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

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Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

>> Mianyang Landfill Gas Utilisation Project
Version 06 dated 27th February 2008

A.2. Description of the project activity:

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The Mianyang Landfill Gas Utilisation Project (hereafter referred to as the Project) is sited within Mianyang Landfill, Loufang village, Mianyang City, Sichuan Province, P.R.China. The Project aims to reduce approximately 93,500 tCO_2e yearly over the 10-year crediting period. The average gas generated from this Project will be 6,118,867 Nm^3/year. The gas will power 4 * 500 kW generators and excess gas will be flared in an enclosed flare with a capacity of 1000 Nm3/h. It is expected that the generators will consume around 5.5 million m3 of methane per year (approx 89%) and the remaining 650,000 m3 (11%) of methane will be destroyed by the flare.

Mianyang is ranked as the second largest city in Sichuan Province. Mianyang landfill is located at Loufang village, 7 km southwest of Mianyang City. It was opened in September 1998 and covers an area of 11.7 ha. Mianyang Landfill is divided into two distinct areas. The first area was recently closed and waste is now being deposited in the second area at a rate of 500t per day. The rate of deposition is expected to increase to 600 t per day and the site is planned to close in 2012 with a total storage capacity of 2.2 million tonnes. The Project will be implemented in the second area. The DOE at verification will be able to compare the area of the project with reference map in the approved feasibility study.

The landfill only has installations for methane venting via vertical wells and has no landfill gas utilisation equipment, and absent the project activity, no additional activities are planned. Under the project activity, landfill gas extraction equipment will be installed and operated. The extracted gas will be used to generate electricity. When the yield of gas is insufficient to power a generator, an enclosed flare will be employed to minimise methane emissions.

The project activity will bring a number of benefits to the project owners and city of Mianyang.
Environmental benefits:

- Through a revised tipping practice the leachate production will be reduced. As a result, the project will drastically reduce risks of soil and water contamination from infiltration;
- Reduced leachate quantities will decrease the burden on local sewerage systems;
- The project will significantly improve local air quality; and
- The project will create global benefits through reduced impact upon climate change.

The project activity will also ensure that correct management of the landfill is carried out as to optimise landfill gas recovery.

Social impacts:

- Improved air quality, through the reduction of odours, will have a marked impact upon the quality of life for the neighbouring communities
- The utilisation of a renewable source of energy to generate electricity will contribute to China's sustainable development.

- Collection of the landfill gas will improve the safety aspects of the landfill, reducing the dangers of combustion and explosion of methane pockets.
- Moreover, the landfill operators will benefit from an additional source of revenue from sales of electricity and sales of CER, providing reserve funds to secure their future and the continued provision of sanitary waste disposal.
- The Project will also create employment opportunities through the construction, operation and continuous monitoring of the Project.

Economic impacts:

- The landfill operators will benefit from an additional source of revenue, helping to secure their future and the continued provision of sanitary waste disposal.
- Employment opportunities will be created through the construction, operation and continuous monitoring of the project activity.

Technology transfer:
The project will introduce new technology to the landfill management sector in China, demonstrating how improved gas capture techniques can improve the capture of methane, resulting in more power generation. Horizontal piping systems will be installed to extract a higher percentage of the gas generated from the landfill. The technology gives a higher capture efficiency of gas and a more constant flow of gas. It is a new technology from Canada yet to be used in China. The Project will be a pioneer to use the technology on Chinese landfills which have a very different waste composition to Western ones.

A.3. Project participants:

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Name of Party Involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Mianyang Taidu Environment Energy Technical Development Company Ltd	No
UK (Annex 1)	Sindicatum Carbon Capital Ltd (SCC)	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

The Project is located within Mianyang Landfill, Loufang Villige, Mianyang City, Sichuan Province, P.R.China. The geographic coordinates of the project are: latitude 104° 43′6″ East and longitude 31°24′50″ North. The landfill is 7km southwest to the downtown area of Mianyang city, close to the highway from Mianyang to Zhongjiang.

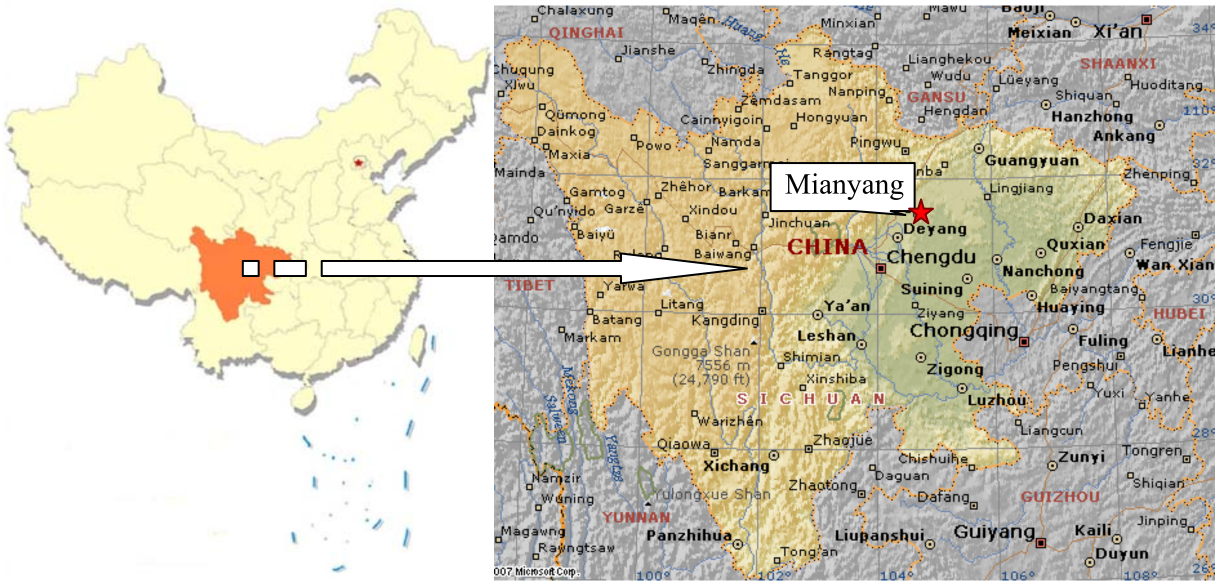

Fig 1: Location of Mianyang City in Sichuan Province

Fig 2: Map showing location of Mianyang Landfill

Fig 3: Photograph showing location of the Project

The site drawings (see Annex 3) which were taken from the feasibility studies show the layout of the entire landfills and their respective project boundaries. The position of the extraction pipes, generators and flares will be adjacent to the management office, next to the east side gate.

A.4.1.1. Host Party(ies):

>> People's Republic of China

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

>>Sichuan Province

A.4.1.3. City/Town/Community etc:

1. Loufang Village, Mianyang Town

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

The landfills locations are defined by the following coordinates:
104, 43' 6" E and 31, 24' 50" N

The site drawings (see Annex 3) which where taken from the feasibility studies show the layout of the entire landfills and their respective project boundaries. The position of the extraction pipes, generators and flares will be adjacent to the management office, next to the south side gate.

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

Sectoral Category 13 – Waste Handling and Disposal and
Sectoral Category 1 – Energy industries (renewable - / non-renewable sources)

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

The project activity will use state of the art LFG gas collection systems combined with western tipping practices, rainfall and leachate management techniques to maximise landfill gas extraction efficiency.

Landfill gas collection system:
High density plastic (HDPE) horizontal and vertical pipes will be laid into the already existing waste. The pipes will be surrounded in gravel and connected to a pump, which will be used to create differential pressures within the landfill. The landfill gas, comprising approximately 50% methane will be extracted from the landfill and piped to a combination of generator(s) and flare(s). The LFG collection system is designed to maximise gas collection compared to the traditional practice of only vertical vents.

Rainfall and leachate
Chinese landfills typically have a high content of leachate due to the high percentage of organic waste composition and poor tipping practices. Leachate is further increased by rainfall which percolates through the daily cover. By working with the landfill management and implementing controlled tipping practices, the quantity of leachate will be reduced, facilitating the capture of methane and reducing the problem of leachate treatment.

Leachate will be minimised by:

a) minimising rainfall ingression by landscaping the surrounding area
b) changing tipping practices
b) managing incoming waste composition
c) using the gas collection system to help drain leachate

The gas will be extracted and a filtered before combustion. When the gas is sufficient it will be routed to the generators, when insufficient to power the generator, the gas will be flared. It is anticipated that successive generators will be added as the gas yield increases during the project activity due to more waste deposition. Between each new addition, the remaining gas which is not used by the generators will be flared. The combination of the two practices will ensure optimum utilisation and maximum destruction.

Landfill gas utilization (power generation)

After filtration the landfill gas will enter power generating sets. The project activity consists of 4 sets of Internal Combustion Engine & Generator system manufactured by Jinan Diesel Engine Co. Ltd. The total installed capacity is 2 MW. The specification for the generator sets are shown below:

Parameters	**Engines**
Model	G12V190ZLDT-Z
Quantity	4
Style	4 strokes
Rated rotating speed	1000r/minute
parameters	**Generators**

Model	17C6456-6LA42
Quantity	4
Style	automatic, brushless
Rated power	500kW
Rated voltage	400V
Rated frequency	50Hz
Power factor	0.8(lagging)
Rated rotating speed	1000r/minute

The Internal Combustion Engine & Generator system used by this project is applicable for power generation by utilizing landfill gas.

Flaring system

The surplus gas will be destroyed by a flaring system. The combination of power generation and flare will optimize the destruction of landfill gas.

The flare installation used by this project meets all of the necessary conditions that are required by "Tool to determine project emissions from flaring gases containing methane" for continuous monitoring.

SCC has provided technical support to Nanjing Shunfeng-Pioneer to help them design and manufacture enclosed flare according to international technology and standards.

Below is summery of the technical specification of the flare:

Parameters	Flare
Type	Enclosed Flare
Quantity	1
Capacity	1000 Nm^3/h
Manufacturer	Nanjing Shunfeng-Pioneer

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

Fixed crediting period (10yrs) is adopted by the Project. It is expected that the Project will generate emission reductions for about 935,389 tCO_2e over the 10-year crediting period from June 2008 to May, 2018.

Years	Annual estimation of emission reductions in tonnes of CO_2e
2008 (June)	64,258
2009	115,422
2010	120,445
2011	124,596
2012	128,070
2013	117,020
2014	91,672
2015	69,769
2016	52,610
2017	39,198
2018 (May)	12,330
Total estimated reductions (tonnes of CO_2e)	**935,389**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**93,539**

A.4.5. Public funding of the project activity:

>> The project activity will not be funded by any public money.

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:

- Baseline methodology ACM0001 (Version 05) - "Consolidated baseline methodology for landfill gas project activities";
- Monitoring methodology ACM0001 (Version 05) – "Consolidated monitoring methodology for landfill gas project activities";
- AMS.I.D – "Grid-connected electricity generation from renewable sources (version 12)";
- Tool for the demonstration and assessment of additionality (Version 03);
- Tool to determine project emissions from flaring gases containing methane as adopted during EB28.

Detailed information regarding these methodologies and tools please refer to
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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.
The Project fulfils condition a) and c) thus ACM0001 was considered the most appropriate methodology. The installed capacity of the Project is about 2 MW, less than 15 MW therefore the small scale methodology AMS.I.D. will be applied for the calculations of emissions reductions from the grid electricity displacement.

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

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Project boundary
The project boundary includes the landfill gas capture and delivery system, generator sets, flare and relevant facilities that are located inside the project site. The electricity generated by this project will be delivered to the Central China Power Grid via Sichuan Power Grid. Therefore, the project boundary also includes all of the power plants that are connected to the Central China Power Grid. The area covered by Central China Power Grid includes Henan, Hubei, Hunan, Jiangxi, Sichuan and Chongqing.
The project boundary is shown in Figure 4 below.

