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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

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Fuzhou Hongmiaoling Landfill Gas to Electricity Project

Version number of the document:4

Date: 25 February 2008

A.2. Description of the project activity:

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The Fuzhou Hongmiaoling Landfill Gas to Electricity Project (hereafter refers to the proposed project) is a landfill gas (LFG) collection and utilization project in Fuzhou City, Fujian Province, P. R. China. Fuzhou Hongmiaoling Landfill is the only landfill in Fuzhou City, Fujian Province. The landfill starts to receive municipal waste from 1995 and will stop receiving new municipal waste in 2008. At present, it has an average reception of 1,900 tonnes of waste per day, and the total amount of waste accumulated in the landfill is 5,366,000 tonnes by the end of 2005. The proposed project involves the installation of a gas collection system, leachate drainage system, flaring equipment and an electricity generation plant at Fuzhou Hongmiaoling Landfill. The generators will combust methane in the landfill gas to produce electricity for export to the grid. The generator technology employed is from GE, a world leading company in manufacturing gas engines and generators. The proposed project will assist in transferring advanced LFG utilization technology to China. Three GE gas engines will be installed with a total capacity of 2.5 MW and annual output of 9,510MWh. The electricity generated by the proposed project will be sold to Fujian Provincial Power Gird that is part of the East China Power Grid to replace certain capacity of coal-fired power plants. Excess landfill gas, and all the gas collected during the period when electricity is not produced, will be flared.

The proposed project is consistent with China's national energy policy and sustainable development strategy, which will be shown specifically as follows:

1, GHG emission reduction

The proposed project will utilize methane for electricity. It is estimated that 7,868 ton methane will be reduced by the proposed project activity. The electricity generated by the proposed project will be sold to Fujian Provincial Power Gird that is a part of the East China Power Grid to replace the capacity of coal-fired power plants. The estimated emission reduction will be 143,194 CERs per year in average.

2, Contribution to environment protection

The main social and environmental contribution of the proposed project will be a positive effect on the health of people in local community. Contaminated leachate and surface run-off from landfills can affect the quality of underground and surface water consequently polluting the local environment and harming the health of local population. The uncontrolled release of landfill gas can also impact negatively on the harmony of the local environment leading to risk of explosions in local surroundings. By managing this landfill properly the environmental health risks and the possibility of explosions are significantly reduced.

3, Clean energy demonstration

The proposed project is the first LFG to electricity project in the province and one of the first projects around China. Advanced international technology will be employed, which will help technology transfer activity. The proposed project will provide an example that can be used by others that may want to develop modern and more efficient clean generation of electricity using landfill gas throughout China.

4, Providing job opportunities
The newly installed capacity by the proposed project will directly benefit the local region by creating new jobs and will play an important role to help local residents casting off poverty and becoming better off.

In conclusion, the proposed project is consistent with China's national energy policy and sustainable development strategy. 25 direct job opportunities will be created by the proposed project.

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)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Peoples' Republic of China (host)	Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.	No
Japan	ECO BANK LTD	No

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Host Country: **People's Republic of China,** which has ratified the Kyoto Protocol to the United Nations Framework Convention on Climate Change in August 2002

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party (ies):

>>
People's Republic of China

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

>>
Fujian Province

A.4.1.3. City/Town/Community etc:

>>
Fuzhou City

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

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The proposed project activity is located at bottom of Lianhua Mountain, Hongmiaoling, and 17 km northwest of Fuzhou City, Fujian Province, P. R. China, and E119 ° 18′and N26 ° 05′ . Geographical location of the project is shown in Figure A1 and A2.

Figure A1. The proposed project in the map of P.R.China

Figure A2. The proposed project in the map of Fuzhou City

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

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Category: Renewable electricity in grid connected applications

Scope 13, Waste Handling and Disposal

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

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The proposed project will apply state-of-the-art gas collection technology. The project developer decided to develop a complete set of landfill gas management technology. In the landfill, there are 55 wells exists. To a better utilization of the LFG, the proposed project will increase 50 new vertical wells with optimized well spacing for maximum gas collection. The collected LFG through the wells will be carefully treated by several approaches before entering into generators for electricity generation. The treatments include storage system for LFG buffer, gas desulfurization, separating gas from water and condensate extraction, etc.

The treated LFG will be fed into gas engines for electricity generation. The technology of gas engine is imported from GE. Three gas engines (model: JGS 316 GS-L.L) will be installed with a total capacity of 2.5 MW and 825kW for each. The generator will be procured from GE, the world's leading manufacturer of industrial engines, which promotes transfer of advanced technology to China. All the auxiliary equipments will be sourced from the domestic market.

When LFG collected exceeds the needs from the engines, the extra LFG drawn will be flared. Any gas that is not used in the engine generator will be directed to the advanced enclosed flaring system by pressure control. A runtime meter will monitor the working hours of the flare.

The electricity produced by the proposed project will be transmitted through a 10kV transformer at the site to a nearby 110kV substation, and then to Fujian Provincial Power Grid that is an integral part of East China Power Grid.

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

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A crediting period of 10 (ten) years is selected for the project activity. An estimation of emissions reductions expected over the crediting period is provided in the table below.

Years	Annual estimation of emission reductions in tonnes of CO2 e
2008	173,714
2009	166,011
2010	158,683
2011	151,712
2012	145,082
2013	138,775
2014	132,775
2015	127,068
2016	121,640
2017	116,476
Total estimated reductions (tonnes of CO2 e)	1,431,936
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	143,194

A.4.5. Public funding of the project activity:

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There is no public funding for this project.

SECTION B. Application of a baseline and monitoring methodology:

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

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Version 5 of ACM0001 "Consolidated methodology for landfill gas project activities" is used for the proposed project together with the Approved Methodology: AMS-I.D- "Grid connected renewable electricity generation" Version 11. .

Tool for the Demonstration and Assessment of Additionality Version 3 is used with the requirement from ACM0001.
Tool for determine project emissions from flaring gases containing methane to calculate the project emissions Version1.

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

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The methodology ACM0001 allows for the development of projects falling under 3 options. Option a) refers to landfill projects that capture gas but this is simply flared. Option b) refers to projects that use the gas to produce energy (e.g. electricity/thermal energy) but do not claim emission reductions from displacing or avoiding energy from other sources. Option c) refers to projects where the captured gas is used to produce energy (e.g. electricity/thermal energy), and emission reductions are claimed for displacing or avoiding energy generation from other sources.

As previously described, the proposed project is based on two complementary activities, as follows:

- The collection and flaring/combustion of landfill gas, thus converting its methane content into CO_2, reducing its greenhouse gas effect; and,

- The generation and supply of electricity to the regional grid, thus displacing a certain amount of fossil fuels used for electricity generation.

The proposed project fulfils the conditions of Option c (i.e. the captured landfill gas is used to produce electricity and reductions are claimed for displacing electricity generation from other sources). Therefore ACM0001 was considered the most appropriate methodology for the Project.

Because emission reductions are claimed to for electricity displacement and the installed power plant does not exceed 15MW, the AMS-I.D. methodology is used in addition to ACM0001.

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

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According to ACM0001 methodology, the project boundary is the site of the project activity where the gas will be captured and destroyed and/or used, which is the site of the landfill. According to the methodology (AMS-I.D), a project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. The proposed project is within the boundary of the East China Power Grid, which geographical range includes Fujian Province, Shanghai, Jiangxi Province, Anhui Province and Jiangsu Province.

	Source	Gas	Included?	Justification / Explanation
Baseline	Fossil fuels fired by power plants	CO_2	Yes	Major emission sources
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Landfill gas	CO_2	No	Excluded for simplification.
		CH_4	Yes	Major emission sources
		N_2O	No	Excluded for simplification.
Project Activity	Emissions by project activity	CO_2	Yes	May be an important emission source.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.

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

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In absence of the proposed project, reasonable and credible alternatives that are in accordance with current laws and regulations include:

1) The landfill operator could continue the current business as usual practice of not collecting and flaring landfill gas from the waste management operations. In this case, methane from the landfill will be directly no power would be generated at the sites and China power system would remain unaffected.

2) The landfill operator or project developer could invest in a landfill gas collection system of high effectiveness, a high-efficiency flaring system, and a set of LFG power generation equipment without the CDM support (the proposed project activity not undertaken as a CDM project activity)..

Specific analysis on the six alternative scenarios in absence of the proposed project is as follows:
Alternative 1):
The Chinese legislation does not require landfill operators to flare or recover landfill gas. Current priorities with the authorities are to prevent illegal dumping and improving the conditions at “controlled” sites, which apply lower standards. Considering the significant technical and economic barriers to upgrade existing landfills, it is unlikely to introduce such regulation in the foreseeable future. The only requirement is to passively vent the landfill gas in order to avoid the risk of explosion. Hence, the baseline scenario of the proposed project is that the methane produced by the landfill directly emits to the atmosphere. Therefore, the Alternative 1) can be considered as an alternative.

Alternative 2):
According to Chinese law, the development of a new biomass energy project of the same capacity without CDM is feasible. Therefore, the Alternative 2) can be considered as an alternative.

