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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

Controlled combustion of municipal solid waste and sewage sludge and energy generation in Shaoxing City, People's Republic of China (the Project or the Project activity)

(Version 01, 22/04/2008)

A.2. Description of the project activity:

The Project activity involves the incineration of municipal solid waste (MSW) and sewage sludge in Shaoxing City, People's Republic of China. MSW and sewage sludge will be incinerated by 6 circulating fluidized bed type incinerators. Coal will be used as a supplementary fuel in the incineration process. A part of steam generated by the incineration process will be used for electricity generation and the remaining steam will be exported to the nearby facilities. For electricity generation, 4 sets of 12 MW (maximum power capacity of 15 MW) condensing turbine generators will be installed. The Project activity will be implemented stepwise. Once the Project activity reaches at its full capacity, it is expected that approximately 267,000 MWh of net electricity will be exported to East China grid and 1,188,000 GJ of thermal energy will be exported to the nearby industrial facilities in each year.

At present, MSW and sewage sludge are disposed of in nearby landfill sites, such as Pingshui Dawuao Landfill site and Sanjiangkou Landfill site. In those landfill sites, there is no landfill gas capturing system and the landfill gases are directly emitted to the atmosphere. Therefore, in the absence of the Project activity, disposal of MSW and sewage sludge in the landfill sites would cause significant of GHG emissions.

The emission reductions achieved by the Project activity over the 7-year crediting period will be approximately 1,275,391 tCO_2e. The Project activity will also contribute to sustainable development of China in following ways:

- **Improvement local environment** – The Project activity prevents waste from being left to decay, which would lead to uncontrolled methane emission and putrid odor. In the absence of the Project activity, waste is left to decay in landfills resulting in the emission of LFG that contains methane, a potent greenhouse gas and potential fire hazard.

- **Job creation –** A large number of local staff will be employed during the construction stage and also to operate and maintain the project. A number of these staff will receive comprehensive training in the technology to be used by the Project activity.

- **Renewable energy generation which reduces consumption of fossil fuels** - By utilizing waste as the primary fuel for energy generation, the Project activity contributes to national goals of greater energy security by reducing the country's need to rely on imported fossil fuels.

A.3. Project participants:

Name of Party involved(*) ((host) indicates a host Party)	Private and/ or Public entity(ies) Project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered a project participant (Yes/ No)
China (host)	**Shaoxing National Environmental Renewable Energy Development Co., Ltd**	No
Portugal	**LUSO Carbon Fund**	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

People's Republic of China

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

Zhejiang province

A.4.1.3. City/Town/Community etc:

Shaoxing city

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

The Project activity will be located in Paojiang Industrial Park, Mashanwan, Hehu Village, Shaoxing City. The geographical coordinates are east longitude 119053' to 121013' and north latitude 29013' to 30016'. The site is in close vicinity to MSW and sludge sources and has a high energy demand from factories within the industrial park.