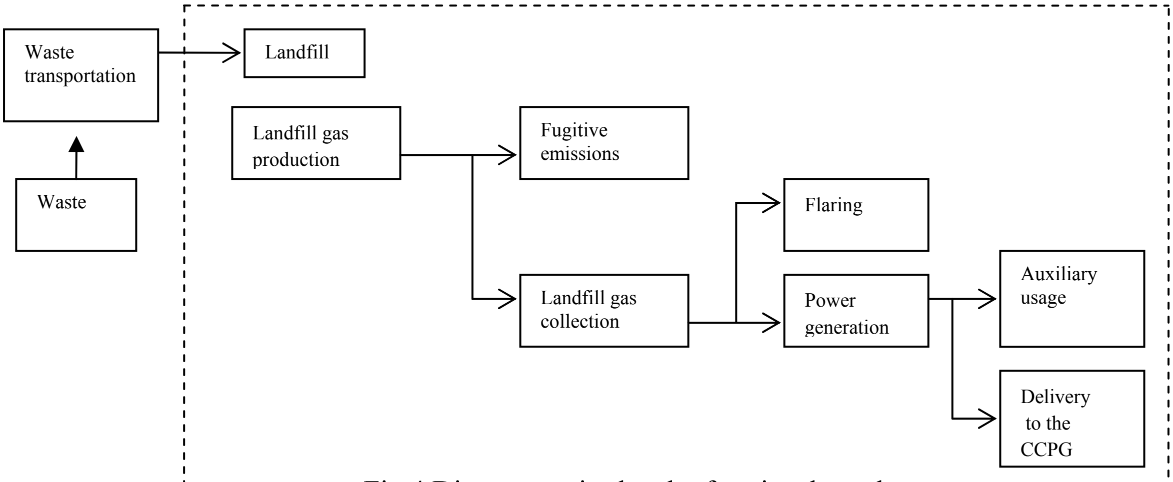

Fig 4 Diagrammatic sketch of project boundary

The following project activities and emission sources are considered within the project boundary:

Table 2

Basaline

Source	**Gas**		**Justification / Explanation**
Emissions of methane as a result of venting	CH_4	Included	• Main emission source.
Emissions from destruction of methane in the baseline	CO_2	Excluded	• There is no methane destruction in the baseline
	CH_4	Excluded	
	N_2O	Excluded	
Grid electricity generation (electricity provided to the grid)	CO_2	Included	• Only CO_2 emissions associated with the power generated by the project activity and the emissions from the gas flaring are included. • Use of combined margin method as described in ACM0002 should be used / small scale methodology
	CH_4	Excluded	• Excluded for simplification. This is conservative.
	N_2O	Excluded	• Excluded for simplification. This is conservative.

Project Activity

Source	**Gas**		**Justification / Explanation**
Emissions of methane as a result of continued venting	CH_4	Excluded	• Methane emissions will arise on occasions when no equipment is operating, however these emissions would have arisen in the baseline and therefore not included.
On-site fuel consumption due to the project activity, including transport of the gas	CO_2	Included	• The project will use energy for pumping. This may be taken from the grid, in which case the emissions will be added to the project emissions, or the power may come directly from the generators on site, in which case electricity exported to the grid will be reduced.
	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 methane destruction	CO_2	Excluded	• As the methane is organic in origin, emissions equal zero.
Fugitive emissions of unburned methane	CH_4	Excluded	• Small amounts of methane are emitted as a result of inefficient combustion. Methane destroyed by the project activity is reduced accordingly. The remaining methane would have been emitted in the baseline.
Fugitive or accidental emissions from on-site equipment	CH_4	Excluded	• This methane would have been emitted in the baseline.

The baseline scenario is identified by reference to the approved feasibility studies (which describe how the landfills are designed and managed) and the existing regulations and guidelines. Current practices and scenarios were also re-confirmed upon visiting the site where we observed no gas extraction or utilisation besides venting. A copy of the feasibility study is available to the DOE in Chinese . The feasibility studies state that if possible, gas will be utilised to generate power, but as no investors are interested in paying for this equipment, there is no generation and in practice, the methane is simply vented to atmosphere through vertical pipes.

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

Step 1: Identification of alternative scenarios.
Sub-step1a.Define alternatives for baseline scenarios:

In the absence of the project activity, the possible baseline alternatives might include:

Alternative 1: The landfill operator would continue the current business as usual practice of not collecting and flaring LFG from waste management operations. The business as usual scenario is direct venting into the atmosphere.

Alternative 2: The landfill operator would invest in the LFG collection system as well as a flaring system.
Alternative 3: The landfill operator would invest in the LFG collection system as well as an energy production system to produce electricity/thermal energy but not develop the project as CDM.

Alternative 4: Existing or construction of a new on site or off site fossil fuel fired cogeneration plant.

Alternative 5: Existing or construction of a new on-site or off-site fossil fuel fired captive power plant.

Sub-step1b. Consistency with mandatory laws and regulations:

The following regulations in the Host country dealing with the management of landfills and landfill gas are applicable to the project activity:
"Pollution Control Criteria on Landfills for Domestic Garbage (GB16889-1997)" [1]and
"Technical Code for Sanitary Landfill of Municipal domestic Refuse(CJJ17-2001)[2]"

Only fire and explosion proof measures are required. No landfill gas collection and utilization is mandated by either of the above regulations.

Therefore Alternative 1 and Alternative 2 comply with all the applicable laws and regulations.

Alternative 3 complies with all laws and regulations but is not required by laws and regulations.

Alternative 4: No on-site or off-site fossil fuel fired cogeneration plant exists in the region. The stipulation by NDRC and the Ministry of Construction in January 17, 2007[3] confirms that no cogeneration plant nor central heating systems will be built in the region. So Alternative 4 does not comply with current laws and regulations and should be eliminated.
Alternative 5: No on-site or off-site fossil fuel fired captive power plant with the similar installed capacity as the project activity exists in the region. It is prohibited to build fossil fuel fired power plant with the

[1] http://kbs.cnki.net/froums/printthread.aspx?pos

[2] http://www.jianshe99.com/html/2006%2F12%2Fzh918654827182216002378O.html

[3] http://www.sdpc.gov.cn/zcfb/zcfbtz/2007tongzhi

installed capacity of 135MW or below in accordance with the regulations issued by the State Council[4]. Therefore the construction of a new fossil fuel fired captive power plant with similar installed capacity (2MW), will not comply with the State Council's regulations and is consequently eliminated.

Step 2. Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable.

The power grids of China are coal dominated. Take the Central China Power Grid as an example, amongst the fossil fuel fired power generations of 2005, 99.47% was coal-fired power, and the oil-fired and gas fired power only accounted 0.17% and 0.36% respectively. As a main energy source in China, the coal reserve in China is rich and abundant, and this situation will last for decades, there is no supply constraint of coal. Therefore coal is identified as the baseline fuel.

Based on the above analysis, the baseline scenario of this project is determined as:

Table 3

Scenario	**Baseline**		**Description**
	Landfill gas treatment	**Power generation**	
1	Alternative 1		The atmospheric release of landfill gas is the common practice. Electric power is obtained from the Central China Power Grid which is coal dominated.

The baseline scenario was identified by reference to

- Current practices and scenarios at other landfills across the Province
- Re-confirmation upon visiting the site where we observed no gas extraction or utilisation besides venting
- Current practices at the landfills as approved by Feasibility Study Reports (which describe how the landfill are designed and managed)
- Existing regulations and guidelines.

The feasibility study states that if possible, gas will be utilised to generate power. Without financial assistance from CDM LFG utilisation, we can see from the investment analysis in Step 2 of Section B.5, the Project is not financially feasible. Incentive for implementation might be from power generation revenues however, the risk attached to implementing the project has proven too high for landfill operators to consider it a realistic option. These risks include|:

- Risk of implementing and maintaining the LFG extraction system in the landfill
- Risk of flood and leachate blockage of the LFG system
- Risk of managing power generation equipment without the appropriate knowledge

[4] "Decision on strictly forbidding the illegal construction of fuel-fired power plant with the capacity 135MW and below", General Office of the State Council, April 15th 2002. http://www.gov.cn/gongbao/content/2002/content_61480.htm

- Risk of grid connection failure (grid connection may take from 4 months up to over 2 years). The financial risk of buying a generator and not have a grid connection would be too high for the landfill management.

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):

The additionality of the Project is demonstrated and assessed by using the “Tool for the demonstration and assessment of additionality” ver. 03 approved by CDM EB.

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

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

Alternative 1: The landfill operator would continue the current business as usual practice of not collecting and flaring LFG from waste management operations. The business as usual scenario is direct venting into the atmosphere.

Alternative 2: The landfill operator would invest in the LFG collection system as well as a flaring system.
Alternative 3: The landfill operator would invest in the LFG collection system as well as an energy production system to produce electricity/thermal energy but not develop the project as CDM.

Alternative 4: Existing or construction of a new on site or off site fossil fuel fired cogeneration plant.

Alternative 5: Existing or construction of a new on site or off site fossil fuel fired captive power plant.

Sub-step 1b. Enforcement of applicable laws and regulations:
A new code *National Standard for Pollution Control of Landfill Sites for Domestic Waste* (GBI6889-1997) entered into force in 1998. In addition, the *Technical Code for Sanitary Landfill of Municipal Practice Refuse* (CJJ17-2001 J122-2001) was introduced in 2001 stating that landfills are required to collect and if possible utilize landfill gas. However, the code is not enforced and most Chinese landfills show that regardless if they are covered by the code or not they do not flare or utilize landfill gas.

Despite efforts of the government to encourage usage of landfill gas the numerous barriers were addressed when the national EPA, UNDP, GEF and UNDESA jointly published the “National Action Plan for Recovery and Utilization of landfill Gas (12/2004)’
“At present, in China the municipal refuse is displaced using the technology of traditional landfill, without consideration of recovery and utilization of landfill gas.”

It was later added that “*there is no mechanism and policy to guide the whole country to have landfill gas recovery and utilization systems. Therefore it is still a blank paper for landfill management to establish landfill gas recovery and utilization systems*”.

Proof that passive venting is tolerated exists in the older half of the landfill, where there is no landfill gas capture and treatment in place.

All the above alternatives are consistent with existing regulation and would face no legal restrictions for implementation. However, conclusion is that implementation of any of alternatives 2-5 is highly unlikely.

In conclusion, according to analysis made in B.4, Alternative 4 and 5 do not comply with laws and regulations whereas Alternative 1 is current practice and Alternative 3 is the proposed project activity.

Step 2. Investment Analysis

The additionality of the project is going to be established by conducting step 2 (investment analysis). The purpose is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without the revenues from the sale of certified emission reductions (CERs). To conduct the investment analysis, the following sub-steps are followed:

Sub-step 2a. Determination of the appropriate analysis method

The "Tools for the demonstration and assessment of additionality (version 03)" recommends three analysis methods, including simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

The proposed project activity generates both CDM related income and electricity related income, then option I- the simple cost analysis can not be used. The investment comparison analysis method (Option II) is only applicable to projects where alternatives should be similar investment projects. The alternative baseline scenario of the project activity is the continuation of current status of Mianyang Landfill rather than a new investment project. Further, 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 is simply not to install flaring and generation equipment at the site, as business as usual scenario. Therefore it does not involve investment of comparable scale to the project. Therefore Option II cannot be used either and as a result, 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. Here, the benchmark analysis is selected to be conducted as follows.

Sub-step 2b. Benchmark analysis (Option III)

The indicator to be used for financial analysis of the project activity is selected to be the Project Internal Rate of Return (IRR) in accordance with the "Tool for the demonstration and assessment of additionality (version 03)".

Currently, the return rate of 10 year bonds is 4% and 15 years is 4.1%, which is the expected return rate of a project without risk. Considering the risk factors of real project, the expected return rate could be much higher than that.

The benchmark value of the project IRR for the thermal power sector with stable power production (total investment, before income tax) is chosen to be 8% also in accordance with "Economic Evaluation Method and Parameters for Construction Projects (Version 03)[5]"also in accordance with "Provisional Measures on Economical Assessment for Technical Upgrading Project of Power Engineering".

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

The basic data used for the IRR calculation are listed in Table 1.

5 "Economic Evaluation Method and Parameters for Construction Projects/Version 03", China Plan Press, 2006.

Table 4 Basic data used for the IRR calculation

Parameters	Value
Installed capacity	2MW
Annual electricity supply	10,8368MWh.Max (8,661 MWh avg over 10 years)
Static total investment	13million RMB Yuan
Annual operating cost	276.4million RMB Yuan
Electricity tariff	0.597 RMB Yuan/kWh(with tax)
Project lifetime	10 years
Value added tax rate	17%
Enterprise income tax rate	25%
Associate charges of sale tax	10%
Crediting period	10 years
Expected CERs price	10USD/tCO_2e
Exchange rate	USD: RMB=1:7.2

Table 5 shows the calculated project IRR with and without CDM revenues. It could be noted that the project IRR without CDM revenues is -1.8%, which is lower than the benchmark value (8%). It means that the project is not attractive from a financial point of view. Considering CDM revenues, the project IRR amounts to 84% that is much higher than the benchmark value. Therefore the CDM revenues could enable the project to overcome the investment barrier and make it become feasible.