Hence, both Alternative 1) and Alternative 2) are feasible baseline scenarios.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

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The additionality of the proposed project is demonstrated and assessed by the approved Tool for the Demonstration and Assessment of Additionality. Following steps include:

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations
Define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario through the following sub-steps:

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

In absence of the proposed project, reasonable and credible alternatives that are in accordance with current laws and regulations include:

1) The landfill operator could continue the current business as usual practice of not collecting and flaring landfill gas from the waste management operations. In this case, methane from the landfill will be directly no power would be generated at the sites and China power system would remain unaffected.

2) The landfill operator or project developer could invest in a landfill gas collection system of high effectiveness, a high-efficiency flaring system, and a set of LFG power generation equipment without the CDM support (the proposed project activity not undertaken as a CDM project activity).

Sub-step 1b. Consistency with mandatory laws and regulations:

The Chinese legislation[1] does not require landfill operators to flare or recover landfill gas. Current priorities with the authorities are to prevent illegal dumping and improving the conditions at "controlled" sites, which apply lower standards. Considering the significant technical and economic barriers to upgrade existing landfills, it is unlikely to introduce such regulation in the foreseeable future. The only requirement is to passively vent the landfill gas in order to avoid the risk of explosion.[2]

Therefore, there is no legislative requirement to flare or recover landfill gas. Thus both alternatives defined in *Sub-step 1a* comply with all relevant regulations and laws.

Step 2. Investment analysis
The purpose of this step is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without an additional funding that may be derived from the CDM project activities. The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method
The three analysis methods suggested by *Tools for the demonstration and assessment of additionality* are simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). Since the proposed project will earn revenues from not only the CDM but also the electricity output, the simple cost analysis method is not appropriate. Investment comparative analysis method is only applicable to the case that alternative baseline scenario is similar to the proposed projects, so that comparative analysis can be conducted. The alternative baseline scenario of the proposed project is the East China Power Grid rather than a new investment project. Therefore option 2 is not an appropriate method either. The proposed project will use benchmark analysis method based on total investment IRR.

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[1] "Technical specification for operation and maintenance of municipal domestic refuse sanitary landfill", CJJ93 2004

[2] National Action Plan for Recovery and Utilization of landfill Gas (12/2001)

Sub-step 2b –Apply benchmark analysis (Option III)
With reference to *Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects,* the financial benchmark rate of return of Chinese power industry is 8% of the total investment, which has been used widely for Feasibility Studies of the power project investments.

Sub-step 2c. Calculation and comparison of financial indicators
Based on the above-mentioned benchmark, the calculation and comparative analysis of financial indicators for the proposed project are carried out in sub-step 2c.

(1) Basic parameters for calculation of financial indicators
Based on the Feasibility Study Report of the proposed project, basic parameters for calculation of financial indicators are as follows:
Installed capacity: 2.5MW
Annual output: 9,510MWh
Project lifetime: 15 Year (1 year of construction and 14 years of operation).
Total investment: RMB 46, 0350 million (equity/debt ratio: 40/60)
Annual Operational cost: RMB 1.7723million
Tariff: RMB 0.50 yuan/KWh (including VAT)
Tax: 0% VAT, 15% (income tax)
Crediting period: 10 Years
Expected CERs price: Euro 8/t CO2e
Note: In the benchmark analysis, the data used for project financial scenario has been updated according to real circumstances after the Feasibility Study had been conducted.

(2) Comparison of IRR for the proposed project and the financial benchmark
In accordance with the benchmark analysis (Option III), the proposed project will not be considered as financially attractive if its financial indicators (such as IRR) are lower than the benchmark rate.

Table B2 shows the fluctuating situation of IRR of the proposed project based on current status under the condition of with and without CDM revenues. Without the CDM revenue, the IRR of total investment is lower than the benchmark rate of 8%. Thus the proposed project does not look financially attractive to the investors. However, with the CDM revenue, IRR of total investment is significantly improved and exceeds the benchmark rate. Therefore, the proposed project with the CDM revenue can be considered as financially viable to the investors.

Table B2. Financial indicators of the Fuzhou Hongmiaoling Landfill Gas to Electricity Project

	IRR (Total investment, benchmark=8%)
Without CDM revenue	-4.50%
With CDM revenue	28.70%

Sub-step 2d. Sensitivity analysis (only applicable to options II and III):
The purpose of the sensitivity analysis is to examine whether the conclusion regarding the financial viability of the proposed project is sound with those reasonable variations in the assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be financially attractive.

Three financial parameters including: total investment, tariff (excluding VAT) and annual O&M cost were identified as the main variable factors for sensitive analysis of financial attractiveness. Their impacts on IRR of total investment were analyzed as follows.

(a) Total investment
When the total investment decreases by 53.6%, the IRR of total investment reaches the benchmark. Considering economical development in China and the price rising of materials during construction, the total investment couldn't be cut down over half.

(b) Annual O&M cost
When the annual O&M cost decreases by 184%, the IRR of total investment reaches the benchmark, and this will never happen for any project.

(c) Tariff
When the tariff increases by 29.3%, the IRR of total investment reaches the benchmark. According to the concession contract signed by the project owner and the government, the tariff of the project is 0.5 Yuan/kWh for the first operational year, and the tariff for the years thereafter increases with the Consumer Price Index (CPI) in Fujian Province. When the tariff increase by 29.3%, the CPI should rise 29.3% than that of the year before. According to the Fujian Statistical Yearbook 2007, where the CPI from the year 1951 to 2006 is stated, such high rise of CPI could not happen.

(d) Power generation
When the power generation increases by 29.59%, the IRR of total investment reaches the benchmark. The power generation of the proposed project is determined by the annual landfill gas that can be generated, and the quantity of generated landfill gas is calculated scientifically by estimation model. According to the Feasibility Study report, the average operational hour of the proposed project is 7300h, when the power generation increases by 29.59%, the operational hour would be over 8760 hours/year, which will never happen.

After above sensitive analysis, when financial indicators change within reasonable range, the proposed project is not financially feasible without CDM support.

Step 3. Barriers analysis (not selected)

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:
With the increasing of organic content of the waste, methane emission from landfills has become one of the fastest growing sectoral sources of GHG in China. The Ministry of Construction developed a comprehensive technical standard on municipal solid waste management in 1989. However, in general the standards were not followed due to investment and technology barriers. To date there has been limited development of LFG collection and utilization projects in China. For a quite large number of landfills, there exist problems such as having inappropriate or no cover system, limited or no compaction, no gas control system, etc[3].
Currently in China, the municipal waste is disposed by using the technology of traditional landfills, without consideration of collection and utilization of LFG[4]. So far, very few landfills have been designed

[3] . Source: Environmental Resource Management 2004, *China Waste Management Working Paper*
[4]. Source: National Action Plan for Collection and Utilization of LFG (12/2001)

to collect and utilize (or even) flare the main body of LFG generated. Most of which are demonstration projects funded by development assistance resources. The Nanjing Tianjingwa LFG Electricity Project and Meizhou Landfills Gas Recovery and Utilization as Energy Project approved by China DNA have provided detail description on the importance of CDM revenue for certain type of projects. In a word, the passive venting method remains the common practice in current landfill situation in China

Sub-step 4b. Discuss any similar options that are occurring:
As stated in Sections above, China has very few landfills that collect and utilize LFG, and the proposed is the only landfill conducting a LFG collection and utilization project in the province.

Consideration of CDM before construction start
To realize the resource comprehensive utilization and avoid the risk of uncontrolled methane emissions to the safety of local surroundings, Fuzhou Municipal Government invited a public bidding for Fuzhou Hongmiaoling LFG Utilization Project in August 2005. Xiamen Pengliqing Environmental Protection Science Development Co, Ltd. won the bid as the only bidder and signed exclusive operation contract with Fuzhou Municipal Government. The biggest shareholder of the bid winner is Netherlands Global Recycling Co., Ltd. , who takes the majority of the shares. However, after the feasibility study of the proposed project was developed in Oct. 2005, the result showed the investment return of the proposed project is unattractive without CDM revenue. However, being a none Chinese holding project developer, Netherlands Global Recycling Co., Ltd. was not eligible to develop CDM and gain CDM revenue under *Measures for Operation and Management of Clean Development Mechanism Projects in China* issued in Oct 2005. Failing to identify approach to improve the unattractive investment return of the proposed project, Netherlands Global Recycling Co., Ltd. decided to quit the proposed project. And the proposed project was finally transferred it to Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd., who is a Chinese holding company in the early of 2006. To develop CDM for the proposed project, Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. signed CDM consultancy agreement with Easy Carbon in July 6, 2006 before the construction work started. The development procedure shows that the proposed project will not be developed without CDM support.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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According to ACM0001, the emission reductions will be calculated as follows:

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

Where:

- λ ER_y: greenhouse gas emission reduction achieved by the project activity during a given year "y" (t CO_2e).
- λ $MD_{project,y}$: amount of methane actually destroyed/combusted during the year "y" (tCH_4).
- λ $MD_{reg,y}$: amount of methane that would have been destroyed/combusted during the year "y" in the absence of the project activity (tCH_4).
- λ GWP_{CH4}: approved Global Warming Potential value for methane (21 t CO_2e / tCH_4).
- λ EG_y: net quantity of electricity displaced during the year "y" (MWh).
- λ $CEF_{electricity,y}$: CO_2 emissions intensity of the electricity displaced during year "y" (tCO_2e/MWh).