Map of China

Shaoxing in Zhejiang Province

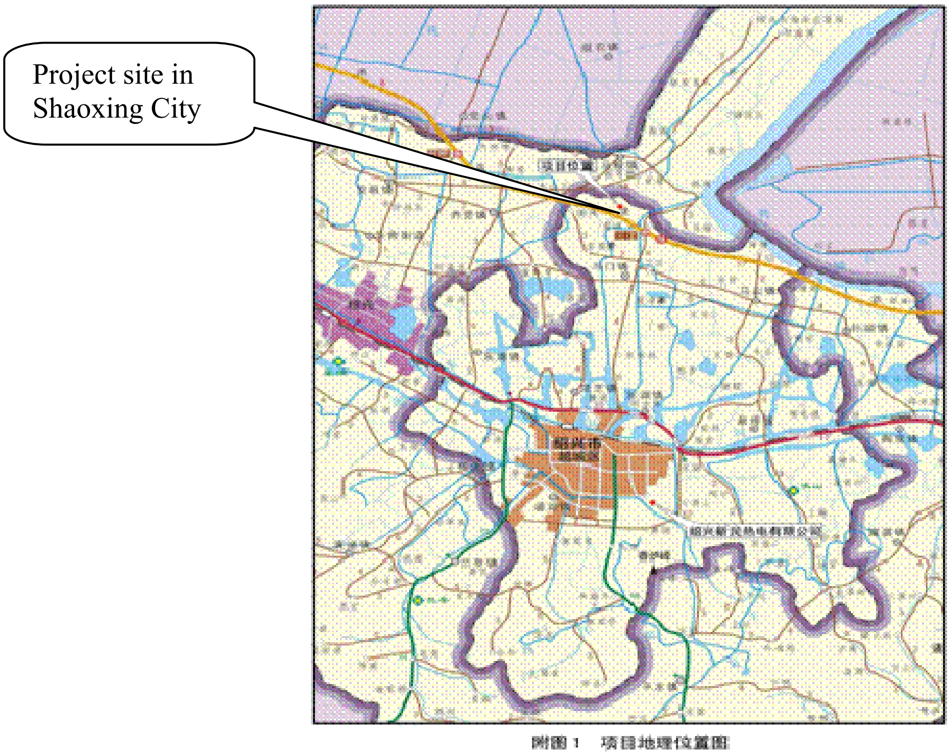

Figure 1. Location of the site for the project activity

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

The categories applicable to the Project activity are:

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

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

The Project will employ 6 sets of fluidized-bed type incinerators with rated steam capacities of 75t/hr and MSW/sludge disposal capacity of 600 t/day. The steam produced by the boilers will feed into 4 sets of 12 MW condensing turbine generators. Following tables show the installation schedule of the equipment and their specifications.

Installation schedule

Expected implementation Date	New installation	Total installation
March 2008	Incinerator #1 and turbine #1	One incinerator and one turbine
June 2008	Incinerator #2 and turbine #2	Tow incinerators and two turbines
December 2008	Incinerator #3	Three incinerators and two turbines
December 2009	Incinerator #4 and turbine #3	Four incinerators and three turbines
December 2010	Incinerator #5 and turbine #4	Five incinerators and Four turbines
December 2011	Incinerator #6	Six incinerators and four turbines

Specification of Turbine

Item	Value
Model	C12-4.9/0.981
Rated steam pressure inflow	4.90 Mpa
Rated power	12 MW
Maximum power	15 MW
Rated steam extraction pressure	0.981 Mpa
Steam extraction pressure (scope)	0.981 Mpa ~ 1.28 Mpa
Rated steam extraction volume	50 t/h
Maximum steam extraction volume	80 t/h
Steam consumption in rated operating mode (guarantee value)	6.965 kg/kWh
Heat consumption in rated operating mode (guarantee value)	8674 kJ/kWh
Steam consumption in condensing operating mode (guarantee value)	4 kg/kWh
Temperature of fed-in water	145 ℃
Rated rotation speed	3000 r/min

Specification of Generator

Item	Value
Model	QFW-15-2A(10.5KV)
Rated voltage	10.5 KV
Rated flow	1031
Rated power	15 MW
Power factor	0.8
Rated rotation speed	3000 r/min
Frequency	50 Hz
Efficiency	Not low than 97.0%
Temperature of fed-in water	≤33 ℃
Temperature of air used for cooling	≤40 ℃
Noise (1 meter from the equipment)	85 db

Specification of CFB boiler

Data Item	Value
Model	TG-75/5.3-MT
MSW/sludge disposal capacity	600 t/d
Rated steam capacity	75 t/h
Flue gas temperature	150 ºC
Rated steam temperature	485 ºC
Efficiency	81 %
Rated steam pressure	5.3 MPa
Combustion mode	CFB
Temperature of fed-in water	150 ºC
Height of operation layer	7 m
Coal	0~10 mm
Load range	50~110 %
Temperature of air used for cooling	20 ºC
MSW disposal rate	600 t/d
Coal to support combustion	92 t/d
Boiler installation	Semi-outdoor

Pollution control equipment and measures, flue gas filtration and other waste disposal

MSW/sludge will be mixed with coal in a 4:1 ratio by weight. The boilers are designed to allow combustion at 860 ºC, which will improve the efficiency of MSW/sludge combustion, destroy organic pollutants, and limit the production of toxic substances such as dioxins.