Table 5. Comparison of the project IRR with and without CDM revenues

	IRR (total investment, after income tax)
Without CDM revenues	-1.8%
With CDM revenues	84%
Benchmark value	8%

Sub-step 2d: Sensitivity analysis

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. For such purpose, the following parameters were selected as sensitive factors to check out their effects on project IRR.

1. Static total investment
2. Annual operating cost
3. Annual power supply or power tariff

The project IRR will fluctuate with the variations (-10% to 10%) of the above three factors. The result is demonstrated in Table 4 and Figure 5.

Table 6 Sensitivity analysis

	-10%	-5%	0	5%	10%
Annual power supply or power tariff	-8.00%	-4.70%	-1.80%	1.00%	3.70%
Annual operating cost	2.00%	0.20%	-1.80%	-3.90%	-6.30%
Static total investment	1.10%	-0.40%	-1.80%	-3.00%	-4.20%
Benchmark IRR	8%	8%	8%	8%	8%

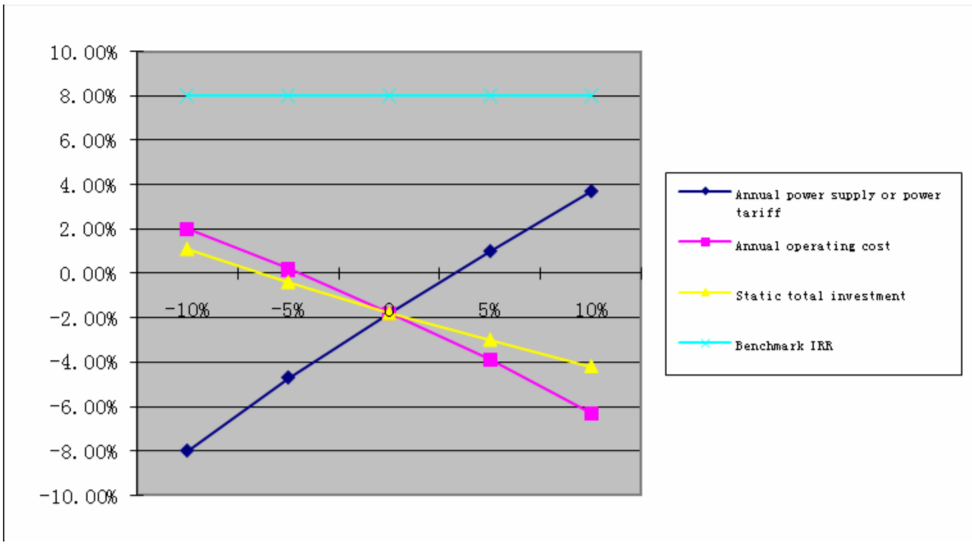

Figure 5 Sensitivity Analysis

It could be seen from Table 6 and Figure 5 that whatever the three key parameters changes, the project IRR will be always lower than the benchmark value of IRR. The sensitivity analysis shows that it will not be possible to get the project IRR above the benchmark value without the CDM revenues. It is always true that the project activity is not financially attractive without the CDM revenues.

Step 4: Common practice analysis

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

According to consolidated construction financial statistics by the end of 2003, there were 457 landfills across the 660 major cites in China.[6] Apart from simple control systems installed for safety reasons to prevent explosions, the overwhelming majority of landfills vent their LFG directly into the atmosphere.[7] The 'National Action Plan for Recovery and Utilisation of Landfill Gas' (12/2001)

[6] http://www.shjec.cn/new/article.asp?articleid=17#top

[7] National Action Plan on Landfill Gas Collection and Utilisation in China

admits that landfill gas utilisation is not widespread practice in the Host Country. Before the CDM project activity, the landfill operator was not utilising any LFG. This project is the first LFG recovery and utilization project in Sichuan province. There are no existing or potential similar projects in Sichuan.

Sub-step 4b. Discuss any similar options that are occurring:
According to statistical data, there is no LFG recovery and utilization project without the financial aid of CDM in Sichuan province. Therefore, this project is not considered to represent common practice in the region. Moreover, this project has been identified as the first in China to use a horizontal piping system.

It can be concluded that the project activity is not financially attractive and is therefore infeasible without the CDM revenues. It is not common practice in Sichuan Province. The project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Emission reductions are calculated using ACM 0001 version 05, as follows:

$$ER_y = (MD_{project,y} – MD_{reg,y}) * GWP_{CH4} + EL_y*CEF_{electricity,y} – ET_y*CEF_{thermal,y} \quad (1)$$

ER_y = Emission reduction (tCO2e)
$MD_{project,y}$ = Amount of methane that would have been destroyed/combusted during the year (tCH4),
$MD_{reg,y}$ = Amount of methane that would have been destroyed/combusted during the year in the absence of the project (tCH4) (no requirement in China)
GWP_{CH4} = Global Warming Potential value for methane for the first commitment period is 21 tCO2e/ tCH4
EL_y = Net quantity of electricity exported during year y (MWh),
$CEF_{electricity,y}$ = CO2 emissions intensity of the electricity displaced (tCO2e/ MWh),
ET_y = Incremental quantity of fossil fuel, defined as difference of fossil used in the baseline and fossil use during project, for energy requirement on site under project activity during year y (TJ), (there is no thermal energy use on site due to the project)
$CEF_{thermal,y}$ = CO2 emissions intensity of the fuel used to generate thermal/mechanical energy (tCO2e/ TJ)

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y} \quad (2)$$

$MD_{flared,y}$ = amount of methane destruction in flares during the year y；
$MD_{electricity,y}$ = amount of methane destruction in power plant during the year y；
$MD_{thermal,y}$ = amount of methane destruction in heating during the year y; (zero in this project activity)

$$EL_y = EL_{EX,LFG} - EL_{IMP} \quad (3)$$

$EL_{EX,LFG}$ = total amount of electricity exported out of the project boundary (MWh),
EL_{IMP} = total amount of electricity imported to meet project requirement (MWh),

$$MD_{electricity,y} = LFG_{electricity,y} * w_{CH4,y} * D_{CH4} \quad (4)$$

$LFG_{electricity,y}$ = quantity of LFG destroyed by the generators in m3

$w_{CH4,y}$ = average concentration of methane in LFG (m3CH4/m3LFG)
D_{CH4} = density of methane (tCH4/m3)
Combustions efficiency for generators has a default value of 0.995. Including it in this equation takes account of the fact that $LFG_{electricity,y}$ is measured at the inlet to the generator.

$$MD_{flared,y} = (LFG_{flared,y} * w_{CH4,y} * D_{CH4}) - (PE_{flare\ y} / GWP_{CH\ 4}) \quad (5)$$

$LFG_{flared,y}$ = quantity of landfill gas fed to the flare during the year measured in cubic meters (m^3),
$w_{CH4,y}$ is the average methane fraction of the landfill gas as measured during the year and expressed as a fraction (m3CH4/m3LFG);
D CH4 methane density, (tCH4/m3CH4)
PEflare,y are the project emissions from flaring of the residual gas stream in year y (tCO2e)

In the above formula, *LFGflared,y* and *wCH4,y* will be confirmed ex-post during project implementation.

The value of *DCH4* is under standard temperature and air pressure(1.013bar and 0c) is 0.000716 tCH4/m3CH4.

To determine project emissions from flaring gases containing methane
For the enclosed flares, the following option will be used to determine the flare efficiency:
(a) To use a 90% default value. Continuous monitoring of compliance with manufacturer's specification of flare (temperature, flow rate of residual gas at the inlet of the flare) must be performed. If in a specific hour any of the parameters are out of the limit of manufacturer's specifications, a 50% default value for the flare efficiency should be used for the calculations for this specific hour.

Applicable steps include:
STEP 1: Determination of the mass flow rate of the residual gas that is flared
STEP 2: Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas
STEP 5: Determination of methane mass flow rate of the residual gas on a dry basis
STEP 6: Determination of the hourly flare efficiency
STEP 7: Calculation of annual project emissions from flaring based on measured hourly values or based on default flare efficiencies.

STEP 1. Determination of the mass flow rate of the residual gas that is flared
This step calculates the residual gas mass flow rate in each hour *h*, based on the volumetric flow rate and the density of the residual gas. The density of the residual gas is determined based on the volumetric fraction of all components in the gas.

$$FM_{RG,h} = \rho_{RG,n,h} \times FV_{RG,h} \quad (1)$$

Where:

Variable	SI Unit	Description
$FM_{RG,h}$	kg/h	Mass flow rate of the residual gas in hour *h*
$\rho_{RG,n,h}$	kg/m^3	Density of the residual gas at normal conditions in hour *h*
$FV_{RG,h}$	m^3/h	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour *h*

and:

and:

$$\rho_{RG,n,h} = \frac{P_n}{\frac{R_u}{MM_{RG,h}} \times T_n} \quad (2)$$

Where:

Variable	SI Unit	Description
$\rho_{RG,n,h}$	kg/m^3	Density of the residual gas at normal conditions in hour *h*
P_n	Pa	Atmospheric pressure at normal conditions (101 325)
R_u	$Pa.m^3/kmol.K$	Universal ideal gas constant (8 314)
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour *h*
T_n	K	Temperature at normal conditions (273.15)

and:

$$MM_{RG,h} = \sum_i (fv_{i,h} * MM_i) \quad (3)$$

Where:

Variable	SI Unit	Description
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour *h*
$fv_{i,h}$	-	Volumetric fraction of component *i* in the residual gas in the hour *h*
MM_i	kg/kmol	Molecular mass of residual gas component *i*
I		The components CH_4, CO, CO_2, O_2,H_2, N_2

STEP 2. Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas

Determine the mass fractions of carbon, hydrogen, oxygen and nitrogen in the residual gas, calculated from the volumetric fraction of each component *i* in the residual gas, as follows:

$$fm_{j,h} = \frac{\sum_i fv_{i,h} \cdot AM_j \cdot NA_{j,i}}{MM_{RG,h}} \quad \textbf{(4)}$$

Where:

Variable	SI Unit	Description
$fm_{j,h}$	-	Mass fraction of element *j* in the residual gas in hour *h*
$fv_{i,h}$	-	Volumetric fraction of component *i* in the residual gas in the hour *h*
AM_j	kg/kmol	Atomic mass of element *j*
$NA_{j,i}$	-	Number of atoms of element *j* in component *i*
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour *h*
j		The elements carbon, hydrogen, oxygen and nitrogen
i		The components CH_4, CO, CO_2, O_2,H_2, N_2

STEP 5. Determination of methane mass flow rate in the residual gas on a dry basis

The quantity of methane in the residual gas flowing into the flare is the product of the volumetric flow rate of the residual gas (*FVRG,h*), the volumetric fraction of methane in the residual gas (*fvCH4,RG,h*) and the density of methane (ρ*CH4,n,h*) in the same reference conditions (normal conditions and dry or wet basis). It is necessary to refer both measurements (flow rate of the residual gas and volumetric fraction of methane in the residual gas) to the same reference condition that may be dry or wet basis. If the residual gas moisture is significant (temperature greater than 60ºC), the measured flow rate of the residual gas that is usually referred to wet basis should be corrected to dry basis due to the fact that the measurement of methane is usually undertaken on a dry basis (i.e. water is removed before sample analysis).

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n} \quad \textbf{(13)}$$

Where:

Variable	SI Unit	Description
$TM_{RG,h}$	kg/h	Mass flow rate of methane in the residual gas in the hour *h*
$FV_{RG,h}$	m^3/h	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour *h*
$fv_{CH4,RG,h}$	-	Volumetric fraction of methane in the residual gas on dry basis in hour *h* (NB: this corresponds to $fv_{i,RG,h}$ where *i* refers to methane).
$\rho_{CH4,n}$	kg/m^3	Density of methane at normal conditions (0.716)

STEP 6. Determination of the hourly flare efficiency

In case of **enclosed flares and use of the default value** for the flare efficiency, the flare efficiency in the hour *h* (h*flare,h*) is:

• 0% if the temperature in the exhaust gas of the flare (Tflare) is below 500 °C for more than 20 minutes during the hour *h* .

• 50%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour *h,* but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h*.