- ET_y: Incremental quantity of fossil fuel, defined as difference of fossil fuel used in the baseline and fossil fuel used during the project, for energy requirement on site under project activity during the year y, in TJ.
- $CEF_{thermal,y}$: CO_2 emissions intensity of the thermal energy displaced during year "y" (tCO_2e/TJ).

The amount of methane actually destroyed/combusted during the year y ($MD_{project,y}$) is obtained by the formula provided by applied methodology.

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y}$$

where:
$MD_{flared,y}$ 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;
There is no heating activity in the proposed project, $MD_{thermal,y}$=0.

The amount of methane destruction by flaring can be estimated by the following formula:

$$MD_{flared,y} = (LFG_{flare,y} * w_{CH_4,y} * D_{CH_4}) - (PE_{flare,y} / GWP_{CH_4})$$

where:
$LFG_{flared,y}$ is the 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 (m^3CH_4/m^3LFG);
D_{CH4} methane density (tCH_4/m^3CH_4)
$PE_{flare,y}$ are the project emissions from flaring of the residual gas stream in year y (tCO_2e)
In the above formula, $LFG_{flared,y}$ and $w_{CH4,y}$ will be confirmed ex-post during project implementation. The value of D_{CH4} is under stand temperature and air pressure. D_{CH4} methane density=0.0007168 tCH_4/m^3CH_4.

The amount of methane destruction in power plant can be estimated by the following formula:

$$MD_{electricity,y} = LFG_{electricity,y} \times w_{CH4,y} \times D_{CH4}$$

where:
$LFG_{electricity,y}$ amount of landfill gas destruction in power plant. This value will be confirmed ex-post by monitoring process during project implementation.
The amount of regulatory requirements of methane destruction ($MD_{reg,y}$)=0 during the first commitment period because Chinese government will not enact laws or regulations to require reconstruction of landfill site in operation.

ACM0001 will require the future GHG emission reductions ex-ante by estimating landfill gas in the site. Taking into account that the amount of waste disposal varies among years, the formula derived from the First Order Decay (FOD) Model recommended by the Revised 1996 IPCC Guideline for National Greenhouse Gas Inventory is adopted to estimate the total amount of methane generated from Fouzhou Hongmiaoling landfill site. The formula applied by the Canyon Scholl Model is:

$$Q_{T,X} = A*R_x*Lo*k*(\exp(-k*(t-x)))$$

$Q_{T,X}$: amount of Methane produced (m^3 CH4/year)
R_x: amount of waste carried into the site in year x. x: the year of waste input;
k: Methane generation rate;
Lo: Methane generation potential (m^3 CH4/tonne MSW);
A: Normalization factor;
T: current year (year).

For the EL_y in the formula of emission reductions, the following formula is obtained:

$$EL_y = EL_{EX,LGFG} - EL_{IMP}$$

where:
$EL_{EX,LGFG}$ total amount of electricity exported out of the project boundary (MWh),
EL_{IMP} total amount of electricity imported to meet project requirement (MWh).

Calculation of Carbon Emission Factor ($CEF_{electricity,y}$)
According to the methodology of ACM0001, the GHG emission calculation from electricity generation of the proposed project should follow the instruction of AMS-I. D. All the dada employed in the calculation is based on available data from East China Power Grid following the published calculation of Chinese power grid emission factor by Chinese DNA. The baseline emission factor (EF_y) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following three steps:

STEP 1. Calculate the Operating Margin emission factor(s) ($EF_{OM,y}$)
Calculation of the Operating Margin should be based on one of the four following methods according to the instruction of ACM0002:

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

Although Dispatch Data Analysis should be considered the first methodology choice as required in the ACM0002, unavailability of detailed information in China, such as the dispatch data make method (c) not feasible for the calculation in China.

In China, specific data from the grid or each power plant is treated as business confidential and thus not publicly available. Therefore, the Simple adjusted OM (b) cannot be possibly used for the proposed project either.

Without any nuclear source, the East China Power Grid only possesses 5.25% of its total electricity generation that come from renewable energy sources in 2004, 7.48% in 2003, 10.33% in 2002, 10.70% in 2001, and 9.77% in 2000[5]. Hence, the low operating cost/must run sources is much less than 50% of the total grid generation, which accords with the defined condition of method (a), but not method (d). Consequently, Simple OM method is selected to calculate the Operating Margin emission factor of the proposed project.

Simple OM method is selected to calculate the Operating Margin emission factor of the proposed project.

[5] Source: China Power Year Book

The Simple OM emission factor (*$EF_{OM,simple,y}$*) is calculated as the generation-weighted average emissions per electricity unit (tCO_{2e}/MWh) of all generating sources serving in the system, excluding low-operating cost and must-run power plants:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_j GEN_{j,y}}$$

Where:

$F_{i,j,y}$: the amount of fuel i consumed by relevant power sources j in year(s) y.

$COEF_{i,j,y}$: the CO_2 emission coefficient of fuel i, taking into account the carbon content of fuels used by relevant power sources j and the percentage oxidation of the fuel in year(s) y;

$GEN_{j,y}$: the electricity delivered to the grid by source j in year y.

The CO_2 emission coefficient is equal to the net calorific value of fuel i, multiplied by the oxidation factor of the fuel i and the CO_2 emission factor per unit of energy of the fuel i.

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$$

NCV_i *:* is the net calorific value of fuel *i* that is specified by countries;
$OXID_i$ *:* is the oxidation factor of the fuel. IPCC default values are used.
$EF_{CO2,i}$, : is the CO_2 emission factor per unit of energy of the fuel *i* (tCO_2e/TJ). IPCC default values are used.

STEP 2. Calculate the Build Margin emission factor (*$EF_{BM,y}$*)

According to ACM0002, the Build Margin Emission Factor is calculated as the generation-weighted average emission factor (measured in tCO_{2e} /MWh) of a sample of m power plants:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m,y}}{\sum_m GEN_{m,y}}$$

Where

$F_{i,m,y}$, $COEF_{i,m,y}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method in step a for plants m.

Option 1, calculate the Build Margin emission factor $EF_{BM,y}$, ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submissions was selected for the proposed project.

According to the consolidated baseline methodology ACM0002, the sample group *m* consists of either (1) the five power plants built most recently, or (2) the power plants capacity additions in the electricity system comprising 20% of the system generation (in MWh) and that have been built most recently. It is suggested that the sample group that comprises the larger annual generation should be used.

However, it is very difficult to obtain the data of the five power plants built most recently because these data are considered as confidential information by the company itself and the Grid in China. Taking notice of this situation, EB accepts the following deviation in methodology application[6]:

The calculation applied here follows the method of a relevant deviation of methodology approved by the EB, calculating the new capacity additions and the proportion of each component. Then the capacity weight of each component can be worked out. Based on the efficiency factor representing best technology commercially available for fossil fuel fired power plants, the Build Margin emission factor of the proposed project will be calculated.

1) Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity.

2) Use of weights estimated using installed capacity in place of annual electricity generation.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

In this PDD, as required, capacity additions of the East China Grid during 2001~2004[7] were used for estimating the Build Margin emission factor for grid electricity and the 600 MW sub-critical coal-fired power generator was used as the proxy of efficiency level of the best technology in China[8].

STEP 3. Calculate the baseline emission factor *EF_y*

The Baseline Emission Factor is calculated as a Combined Margin, using a weighted average of the Operating Margin and Build Margin.

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

The defaults weights are used, i.e. each of the Operating Margin and Build Margin is weighted equally.

$w_{OM} = w_{BM} = 0.5$

Baseline scenario

The baseline scenario of the proposed project is confirmed that the methane in the landfill gas generated will not be captured and utilized and the landfill gas generated will be totally released to atmosphere.

Project Emissions

The Methodology clearly states that possible CO_2 emissions, resulting from other fuels than the recovered methane, should be accounted as project emission. Hence, this has not to be taken into account for the proposed project activity as no other fuels are used within the project boundary. When the project generates electricity, there is a net export of electricity to the grid and the project emissions from its electricity use are deducted from the emission reductions from its electricity generation. In this case the project emissions are zero.

6 Http://cdm.unfccc.int/Projects/Deviations.

7 Capacity additions during 2001~2004 are most close to 20% of the electricity system. See Annex 3 for details.

8 Http://www.ccchina.gov.cn/source/fa/fa2002082803.html.

Leakage

No leakage effects need to be accounted under this methodology

All equations applied to obtain the emission reduction from the project activity are listed in Section B.6.3.

