chaoyang district, Beijing
Zip code: 100027
Country: China
Contact person: Dr. Alex Westlake
Telephone number: +86 10 8448 3025
Fax number: +86 10 8448 2499
E-mail: alex@clearworld.com.cn

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources

The greenhouse gas emissions from the combustion of landfill gas is neutral and thus will not form part of the project emissions.

According to ACM0001, the GHG emission reductions achieved by the project activity will be directly measured and calculated in the given year "y" (ERy).

E.2. Estimated leakage

According to ACM0001, no leakage effects need to be accounted under this methodology

E.3. The sum of E.1 and E.2 representing the project activity emissions

The sum of the project emissions and the leakage emissions is zero.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline

As stated above the emission reductions are calculated directly by monitoring the destruction of methane that would have formed the baseline. The emission reductions of the project are set out in section E5 below.

E.5. Difference between E.4 and E.3 representing the emission reductions of the Project activity:

The monitoring plan will be applied to determine the actual emission reduction of the project activity in future. The estimation of emission reduction in advance delivers as follows,

Step1 Estimate of total amount of collected methane (CH_4Total,y)
Considering the amount of waste received by the landfill varies yearly, the estimation of the emission reduction of greenhouse gases caused by proposed project will adopt the mutation of FOD model formula of second grade in the Revised 1996 IPCC Guideline for National Greenhouse Gas Inventory , i.e. the total amount of methane production(QT) in present year(T) can be calculated according to the amount of methane produced(QT,X) by the amount of waste(Rx) that filled in the landfill every year(x) after the landfill started operation.

$$Q_T = \Sigma_x Q_{T,x} = \Sigma_x k \ L_o \ R_x \ e^{-k(T-x)}$$

where:

T = present year

x = Every year from the year when the landfill started operation to present year

$Q_{T,x}$ = the amount of methane(tCH_4/yr) produced by the waste filled in year x in present year total amount of the methane generation in present year

k = constant of methane produce rate (1/yr)

L_o = methane produce potentiality (tCH_4/t waste)

R_x = the amount of waste(t/yr) filled in year X

the total amount of methane captured by project activity is the product of QT and collection efficiency η

$CH_{4Total,y} = Q_T * \eta$

According to the estimation of experts and the results of onsite testing, the main parameters of the project are as follows,