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

The Project is projected to reduce an average of 182,198 tCO_2e annually, generating an estimated total of 1,275,391 tCO_2e for the duration of the first 7-year crediting period

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
2009	22,895
2010	83,321
2011	158,301
2012	202,704
2013	239,890
2014	271,061
2015	297,219
Total estimated reductions (tonnes of CO_2e)	1,275,391
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	182,198

A.4.5. Public funding of the project activity:

The financial plans for the Project activity do not involve any public funding from annex I countries.

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:

Approved baseline and monitoring methodology applied to the Project activity is:

"Avoided emissions from organic waste through alternative waste treatment processes" (AM0025 version 10)

Also the Project activity refers to the latest version of following tools:

"Tool for the demonstration and assessment of additionality" (version 04)
"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" (version02)
"Tool to calculate the emission factor for an electricity system" (version 01)

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

The Project activity involves the incineration of municipal solid waste (MSW) and sewage sludge. The Project activity meets all the applicability conditions in AM0025 as follows:

- The project activity involves one or a combination of the following waste treatment options for the fresh waste that in a given year would have otherwise been disposed of in a landfill:

  a) a composting process in aerobic conditions;
  b) gasification to produce syngas and its use;
  c) anaerobic digestion with biogas collection and flaring and/or its use;
  d) mechanical/ thermal treatment process to produce refuse-derived fuel (RDF)/ stabilized biomass (SB) and its use. The thermal treatment process (dehydration) occurs under controlled conditions (up to 300 degrees Celsius). In case of thermal treatment process, the process shall generate a stabilized biomass that would be used as fuel or raw material in other industrial process. The physical and chemical properties of the produced RDF/SB shall be homogenous and constant over time;
  e) incineration of fresh waste for energy generation, electricity and/or heat. The thermal energy generated is either consumed on-site and/or exported to a nearby facility. Electricity generated is either consumed on-site, exported to the grid or exported to a nearby facility. The incinerator is rotating fluidized bed or hearth or grate type.

The Project activity involves the incineration of fresh waste for energy generation-electricity and heat. The thermal energy generated is exported to nearby facilities. Electricity generated is exported to East China grid. The incinerators installed are circulating fluidized bed type. Even though the circulating fluidized bed type boiler is not mentioned in the applicability condition above, it is clarified by EB that AM0025 is applicable to the project activities that install the circulating fluidized bed type boiler. [1]

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[1] Request for deviation from the following AM0025 applicability condition

- In case of anaerobic digestion, gasification or RDF processing of waste, the residual waste from these processes is aerobically composted and/or delivered to a landfill.

This applicability condition is not related to the Project activity.

- In case of composting, the produced compost is either used as soil conditioner or disposed of in landfills.

This applicability condition is not related to the Project activity.

- In case of RDF/stabilized biomass processing, the produced RDF/stabilized biomass should not be stored in a manner that may result in anaerobic conditions before its uses.

This applicability condition is not related to the Project activity.

- If RDF/SB is disposed of in a landfill, project proponent shall provide degradability analysis on an annual basis to demonstrate that the methane generation, in the life-cycle of the SB is below 1% of related emissions. It has to be demonstrated regularly that the characteristics of the produced RDF/SB should not allow for re-absorption of moisture of more than 3%. Otherwise, monitoring the fate of the produced RDF/SB is necessary to ensure that it is not subject to anaerobic conditions in its lifecycle.

This applicability condition is not related to the Project activity.

- In the case of incineration of the waste, the waste should not be stored longer than 10 days. The waste should not be store in conditions that would lead to anaerobic decomposition and, hence, generation of CH_4.