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

>>

Data / Parameter:	**EF_{OM}**
Data unit:	tCO_2e/ MWh
Description:	Operating Margin Emission Factor
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	0.9411
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance
Any comment:	

Data / Parameter:	**EF_{BM}**
Data unit:	tCO_2e/ MWh
Description:	Build Margin Emission Factor
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	0.7671
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance.
Any comment:	

Data / Parameter:	**NCV_i**
Data unit:	MJ / tonne or km^3
Description:	Net Calorific Value of fossil fuel type *I* consumed by the power plants in the grid
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	N/A
Justification of the choice of data or description of measurement methods	According to the updated Baseline Emission Factors for Power Grids in China.

and procedures actually applied :	
Any comment:	

Data / Parameter:	**$EF_{CO2,i}$**
Data unit:	tc/TJ
Description:	CO2 emission factor of fossil fuel type *I* consumed by the power plants in the grid
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	N/A
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the updated Baseline Emission Factors for Power Grids in China.
Any comment:	

Data / Parameter:	**Carbon Oxidation Factor**
Data unit:	%
Description:	Carbon Oxidation Factor of fossil fuel type *I* consumed by the power plants in the grid
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	N/A
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the updated Baseline Emission Factors for Power Grids in China.
Any comment:	

Data / Parameter:	**L_0**
Data unit:	Nm^3CH_4/Mg of waste
Description:	Potential CH_4 generation capacity
Source of data used:	
Value applied:	159.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	L_0 is a constant that represents the potential capacity of a landfill to generate CH_4.
Any comment:	

Data / Parameter:	**k**

Data unit:	$year^{-1}$
Description:	Rate of methane generation
Source of data used:	
Value applied:	0.05
Justification of the choice of data or description of measurement methods and procedures actually applied :	k is a constant that determine the rate of landfill gas generation. The first-order decomposition rate assumes that k value before and after peak landfill gas generation are the same.
Any comment:	

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

>>

Based on the data of waste amount, the estimated LFG generation from the beginning year of disposal to the end of the crediting year shows in the table below by applying the Canyon Scholl Model.

Waste disposal and LFG volume estimation

Year	Annual Waste (tonne)	Cumulative Waste (tonne)	Year of disposal	Year of Crediting	LFG (m^3/year)
1995	66,700	66,700	1	x	x
1996	387,700	454,400	2	x	1,093,336
1997	407,100	861,500	3	x	7,720,964
1998	452,500	1,314,000	4	x	14,359,666
1999	508,800	1,822,800	5	x	21,456,939
2000	501,100	2,323,900	6	x	29,178,250
2001	524,400	2,848,300	7	x	36,390,301
2002	578,500	3,426,800	8	x	43,652,127
2003	609,000	4,035,800	9	x	51,492,056
2004	647,900	4,683,700	10	x	59,475,211
2005	682,300	5,366,000	11	x	67,739,359
2006	726,500	6,092,500	12	x	76,193,249
2007	320,000	6,412,500	13	x	84,966,505
2008	0	6,412,500	14	1	86,365,503
2009	0	6,412,500	15	2	82,153,407
2010	0	6,412,500	16	3	78,146,738
2011	0	6,412,500	17	4	74,335,477
2012	0	6,412,500	18	5	70,710,093
2013	0	6,412,500	19	6	67,261,521
2014	0	6,412,500	20	7	63,981,138
2015	0	6,412,500	21	8	60,860,741
2016	0	6,412,500	22	9	57,892,528
2017	0	6,412,500	23	10	55,069,076

The table below shows the emission reductions that would take place in the project scenario ($MD_{project}$), using the equations described above as well as key parameters in determining the emission reductions.

Parameters and calculations in determining annual average methane

	Parameters	Unit	Average in Crediting Period	Sources or Formulae
A	$LFG_{total,y}$	m^3	69,677,622	Model Predicted Value
B	CH_4 Concentration	%	45	Feasibility Study Report
C	Density of CH_4	t CH_4/m^3 CH_4	0.0007168	Default Value
D	Gas collection efficiency	%	30	Feasibility Study Report
E	$MD_{total,y}$	tCH_4	6,743	E=A*B*C*D

Determination of methane destruction in power plant by the project activity(project developer)

	Parameters	Unit	Average in Crediting Period	Source or Formula
A	Project Installed Capacity	MW	2.5	Feasibility Study Report
B	Operation Hours	h	7300	Feasibility Study Report
C	Caloric value of electricity	kJ/kWh	3600	Default Value
D	Caloric value of methane	GJ/m3	0.037	Default Value
E	Power generation efficiency of the gas engine	%	35	Feasibility Study Report
F	Density of CH_4	t CH_4/m^3 CH_4	0.0007168	Default Value
G	$MD_{electricity,y}$	tCH_4	3,637	G=A*B*C/D/E/1000*F

Methane destroyed in the project scenario:

In the case that the power generation units are under maintenance and/or landfill gas captured exceed the demand for power generation, the remaining part of the landfill gas will be fed into flare to be destructed. Therefore, the annual amount of methane destruction by flaring can be estimated by the following formula:

$$MD_{flared,y} = (LFG_{flare,y} * w_{CH_4,y} * D_{CH_4}) - (PE_{flare,y} / GWP_{CH_4})$$

$PE_{flare,y}$ are the project emissions from flaring of the residual gas stream in year y (tCO_2e) determined following the procedure described in the “Tool to determine project emissions from flaring gases containing Methane”.

According to the description in methodological tool, the project emissions from flaring gases are calculated as follows:

$$PE_{flare,y} = \sum_{i=1}^{8760} TM_{RG,h} ? \ (1 \quad h_{flare,h}) \square \frac{GWP_{CH4}}{1000}$$

where:

$PE_{flare,y}$ is project emissions from flaring of the residual gas stream in year y (tCO_2e)

$TM_{RG,h}$ is mass flow rate of methane in the residual gas in the hour *h* (kg/h)

$\eta_{flare,h}$ is flare efficiency in hour *h*
GWP_{CH4} is Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

The proposed project will adopt the enclosed flares and use the default value for the flare efficiency, the flare efficiency in the hour h ($\eta_{flare,h}$) is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500°C for more than 20 minutes during the hour *h*.
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) 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 (T_{flare}) 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*.

The flare efficiency used in the ex-ante estimation of the proposed project is 90%.

The quantity of methane flow rate in the residual gas flowing into the flare is calculated as following:

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n}$$

where:
$TM_{RG,h}$ is mass flow rate of methane in the residual gas in the hour *h* (kg/h)
$FV_{RG,h}$ is volumetric flow rate of the residual gas in dry basis at normal conditions in hour *h* (m^3/h)
$fv_{CH4,RG,h}$ is volumetric fraction of methane in the residual gas on dry basis in hour *h* (50%)
$\rho_{CH4,h}$ is density of methane at normal conditions (0.716 kg/ m^3)

In the case that the power generation units are under maintenance and/or landfill gas captured exceed the demand for power generation, the remaining part of the landfill gas will be fed into flare to be destructed. Therefore, the average amount of methane destruction by flaring estimated by Canyon Scholl Model (First Order Decay Model, IPCC Reference Manual 1996)) is 2,795tCH_4 per year.

The methane destructed by the project activity is calculated as follows:

	Parameters	Unit	Average in Crediting Period	Sources or Formulae
A	$MD_{electricity,y}$	tCH_4	3,637	Model predicted value
B	$MD_{flare,y}$	tCH_4	2,795	Model predicted value
C	$MD_{project,y}$	tCH_4	6,432	C=A+B

Methane destructed in the baseline scenario:

No compulsory regulations mandate collection and utilization of landfill gas in China. A huge amount of investment is required for landfill reconstruction. Therefore, the Chinese Government are not likely to enforce any legislation of executing landfill reconstruction. The adjustment factor AF was set at 0%.

Determination of methane destructed in the baseline scenario

	Parameters	Unit	Average in Crediting Period	Sources or Formulae
A	$MD_{project,y}$	tCH_4	6,432	Model predicted value
B	AF	%	0	Present Chinese Regulation
C	$MD_{reg,y}$	(tCH_4)	0	C=A*B

Electricity displacement of the grid:

The emission factor applied in the project is an ex-ante estimated baseline CEF. Parameters and calculations in determining baseline emission of power generation are as follows:

	Parameters	Unit	Average in Crediting Period	Sources or Formulae
A	$EL_{EX,LGFG}$	MWh	10,094	Feasibility Study Report
B	EL_{IMP}	MWh	584	Feasibility Study Report
C	EL_y	MWh	9,510	C=A-B
D	OM	tCO2e /MWh	0.9411	Chinese Emission Factor
E	BM	tCO2e /MWh	0.7671	Chinese Emission Factor
F	$CEF_{electricity,y}$	tCO2e /MWh	0.8541	F=D*0.5+E*0.5
G	Emissions in the baseline scenario of electricity displacement	tCO2e	8,122	G＝C*F

Leakage:

According to the methodology, no leakage calculation is required. Therefore, the leakage of the project activity is zero.

$$L_{Py} = 0$$

The emission reductions of the project are calculated by using the following equation:

$$ER_y = \left(MD_{project,y} - MD_{reg,y}\right) * GWP_{CH4} + EG_y * CEF_{electricity,y}$$

Parameters and calculations in determining emission reduction are as follows:

	Parameters	Unit	Average in Crediting Period	Sources or Formulae
A	$MD_{project,y}(tCH_4)$	tCH_4	6,432	Model predicted value
B	$MD_{reg,y}(tCH_4)$	tCH_4	0	Present Chinese Regulation
C	GWP of CH_4		21	IPCC Default Value
D	EG_y(MWh)	MWh	9,510	Calculation
E	$CEF_{electricity,y}$ (tCO2e /MWh)	tCO2e /MWh	0.8541	National Emission Factor
F	Project Emission	tCO2e	143,194	F=(A-B)*C+D*E

	Reduction(tCO2e)			

Therefore, the annual average emissions reductions of the project in the crediting period are 143,194 tCO2e.