T (Year)	*Yearly amount of disposal landfill R_x (T/yr)*	*Amount of cumulated landfill (Ts)*	*Amount of producing methane (m^3/hr)*	*Methane amount (t/yr)*	*Collection efficient η(%)*	*Amount of collecting methane (m^3/hr)*	*$CH_{4Total,y}$ (t/yr)*
1995	*147,581*	*147,581*	*0*	*0*	*0%*	*0*	
1996	*157,002*	*304,583*	*113*	*710*	*0%*	*0*	
1997	*167,023*	*471,606*	*225*	*1,414*	*0%*	*0*	
1998	*177,684*	*649,290*	*336*	*2,112*	*0%*	*0*	
1999	*189,025*	*838,315*	*446*	*2,803*	*0%*	*0*	
2000	*201,091*	*1,039,406*	*557*	*3,500*	*0%*	*0*	
2001	*213,927*	*1,253,333*	*668*	*4,198*	*0%*	*0*	
2002	*227,582*	*1,480,915*	*781*	*4,908*	*0%*	*0*	
2003	*242,108*	*1,723,023*	*896*	*5,631*	*0%*	*0*	
2004	*295,405*	*2,018,428*	*1,012*	*6,360*	*0%*	*0*	
2005	*274,002*	*2,292,430*	*1,161*	*7,296*	*0%*	*0*	
2006	*287,702*	*2,580,132*	*1,282*	*8,058*	*50%*	*641*	*4,029*
2007	*302,080*	*2,882,212*	*1,403*	*8,817*	*65%*	*912*	*5,731*
2008	*317,000*	*3,199,212*	*1,528*	*9,603*	*75%*	*1,146*	*7,202*
2009	*333,000*	*3,532,212*	*1,653*	*10,388*	*75%*	*1,240*	*7,791*
2010	*349,000*	*3,881,212*	*1,782*	*11,199*	*75%*	*1,336*	*8,399*
2011	*367,000*	*4,248,212*	*1,912*	*12,016*	*75%*	*1,434*	*9,012*
2012	*385,000*	*4,633,212*	*2,047*	*12,864*	*75%*	*1,535*	*9,648*
2013	*404,000*	*5,037,212*	*2,185*	*13,731*	*75%*	*1,638*	*10,299*
2014	*425,000*	*5,462,212*	*2,326*	*14,618*	*75%*	*1,745*	*10,963*
2015	*446,000*	*5,908,212*	*2,473*	*15,541*	*75%*	*1,855*	*11,656*
2016	*468,000*	*6,376,212*	*2,625*	*16,497*	*75%*	*1,969*	*12,372*
2017	*492,000*	*6,868,212*	*2,782*	*17,483*	*75%*	*2,087*	*13,113*
2018	*516,000*	*7,384,212*	*2,946*	*18,514*	*75%*	*2,209*	*13,885*
2019	*542,000*	*7,926,212*	*3,114*	*19,570*	*75%*	*2,336*	*14,677*
2020	*569,000*	*8,495,212*	*3,291*	*20,682*	*75%*	*2,468*	*15,512*
2021	*598,000*	*9,093,212*	*3,474*	*21,832*	*75%*	*2,606*	*16,374*
2022	*0*	*9,093,212*	*3,665*	*23,032*	*75%*	*2,749*	*17,274*
2023	*0*	*9,093,212*	*3,384*	*21,266*	*75%*	*2,538*	*15,950*
2024	*0*	*9,093,212*	*3,123*	*19,626*	*75%*	*2,342*	*14,719*
2025	*0*	*9,093,212*	*2,882*	*18,112*	*75%*	*2,162*	*13,584*
2026	*0*	*9,093,212*	*2,662*	*16,729*	*75%*	*1,996*	*12,548*

NOTES:							
Methane Content of LFG Adjusted to:			*50%*				
Methane generation rate constant (k):							
Ultimate methane generation potential (L_0):			*84 (or,0.064)*				

Step 2 estimation of the amount of methane destroyed by heat supply (MDboiler.y）

The formula for estimation of the amount of methane consumed by heat supply as follows,

Calculation of the amount of gas consumption by boiler.

a. the amount of gas consumed by single boiler

$B = KD（hg-hgs）/\eta Q^{y}_{DW}$

B： the amount of gas consumed by single boiler（M^3/h）

K：

D： the amount of evaporation of single boiler(kg/h)(according to the demarcate value of the boiler, choosing 3000kg/h)

hg: the enthalpy rate of stream(kj/kg)(according to the *Handbook of Design of Oil and Gas Stokehold*, choosing 2675kj/kg)

hgs: the enthalpy rate of feed water (kj/kg)(according to *Handbook of Design of Oil and Gas Stokehold,* choosing 416kj/kg.

η: Combusting efficiency of the boiler (%)(according to the demarcate value, should choose 90%, hereby choosing 85% considering the instability of LFG)

QyDW：combusting value of methane (kj/ m^3)(according to related information, the low heating value of methane is between 30,000 to 35,000kj/ m^3, hereby choosing 32000kj/ m^3)

B= 1.1*3000(2675-417)/（0.85*32000） = 274m^3 (methane)

A boiler of 3000kg/hr rating evaporation needs 274 m3/h methane. needs 548m3 landfill gas.

b. the amount of gas consumed by suit boilers.

the amount of landfill gas consumed by multi-boilers is

$MD_{boiler.y} = N* B *t* D_{CH4}$

where:

MDboiler,y :the amount of methane consumed by heat supply every year（t/yr）

N： the number of boilers in the heat supply set (added year by year, minimum 2 sets, maximum 8 sets)

B： the amount of methane consumed by single boiler（M^3/h）

t： Operation hours of the heat supply sets every year(h/yr)(according to the demarcate value, average 8,000hrs per year)

DCH_4 is the density of methane(0.0007174tCH_4/m3CH_4)

Main parameters of the project choosing as follows(setting the content of methane in the landfill gas as 50%)

Year-T	*Numbers of boiler $N_{boiler,y}$*	*Methane demand for boiler (m^3/hr)*	*Methane demand $MD_{boiler,y}$ (t/yr)*	*$t_{boiler,y}$ (h/yr)*	*$B_{boiler,y}$ (m^3/hr)*
2006	*2*	*548*	*3,145*		
2007	*4*	*1,096*	*6,290*		
2008	*4*	*1,096*	*6,290,*		
2009	*5*	*1,370*	*7,863*		
2010	*5*	*1,370*	*7,863*		
2011	*5*	*1,370*	*7,863*		
2012	*5*	*1,370*	*7,863*		
2013	*6*	*1,644*	*9,435*		
2014	*6*	*1,644*	*9,435*		
2015	*7*	*1,918*	*11,008*		
2016	*7*	*1,918*	*11,008*	*8,000*	*274*
2017	*7*	*1,918*	*11,008*		
2018	*8*	*2,192*	*12,580*		
2019	*8*	*2,192*	*12,580*		
2020	*8*	*2,192*	*12,580*		
2021	*8*	*2,192*	*12,580*		
2022	*8*	*2,192*	*12,580*		
2023	*8*	*2,192*	*12,580*		
2024	*8*	*2,192*	*12,580*		
2025	*8*	*2,192*	*12,580*		
2026	*8*	*2,192*	*12,580*		

Source：

1. **$N_{boiler,y}$：Project feasibility study report**

2. **$t_{boiler,y}$：Project feasibility study report**

3. **$B_{boiler,y}$：Project feasibility study report**

Step 3 estimation of the amount of methane consumed by the flaring（$MD_{flared,y}$）

According to the project application report, the used methane during heat supply and the maintenance of heat supply sets will be flared. Therefore, the formula for estimation of the amount of methane consumed by the flaring is:

$MD_{flared,y} = (CH_{4Total,y} – MD_{boiler,y}) * FE$

where:

$MD_{flared,y}$ is the amount of methane consumed by flaring every year（t/yr）

$CH_{4Total,y}$ is the estimated total amount of captured methane $CH_{4Total,y}$（t/yr） every year according to step 1.

$MD_{boiler,y}$ is the estimated amount of methane（t/yr) consumed by heat supply every year according to step 2

FE is the flaring efficiency (%), the estimated value in this project is 97%.

Step 4 estimation of the amount of the methane destroyed by the project（MDproject,y）

the amount of the methane destroyed by the project（MDproject,y）is the sum of results of step 2 and step 3, i.e

$MD_{project,y} = MD_{boiler,y} + MD_{flared,y}$

Step 5 estimation of the amount of methane destroyed according to the regulatory requirements in the absence of the project.（MDreg,y）

According to ACM0001, the formula for estimation of the amount of methane destroyed（MDreg,y）according to the regulatory requirements in the absence of the project is,

$MD_{reg,y} = MD_{project,y} * AF$

AF is adjustment factor (%), depends on the regulatory and contractual requirements.

The Jiaozi mountain landfill was built in 1992, there was no requirement of employing recycling system of landfill gas, according to the standard by thenAccording to the *Criterion of Sanitary Technological landfilling for Household Waste* issued and implemented in 2004, all landfills are required to set up effective system of LFG recovery and destroyed the landfills by flaring. However, this regulation is only suitable for new constructed landfills, but not applicable to those landfills that had functioned. Moreover, considering the huge investment requirements of reconstruction, Chinese government may not issue compulsory regulations or laws that require present landfills to reconstruct. Therefore, both AF and MDreg,y are zero.