MSW and sewage sludge will not be stored longer than 7 days before incineration. The waste will be stored in conditions that would not lead to anaerobic decomposition.

- The proportion and characteristics of different types of organic waste processed in the project activity can be determined, in order to apply a multiphase landfill gas generation model to estimate the quantity of landfill gas that would have been generated in the absence of the project activity.

The proportion and characteristics of different types of organic waste processed in the Project activity will be determined by the guideline in the monitoring methodology procedure in the AM0025 and “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”.

- The project activity may include electricity generation and/or thermal energy generation from biogas, syngas captured, RDF/stabilized biomass produced, combustion heat generated in the incineration process, respectively, from the anaerobic digester, the gasifier, RDF/stabilized biomass combustor, and waste incinerator. The electricity can be exported to the grid and/or used internally at the project site. In the case of RDF produced, the emission reductions can be claimed only for the case where the RDF used electricity and/or thermal energy generation can be monitored.

The Project activity includes electricity generation and thermal energy generation from combustion heat generated in the incineration process.

- Waste handling in the baseline scenario shows a continuation of current practice of disposing the waste in a landfill despite environmental regulation that mandates the treatment of the waste, if any, using any of the project activity treatment options mentioned above.

The fact that the MSW and sewage sludge would be disposed of in landfill sites will be shown in section B.4. In addition, there is no regulation that mandates the treatment of MWS and sewage sludge using any of the project activity treatment options mentioned above in China.

- In case of waste incineration, the residual waste from the incinerator does not contain more than 1% residual carbon.

According to the feasibility study, the residual waste from the incinerator does not contain more than 1% residual carbon.

- The compliance rate of the environmental regulations during (part of) the crediting period is below 50%; if monitored compliance with the MSW rules exceeds 50%, the project activity shall receive no further credit, since the assumption that the policy is not enforced is no longer tenable;

At present, there is no regulation with regards to the MSW and sewage sludge treatment. If the monitored compliance rate exceeds 50% during the crediting period, no credit will be claimed.

- Local regulations do not constrain the establishment of RDF production plants/thermal treatment plants nor the use of RDF/stabilized biomass as fuel or raw material.

This applicability condition is not related to the Project activity.

- In case of RDF/stabilized biomass production, project proponent shall provide evidence that no GHG emissions occur, other than biogenic CO_2, due to chemical reactions during the thermal treatment process (such as Chimney Gas Analysis report).

This applicability condition is not related to the Project activity.

- The project activity does not involve thermal treatment process of neither industrial nor hospital waste;

The Project activity does not involve thermal treatment process.

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

The spatial extent of the project boundary is the site of the Project activity where the waste treated. This includes the facilities for processing waste, on-site electricity generation and/or consumption, onsite fuel use, thermal energy generation, wastewater treatment plant and the landfill site. The project boundary does not include facilities for waste collection, sorting and transport to the project site.