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

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Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2008	**173,714**	**0**	**0**	**173,714**
2009	**166,011**	**0**	**0**	**166,011**
2010	**158,683**	**0**	**0**	**158,683**
2011	**151,712**	**0**	**0**	**151,712**
2012	**145,082**	**0**	**0**	**145,082**
2013	**138,775**	**0**	**0**	**138,775**
2014	**132,775**	**0**	**0**	**132,775**
2015	**127,068**	**0**	**0**	**127,068**
2016	**121,640**	**0**	**0**	**121,640**
2017	**116,476**	**0**	**0**	**116,476**
Total (tonnes of CO_2 e)	**1,431,936**	**0**	**0**	**1,431,936**

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 amount of LFG captured
Source of data to be used:	Project Developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	20,903,287
Description of measurement methods and procedures to be applied:	Data will be measured continuously with a flow meter by the project developer. The flow meter will be maintained and calibrated regularly in line with the manufacturer's requirements. This will ensure that the accuracy of the measurement instrument is maintained. Data to be aggregated monthly and yearly.
QA/QC procedures to be applied:	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment:	

Data / Parameter:	**$LFG_{electricityy}$**
Data unit:	m^3
Description:	The total quantity of LFG for power generation
Source of data to be used:	Project Developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10,146,718
Description of measurement methods and procedures to be applied:	Data will be measured continuously with a flow meter by the project developer. The flow meter will be maintained and calibrated regularly in line with the manufacturer's requirements. This will ensure that the accuracy of the measurement instrument is maintained. Data to be aggregated monthly and yearly.
QA/QC procedures to be applied:	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment:	

Data / Parameter:	**$LFG_{flare,y}$**
Data unit:	m^3
Description:	The total quantity of LFG for flaring
Source of data to be used:	Project developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10,756,569
Description of measurement methods and procedures to be applied:	Data will be measured continuously with a flow meter by the project developer. The flow meter will be maintained and calibrated regularly in line with the manufacturer's requirements. This will ensure that the accuracy of the measurement instrument is maintained. Data to be aggregated monthly and yearly.
QA/QC procedures to be applied:	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment:	

Data / Parameter:	**$PE_{flare,y}$**
Data unit:	tCO2e
Description:	Project emissions from flaring of the residual gas stream in year y
Source of data to be used:	Measured and calculated
Value of data applied for the purpose of calculating expected	N/A

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The parameters should be monitored as per the "*Tool to determine project emissions from flaring gases containing Methane*"
QA/QC procedures to be applied:	Meters and equipments will be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment:	

Data / Parameter:	$\mathbf{w_{CH4}}$
Data unit:	m^3 CH_4 / m^3 LFG
Description:	Methane fraction in the LFG
Source of data to be used:	Project Developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	45%
Description of measurement methods and procedures to be applied:	Methane content will be measured continuously with a fixed gas analyser by the project developer. The gas analyser will be maintained and calibrated regularly in line with the manufacturer's requirements in order to ensure that factory standards of accuracy are maintained.
QA/QC procedures to be applied:	The gas analyser should be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment:	

Data / Parameter:	**Degree**
Data unit:	C^0
Description:	Temperature of the landfill gas
Source of data to be used:	Measured by thermometer
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 of the landfill gas is measured by thermometer and recorded monthly.
QA/QC procedures to be applied:	Meter shall be operated and maintained as per the specifications prescribed by the manufacturer.

Any comment:	

Data / Parameter:	*P*
Data unit:	Pa
Description:	The pressure of landfill gas
Source of data to be used:	Project developer
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:	Pressure of the landfill gas is measured by pressure meter and recorded monthly
QA/QC procedures to be applied:	Meter shall be operated and maintained as per the specifications prescribed by the manufacturer.
Any comment:	

Data / Parameter:	$EG_{EX,LFG}$
Data unit:	MWh
Description:	Total amount of electricity exported out of the project
Source of data to be used:	Project developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10094
Description of measurement methods and procedures to be applied:	Required to monitor the emission reductions from electricity generation from LFG, and to cross-check the measurement against the sales receipts. Electricity will be measured continuously using an electricity meter that will be maintained and calibrated regularly to assure high levels of accuracy. The precision of the meter is 0.2s.
QA/QC procedures to be applied:	Electricity meter will be maintained and calibrated regularly to ensure that the accuracy of the measurement instrument is maintained
Any comment:	

Data / Parameter:	EL_{IMP}
Data unit:	MWh
Description:	Total amount of electricity imported to meet project requirements
Source of data to be used:	Grid operator
Value of data applied	584

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Required to determine CO_2 emissions from use of electricity or other energy carriers to operate the project activity. The records of any electricity imported in the baseline also should be recorded at the start of project. The precision of the meter is 0.2s.
QA/QC procedures to be applied:	Measurements are to be cross-checked with sales receipts. Electricity meter is to be maintained and calibrated regularly to ensure that the accuracy of the measurement instrument is maintained.
Any comment:	

Data / Parameter:	**Regulatory requirements relating to landfill gas projects**
Data unit:	%
Description:	Regulatory requirements relating to landfill gas projects
Source of data to be used:	National legislation and mandatory regulations
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	There is no enforced regulation in China on the LFG collection and ultilization.
QA/QC procedures to be applied:	Check enforced regulations in China
Any comment:	

Data / Parameter:	**Operation hours of the power plant**
Data unit:	hour/year
Description:	Operation hours of the power generation plant
Source of data to be used:	Project developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	7300

Description of measurement methods and procedures to be applied:	Data will be monitored and recorded by the project developer to ensure methane destruction is claimed for methane used in electricity plant when it is operational.
QA/QC procedures to be applied:	Equipment will be operated and maintained in line with manufacturer's recommendations to assure high quality output.
Any comment:	

Data / Parameter:	$\mathbf{fv_{CH4,RG,h}}$
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 analyzer
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:	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 C 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.

Data / Parameter:	$\mathbf{FV_{RG,h}}$
Data unit:	m^3/h
Description:	volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h
Source of data to be used:	Measured by project participants using a flow meter
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 C Degree

QA/QC procedures to be applied:	Flow meters are to be periodically calibrated according to the manufacturer's recommendation.
Any comment:	

Data / Parameter:	$\mathbf{T_{flare}}$
Data unit:	C^0
Description:	Temperature in the exhaust gas of the flare
Source of data to be used:	Measured 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:	Measure the temperature of the exhaust gas stream in the flare by a Type N thermocouple. A temperature above 500 C° indicates that a significant amount of gases are still being burnt and that the flares are operating.
QA/QC procedures to be applied:	Thermocouples should be replaced or calibrated every year.
Any comment:	

Data / Parameter:	**Other flare operation parameters**
Data unit:	tCO2e
Description:	This should include all data and parameters required to be monitored whether the flare operators within the range of operating conditions are in accordance to the manufacturer's specifications
Source of data to be used:	Measured 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:	Measured and recorded by the project participants according to requirements of the methodology
QA/QC procedures to be applied:	Meter shall be operated and maintained as per the specifications prescribed by the manufacturer.
Any comment:	Only applicable in case of a default value

B.7.2. Description of the monitoring plan:

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1.Introduction of Monitoring Plan

This Monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of projected greenhouse gas (GHG) emission reductions for the proposed project are well managed and reported. This requires an on-going monitoring of the project to guarantee a performance according to its design and that claimed Certified Emission Reductions (CERs) are actually achieved.