Step 6 estimation of the emission reduction of the project（ERy）

Power generation is not a component of this project, and therefore ETy*CEFelectricty,y is not considered as a part of the project. Moreover, there is not fossil fuel used in either the baseline activity or during the project activity. Therefore, ETy*CEF is not considered. Therefore, emission reductions for this project will be considered as:

$ERy = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4}$

the unit of ERy is t CO_2 e/yr

$GWPCH_4$=21（Accroding to the *Revised 1996 IPCC Guideline for National Greenhouse Gas Inventory*）

$MD_{reg,y} = 0$

Detailed calculations and values are prvoided in table E6 below.

E.6. Table providing values obtained when applying formulae above

Year-T	Q_T (t/yr)	$CH_{4Total,y}$ (t/yr)	$MD_{boiler,y}$ (t/yr)	$MD_{flared,y}$ (t/yr)	$MD_{project,y}$ (t/yr)	ERy (t CO_2 e/yr)
2006.6	8,058	4,029	3,145	858	4,003	42,032(6M)
2007	8,817	5,731	6,290	0	5,371	112,791
2008	9,603	7,202	6,290	885	7,175	150,675
2009	10,388	7,791	7,863	0	7,791	163,611
2010	11,199	8,399	7,863	520	8,383	176,043
2011	12,016	9,012	7,863	1,115	8,978	188,538
2012	12,864	9,648	7,863	1,731	9,594	201,474
2013	13,731	10,299	9,435	838	10,273	215,733
2014	14,618	10,963	9,435	1,482	10,917	229,257
2015	15,541	11,656	11,008	629	11,637	244,377
2016	16,497	12,372	11,008	1,323	12,331	258,951
2017	17,483	13,113	11,008	2,042	13,050	274,050
2018	18,514	`13,885	12,580	1,266	13,846	290,766
2019	19,570	14,677	12,580	2,034	14,614	306,894
2020	20,682	15,512	12,580	2,844	15,424	323,904
2021	21,832	16,374	12,580	3,680	16,260	341,460
2022	23,032	17,274	12,580	4,694	17,274	362,754
2023	21,266	15,950	12,580	3,269	15,849	332,829
2024	19,626	14,719	12,580	2,075	14,655	307,755
2025	18,112	13,584	12,580	974	13,554	284,634
2026	16,729	12,548	12,580	0	12,548	263,508

The right list of the table above presenting the estimated amount of the emission reductions of greenhouse gases every year achieved by the proposed project. The ex-ante estimate for the total CO_2 e emission reductions of the project during seven-years crediting period (2006-2013) is approximately 1,143,031 tonnes, which over the seven year crediting period averages to 163,290 tonnes per year. The accumulative amount of CO_2 emission reductions in twenty one years crediting period of the project would be 5,072,036 tonnes, 241,525.5 tonnes per year.

F. Environmental impacts

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

The environmental impacts report of the proposed project had been finished by the Institute of Environmental Science Studies at Nanjing University, and was approved by the Jiangning District Environmental Protection Bureau of Nanjing City on 16th, Jul., 2005. Archived as follows：

Analysis of environmental impacts during construction period:
The main environmental impacts during construction period include noise, dust, constructive waste, human sewage, and human waste caused by the construction of the project. These impacts are all temporal and with the effective measures being taken, the negative impacts on environment will disappear after the complete of the project.

Analysis of environmental impacts during operation period.

1. **Analysis of impacts on atmospheric environment.**

During operation, the proposed project will supply heat through combusting the methane in the landfill gas, consequently reducing uncontrolled emission of landfill gas, alleviating the smell of the landfill, and reducing greenhouse gases emissions. All these are benefit for improving the quality of the atmosphere.