• 90%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour *h* and the manufacturer's specifications on proper operation of the flare are met continuously during the hour *h*.

STEP 7. Calculation of annual project emissions from flaring

Project emissions from flaring are calculated as the sum of emissions from each hour *h*, based on the methane flow rate in the residual gas (*TMRG,h*) and the flare efficiency during each hour *h* (h*flare,h*), as follows:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times \left(1 - \eta_{flare,h}\right) \times \frac{GWP_{CH4}}{1000} \qquad \textbf{(15)}$$

Where:

Variable	SI Unit	Description
$PE_{flare,y}$	tCO_2e	Project emissions from flaring of the residual gas stream in year *y*
$TM_{RG,h}$	kg/h	Mass flow rate of methane in the residual gas in the hour *h*
$\eta_{flare,h}$	-	Flare efficiency in hour *h*
GWP_{CH4}	tCO_2e/tCH_4	Global Warming Potential of methane valid for the commitment period

Central China Power Grid Emission Factor Calculation

The installed capacity for this project is 2MW. The electricity generated by this project will replace the same quantity of electricity supplied by the Central China Power Grid. According to methodology ACM0001, methodology AMS.I.D should be used for the calculation of emission factor of the grid electricity displaced. The results announced by the Chinese DNA[8] are used for the project activity.

Step1. Calculate the Operating Margin emission factor ($EF_{OM,y}$)

a) Simple OM
b) Simple adjusted OM, or
c) Dispatch Data Analysis OM, or
d) Average OM.

For The Project, the simple Operating Margin emission factor was chosen based on the following reason: The simple OM method can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years. Electricity generated by low-cost/must-run power plant against the total electricity of Central China Power Grid is 24.68% in 2001, 31% in 2002, 30.88% in 2003, 37.89% in 2004 and 44.49% for 2005.[9] Each of them is below 50%, which meets the application requirement of method a).

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_{j} GEN_{j,y}} \qquad (6)$$

Where:

$F_{i,j,y}$:	The amount of fuel i consumed (in a mass or volume unit) by relevant provincial sub-grid j in year y;
$COEF_{i,j,y}$:	The CO_2 emission coefficient of fuel *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by provincial sub-grid *j* and the percent oxidation of the fuel in year *y*;
$GEN_{j,y}$:	The electricity (MWh) delivered to the Central China Power Grid by provincial sub-grid *j*.

The CO_2 emission coefficient of fuel *i* ($COEF_i$) is obtained as

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad (7)$$

Where:

NCV_i:	The net calorific value of fuel i per unit mass or unit volume (energy content), national specific value (TJ/tce or m^3);
$OXID_i$:	The oxidation factor of fuel *i,* IPCC default value;
$EF_{CO2,i}$:	The CO_2 emission factor per unit of energy of fuel i (tCO_2/TJ),

[8] "Notice on determination of China Power Grid Baseline Emission Factor", http://cdm.ccchina.gov.cn

[9] 2002 China Power Year Book page 381, 2003 China Power Year Book page 355, 2004 China Power Year Book page 465, 2005 China Power Year Book page 485, 2006 China Power Year Book page 571.

According to the methodology, the $EF_{OM,y}$ is ex-ante calculated as electricity-to-the-grid weighted average in the Central China Power Grid during the most recent 3 years (2003-2005), and will be fixed in the first crediting period

Step2: Calculate the Build Margin emission factor ($EF_{BM,y}$)

The BM is calculated as the generation-weighted average emission factor of a sample of power plants *m*, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \qquad (8)$$

Where:

$F_{i,m,y}$: The amount of fuel *i* (in a mass or volume unit) consumed by plant *m* in year *y*(tce or m^3);

$COEF_{i,m}$: The CO_2 emission coefficient of fuel *i* (tCO_2e/tce), taking into account the carbon content and the percent oxidation of the fuel i used by plant *m* in year *y*;

$GEN_{m,y}$: The electricity (MWh) delivered to the grid by plant *m in year y*.

The methodology presents two options for BM calculation:
Option 1, Calculate the $EF_{BM,y}$ ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission;

Option 2, for the first crediting period, the $EF_{BM,y}$ must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting period, $EF_{BM,y}$ should be calculated ex-ante, as described in option 1 above. The $EF_{BM,y}$ published this time is calculated based on option 1. Ex-post monitoring and updating is not necessary.

Because of the data availability, the $EF_{BM,y}$ calculation in this PDD adopts the deviation agreed by the CDM EB. Calculate first the additional installed capacity and determine its composition on power generation technology being used, then calculate the weights of each power generation technology in the additional installed capacity, and finally the $EF_{BM,y}$ by using the commercialized optimal efficiency level of each power generation technology.
Because the capacity of the coal-fired, oil-fired and gas-fired technology can not be separated from the existing statistical data, the following method is adopted: Firstly, use the available data in the energy balance sheets on the most recent year to calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels in the total CO_2 emissions. Secondly, use the proportions as the weights, based on the emission factors at the commercialized optimal efficiency level of each power generation technology, calculate the emission factor of the thermal power in the grid. Finally, this thermal emission factor is multiplied by the proportion of thermal power in the additional 20% installed capacity. The result is BM emission factor.

Concrete steps and the formula are as follows:

Sub-step2a: Calculation of the proportion of CO_2 emissions from solid, liquid and gaseous fuels in the total emissions.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (9)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (10)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (11)$$

Where:

$F_{i,j,y}$: The amount of fuel *i* consumed (in a mass or volume unit) by relevant provincial sub-grid j in year y (tce or m^3);

$COEF_{i,j,}$: The CO_2 emission coefficient of fuel *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by provincial sub-grid *j* and the percent oxidation of the fuel(tCO_2/tce) ;

Coal, Oil and Gas refer to solid fuels, liquid fuels and gas fuels.

Sub-step 2b: Cacluation the emission factor of thermal power

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (12)$$

$EF_{Coal,Adv}$,$EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ represent the emission factors of the commercialized optimal efficient coal-fired, oil-fired and gas-fired technologies(as per Annex 3).

Sub-step2c: Calculation of BM in the grid.

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (13)$$

Where:

CAP_{Total}: The total additional installed capacity;

$CAP_{Thermal}$: The total additional installed capacity for thermal power.

Step3: ***Calculation of the baseline emission factor for Central China Power Grid ($CEF_{elec,BL,y}$)***

According to the baseline methodology (ACM0002), the baseline emission factor (***$CEF_{elec,BL,y}$***) is calculated as the weighted average of the Operating Margin emission factor (***$EF_{BM,\ y}$***) and the Build Margin emission factor (***$EF_{OM,y}$***):

$$\boldsymbol{CEF_{elec,BL,y}} = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \quad (14)$$

Where

Weights w_{OM} and w_{BM} are both 0.5 by default.

The value is listed below:

$\boldsymbol{EF_{OM,y}}$	1.2899tCO2/MWh
$\boldsymbol{EF_{BM,\,y}}$	0.6592tCO2/MWh
$\boldsymbol{CEF_{elec,BL,y}}$= ($\boldsymbol{EF_{OM,y}}$+ $\boldsymbol{EF_{BM,\,y}}$)/2	0.97455 tCO2/MWh

Leakage

No leakage is considered in accordance with ACM0001.

Gas generation is calculated using the USAEPA LandGem Model

Methane captured is estimated using the USEPA's LandGEM model, which is driven by the following first order rate decomposition equation:

$$Q_{CH4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_0 \left(\frac{M_i}{10} \right) e^{-kt_{i,j}} \tag{9}$$

Where:

Lo = potential methane generation capacity (m^3/tonne of waste) = 80;

k = methane generation rate = 0.25;

Mi = mass of waste deposited in year i, about 500 t/day; and

Gas collection efficiency = 70% (value is higher than the normal 50% but a number of trials in the USA and Canada have shown that horizontal piping has higher extraction efficiency).

Note: Lo and K values have been chosen based on several test trials conducted on behalf of SCC

K value was reconfirmed by the 'First-Order Kinetic Gas Generation Model.

Parameters for Wet Landfills' 2005 Report produced by the USAEPA. The report states "*Therefore, a conservative set of LandGEM parameters, based on the upper 95 percent CI, for wet landfills would be a k of 0.3 year-1, a Lo of 100 m^3/Mg*".

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

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of methane
Source of data used:	IPCC
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value
Any comment:	No comment

Data / Parameter:	D_{CH4}
Data unit:	$tCH_4/m^3\ CH_4$
Description:	Density of methane
Source of data used:	ACM0001
Value applied:	0.0007168
Justification of the choice of data or description of measurement methods and procedures actually applied :	As defined in ACM0001. At standard temperature and pressure (0 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH4/m3CH4. Volume will be corrected for actual temperature and pressure according to the formula V1P1/T1 = V2P2/T2
Any comment:	No comment

Data / Parameter:	$\boldsymbol{EF_{OM,}}$
Data unit:	tCO2/ MWh
Description:	Operation Margin Emission Factor of Central China Power Grid
Source of data used:	China Power Grid Baseline Emission Factor
Value applied:	1.2899
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to ACM0002 (ver 5) by EB guidance
Any comment:	No comment

Data / Parameter:	$EF_{BM,}$
Data unit:	tCO2/ MWh
Description:	Built Margin Emission Factor of Central China Power Grid
Source of data used:	China Power Grid Baseline Emission Factor
Value applied:	0.6592
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to ACM0002 (ver 5) by EB guidance
Any comment:	No comment

Data / Parameter:	$CEF_{ELEC,}$
Data unit:	tCO2/ MWh
Description:	Built Margin Emission Factor of Central China Power Grid
Source of data used:	China Power Grid Baseline Emission Factor
Value applied:	0.97455
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to ACM0002 (ver 5) by EB guidance
Any comment:	No comment

B.6.3 Ex-ante calculation of emission reductions:

The methodology ACM0001 requires that 'Project proponents should provide an ex ante estimate of emission reductions, by projecting the future GHG emissions of the landfill. In doing so, verifiable methods should be used'. In the case of this project, a proprietary model based on the USEPA's LandGEM model, driven by the following first order rate decomposition equation is used to determine estimated emission reductions *ex ante*. This *ex ante* estimate is for illustrative purposes, as actual emission reductions will be monitored *ex-post*, according to the methodology.

1. Estimation of Total Collectable Methane (*MDtotal,y*)

Methane generation is estimated using the USEPA's LandGEM model, which is:

$$Q_{CH4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_0 \left(\frac{M_i}{10} \right) e^{-kt_{i,j}} \qquad (18)$$

Where

Q_{CH4} : Annual methane generation in the year of the calculation($Nm^3 CH_4/y$);

Lo: Potential methane generation capacity ($Nm^3 CH_4$/tonne of waste, taking as 80);

k: Methane generation rate($year^{-1}$, taking as 0.25);

Mi: mass of waste deposited in year i(t/day, taking as 500t/d);
The annual increasing pace of waste will be 1%;

$t_{i,j}$: Age of the j^{th} section of waste mass M_i accepted in the i^{th} year；

n: Year of the calculation(from the initial year of waste acceptance)

The amount of methane captured can be estimated by using following formula:

$$MD_{total,y} = CE * Q_{CH4,y} \quad (19)$$

Where

$MD_{total,y}$: The amount of methane captured in year y (Nm^3CH_4);

CE : The efficiency for landfill gas capture (%, taking as 70 %);

$Q_{CH4,y}$: The methane generation in year y (Nm^3CH_4).

The estimated amounts of methane that can be captured in the crediting period are listed in Table 7.