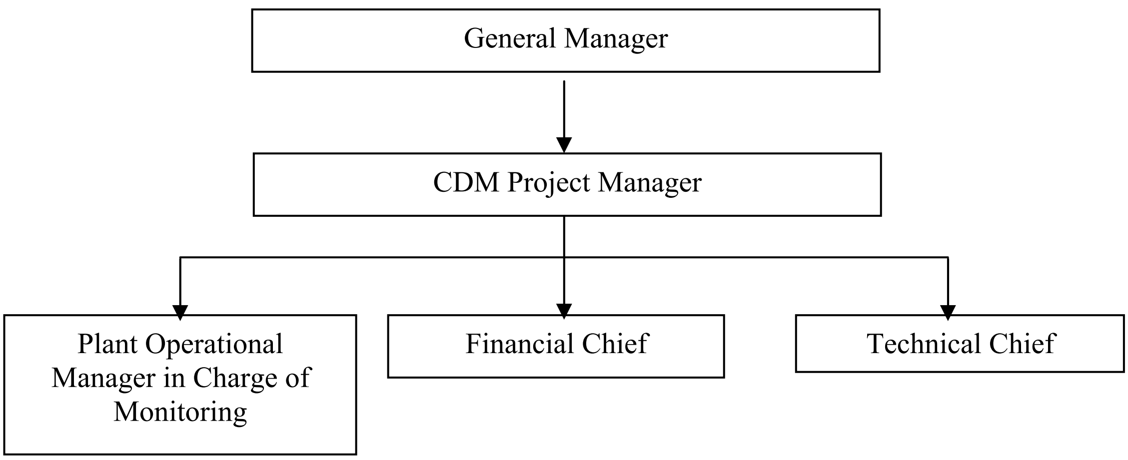
The monitoring plan of the proposed project is a guidance document that provides the set of procedures for preparing key project indicators, tracking and monitoring the impacts of the proposed project. The monitoring plan will be used throughout the defined crediting period for the project to determine and provide documentation of GHG emission impacts from the proposed project. This monitoring plan fulfils the requirement set out by the Kyoto Protocol that emission reductions projects under the CDM have real, measurable and long-term benefits and that the reductions in emissions are additional to any that would occur in the absence of the certified project activity.

The monitoring plan provides the requirements and instructions for:

- Establishing and maintaining the appropriate monitoring systems for both flaring and electricity generation component of the project;
- Quality control of the measurements;
- Procedures for the periodic calculation of GHG emission reductions;
- Assigning monitoring responsibilities to personnel;
- Data storage and filing system;
- Preparing for the requirements of an independent, third party auditor or verifier.

2. User of the Monitoring Plan

The responsibilities for carrying out these tasks are illustrated in the table below:
The Project Developer has designated the General Manager of Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. to be responsible for the monitoring activities and act as the focal point with doe. The data will be monitored and recorded by qualified technicians according to the monitoring plan. All the technicians will receive proper training to ensure they understand their specific tasks and handling of equipment. The records will be double checked by the Operational Manager of the proposed project who will be responsible for accuracy and frequency of the measurements. The data will be kept both in computer and hard copy in a transparent system. Receipts of electricity sales will be obtained.



3. Key definitions

The monitoring plan will use the following definitions of monitoring and verification.
Monitoring: the systematic surveillance of the project's performance by measuring and recording performance-related indicators relevant in the context of GHG emission reductions.
Verification: the periodic ex-post auditing of monitoring results, the assessment of achieved emission reductions and of the project's continued conformance with all relevant project criteria by a selected Designated Operational Entity (DOE).

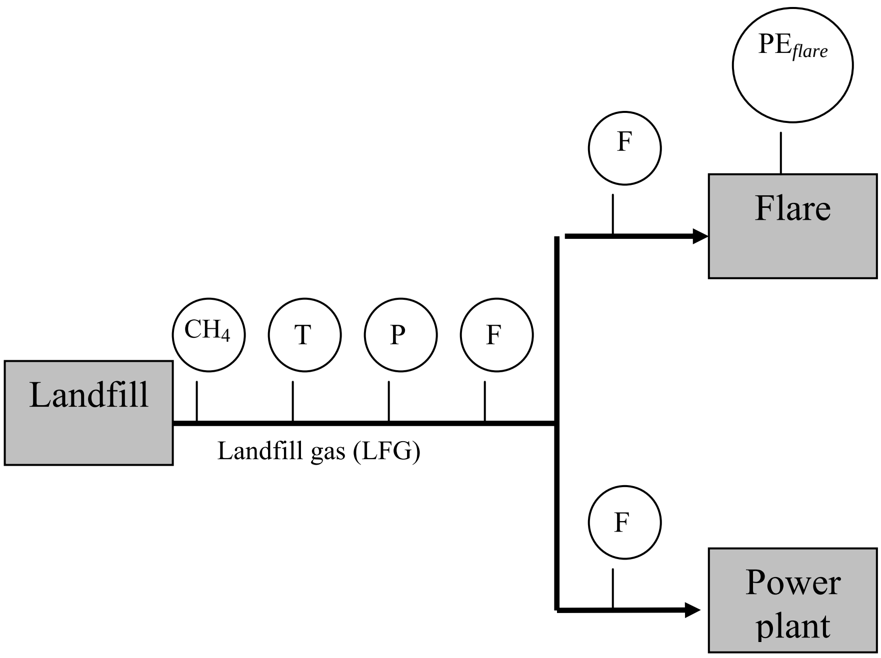
4. Monitoring & Calibration
The monitoring plan details the actions necessary to record all the variables and factors required by the methodology ACM0001, as detailed in this section of the PDD.

To ensure accuracy, an agreement on measurement arrangement and quality control process is to be signed between the project developer and the electricity grid company. Equipment of measurement is to be yearly checked and calibrated to ensure accuracy. The project owner will prepare backup procedures to deal with any errors occurred to the meters. If there is any error, the project owner and the electricity grid company will decide the electricity quantity of the grid according to the error disposal procedures.

The electricity grid company is to verify the electricity quantity and to provide the records to the developer. The records are to be preserved by the developer and the third party nominated.

The metering equipments used for monitoring LFG such as flow meter, online catharometer and temperature pickup shall be calibrated and checked for accuracy, the frequency of which will be strictly follow the National Calibration Standard.

Measurements:
CH_4 = Fraction of CH_4
T = Temperature
P = Pressure
F = Flow of LFG (m^3)
PE_{flare} = Project emissions from flaring of the residual gas stream



5. Quality Assurance and Quality Control
The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity. This is an on-going process that will be ensured through the CDM in terms of the need for verification of the emissions on an annual basis according to this PDD and the CDM manual.

6. Data Management System
This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation to the monitoring process. Without accurate and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records would be managed.

Overall responsibility for monitoring of GHG emissions reduction will rest with the CDM responsible person of the proposed project. The CDM manual sets out the procedures for tracking information from the primary source to the end-data calculations in paper document format. It is the responsibility of the proposed project owner to provide additional necessary data and information for validation and verification requirements of respective DOE. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. All paper-based information will be stored by the proposed project owner and kept at least one copy.

7. Verification and Monitoring Results
The verification of the monitoring results of the project is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD. It is expected that the verification will be done annually.

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

>>
Date of completion of baseline study and monitoring methodology: 31/1/2007

Name of person/entity determining the baseline:

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Email: gyisong@easy-carbon.com

The personnel above are not Project Participants of the proposed project.

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:

>>
30/09/2006 (start construction)

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

>>
15 years

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

C.2.1. Renewable crediting period

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

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>
Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/06/2008

C.2.2.2. Length:

>>
10 (ten) years

SECTION D. Environmental impacts

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

>>
An Environmental Impact Assessment of the proposed project was conducted by Fuzhou City Environmental Science Research Institute of Fujian Province in October 2005. The analysis of the impacts is demonstrated in the following texts:

Impact on Air
In the construction period, dusts will be produced from the on-site construction and waste air emitted from the machines and vehicles. However, the volume of these wastes is very small, which will have insignificant impact to environment. In the operation period, the project will have a significant positive effect on the existing local air quality, as landfill gas from the site is currently disposed without any control being vented directly to the atmosphere. The recovery of landfill gas due to the project will prevent the gas from permeating the surroundings. Some of the apparent benefits to be achieved are notable reduction of odour nuisance and greenhouse gas emissions. There will also be a remarkable decrease of the potential for fire and explosion due to methane accumulated in the landfill.

Impact from Noise
There are no residents near the site of the proposed project. When the proposed project is put into delivery, there will be some increase in noise from the site associated with energy recovery, though the engines will be optimally placed to mitigate noise emissions. The impacts are likely to be insignificant given that the noises are typically associated with operations at the landfills. The equipment selected is state-of-the-art with low noise level, and measures of sound proof and shock absorption will be undertaken. Noises of the project site will fall into the Category II of “the Industrial Company and Factory Noise Standards” (GB12348-90 II).

Impact on Water
In the process of LFG collecting, some water will be produced due to the condensing effect. This water could be emitted to the landfill directly and the amount is very little, which will not have impact to the local environment.

Impact from Solid Waste
The operation of the proposed project will not yield any solid waste. However, the employee of the proposed project at the site will produce a small amount of household solid waste, which will not be more than 4.38 tonnes per year. These solid wastes will be filled into the landfill and has no significant impact to environment.

Bio-environmental Impact
The site of the proposed project is not in bio-environment sensitive area. The surrounding of the impact brought by the proposed project will be less than 20km^2. Plants in a small area will be affected by the construction. After the construction, replantation will be conducted, and all the bare ground will be planted with vegetables. Therefore, the impact of the proposed project to local bio-environment is not significant.