During operation, the heat supply boilers will adhere to the second category of the *Atmospheric contaminations Synthesized Emission Standards for Boiler (*GB12348-2001*)*. All exhaust gas contaminations will therefore be vented in accordance with the related standard and the exhaust emissions will adhere to regional environmental quality standards.

2. **Analysis of impacts on water environment**

The waste water produced during operation of the project comes from both the condensation of landfill gas and waste water from staff facilities. The condensation water produced by the project activity will be filled into the sewage treatment plant in the landfill through water pump. The human sewage will enter a separate sewage treatment system. The emission of treated sewage will not bring any negative impact on the water environment nearby.

3. **Analysis of acoustic environment**

The noise emissions of the project during operation mainly comes from pre-treatment of landfill gas (pressurisation fan), discharging of condensation water (water pump), heat supply by landfill gas (heat supply boilers), and flaring of landfill gas (burner). No residents live within 1.5 km around the plant boundary. Therefore, the noise during operation will adhere to environmental standards and has very little impact on the regional acoustic environment.

4. **Analysis of impacts on environment by solid waste**

The solid waste produced by the project mainly comes from the scale and deposed lubricating oil during maintenance of equipment. Given that the industrial waste constitutes only a very amount, the waste will be collected on site and sent to the industrial waste treatment factory when there is sufficient to be transported. This will ensure that the waste will not pollute the environment.

5. **Analysis of impacts on the biological environment**

The construction of the project had started in No.3 storage area of Jiaozi mountain landfill that had been closed, and green vegetation work will be delivered in the plant of landfill gas heat supply plant, which will form integrated plant community and enhance the biological environment of the site.

In summary the project employs advanced gas heat supply technology with high level of automation. The project has little impact on the surrounding environment and does not have any trans-boundary impacts.

F.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

The implementation of the proposed project will not bring about significant impacts on the environment and the protecting measures taken by the project are reasonable and effective. Implementation of the proposed program takes full advantage of the landfill gas captured in the Jiaozi mountain landfill and reduces the emission of greenhouse gases.

G. Stakeholders' comments

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

The proposed project gained approval from the Development and Reform Committee of Nanjing City. In order to collect local stakeholders' opinions and views on the project, on 20th, Dec. 2005, the developer invited the stakeholders to the Jiaozi mountain landfill to express their view of the project. Participants included related personnel from Nanjing City's Appearance Administration Bureau, Administrative Office of Landfills of Nanjing City, Jiaozi Mountain Landfill, Dou Village, and the Administrative Committee of Development Zone of Jiangning District.

G.2. Summary of the comments received

Both Nanjing City's Appearance Administration Bureau and the Administrative Committee of Development Zone of Jiangning District approve of and actively promote the construction of the project.

Villagers from Dou village think that the construction of the project will reduce the odour of the landfill and enhance the quality of life for villagers nearby. Moreover, the project will not take over any new land or bring about any additional pollution, which means the project will not bring any negative impact to the community. The villagers are in favour of the project.

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

N/A. No negative comments were received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization	*The administrative office of landfills of Nanjing City*
Street/P.O.Box	
Building:	
City	*Nan Jing*
Province	*Jiang Su*
Postfix/ZIP	
Country	*PRC*
Telephone	*+86-25-5274-1184*
FAX	*+86-25-5274-1176*
E-mail	
URL	
Represented by	*Chen, Mingdong*
Title	*Chief Officer*
Salutation	*Mr*
Last Name	*Chen*
Middle Name	*--*
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Department	*--*
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Personal E-Mail	*alex@camco-international.com.cn*

Annex 2

Information regarding public funding

No public funding is involved in the project.