Table 7 Estimated of methane collection in the crediting period

Year	Estimated annual methane collection (Nm^3CH_4)
2008 (7 months)	4,175,808
2009	7,533,462
2010	7,930,105
2011	8,257,908
2012	8,532,235
2013	7,659,643
2014	5,871,797
2015	4,476,526
2016	3,386,907
2017	2,535,235
2018 (5 months)	829,041

2. Estimation of the quantity of methane destroyed by Power generation ($MD_{electricity,y}$)

The methane destroyed by power generation is estimated by the rated methane consumption of the gas engine which is $4m^3$/minute. When the gas input is over 80% of the rated methane consumption, another gas engine will be triggered. The density of methane under normal conditions (20°C, 1.013bar) is 0.00067

Table 8 the quantity of methane destroyed in the course of power generation

Year	Installed Capacity (MW)	Methane generation (m^3/min)	Methane consumption capacity of generator set (m^3/min)	Methane actually consumed by the generator set (m^3/min)	$MD_{electricity,y}$ (m^3CH_4/y)	$MD_{electricity,y}$ (tCH_4/y)
2008 (7 months)	2	13.37	12.8	12.80	3,924,480	2,629
2009	2	13.87	12.8	12.80	6,727,680	4,508
2010	2	14.79	12.8	12.80	6,727,680	4,508
2011	2	15.38	12.8	12.80	6,727,680	4,508
2012	2	16.56	12.8	12.80	6,727,680	4,508
2013	2	15.90	12.8	12.80	6,727,680	4,508

Year	Installed Capacity (MW)	Methane generation (m^3/min)	Methane consumption capacity of generator set (m^3/min)	Methane actually consumed by the generator set (m^3/min)	$MD_{electricity,y}$ (m^3CH_4/y)	$MD_{electricity,y}$ (tCH_4/y)
2014	2	13.24	12.8	12.80	5,849,414	3,919
2015	2	9.10	12.8	9.10	4,476,526	2,999
2016	2	7.13	12.8	7.13	3,386,907	2,269
2017	2	5.73	12.8	5.73	2,535,235	1,699
2018 (5 months)	2	3.92	12.8	3.92	829,041	555

3. Estimation of the quantity of methane destruction by the flare (*MDflared,y*)
The quantity of methane destroyed by flaring is calculated using the following equation:

$MDflard,y, =(MD_{total,y}-MD_{electricity,y})* \eta$

Where:

$MD_{flared,y}$: The quantity of methane destroyed by the flare(tCH_4) ;
$MD_{Total,y}$: Total quantity of captured methane (tCH_4);
$MD_{electricity,y}$: The quantity of methane destroyed by power generation (tCH_4);
η : Flare efficiency (%, taking as the default of 90%).

Table 9 The quantity of methane destroyed by the flare

Year	($MD_{total,y} - MD_{electricity,y}$) ($m^3CH_4$/year)	$MD_{flared,y}$ (tCH_4/year)
2008	251,327	152
2009	805,782	486
2010	1,202,425	725
2011	1,530,228	923
2012	1,804,555	1,088
2013	931,963	562
2014	22,383	13
2015	0	0
2016	0	0
2017	0	0
2018	0	0

4. Estimation of the power generation of the project activity
$EL_{LFG,y} = MD_{electricity,y} * HV_{CH4} * EE/3600$ （21）

Where
$EL_{LFG,y}$: The quantity of power generation of the project in year y (MWh);
$MD_{electricity,y}$: The quantity of methane destroyed in the course of power generation in year y (tCH_4);

HV_{CH4} : The caloric value of methane (35.9MJ/m3CH_4);
EE : Gas engine efficiency (taking as 30%).

Table 10 The quantity of power generated by the project.

Year	The quantity of methane destroyed by power generation (tCH_4/year)	The quantity of power generation (MWh/year)
2008 (7 months)	2,629	6,755
2009	4,508	11,580
2010	4,508	11,580
2011	4,508	11,580
2012	4,508	11,580
2013	4,508	11,580
2014	3,919	10,068
2015	2,999	7,705
2016	2,269	5,830
2017	1,699	4,364
2018 (5 months)	555	1,427

5. Estimation of the methane destroyed in the baseline (*MDreg,y*)

There is no destruction of LFG in the baseline, thus $MD_{reg,y} = 0$.

6. Estimation of the total emission reductions of the project activity

$$ER_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} + EL_y*CEF_{electricity,y} - ET_y*CEF_{thermal,y}$$

Table 11 estimation of project total emission reduction

Year	The quantity of methane destroyed by power generation (tCH_4/year)	The quantity of methane destroyed by flare (tCH_4/year)	Total quantity of methane destroyed (tCH_4/year)	The quantity of power generation (MWh/year)	Annual emission reductions (tCO_2e/year)
2008 (7 months)	2,629	152	2,781	6,755	64,258
2009	4,508	486	4,993	11,580	115,422
2010	4,508	725	5,233	11,580	120,445
2011	4,508	923	5,430	11,580	124,596
2012	4,508	1,088	5,596	11,580	128,070
2013	4,508	562	5,070	11,580	117,020

Year	The quantity of methane destroyed by power generation (tCH_4/year)	The quantity of methane destroyed by flare (tCH_4/year)	Total quantity of methane destroyed (tCH_4/year)	The quantity of power generation （MWh/year）	Annual emission reductions （tCO_2e/year）
2014	3,919	13	3,933	10,068	91,672
2015	2,999	0	2,999	7,705	69,769
2016	2,269	0	2,269	5,830	52,610
2017	1,699	0	1,699	4,364	39,198
2018 (5 months)	555	0	555	1,427	12,330

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

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Fixed crediting period (10yrs×1) is adopted by the Project. It is expected that the Project activities will generate emission reductions for about 935,389 tCO_2e over the 10-year crediting period.

Year	**Estimation of project emissions (tCO_2e)**	**Estimation of baseline emissions (tCO_2e)**	**Estimation of leakage emissions (tCO_2e)**	**Estimation of emission reductions (tCO_2e)**
2008 (7 months)	0	64,258	0	64,258
2009	0	115,422	0	115,422
2010	0	120,445	0	120,445
2011	0	124,596	0	124,596
2012	0	128,070	0	128,070
2013	0	117,020	0	117,020
2014	0	91,672	0	91,672
2015	0	69,769	0	69,769
2016	0	52,610	0	52,610
2017	0	39,198	0	39,198
2018 (5 months)	0	12,330	0	12,330
Total (tCO2e)	0	**935,389**	0	**935,389**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$LFG_{total,y}$
Data unit:	m^3
Description:	Total quantity of landfill gas captured in year y
Source of data to be used:	Flow meter readings
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As per Table 7
Description of measurement methods and procedures to be applied:	Measured by a flow meter continuously. Data to be aggregated monthly and yearly.
QA/QC procedures to be applied:	The meters will be subject to maintenance and calibration according to manufacturer's recommendations. On site staff will receive training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations will be carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records will be retained. Data will be recorded in hard copy format and transferred to an electronic file. Checks of the data entry process will be conducted by someone other than the person entering the data.
Any comment:	The sum of the LFG quantities fed to the flare and the power plant would be compared hourly with the LFGtotal. The lowest value would be used for calculation of MDProject,y

Data / Parameter:	$LFG_{electricity,y}$
Data unit:	m^3
Description:	Total amount of landfill gas combusted in power plant in year y
Source of data to be used:	Flow meter on the inlet to each generator
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As per Table8
Description of measurement methods and procedures to be applied:	Measured by a flow meter continuously. Data to be aggregated Monthly and yearly.
QA/QC procedures to be applied:	Data will be backed up and archived, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. Flow meters will be calibrated according to the manufacturer's specifications. Total flow to the generators will be checked by mass balance calculation with total LFG flow and flare consumption.
Any comment:	-

Data / Parameter:	*$LFG_{flared,y}$*
Data unit:	m^3
Description:	The quantity of landfill gas fed into the flare(s)
Source of data to be used:	Flow meter on the inlet to each flare
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As per Table 9
Description of measurement methods and procedures to be applied:	The flares will be fitted with individual flow meters which will measure volume flow by the use of orifice plates or turbine meters or similar. Measured by a flow meter continuously. Data to be aggregated Monthly and yearly.
QA/QC procedures to be applied:	Data will be backed up and archived, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. Flow meters will be calibrated according to the manufacturer's specifications. Total flow to the flares will be checked by mass balance calculation with total LFG flow and generator consumption.
Any comment:	-

Data / Parameter:	$\omega_{CH4,y}$
Data unit:	m^3CH4/m^3LFG
Description:	Average value of the concentration of methane in landfill gas.
Source of data to be used:	Measured by gas quality analyser
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50%
Description of measurement methods and procedures to be applied:	Methane concentration will be measured continuously by proprietary infra red instrumentation mounted in the gas pipe work between the gas treatment package and the generator sets/flares.
QA/QC procedures to be applied:	Data will be backed up and archived where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. Methanometers will be calibrated according to the manufacturer's specifications.
Any comment:	N/A

Data / Parameter:	*FVRG,h*
Data unit:	m3/h

Description:	volumetric flow rate of the residual gas at normal conditions in the hour h
Source of data to be used:	Measured by project participants using a V-cone flow meter with +/-0.5% accuracy
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	Ensure that the same basis is considered for this measurement and the measurement of the volumetric fraction of all components in the residual gas when the residual gas temperature exceeds 60 Degree
QA/QC procedures to be applied:	Flow meters are to be periodically calibrated according to the manufacturer's recommendation.
Any comment:	-

Data / Parameter:	*fvi,h*
Data unit:	-
Description:	Volumetric fraction of component *i* in the residual gas in the hour *h* where *i* = CH4, CO2
Source of data to be used:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Ensure that the same basis wet is considered for this measurement and the measurement of the volumetric flow rate of the residual gas (*FVRG,h*) when the residual gas temperature exceeds 60 ºC
Description of measurement methods and procedures to be applied:	Continuously. Values to be averaged hourly time interval
QA/QC procedures to be applied:	Analysers must be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard certified gas.
Any comment:	As a simplified approach, project participants may only measure the Methane content of the residual gas and consider the remaining part as N2.

Data / Parameter:	*fv CH* 4,*RG,h*
Data unit:	-
Description:	volumetric fraction of methane in the residual gas on dry basis in hour *h*
Source of data to be used:	Measured by project participants using a continuous gas analyser
Value of data applied for the purpose of	50%

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Ensure that the same basis is considered for this measurement and the measurement of the volumetric flow rate of the residual gas when the residual gas temperature exceeds 60 Degree
QA/QC procedures to be applied:	Analysers must be periodically calibrates according to the manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard certified gas.
Any comment:	As a simplified approach, project participants may only measure the methane content of the residual gas and consider the remaining part as N2. Moverover, the gas at flare inlet is absolutely same as the landfill gas and the measured methane volumetric fraction data of landfill gas(wCH4,y) will be used as volumetric methane fraction of residual gas for flare efficiency calculation.

Data / Parameter:	*ELEX,LFG*
Data unit:	MWh
Description:	Total amount of electricity exported out of the project boundary
Source of data to be used:	Electricity meter on sub-station connecting generators to the grid
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As per Table 10
Description of measurement methods and procedures to be applied:	Electricity meter readings
QA/QC procedures to be applied:	The electricity meters will meet the relevant Chinese standards for fiscal calibration purposes. They will be maintained and calibrated according to manufacturer's instructions or the relevant regulations. Data will be archived for 2 years after the crediting period or two years after the last issuance of CERs. The data can be corroborated against financial data from the export of power to the grid.
Any comment:	-

Data / Parameter:	EL_{IMP}

Data unit:	MWh
Description:	Total amount of electricity imported to meet project requirement
Source of data to be used:	Electricity import meter on incoming connection to LFG utilisation compound
Value of data applied for the purpose of calculating expected emission reductions in section B.6.3	N/A
Description of measurement methods and procedures to be applied:	According to the requirements of grid administrative department, electricity calculation meter is installed to monitor the actual electricity transmitted to the grid
QA/QC procedures to be applied:	The electrical meters will meet the relevant Chinese standards for fiscal metering purposes. They will be maintained and calibrated according to manufacturer's instructions or the relevant regulations. Data will be archived for 2 years after the crediting period or two years after the last issuance of CERs. The data can be corroborated against financial data from the export of power to the grid.
Any comment:	N/A

Data / Parameter:	Annual operation hours
Data unit:	h/year
Description:	Annual operation hours of the generators
Source of data to be used:	Project developer (Feasibility Study)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	7200
Description of measurement methods and procedures to be applied:	Data will be measured by the project developer. Data is monitored annually to ensure methane destruction is claimed for methane used in electricity plant and flare when it is operational.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

Data / Parameter:	*P*
Data unit:	Pa
Description:	Pressure of the LFG captured
Source of data to be used:	Pressure transmitter mounted in the gas pipe work between the gas treatment package and the generator sets / flares.
Value of data applied for the purpose of	N/A

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Pressure will be measured continuously and recorded hourly
QA/QC procedures to be applied:	The pressure gauge will be calibrated according to manufacturers' instructions and the data will be recorded and archived for two years after the end of the crediting period or two years after the last issuance of CERs.
Any comment:	-