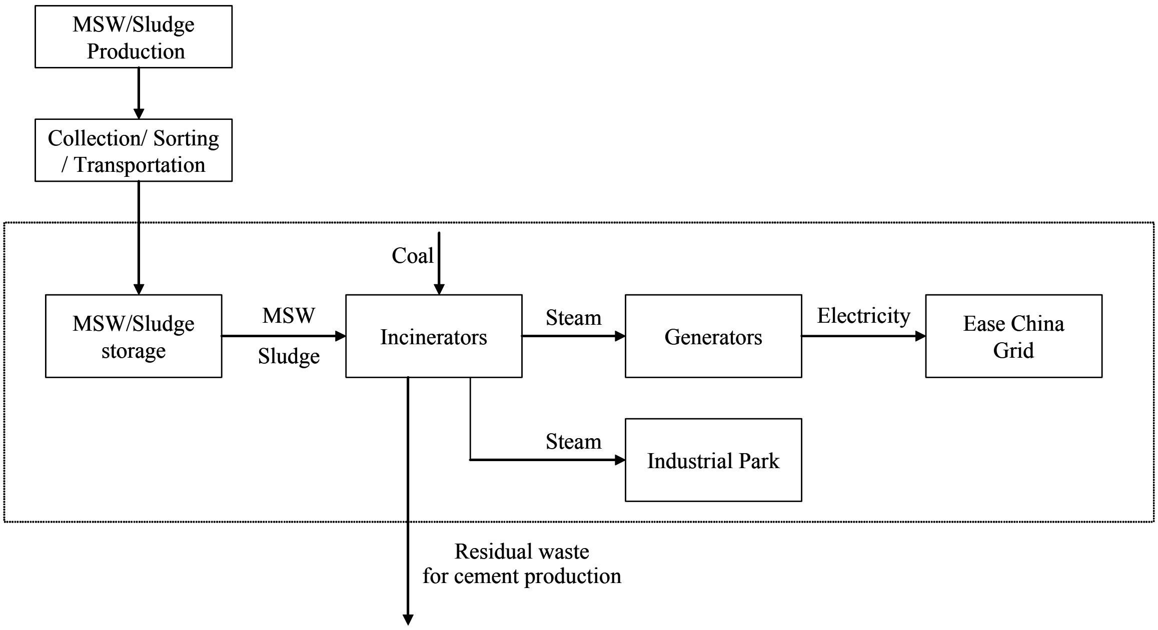


Figure 2. Project boundary

The greenhouse gases included in or excluded from the project boundary are shown in the following table.

Summary of gases and sources included in the project boundary

	Source	**Gas**	**Included?**	**Justification / Explanation**
Baseline	Emissions from decomposition of waste at the landfill site	CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not counted.
		CH_4	Included	The major source of emissions in the baseline.
		N_2O	Excluded	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative.
	Emissions from electricity consumption	CO_2	Included	Electricity from East China grid would be consumed in the baseline scenario.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Emissions from thermal energy generation	CO_2	Included	Displaces thermal energy generation by customers nearby who use coal-fired boilers.
		CH_4	Excluded	Excluded for simplification. This is conservative.

		N_2O	Excluded	Excluded for simplification. This is conservative.
Project activity	On-site fossil fuel consumption due to the project activity other than for electricity generation	CO_2	Included	May be an important emissions source. It includes vehicles used on-site, auxiliary fossil fuels need to be added into incinerators, etc.
		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.
	Emission from on-site electricity use	CO_2	Included	May be an important emission source. Even though the Project activity will generated electricity to be used on-site, if the electricity is imported from the grid, it will be counted as project emission.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Direct emissions from the waste treatment processes	CO_2	Included	CO_2 emissions from the incineration of fossil based waste shall be included. CO_2 emissions from the incineration of organic waste are not accounted.
		CH_4	Included	CH_4 may be emitted from stacks from incineration.
		N_2O	Included	N_2O may be emitted from stacks from incineration.
	Emissions from waste water treatment	CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	Excluded	The wastewater will be treated using aerobic treatment process. However, if wastewater is treated in a manner that results in CH_4 emissions, the emissions are treated as project emissions.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.

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

As per the guideline in AM0025, following procedure is applied for the identification and description of the baseline scenario.

Step 1: Identification of alternative scenarios

To identify the alternative scenarios, step 1 of the latest version of the "Tool for the demonstration and assessment of additionality" is applied. Relevant national and/or sectoral policies and circumstances will be taken account in the following ways.

It will be shown that the Project activity is not the only alternative that is compliance with all regulations in Sub-step 1b of the "Tool for the demonstration and assessment of additionality".

Via the adjustment factor AF in the baseline emissions, which is based on the approved consolidated baseline methodology ACM0001 "Consolidated based methodology for landfill gas project activities", it will be taken into accounted that some of the methane generated in the baseline may be captured and destroyed to comply with regulations or contractual requirements

The project developer will monitor all relevant policies and circumstances at the beginning of each crediting period and adjust the baseline accordingly.