Annex 3

BASELINE INFORMATION

Table A1 Given parameters applied in the estimation in advance of the amount of methane produced in the Jizaozi mountain landfill

Code	*Description*	*numerical value*	*Data source*
GWP_{CH4}	Approved Global Warming Potential value for CH_4	*21 t- CO_2 e/t-CH_4*	ACM0001
AF	adjustment factor	*0*	Before construction the proposed project, there is no collecting well on the landfill site.
$f_{recover}$	the proportion of the area of effective function system in the total area of the landfill	*75%*	The operating area occupies 10% of the total area of landfill and no landfill gas could be captured in the operational area. Therefore, assume 50-75% of the total area of the landfill is covered by collection system%
$EF_{recover}$	collection efficiency		Actual onsite testing
FE	Flaring efficiency	*97%*	equipments suppliers, detailed information could be submitted to authentication DOE for verification
$FE_{boiler\ y}$	Flaring efficiency of boiler	*85%*	the demarcate efficiency of the boilers in the project is 91%. Considering the low heat value of landfill gas, choosing average counting value of domestic boilers.
k	methane generation rate constant	*0.08*	refer to the calculating explanation of Table A1
F	the cubage proportion of methane in the landfill gas	*0.5*	Default range 0.45-0.55, choosing medium value 0.50.
D_{CH4}	density of methane	*0.0007174 t/m³*	standard atmospheric pressure(101,325Pa)
L_0	methane generation potential	*0.0602*	refer to the calculating explanation of Table A1 0 F unit: t-CH_4/t-Waste

Calculating explanation of Table A1
value determination of two main parameters(Lo and k) in the formula for estimation of the amount of landfill gas

- *Methane generation potential (L0)*

IPCC Good Practice Guidance and *Uncertainty Management in National Greenhouse Gas Inventories* provide the following formula for calculation of L0:

$$L_o = MCF * DOC * DOC_f * F * 16/12$$

where:

MCF = Methane correction factor, the default of IPCC 1.0 could be applied, considering the landfill in the project is a well-managed landfill.
DOC = The proportion of degradable organic carbon (Gg C/Gg waste), the value should be obtained through the following calculating formula.
DOCf = Fraction of DOC dissimulated, the suggested default in IPCC Good Practice Guidance is 0.5-0.6, the project choosing the medium value 0.55.
F = The proportion of methane in the landfill gas (%), choose default value 50%.

DOC can be calculated by the following formula,

$$DOC = (0.4 * A) + (0.17 * B) + (0.15 * C) + (0.3 * D)$$

where:

A = Fraction of paper goods and textile
B = Fraction of garden virescence waste and non-foodstuff organic matter
C = Fraction of foodstuff
D = Fraction of wood and straw

According to the investigation in the Plan of household waste treatment facilities in the central district of Nanjing city before 2010, the estimated average components of life waste in Nanjing city.

A	*paper*	*20.5%*
B	*Non- food organic wastes*	*0%*
C	*food wastes*	*48%*
D	*wood waste*	*3.4%*

The DOC value obtained through calculating of the data mentioned above is 0.164(Gg C/Gg waste) The value of L0 through recounting is 0.0602 tCH_4/t waste or 84m3CH_4/t

Constant of velocity of methane production (K)
IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories provide the following formula for calculation of k:
k = ln 2 / t1/2
where, t1/2 is the time taken for DOC in waste to decay to half it initial mass(y), called half lives.
For the proposed project, the value of t1/2 estimated by experts is 18yrs, with which the value of k is 0.077/y through calculating. Considering the humidity in Nanjing area is very high and the average rainfall is up to 1,000mm/y, adjusting the value of K to 0.08/y referring to the parameters of EPA model.