The research concludes that the proposed project will not cause significant negative environmental impact. On the contrary, by avoiding methane emissions to the air, the surrounding air and safety could be improved. Therefore, the local environment could be positively affected by the proposed project.

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

>>

The environmental impacts of the Fuzhou Hongmiaoling Landfill Gas to Electricity Project are not considered significant.

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SECTION E. Stakeholders' comments

>>

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

>>

To guarantee a successful implementation of the proposed project with the interests of stakeholders being taken into account, the project developer has sent out in 2005 some questionnaires to the stakeholders in the surrounding area of Fuzhou Hongmiaoling Landfill Gas to Electricity Project for comments of the proposed project construction as an important section of the EIA report. The interviewees are nearby villagers, employees of the Fuzhou Hongmiaoling Landfill and staffs of local district government. 50 copies of questionnaire were distributed, and 47 pieces of reply were received, through which show a quite positive attitude towards the proposed project.

The information of the interviewees:

Age	18-30	30-40	40-50	50-60	Above 60
	5	10	18	13	1
Education level of the interviewee	Middle school	High school	College	Others	
	30%	28%	12%	30%	
Gender	Male			Female	
	60%			40%	

E.2. Summary of the comments received:

>>

Summary of the survey is:

1. Awareness of the proposed project:

85% of the interviewees heard about the proposed project and 15% did not know the project. After the surveyors introduced and explained the proposed project to them, they all have got a certain degree of knowledge of the proposed project.

2. Attitudes towards the project construction

64% of the interviewees show full agree to the proposed project and believe the proposed project will bring significant social benefits and environmental benefits; 32% shows agree to the project construction; 13% shows some doubt about the environmental benefits; 2% of the interviewees don't care about the construction.

3. Concerned issues on impacts during construction

55% of the interviewees concern about the problem of ecological damage, 30% concern about the noise impact, and 15% concern about the pollution from construction waste.

4. Environmental issues concerned after the construction

50% of the interviewees think the project may raise some environmental problems such as malodor and waste gas pollution. 30% of the interviewees think it may ruin the ecology, 20% pay most attention to the noise from the power plant operation. .

5. Impacts on public benefits of the project construction

"Whether your benefits will be impacted by the project construction?" When this question is asked, 83% of the interviewees indicate no negative impact from the proposed project. 17% think its impacts are small, but none of them consider the impacts serious.

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

>>

It could be learned from the survey summary that most stakeholders investigated support the construction of the project. In addition, the economic and environment improvements brought by the proposed project are largely considered positive. The biggest concern is on the pollution from the project, which has been well considered and resolved in the EIA report, which has been approved by the local government. In general, the local community possesses strong positive comments on the effects that the project activity will make on the local economy and infrastructure. There consequently has no reason to modify the plans due to comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.
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Title:	President
Salutation:	Mrs.
Last Name:	Kazuko
Middle Name:	

First Name:	Nadaka
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the Fuzhou Hongmiaoling Landfill Gas to Electricity Project.

Annex 3

BASELINE INFORMATION

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All the tables related to the calculation of baseline emission reduction are presented below:

Table A1. Simple OM Emission Factor of East China Power Grid in 2002

Fuel types	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Subtotal	Emission Factor (tc/TJ)	Oxidation rate (%)	Average low Caloric value (MJ/t,km³)	CO_2 emission （tCO_2e） J=G*H*I*F*44/12/10000（unit of mass）
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J=G*H*I*F*44/12/1000 (unit of volume)
Raw coal	10000 ton	2386	5674.69	2923.66	2025.05	1336.49	**14345.89**	25.8	98	20908	278071961.3
Cleaned coal	10000 ton						**0**	25.8	98	26344	0
Other washed coal	10000 ton						**0**	25.8	98	8363	0
Coke	10000 ton						**0**	29.5	98	28435	0
Coke oven gas	10^8m^3	2.23	0.02				**2.25**	13	99.5	16726	178489.4183
Other coal gas	10^8m^3	66.82					**66.82**	13	99.5	5227	1656520.577
Crude oil	10000 ton						**0**	20	99	41816	0

Gasoline	10000 ton		0.07				**0.07**	18.9	99	43070	2068.432443
Diesel	10000 ton	1.21	13.45	30			**44.66**	20.2	99	42652	1396741.747
Fuel oil	10000 ton	53.2	1.19	91.38	1.09	12.6	**159.46**	21.1	99	41816	5107205.431
LPG	10000 ton						**0**	17.2	99.5	50179	0
Refinery gas	10000 ton	0.84					**0.84**	18.2	99.5	46055	25687.50785
Natural gas	10^8m^3						**0**	15.3	99.5	38931	0
Other oil product	10000 ton	10	3.47				**13.47**	20	99	38369	3752188.922
Other coking product	10000 ton						**0**	25.8	98	28435	0
Other fuel	10000 tce	3		10.4			**13.4**	0	0	0	0
										Subtotal	290190863

China Energy Statistical Yearbook 2005

Table A2. Thermal Power Generation of East China Power Grid in 2002

Province	Power Generation （10^8kWh)	Power Generation （MWh)	Ratio of Self Power Consumption of Plant （%）	Power Supply （MWh)
Shanghai	616.48	61648000	5.44	58294348.8
Jiangsu	1167.16	116716000	6.09	109607995.6
Zhejiang	692.87	69287000	5.95	65164423.5
Anhui	457.03	45703000	6.36	42796289.2
Fujian	308.5	30850000	6.68	28789220
Total				304652277

China Power Yearbook 2003

Table A3. Emission Factor of East China Power Grid in 2002

	Parameter	Unit	Value	Source
A	Net Import from Central China Power Grid to East China Power Grid (MWh)	MWh	7883000	China Power Yearbook 2003
B	Total Emissions of Central China Power Grid	tCO_2e	215081402.8	Calculation based on data from China Power Yearbook and China Energy Statistical Yearbook
C	Total Power Supply of Central China Power Grid	MWh	295691680.7	China Power Yearbook 2003
D	Average Emission Factor of Central China Power Grid	tCO_2e/MWh	0.727384018	D=B/C
E	Total Power Supply of East China Power Grid	MWh	312535277.1	E=Total Power Generation of East China Power Grid＋A
F	Total Emissions of East Power Grid	tCO_2e	295924831.5	
G	Emission Factor of East China Power Grid	tCO_2e/MWh	0.946852574	G=F/E

Table A4. Simple OM Emission Factor of East China Power Grid in 2003

Fuel types	**Unit**	**Shanghai**	**Jiangsu**	**Zhejiang**	**Anhui**	**Fujian**	**Subtotal**	**Emission Factor （tc/TJ）**	**Oxidation rate （%）**	**Average low Caloric value （MJ/t,km³）**	**CO_2 emission （tCO_2e） J=G*H*I*F*44/12/10000（unit of mass）**
		A	**B**	**C**	**D**	**E**	**F=A+B+C+D+E**	**G**	**H**	**I**	**J=G*H*I*F*44/12/1000 (unit of volume)**
Raw coal	10000 ton	2618	6417.74	3442.4	2669.67	1754	**16901.81**	25.8	98	20908	327614351.9

Cleaned coal	10000 ton						**0**	25.8	98	26344	0
Other washed coal	10000 ton						**0**	25.8	98	8363	0
Coke	10000 ton						**0**	29.5	98	28435	0
Coke oven gas	10^8m^3	1.99	0.06				**2.05**	13	99.5	16726	162623.6922
Other coal gas	10^8m^3	66.34					**66.34**	13	99.5	5227	1644620.998
Crude oil	10000 ton						**0**	20	99	41816	0
Diesel	10000 ton	1.26	14.71	13.99			**29.96**	20.2	99	42652	936999.1654
Fuel oil	10000 ton	95.49	0.76	174.48		18.89	**289.62**	21.1	99	41816	9275986.686
LPG	10000 ton						**0**	17.2	99.5	50179	0
Refinery gas	10000 ton	0.49	0.96				**1.45**	18.2	99.5	46055	44341.5314
Natural gas	10^8m^3						**0**	15.3	99.5	38931	0
Other oil product	10000 ton	18.91	5.3	15.04			**39.25**	20	99	38369	1093343.84
Other coking product	10000 ton						**0**	25.8	98	28435	0
Other fuel	10000 tce	5.68		7.08			**12.76**	0	0	0	0
										Subtotal	340772267.9

China Energy Statistical Yearbook 2004

Table A5. Thermal Power Generation of East China Power Grid in 2003

Province	Power Generation （10^8kWh)	Power Generation （MWh)	Ratio of Self Power Consumption of Plant （%）	Power Supply （MWh)
Shanghai	694.44	69444000	5.14	65874578
Jiangsu	1332.77	133277000	5.9	125413657
Zhejiang	830.89	83089000	5.31	78676974

Anhui	541.56	54156000	6.06	50874146
Fujian	421.46	42146000	5.07	40009198
Total				360848554