Data / Parameter:	$T_{total,y}$
Data unit:	℃
Description:	Temperature of the landfill gas
Source of data to be used:	Temperature probe in gas pipe
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	Temperature will be measured continuously and recorded hourly using a probe mounted in the gas pipe work between the gas treatment package and the generator sets / flares.
QA/QC procedures to be applied:	Data will be backed up and archived where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. The probe will be calibrated according to the manufacturer's specifications.
Any comment:	N/A

Data / Parameter:	$PE_{flare,y}$
Data unit:	tCO_2
Description:	Emission caused by methane not being destroyed in the course of flaring in year y
Source of data to be used:	Measured and calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	The parameters to be monitored as per " Tool to determine project emissions from flaring gases containing Methane" "

QA/QC procedures to be applied:	Regular maintenance should ensure optimal operation of flares. The enclosed flare shall be operated and maintained as per the specifications prescribed by the manufacturer.
Any comment:	-

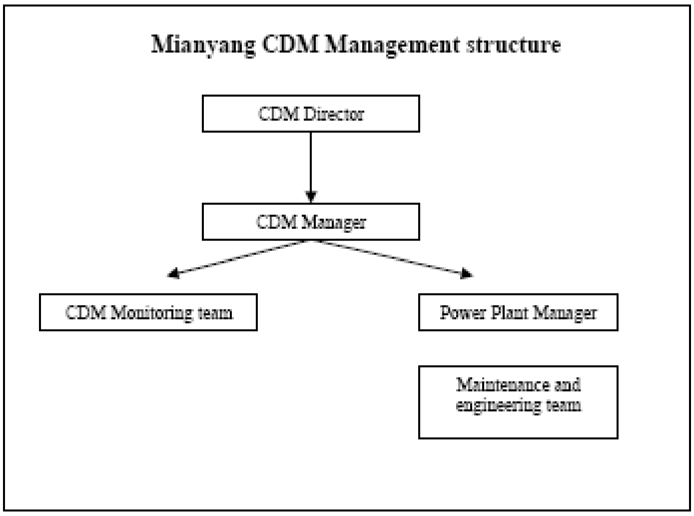
Data / Parameter:	T_{flare}
Data unit:	℃
Description:	Temperature of the flue gas of the flare
Source of data to be used:	Temperature thermocouple
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Monitored continuously by a Type N thermocouple. A temperature above 500 Degree indicates that a significant amount of gases are still being burnt and that the flares is operating.
QA/QC procedures to be applied:	Data will be backed up and archived where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. Thermalcouple will be calibrated according to the manufacturer's specifications.
Any comment:	N/A

Data / Parameter:	Laws and regulations about waste management system in China
Data unit:	N/A
Description:	Some relevant laws and regulations about solid waste management system in China should be monitored yearly. While there is some changes, the baseline scenario or monitor plan will changed accordingly.
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	Regular follow-up of law and regulations by project participants (e.g. governmental publications, official communications, official journal, conferences)
QA/QC procedures to be applied:	Set responsibility for follow-up and logging information.
Any comment:	- N/A

B.7.2 Description of the monitoring plan:

A monitoring plan will be implemented to ensure that the approved monitoring methodology ACM0001 version 05 is correctly implemented in order to enable the accurate and transparent determination of avoided emissions. The plan will incorporate the QA/QC procedures described in 7.1 above.

Scope: This procedure covers the project activity described in the CDM project entitled Mianyang Methane Utilisation Project.



Responsibility and CDM management: A CDM manager will be appointed at the landfill with responsibility for monitoring all Project related activities and organising training. The CDM Project Manager is responsible for overseeing the implementation of this procedure. Competency requirements for the position of Project Manager will be defined and applied to ensure that the Project Manager is able to implement this procedure.

All calculations will be checked and signed off by the CDM monitoring manager who will also be responsible for preparing and checking documents required for verification.

A CDM monitoring team will report directly to the monitoring manager and who will have day to day responsibilities for checking instrumentation, record keeping, data handling and data processing, filing, reporting, organising repair and maintenance of monitoring equipment and ensuring the monitoring plan is adhered to as indicated in the approved PDD. The monitoring staff will receive technical training and refresher training as well as safety training to minimise exposure to workplace hazards. At least one fully trained technical member of the monitoring team will be present on every shift.

Operational staff with existing responsibilities for gas monitoring at the extraction plant will receive additional training and will collaborate with the monitoring staff. A management level link will be established to ensure effective co-operation between landfill staff and CDM monitoring staff.

All relevant information, notes of meetings, data files, maintenance records, defect reports, hard copy and computerised records of monitoring will be kept at a designated location and arranged in an orderly and transparent manner to facilitate audit as and when required.

Responsibilities, procedures, methods, equipment types and specifications are to be described in detail in a site-specific CDM monitoring manual.

On-line monitoring system: All key meters required to determine GHG emissions and emission reductions will be monitored from a central control point which will record meter readings at a pre-determined interval as specified in the CDM monitoring manual. These data will be used to continually update total emission reductions as long as the generating plants are in operation.

Key meters will measure the parameters listed in B.7.1 above,

Calculation of avoided emissions:
The data required for calculating baseline and project emissions will be fed into a processor (spreadsheet application) which will calculate the emission reductions according to the formulae described above (B.6), using the defined default values. Access to the spreadsheet will be controlled for security. The process will include various checks, such as a comparison of total methane consumed against total power generated and will be regularly audited to ensure it is operating correctly.

Non essential data
The on-line monitoring system will also record "non-essential" data. Such data is termed non-essential because it is not directly listed in the CDM Monitoring Methodology, but it will constitute a means of corroborating the on-line system. Non-essential data will include measurements of net and gross output from individual generators, certificated conversion efficiency, waste deposition and any other data considered relevant to the project activity.

Accuracy and calibration of instruments
All meters will be purchased and maintained as specified in the CDM monitoring manual according to manufacturer specifications. All key meters will be subject to a quality control regime that will include regular maintenance and calibration. A record will be maintained showing the location and unique identification number of each meter, the calibration status of that meter (when last calibrated, when next due for calibration) and who performs the calibration service. Calibration certificates will be retained for all meters until two years after the end of the crediting period.

Mass flow of methane supplied to the engines will be corroborated by comparison with the sum of the gross engine power outputs, the relationship being a function of engine efficiency which can be considered a constant under the proposed maintenance regime

Archiving of data
The on-line system will automatically archive data to a secure and retrievable storage format on a periodic e.g. weekly basis. Calibration records will be archived in an accessible electronic format.
These data will be stored until 2 years after the end of the crediting period.

Document Control
The Project Manager will implement a document control system that ensures that the current versions of necessary documents are available at the point of use.

Preparation of monitoring report

The archived / live data will be used to prepare a periodic monitoring report to be submitted to the CDM EB for verification and issuance of CERs. A standard format for the monitoring report will be prepared and prior to the submission of the first monitoring report.

Manual data recording system

The Site Manager will implement a manual data recording system to act as a back-up for the on-line system. This will involve completion of a daily log sheet that records flow meter readings at the start of the day (which is also the end of the previous day). Spot readings of other values (methane content, temperature and pressure) will also be recorded periodically and at the times when flow meter readings are taken. At least one set of manual readings will be taken directly from the meters each day, and used to check the read-outs in the control room. These log sheets will act as a back-up for total volume combusted and a means of estimating other essential data in the event of a prolonged failure of the on-line system. Prolonged failure will constitute more than 24 hours (cumulative) without on-line monitoring.

Treatment of missing or corrupted data

Where data in the on-line system are corrupted or missing whilst the generators are operating (as shown, for example, by electricity output) the missing data can be estimated by taking the lower of the average value for the parameter in question in the hour before the error arose or the hour immediately after the system came on-line again. If there is evidence to suggest that both of these values are un-representative, the average from the previous 24 hours will be used.

The error will be recorded in the daily log sheet and the occurrence of the error will be investigated and rectified as soon as possible. If the on-line system is compromised for more than 24 hours, data will be manually recorded.

Any deficiencies in methane flow monitoring data will be rectified by back calculation from power generation data.

Audit function and management review

The Project Manager will arrange for an audit of the management system periodically and at least once per year. The auditor will not be involved in the daily operation of the landfill and if necessary, may be sourced from a third party. The auditor will assess the implementation of the monitoring procedure and the preparation of the monitoring report. Audit findings, and steps taken to address findings will be recorded and reviewed in a Management Review meeting (convened at least annually) at which time the effectiveness of these procedures will be reviewed and necessary changes implemented.

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

The application of the baseline study and monitoring methodology of the Project was completed on 14/05/2007 by Gareth Phillips, Chief Climate Change Officer and Giulia Sartori, CDM Project Officer, Sindicatum Carbon Capital. Gareth.phillips@carbon-capital.com. Sindicatum Carbon Capital is a project participant.

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:

01/08/2007

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

10 years from the date of commercial operation

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:

>> Not chosen

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/06/2008

C.2.2.2. Length:

>> 10 years- 0 m

SECTION D. Environmental impacts

>>

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

The Environmental Impact Assessment of the project activity has been carried out according to rules and regulations of China. Environmental Protection Bureau of Mianyang municipal government approved the EIA on September 10th 2007 (Approval No. [2006]287).

1. Noise

The source of noise in construction period is mainly from construction machinery and transport vehicles, which is usually measured between 80 to 85 dB(A). The source of noise in operation period is mainly from generator sets, cooling tower and pump house which is usually measured between 70 to 88 dB(A).

Construction machinery with low noise level will be selected during construction period. Machinery with high noise level will not be allowed working during the night. The implementation of these measures will effectively reduce the noise level within the construction boundary during construction period. As a result, requirements stipulated in "Noise limits for construction site" (GB 12523-90) can be met. Equipment with low noise level will be used during operation period. Noise control measures like absorption and insulation will be taken during operation period. The generator sets used by this project will be set in a house with sound insulation function. Evergreen trees are planted around the border of the plant, which will reduce the influence to the environment by the noise from the plant. After these measures been taken, the noise level inside the plant can be reduced to 55dB or lower. Noise level for both day and night can meet category III requirement of "Standard of noise at boundary of industrial enterprises" (GB12348-90).

2. Air Pollution

Dust with the suspended solids as the main pollutants will be created during construction period. Requirements stipulated in "temporary provisions concerning management and control of city dust" are strictly followed by the constructors. The stone and soil stemmed from digging activity will be reused by the landfill site. After any construction task being finished, the site will be cleared without delay, and the exposed land will be covered with vegetation. After these measures being taken, dust can be controlled effectively during construction period.

The pollutants created during operation period mainly come from the exhaust of the engines. The composition of the exhaust includes SO_2, NO_x and dust with concentrations of 35.3mg/m^3, 223.4 mg/m^3 and 23.3 mg/m^3 respectively, which meet the requirements stipulated in "Integrated Emission standard of air pollutants-II" (GB16927-1996) (SO_2: 550 mg/m^3, NO_x: 240 mg/m^3, fume: 120 mg/m^3).

3. Wastewater

The wastewater created during construction period, which mainly comes from living and construction activity, will be precipitated first and then enters the pipe networks of the landfill. The wastewater created during operation period mainly comes from the cooling water of the generator sets at 24m^3/day with the suspended matter as the main pollutant. The volume for living sewage is estimated to be around 198 tons/year based on current leachate production. After being treated in septic tank, it will enter the pipe networks of the landfill. The leachate treatment will not be included in the project, however the landfill has built a leahate tank and a cleaning system.

All sewage will be treated in Taziba Sewage Treatment Plant in Mianyang city, and then will be discharged into Fu River.

4. Solid waste

Solid wastes created during construction period mainly include soil created during digging activity and abandoned construction materials. They are put into the landfill locally.

Solid wastes created during operation period mainly include waste engine oil (50 kg/year), used cotton yarn (100 kg/year) and domestic garbage from office building (400 kg/year). Abandoned engine oil and used cotton yarn will be transported and flared in solid waste treatment centre. Domestic garbage will be put into the landfill locally.

5. Ecological impact

This project is located within the landfill. No additional land will be needed. There is no rare plant and animals around the site. Farmers around the landfill have been relocated in places where it is safe to live. So, this project will have little impact to ecological environment.

Environmental impacts are assessed in the feasibility study and in a separate Environmental Impact Assessment which has been approved by the Local DRC and Environmental Bureau.

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

>>

Environmental impacts due to the implementation of the project activity are not considered significant. The measures adopted in this project activity will be reasonable and effective. By capturing and using landfill gas for generation, the project activity can not only reduce GHG emissions, but also realize integrated utilization of municipal solid waste. In addition, the environmental impacts of this project activity will be monitored by State Environmental Protections Administration.