Calculation listed in the Table A2 presenting the amount of methane generation in Jiaozi mountain landfill bases on the parameters listed in table A1

Table **A2. Disposal amount history for Jiaozi Mountain Landfill (t)** and Methane Production Amount (**t**)

Year	***Yearly disposal amount (T/yr)***	***Cumulative amount (Ts)***	*Methane amount* ***Q_T (t/yr)***	***Year***	***Yearly disposal amount (T/yr)***	***Cumulative amount (Ts)***	***Methane amount Q_T (t/yr)***
1995	*147,581*	*147,581*	*0*	*2011*	*367,000*	*4,248,212*	*12,016*
1996	*157,002*	*304,583*	*710*	*2012*	*385,000*	*4,633,212*	*12,864*
1997	*167,023*	*471,606*	*1,414*	*2013*	*404,000*	*5,037,212*	*13,731*
1998	*177,684*	*649,290*	*2,112*	*2014*	*425,000*	*5,462,212*	*14,618*
1999	*189,025*	*838,315*	*2,803*	*2015*	*446,000*	*5,908,212*	*15,541*
2000	*201,091*	*1,039,406*	*3,500*	*2016*	*468,000*	*6,376,212*	*16,497*
2001	*213,927*	*1,253,333*	*4,198*	*2017*	*492,000*	*6,868,212*	*17,483*
2002	*227,582*	*1,480,915*	*4,908*	*2018*	*516,000*	*7,384,212*	*18,514*
2003	*242,108*	*1,723,023*	*5,631*	*2019*	*542,000*	*7,926,212*	*19,570*
2004	*295,405*	*2,018,428*	*6,360*	*2020*	*569,000*	*8,495,212*	*20,682*
2005	*274,002*	*2,292,430*	*7,296*	*2021*	*598,000*	*9,093,212*	*21,832*
2006	*287,702*	*2,580,132*	*8,058*	*2022*	*0*	*9,093,212*	*23,032*
2007	*302,080*	*2,882,212*	*8,817*	*2023*	*0*	*9,093,212*	*21,266*
2008	*317,000*	*3,199,212*	*9,603*	*2024*	*0*	*9,093,212*	*19,626*
2009	*333,000*	*3,532,212*	*10,388*	*2025*	*0*	*9,093,212*	*18,112*
2010	*349,000*	*3,881,212*	*11,199*	*2026*	*0*	*9,093,212*	*16,729*

Annex 4

MONITORING PLAN

Emission reduction will be based on measured quantities of methane actually destroyed in the flare and boilers. The approach described in Section D.2.4 will be used to determine the following variables: the total amount of landfill gas captured ($LFG_{total,y}$) , the amount of landfill gas fed to the flare and boilers ($LFG_{flare,y}$, LFG_{boiler},y), the fraction of methane in the landfill gas (w_{CH4}) , the gas density (D_{CH4}, through temperature and pressure measurements), the flare efficiency *(FE)*.

Monitoring plan is partition of task and arrangement of time of a series of monitoring works. The executive staff should deliver monitoring tasks in accordance with monitoring plan, attempt to achieve effective monitoring, and report the actual, measurable and long-term amount emission reduction of greenhouse gases caused by the CDM project.

1. Requirements of monitoring plan

The owner of the project should set up reliable, transparency and all-round system of emission reduction monitoring with functions as estimation, measuring, collection and tracking. The owner of the project should provide DOE with process and result of authentic, reliable and transparency emission reduction monitoring, through which assures that DOE could attest the actual situation of implementation of the project. Meantime, the process needs to guarantee the authenticity of the amount of CO_2 emission reduction provided to the buyers of CERs

The proposed project realizes the emission reduction through avoiding the uncontrolled emission of landfill gas, therefore, the key data of the proposed project that needs monitoring is the actual amount of methane captured and destroyed by the project activity, and the adjustment factor that determines the baseline scenario of emission reduction.

Requirements of monitoring plan:

- set up and guarantee the monitoring of the amount of methane destroyed by the proposed project;
- employ quality control program;
- Periodically calculate the emission reduction of greenhouse gases;
- Designate person specially assigned for monitoring.
- Generate a data archives system;
- Prepare data and report in accordance with the requirements of independent verification organization.