China Power Yearbook 2004

Table A6. Emission Factor of East China Power Grid in 2003

	Parameter	Unit	Value	Source
A	Net Import from Central China Power Grid to East China Power Grid (MWh)	MWh	13756040	China Power Yearbook 2004
B	Total Emissions of Central China Power Grid	tCO_2e	270902650	Calculation based on data from China Power Yearbook and China Energy Statistical Yearbook
C	Total Power Supply of Central China Power Grid	MWh	352435719.2	China Power Yearbook 2004
D	Average Emission Factor of Central China Power Grid	tCO_2e/MWh	0.768658326	D=B/C
E	Import from Shanxi Yangcheng to East China Power Grid (MWh)	MWh	10705870	
F	Emission Factor of Shanxi Yangcheng	tCO_2e/MWh	0.949779554	
G	Total Power Supply of East China Power Grid	MWh	385310463.7	G=Total Power Generation of East China Power Grid＋A+E
H	Total Emissions of East Power Grid	tCO_2e	361514179	
I	Emission Factor of East China Power Grid	tCO_2e/MWh	0.93824127	I=H/G

Table A7. Simple OM Emission Factor of East China Power Grid in 2004

Fuel types	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Subtotal	Emission Factor	Oxidation rate	Average low Caloric value	CO_2 emission （tCO_2e）

								（tc/TJ ）	（%）	（MJ/t,km^3）	**J=G*H*I*F*44/12 /10000（unit of mass）**
		A	**B**	**C**	**D**	**E**	**F=A+B +C+D+ E**	**G**	**H**	**I**	**J=G*H*I*F*44/12 /1000 (unit of volume)**
Raw coal	10000 ton	2779.6	7601.9	4008.9	2906.2	2183.7	**19480.3**	25.8	98	20908	377594226
Cleaned coal	10000 ton						**0**	25.8	98	26344	0
Other washed coal	10000 ton		5.46			4.63	**10.09**	25.8	98	8363	78229.4857
Coke	10000 ton						**0**	29.5	98	28435	0
Coke oven gas	10^8m^3	2.59					**2.59**	13	99.5	16726	205461.153
Other coal gas	10^8m^3	72.46					**72.46**	13	99.5	5227	1796340.63
Crude oil	10000 ton						**0**	20	99	41816	0
Diesel	10000 ton	2.69	27.17	6.23			**36.09**	20.2	99	42652	1128714.95
Fuel oil	10000 ton	58.52	55.07	202.89		23.26	**339.74**	21.1	99	41816	10881236.5
LPG	10000 ton						**0**	17.2	99.5	50179	0
Refinery gas	10000 ton	0.77	0.55				**1.32**	18.2	99.5	46055	40366.0838
Natural gas	10^8m^3		0.14				**0.14**	15.3	99.5	38931	30423.5254
Other oil product	10000 ton	21.22	1.37	24.89			**47.48**	20	99	38369	1322597.85
Other coking product	10000 ton						**0**	25.8	98	28435	0
Other fuel	10000 tce	6.43		15.48			**21.91**	0	0	0	0
										小计	393077595.9
China Energy Statistical Yearbook 2005											

Table A8. Thermal Power Generation of East China Power Grid in 2004

Province	Power	Power	Ratio of Self	Power Supply

	Generation （10^8kWh)	Generation （MWh)	Power Consumption of Plant （%）	（MWh)
Shanghai	711.27	71127000	5.22	67414171
Jiangsu	1635.45	163545000	5.93	153846782
Zhejiang	952.55	95255000	5.68	89844516
Anhui	598.75	59875000	6.03	56264538
Fujian	504.9	50490000	6.07	47425257
Total				414795263

China Power Yearbook 2005

Table A9. Emission Factor of East China Power Grid in 2004

	Parameter	Unit	Value	Source
A	Net Import from Central China Power Grid to East China Power Grid (MWh)	MWh	26933850	China Power Yearbook 2005
B	Total Emissions of Central China Power Grid	tCO_2e	339209149.9	Calculation based on data from China Power Yearbook and China Energy Statistical Yearbook
C	Total Power Supply of Central China Power Grid	MWh	418261666.3	China Power Yearbook 2005
D	Average Emission Factor of Central China Power Grid	tCO_2e/MWh	0.810997462	D=B/C
E	Import from Shanxi Yangcheng to East China Power Grid (MWh)	MWh	11649610	
F	Emission Factor of Shanxi Yangcheng	tCO_2e/MWh	0.944241481	
G	Total Power Supply of East China	MWh	453378722.6	G=Total Power Generation of East China

	Power Grid			Power Grid＋A+E
H	Total Emissions of East Power Grid	tCO_2e	425920924.9	
I	Emission Factor of East China Power Grid	tCO_2e/MWh	0.939437392	I=H/G

Table A10. Operating Margin Emission Factor of East China Power Grid

		Year 2002	**Year 2003**	**Year 2004**	**Total**
A	Emissions (tCO_2/year)	295924831.5	361514179	425920924.9	1083359935
B	Power Supply (MWh)	312535277.1	385310463.7	453378722.6	1151224463
C	CO_2 Emission Factor (tCO_2/MWh)	C = A/B			**0.94105**

Calculation of Build Margin (BM):

Based on China Energy Statistical Yearbook 2005, the calculation of the weights of solid, liquid, and gas fuels in East China Power Grid are:

$\lambda_{Coal} = 96.08\%$， $\lambda_{Oil} = 3.39\%$， $\lambda_{Gas} = 0.53\%$ (λ_{coal} is the percentage of each type of fossil fuel fired power in the additional thermal capacity), it obviously shows that the amount of gas-fired and oil-fired powers is very small. We consider the EF_{coal} as the $EF_{thermal}$ for facilitation, at the same time, in the conservative, the 600MW sub-critical coal-fired power generator should multiply the λ_{coal} .

Table A11. Emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants

	Variable	Efficiency of Power Supply	Emission Coefficient of Fuel (tc/TJ)	Oxidation Rate	Emissions(tCO_2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-fired Power Plant	$EF_{Coal,Adv}$	36.53%	25.8	0.98	0.9136

Where: $EF_{Coal,Adv}$ refers to the emission factor representing best technology commercially available for fuel of coal fired power plants.

$EF_{thermal}$= 0.8778 (tCO_2/MWh)

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal}$$

Where: CAP_{Total} is the total of new capacity additions, and $CAP_{Thermal}$ is the new capacity addition of thermal power.

Table A12.Installed Capacity of East China Power Grid in 2004

Installed Capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal Power	MW	12014.9	28289.5	21439.8	9364.5	8315.4	79424.1
Hydro Power	MW	0	126.5	6418.4	692.8	7180.1	14417.8
Nuclear Power	MW	0	0	3056	0	0	3056
Wind Power and Others	MW	3.4	17.6	39.7	0	12	72.7
Total	MW	12018.3	28433.6	30953.9	10057.3	15507.5	96970.6

Source: China Power Yearbook 2005

Table A13.Installed Capacity of East China Power Grid in 2003

Installed Capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal Power	MW	11092.6	22245	15321.2	9284.9	7092.8	65036.5
Hydro Power	MW	0	137.8	6054.5	649.1	6761.1	13602.5
Nuclear Power	MW	0	0	2406	0	0	2406
Wind Power and Others	MW	0	0	39.7	0	12	51.7
Total	MW	11092.6	22382.7	23821.4	9934	13865.8	81096.5

Source: China Power Yearbook 2004

Table A14.Installed Capacity of East China Power Grid in 2002

Installed Capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal Power	MW	11382.6	20599	13082.4	9056.3	6999.9	61120.2
Hydro Power	MW	0	137.2	5866.8	649.1	6512	13165.1
Nuclear Power	MW	0	0	1678	0	0	1678
Wind Power and Others	MW	0	0	50.2	0	12	62.2
Total	MW	11382.6	20736.2	20677.4	9705.4	13523.9	76025.5

Source: China Power Yearbook 2003

Table A15.Calculation of BM of East China Power Grid

	Installation in year 2002	Installation in year 2003	Installation in year 2004	New Additions from 2002 to 2004	Ratio in New Additions
	A	**B**	**C**	**D=C-A**	
Thermal Power（MW）	61120.2	65036.5	79424.1	18303.9	87.39%
Hydro Power（MW）	13165.1	13602.5	14417.8	1252.7	5.98%
Nuclear Power（MW）	1678	2406	3056	1378	6.58%
Wind Power（MW）	62.2	51.7	72.7	10.5	0.05%
Total（MW）	**76025.5**	**81096.7**	**96970.6**	**20945.1**	**100.00%**
Percentage compared with installation of 2004	78.4%	83.63%	100%		

$EF_{BM,y}$=0.8778×87.39%=0.7671tCO_2/MWh。

Table A16. Baseline Emission Factor of East China Power Grid

	Parameter	Unit	Amount
A	Operating Margin Emission Factor	tCO_2/MWh	0.9411
B	Build Margin Emission Factor	tCO_2/MWh	0.7671
C	Combined Emission Factor (C=0.5*A+0.5*B)	tCO_2/MWh	0.8541

Annex 4

MONITORING PLAN

Please refer to section B.7.2.