SECTION E. Stakeholders' comments

>>

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

The consultation took place at Linyuan Hotel, Myangyang on the 3 April 2007, 2pm. The participants were invited from a list of stakeholders complied by the landfill in consultation with UCC 10 days prior the meeting (see list of participants in Appendix 1). A notice was displayed Mianyang landfill management on public notice board (see below) show the meeting and the landfill site. Much interest was shown in the projects from government officials and local villagers. Most comments where in favour of the project as it is a type of project that has been implemented before in China and there are track records of its environmental benefits and little disturbance to the status quo. The received questions from the attendees have been recorded in section E.3.

Fig 6: Public announcement of meeting
Says: Welcome to No.8 meeting room 3rd floor for Mianyang Muncipal waste landfill CDM project stakeholder consultation.

Fig 7: UCC presentation introducing CDM and the project

E.2. Summary of the comments received:

The consultation gave an opportunity for the environmental bureau representative and villagers to fully understand the project. By the end of the consultation the participants had a good understanding of the project and where supportive of the environmental benefits proposed. Most participants appreciated the importance of well managed landfill such as Mianyang Landfill, especially compared to the state of previous dumps. Some participants stressed the long negations which were concluded with the signing of a mutually beneficial contract. Most comments made by the participants were directed towards the environmental and social benefits of the project for the local population.

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

>> Below are the questions that were asked at the Mianyang landfill stake holder consultation.
Q: What is the role of UCC? Are we simply brokers for the CERs?
A: UCC is a project developer and not just a broker. We do sell our CERs or the client's CERs on the market once we have received them but that is just a small part of our service. We invest and help the project owner develop CDM projects from the start as well as advise on the type of technology which best suits the projects.

Q: what experience does UCC have in CDM projects in less developing countries? Which countries are these?
A: We have extensive experience in China in various areas such as N2O and coal mine methane. We also have experience in Indonesia such as gas flaring, Mexico and Egypt.

Q: what technology will be used in landfills for the extraction of the methane?
A: A description of the technology as described in section A.4.3 was given.

Q: Is SCC aware that the waste composition is different in China that in the west?
A: There are numerous studies and case studies from early CDM project to show that the waste composition in China is extremely different from the one in Europe or USA. We know that the waste composition in China has a much higher organic content (typically 70% or more) which means that the decomposition rate is much faster and more leachate is created. For this reason we have taken Canadian technology and through test trials that we are running we are modifying the technology to suit conditions of Chinese landfills.

Q: How long will it take for the host country approval and the UN approval?
A: Unfortunately the host country approval is variable particularly in China were numerous projects are submitted. We should expect a period of a few months is everything runs smoothly.

Q: How many landfill projects are we doing in China?
A: We have recently signed agreements to work with a number of landfills in Anhui province.

Q: Do we have projects that we are already producing power?
A: No we do not at the moment.

Q: Are there any requirements of minimum tonnage for projects?
A: No there are no requirements in terms of landfills size to make is a CDM project.

Q: Will there be any associated pollution from the power generation?
A: There will be some slight noise pollution from the generators although they will be places in sound proof containers. There will be no water pollution as the generators have a closed circuit for water and when it will be changed it will be treated and discarded in the waste treatment facility of the city. Small CO_2 emissions will be generated but these are very small compared to the one that are being captured via the implementation of this project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Mianyang Taidu Environment Energy Technical Development Company Ltd
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URL:	
Represented by:	Zhang Fa Ming
Title:	General Manager
Salutation:	
Last Name:	Zhang
Middle Name:	
First Name:	Fa Ming
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Personal E-Mail:	

Organization:	Sindicatum Carbon Capital Ltd.
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City:	London
State/Region:	
Postfix/ZIP:	W1S 1HX
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E-Mail:	Gareth.phillips@carbon-capital.com
URL:	
Represented by:	Gareth Phillips
Title:	Chief Climate Change Officer
Salutation:	Mr
Last Name:	Phillips
Middle Name:	
First Name:	Gareth
Department:	

Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

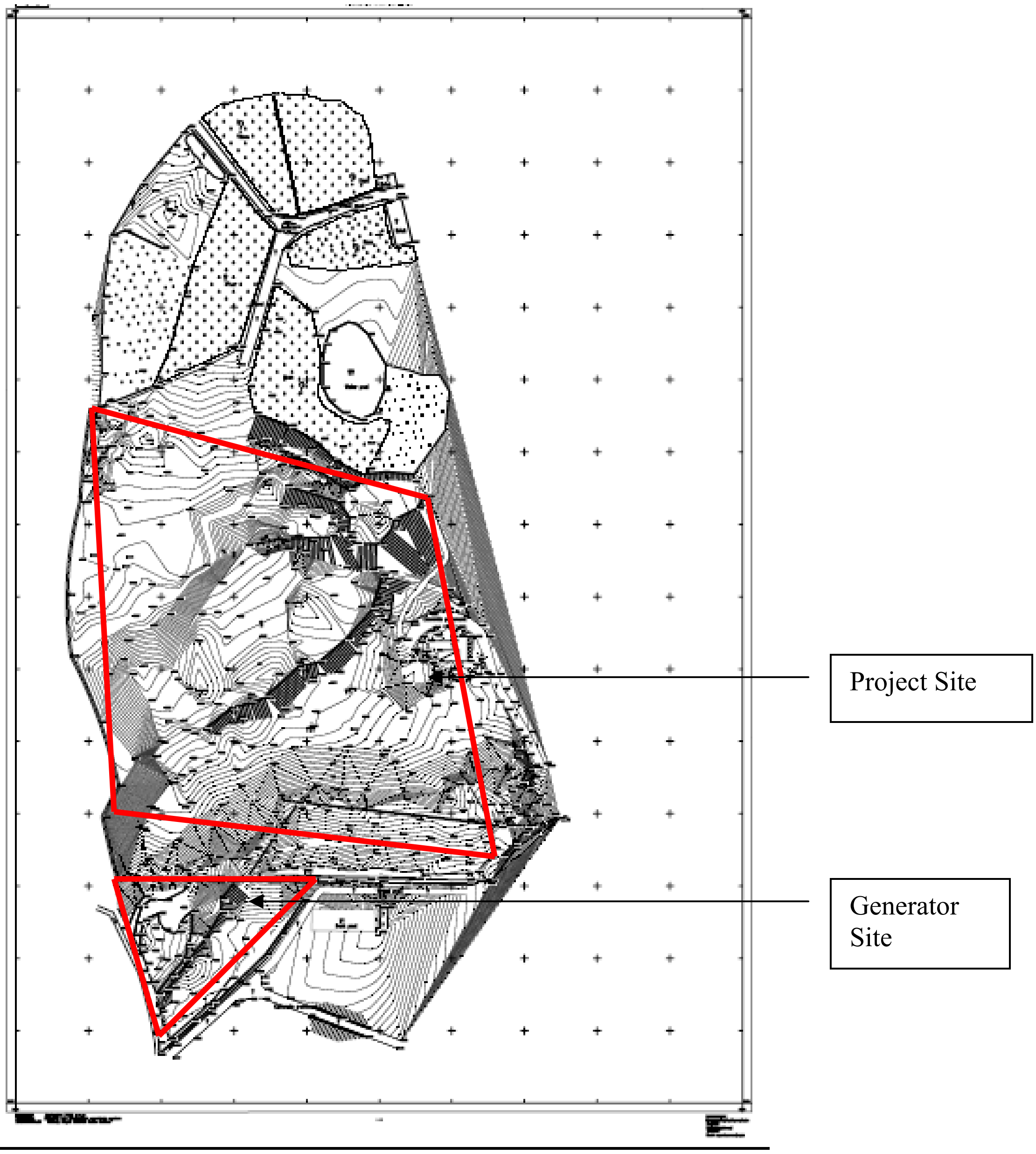
INFORMATION REGARDING PUBLIC FUNDING

No public funding is utilized.

Annex 3

BASELINE INFORMATION

Plan of landfill



Calculation of emission factor of the Central China Power Grid

1. Calculation of OM

Table A3-1 calculation of simple OM emission factor of the Central China Power Grid in 2003

Fuels	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	potential emission factor (tc/TJ)	Oxid (%)	NCV (MJ/t,km3)	Emission （tCO_2e） K=G*H*I*J*44/12/10000（in mass） K=G*H*I*J*44/12/1000 (in volume)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	
Raw coal	10,000 tones	1427.41	5504.94	2072.44	1646.47	769.47	2430.93	**13851.66**	25.8	100	20908	273971539.89
Washed coal	10,000 tones							**0**	25.8	100	26344	0.00
Other washed coal	10,000 tones	2.03	39.63			106.12		**147.78**	25.8	100	8363	1169146.40
Coke	10,000 tones				1.22			**1.22**	25.8	100	28435	32817.40
coke oven gas	0.1billion m^3			0.93				**0.93**	12.1	100	16726	69013.15
Other gas	0.1billion m^3							**0**	12.1	100	5227	0.00
crude oil	10,000 tones		0.5	0.24			1.2	**1.94**	20	100	41816	59490.23
Gasoline	10,000 tones							**0**	18.9	100	43070	0.00
Diesel	10,000 tones	0.52	2.54	0.69	1.21	0.77		**5.73**	20.2	100	42652	181015.94
Fuel oil	10,000 tones	0.42	0.25	2.17	0.54	0.28	1.2	**4.86**	21.1	100	41816	157229.00
LPG	10,000 tones							**0**	17.2	100	50179	0.00
Refinery gas	10,000 tones	1.76	6.53		0.66			**8.95**	18.2	100	46055	275069.63
Natural gas	0.1billion m^3					0.04	2.2	**2.24**	15.3	100	38931	489222.52
Other petroleum products	10,000 tones							**0**	20	100	38369	0.00
Other coking products	10,000 tones							**0**	25.8	100	28435	0.00

Table A3-1 calculation of simple OM emission factor of the Central China Power Grid in 2003

Fuels	**Unit**	**Jiangxi**	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**	**potential emission factor (tc/TJ)**	**Oxid (%)**	**NCV (MJ/t,km3)**	**Emission （tCO_2e） K=G*H*I*J*44/12/10000（in mass）**
		A	**B**	**C**	**D**	**E**	**F**	**G=A+B+C+D+E+F**	**H**	**I**	**J**	**K=G*H*I*J*44/12/1000 (in volume)**
Other energy	10,000 tCe		11.04			16.2		**27.24**	0	100	0	0.00
											Sub-Total	276404544.15

Data source: China energy statistical yearbook 2004

Table A3-2 The amount of electricity generated by thermal power plant in the Central China Power Grid in 2003

Province	**The amount of electricity generated (MWh)**	**The proportion of electricity consumed by the project (%)**	**The amount of electricity delivered (MWh)**
Jiangxi	27165000	6.43	25,418,291
Henan	95518000	7.68	88,182,218
Hubei	39532000	3.81	38,025,831
Hunan	29501000	4.58	28,149,854
Chongqing	16341000	8.97	14,875,212
Sichuan	32782000	4.41	31,336,314
Total			225,987,719

Data source: China Electric Power Yearbook 2004

Table A3-3. Calculation of simple OM of the Central China Power Grid in 2003

Total emission(tCO2)	**276,404,544**
Total power delivered(MWh)	**225,987,719**
Emission factor	**1.223095**

Table A3-4. Calculation of simple OM emission factor of Central China Power Grid in 2004

Fuels	Units	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	Total G=A+B+C+D+E+F	Potential emission factor （tc/TJ） H	OXID （%） I	NCV （MJ/t,m3 ） J	Emission (tCO_2e） K=G*H*I*J*44/12/10000 （in mass） K=G*H*I*J*44/12/1000 (in volume)
Raw coal	10,000 tones	1863.8	6948.5	2510.5	2197.9	875.5	2747.9	**17144.1**	25.8	100	20908	339092605.29
Washed coal	10,000 tones		2.34					**2.34**	25.8	100	26344	58316.13
Other washed coal	10,000 tones	48.93	104.22			89.72		**242.87**	25.8	100	8363	1921441.23
coke	10,000 tones		109.61					**109.61**	25.8	100	28435	2948455.29
Coke oven gas	0.1billion m^3			1.68		0.34		**2.02**	12.1	100	16726	149899.53
Other gas	0.1billion m^3					2.61		**2.61**	12.1	100	5227	60527.09
Crude oil	10,000 tones		0.86	0.22				**1.08**	20	100	41816	33118.27
Gasoline	10,000 tones		0.06			0.01		**0.07**	18.9	100	43070	2089.33
Diesel	10,000 tones	0.02	3.86	1.7	1.72	1.14		**8.44**	20.2	100	42652	266627.32
Fuel oil	10,000 tones	1.09	0.19	9.55	1.38	0.48	1.68	**14.37**	21.1	100	41816	464893.14