2. Use of the monitoring plan

The administrative office of landfills of Nanjing City, as the owner of the proposed project, is the user of the monitoring plan the present plan would become the monitoring guide for the project realized the CER credits. Present plan could be modified in accordance with the requirements of DOE and actual situation to guarantee the reliability, transparency and equity of the process and data of emission reduction monitoring.

3. Basic definition

The monitoring plan defines monitoring and verification as follow,

- Monitoring: measuring and recording of related capability indexes of emission reduction of greenhouse gases of the project.
- verification: the afterwards audit on the results of periodically monitoring, determines whether the owner of the project continuously complies the process related of the project, and

Related standards of the project set down by DOE, and confirms the actual emission reduction achieved by the project activity.

4, Calibrate and measure

The company of the proposed project will sign contract with equipment suppliers respectively, set quality control program of measure and calibration to guarantee accuracy of monitoring. The owner of project will also ask for the help of the standard measure department of Nanjing City in emendation

- Measure and calibrate the meter instruments yearly to ensure the accuracy of the meter instruments, and guarantee any error caused by the meter instruments will not exceed 0.5% of the whole graduation.
- All installed monitoring meters should be checked and sealed by both the owner and the company of the project. Neither party might unseal the measure devices without the attendance of the other party(or authorized representative).

Table A7 provides lists of all key files related to monitoring and verification of emission reduction of the projects.

Table A7 list of monitoring and verification related files

Index No.	Title	key content	source
F-1	PDD, includes electrical form of data and supporting files (assuming condition, estimation of data, method of measure, and so on)	formula of emission reduction calculating and monitoring content	PDD(Chinese/ English) kept by company, or download from UNFCCC website directly
F-2	Report on the qualify control and guarantee of monitoring	Employed facilities and national & industrial standards	Owner of the project
F-3	Experience and qualification of monitoring and calculating personnel	specialty, title of a technical post, working experience	owner of the project
F-4	Monitoring and verification report on the methane destroy.	monthly reading record from meter instruments, and sales invoices for hot water	owner of the project
F-5	Record of maintenance and calibration of monitoring instruments	Reason for every maintenance and calibration, the accuracy after maintenance and adjustment	owner of the project
F-6	Report on the calculation of Baseline emission factor	Source of data and calculating process	owner of the project
F-7	records of emission reduction	calculate quarterly	owner of the project
F-8	confirmation letter of reports	confirmation of the process of monitoring and calculating from F-2 to F-7	owner of the project

F-9	project management records(include data collection and management system)	reflect the management and operation of the CDM project roundly and authentically	owner of the project

7. Verification of the monitoring results

Verification of the monitoring results of the proposed project is a required part of all CDM project. The main target of verification is to independently verify the amount of greenhouse gases emission reduction reported and estimated in the completed PDD. The proper frequency of verification is once per year.

The main tasks of verification of the monitoring result as follows,

? Sign agreement with the verification DOE, and stand to the verification schedule required by CDM EB and buyers during the crediting period. The owner of the project should arrange and prepare for the verification, so that ensure of completion of related tasks effectively with high quality.

- According to the requirement of DOE, before and during the verification process, the owner of the project should provide necessary integrated information to facilitate the verification.
- The owner of the project should cooperate with verification DOE, and inform the employees and managers to assist in the interview, and answer the questions related to verification raised by DOE in consistent with facts.
- Verification DOE should be authorized by CDM EB. In case the owner of the project thinks that the requirements advanced by verification DOE exceed the scope of verification tasks, the owner of the project should contact with CDM service and consulting institution or other qualified entities to confirm whether the requirements of DOE is reasonable. After confirm that the requirements set forth by verification DOE is not reasonable, the owner of the project is entitle to reject in written form and explain the reasons. In case the owner of the project and verification DOE cannot reach agreement about the verification process, may turn to CDM EB or UNFCCC and apply for arbitration.

Owner of the proposed project will assign specialist as liaison of verifying DOE to take whole responsible for the entire course of monitoring and verification.