Fuels	Units	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	Total G=A+B+C+D+E+F	Potential emission factor (tc/TJ) H	OXID (%) I	NCV (MJ/t,m3) J	Emission (tCO_2e) K=G*H*I*J*44/12/10000 (in mass) K=G*H*I*J*44/12/1000 (in volume)
LPG	10,000 tones							**0**	17.2	100	50179	0.00
Refinery gas	10,000 tones	3.52	2.27					**5.79**	18.2	100	46055	177950.07
Natural gas	0.1billion m^3						2.27	**2.27**	15.3	100	38931	495774.61
Other petroleum products	10,000 tones							**0**	20	100	38369	0.00
Other coking products	10,000 tones							**0**	25.8	100	28435	0.00
Other energy	10,000tCe		16.92		15.2	20.95		**53.07**	0	100	0	0.00
											Total	345671697.30

Data source: China Energy Statistical Yearbook 2005

Table A3-5. The amount of electricity of Central China Power Grid generated by thermal power plants in 2004

Province	The amount of electricity generated (MWh)	The proportion of electricity consumed by the project (%)	The amount of electricity delivered (MWh)
Jiangxi	30127000	7.04	28,006,059
Henan	109352000	8.19	100,396,071
Hubei	43034000	6.58	40,202,363
Hunan	37186000	7.47	34,408,206
Chongqing	16520000	11.06	14,692,888
Sichuan	34627000	9.41	31,368,599
Total			249,074,186

Data source: China Electric Power Yearbook 2005

Table A3-6. Calculation of simple OM of Central China Power Grid in 2004

Total emission (tCO2)	**345,671,697**
Total power delivered(MWh)	**249,074,186**
Emission factor	**1.387826**

Table A3-7. Calculation of simple OM emission factor of Central China Power Grid in 2005

Fuels	Units	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Potential emission factor (tc/TJ)	OXID (%)	VCV (MJ/t,m3)	Emission (tCO2e) K=G*H*I*J*44/12/10000 (in mass) K=G*H*I*J*44/12/1000 (in volume)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	
Raw coal	10,000 tones	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	**17827.75**	25.8	100	20908	352614496.76
Washed coal	10,000 tones	0.02						**0.02**	25.8	100	26344	498.43
Other washed coal	10,000 tones		138.12			89.99		**228.11**	25.8	100	8363	1804669.00
Coke	10,000 tones		25.95		105			**130.95**	25.8	100	28435	3522490.83
Coke oven gas	0.1billion m^3			1.15		0.36		**1.51**	12.1	100	16726	112053.61
Other gas	0.1billion m^3		10.2			3.12		**13.32**	12.1	100	5227	308896.88
Crude oil	10,000 tones		0.82	0.36				**1.18**	20	100	41816	36184.78
Gasoline	10,000 tones		0.02			0.02		**0.04**	18.9	100	43070	1193.90
Diesel	10,000 tones	1.3	3.03	2.39	1.39	1.38		**9.49**	20.2	100	42652	299797.78
Fuel oil	10,000 tones	0.64	0.29	3.15	1.68	0.89	2.22	**8.87**	21.1	100	41816	286959.09
LPG	10,000 tones							**0**	17.2	100	50179	0.00
Refinery gas	10,000 tones	0.71	3.41	1.76	0.78			**6.66**	18.2	100	46055	204688.68
Natural gas	0.1billion m^3						3	**3**	15.3	100	38931	655208.73
Other petroleum products	10,000 tones							**0**	20	100	38369	0.00
Other coking products	10,000 tones				1.5			**1.5**	25.8	100	28435	40349.27
Other energy	10,000 tCe		2.88		1.74	32.8		**37.42**	0	100	0	0.00
											Total	359887487.74

Data source: China Energy Statistical Yearbook 2006

Table A3-8. The amount of electricity of Central China Power Grid generated by thermal power plants in 2005

Province	The amount of electricity generated (MWh)	The proportion of electricity consumed by the project (%)	The amount of electricity delivered (MWh)
Jiangxi	30000000	6.48	28,056,000
Henan	131590000	7.32	121,957,612
Hubei	47700000	2.51	46,502,730
Hunan	39900000	5	37,905,000
Chongqing	17584000	8.05	16,168,488
Sichuan	37202000	4.27	35,613,475
Total			286,203,305

Data source: China Electric Power Yearbook 2006

Table A3-9 Calculation of simple OM of Central China Power Grid in 2005

Total emission tCO2	**359,887,488**
Total electricity delivered (MWh)	**286,203,305**
Emission factor	**1.257454**

The weighted average emission factor over three years is 1.28991016tCO_2e/MWh

2. Calculation of BM

Table A3-10. Proportion of CO_2 emissions from solid fuels, liquid fuels and gas fuels against the total emission

Fuels	Units	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Emission factor (tc/TJ)	OXID (%)	NCV (MJ/t,m3)	Emission(tCO_2e) K=G*H*I*J*44/12/10000(in mass) K=G*H*I*J*44/12/1000 (in volume)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	
Raw coal	10,000 tones	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	**17827.75**	25.8	100	20908	352614496.76
Washed coal	10,000 tones	0.02						**0.02**	25.8	100	26344	498.43
Other washed coal	10,000 tones		138.12			89.99		**228.11**	25.8	100	8363	1804669.00
coke	10,000 tones		25.95		105			**130.95**	25.8	100	28435	3522490.83
Total												**357,982,504**
Crude oil	10,000 tones		0.82	0.36				**1.18**	20	100	41816	36184.78
Gasoline	10,000 tones		0.02			0.02		**0.04**	18.9	100	43070	1193.90
Kerosene oil	10,000 tones	0	0	0	0	0	0	**0**	19.6	100	43070	0
Diesel	10,000 tones	1.3	3.03	2.39	1.39	1.38		**9.49**	20.2	100	42652	299797.78
Fuel oil	10,000 tones	0.64	0.29	3.15	1.68	0.89	2.22	**8.87**	21.1	100	41816	286959.09
Total												**624,136**
Natural gas	0.1billion m^3						3	**3**	15.3	100	38931	655208.73
Coke oven gas	0.1billion m^3			1.15		0.36		**1.51**	12.1	100	16726	112053.61
Other gas	0.1billion m^3		10.2			3.12		**13.32**	12.1	100	5227	308896.88
LPG	10,000 tones							**0**	17.2	100	50179	0.00
Refinery gas	10,000 tones	0.71	3.41	1.76	0.78			**6.66**	18.2	100	46055	204688.68
Total												

Fuels	Units	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Emission factor (tc/TJ)	OXID (%)	NCV (MJ/t,m3)	Emission(tCO_2e) K=G*H*I*J*44/12/10000(in mass)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/1000 (in volume)
Total												1,280,848 359,887,488

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} = 0.9482$$

Table A3-11. Optimal efficiency and emission factor of commercialized coal-fired, oil-fired and gas-fired power plant

Type of power plant	Variables	Power supply efficiency (%)	Emission factor of fuels (tC/TJ)	Oxidation rate	Emission factor (tCO_2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal fired power plant	$EF_{Coal,Adv}$	35.82%	25.8	1	0.9508
Gas fired power plant	$EF_{Gas,Adv}$	47.67%	15.3	1	0.4237
Oil fired power plant	$EF_{Oil,Adv}$	47.67%	21.1	1	0.5843

Table A3-12. Installed capacity of Central China Power Grid in 2005

Installed capacity	*Units*	*Jiangxi*	*Henan*	*Hubei*	*Hunan*	*Chongqing*	*Sichuan*	*Total*
Thermal power	*MW*	*5906*	*26267.8*	*9526.3*	*7211.6*	*3759.5*	*7496*	*60167.2*
Hydro-power	*MW*	*3019*	*2539.9*	*8088.9*	*7905.1*	*1892.7*	*14959.6*	*38405.2*
Nuclear power	*MW*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Wind power and others	*MW*	*0*	*0*	*0*	*0*	*24*	*0*	*24*
Total	*MW*	*8925*	*28807.7*	*17615.2*	*15116.7*	*5676.2*	*22455.6*	*98596.4*

Data source: China Electric Power Yearbook 2006

Table A3-13. Installed capacity of Central China Power Grid in 2004

Installed capacity	*unit*	*Jiangxi*	*Henan*	*Hubei*	*Hunan*	*Chongqing*	*Sichuan*	*Total*
Thermal power	*MW*	*5407.8*	*17635.5*	*8173.3*	*6446.7*	*3126.2*	*6104*	*46893.5*
Hydro-power	*MW*	*2307.4*	*2438*	*7337.2*	*6603.1*	*1329.8*	*12341.5*	*32357*
Nuclear power	*MW*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Wind power and others	*MW*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total	*MW*	*7715.2*	*20073.5*	*15510.5*	*13049.8*	*4456*	*18445.5*	*79250.5*

Data source：China Electric Power Yearbook 2005

Table A3-14. Installed capacity of Central China Power Grid in 2003

Installed capacity	*Unit*	*Jiangxi*	*Henan*	*Hubei*	*Hunan*	*Chongqing*	*Sichuan*	*Total*
Thermal power	*MW*	*5128.8*	*15904.5*	*8147.8*	*4975.6*	*3004.5*	*6142*	*43303.2*
Hydro-power	*MW*	*2197.4*	*2438*	*7213.9*	*6135.3*	*1195.5*	*11854.6*	*31034.7*
Nuclear power	*MW*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Wind power and others	*MW*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total	*MW*	*7326.2*	*18342.5*	*15361.7*	*11110.9*	*4200*	*17996.6*	*74337.9*

Data source：China Electric Power Yearbook 2004

Table A3-15. Calculation of BM emission factor for Central China Power Grid

	Installed capacity in 2003	Installed capacity in 2004	Installed capacity in 2005	Newly added installed capacity from 2003 till 2005	Proportion against newly added installed capacity
	A	B	C	D=C-A	
Thermal power (MW)	43303.2	46893.5	60167.2	16864	69.52%
Hydro-power (MW)	31034.7	32357	38405.2	7370.5	30.38%
Nuclear power (MW)	0	0	0	0	0.00%
Wind power (MW)	0	0	24	24	0.10%
Total (MW)	74337.9	79250.5	98596.4	24258.5	100.00%
Share in 2004 installed capacity	75.40%	80.38%	100%		

$EF_{BM,y}$=0.9842x69.52=0.6592tCO_2e/MWh。

Stakeholder consultation attendees

No.	NAME	Organization	**Position**	Telephone
1	Giulia Sartori	SCC	PDD Expert	
2	Yuk Lam	SCC	Project Manager	
3	Zhang Faming	Taidu Company	General Manager	
4	Huo Juan	Taidu Company	Translater	
5	Wei Dong	Taidu Company	Finance	
6	He Yong	Taidu Company	Office Clerk	
7	James Whale	SCC	Vice President	
8	Ying Lijuan	Taidu Company	Office	
9	Xu Guangxu	Landfills	Director	
10	Chen Gang	Landfills	Factory Director	
11	Li Xiuhua	Landfills	Main Identifier	
12	Zheng Chongdong	Loufang Village Team 5	Villager	
13	Jian Xiuli	Loufang Village Team 5	Villager	
14	Tian Chongxiu	Loufang Village Team 5	Villager	
15	Xie Suhua	Loufang Village Team 5	Villager	
16	Xie Gangyu	Municipal Environment and Health Division	Secretary	
17	Yuan Wen	Municipal Environment and Health Division	Division Cheif	
18	Deng Qiao	Municipal Environment and Health Division	Section Cheif	
19	Xiang Jun	Municipal Environment and Health Division	Office Director	
20	Hao Jie	Municipa Evironmental Protection Bureau		
21	Liu Wenjun	Municipal Environment and Health Division		

22	Chen Wei	Municipal Development&Reform Commission	Officer	
23	Chen Qide	Power Supply Company		

Annex 4

MONITORING INFORMATION

As detailed in B.7.2.
Monitoring report will be available at verification.

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