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

For the disposal/treatment of the fresh waste in the absence of the Project activity, following alternatives are considered.

M1. The Project activity (i.e. incineration of MSW and sludge) not implemented as a CDM project;
M2. Disposal of waste at a landfill where landfill gas captured is flared;
M3. Disposal of waste on a landfill without the capture of landfill gas.

For the alternative M2, the "Municipal solid waste sanitary landfill technical standard (CJJ17-2004)" states as follows:

"Landfill site shall install effective landfill gas venting system. The passive gathering and transferring of landfill gas must be forbidden to prevent fire and explosion. In the case of no condition to utilize landfill gas, the landfill gas generated should be vented positively and flared collectively. The existing landfill gas sites which can't reach safe and stable status shall install effective landfill gas venting system and treatment facility."

However, at the same time, according to the "Report for Chinese MSW Treatment and Fees Charging Status", issued by Chinese Development and Reform Commission, only less than 3% of landfill sites have landfill gas recovery and utilization system due to the investment and technical constraints. Considering the current practice, the legal or regulatory requirements of "Municipal solid waste sanitary landfill technical standard (CJJ17-2004)" are systematically not enforced and that non-compliance with these requirements is widespread in China. Therefore, the alternative M2 is considered as feasible and realistic alternative scenario to the Project activity.

For power generation, following alternatives may be considered:

P1. Power generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity;
P2. Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant;
P3. Existing or Construction of a new on-site or off-site renewable based cogeneration plant;
P4. Existing or Construction of a new on-site or off-site fossil fuel fired captive power plant;

P5. Existing of Construction of a new on-site or off-site renewable based captive power plant;
P6. Existing and/or new grid-connected power plants

The electricity generated by the Project activity will be delivered to East China grid and displace the electricity that would be generated by the other power plants connected to East China grid. Therefore, to construct captive power plant or using existing captive power plant are not realistic alternatives to the Project activity. Also, even though the Project activity generates electricity as well as thermal energy, the main purpose of the Project activity is to install an alternative waste treatment process, not to generate electricity and thermal energy. Therefore, construction of fossil fuel based or renewable based cogeneration plant cannot be realistic and credible alternatives to the Project activity. Also there is no existing fossil fuel based or renewable based cogeneration plant. Due to above reasons, the alternative scenario P2, P3, P4 and P5 cannot realistic and credible alternatives to the Project activity. Therefore, only P1 and P6 are identified as realistic and credible alternatives to the Project activity and further considered in the following baseline identification procedures.

For heat generation, following alternatives may be considered:

H1. Heat generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity
H2. Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant;
H3. Existing or Construction of a new on-site or off-site renewable based cogeneration plant;
H4. Existing or new construction of on-site or off-site fossil fuel based boilers;
H5. Existing or new construction of on-site or off-site renewable energy based boilers;
H6. Any other source such as district heat; and
H7. Other heat generation technologies (e.g. heat pumps or solar energy)

The Project activity will provide thermal energy to the nearby facilities where the thermal energy is produced by the existing on-site fossil fuel based boilers. However, as mentioned above, the main purpose of the Project activity is to install an alternative waste treatment process, not to generate electricity and thermal energy. Therefore, construction of fossil fuel based or renewable based cogeneration plant or boilers or installation of other heat generation technologies to provide thermal energy to the nearby industrial facilities cannot be realistic and credible alternatives to the Project activity. Also there is no existing fossil fuel fired/ renewable based cogeneration plant or renewable energy based boilers. Therefore, the alternative scenarios H2, H3, H5 and H7 cannot be realistic and credible alternatives to the Project activity. Also, H6 cannot be a realistic and credible alternative to the Project activity because there is no available district heating system in the region. Therefore, only H1 and H4 are identified as realistic and credible alternatives to the Project activity and further considered in the following baseline identification procedures.

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

In case of electricity generation, the electricity would be generated by the power plants connected to East China grid, which consist of fossil fuel (coal, oil and gas) based power plants as well as renewable based power plants (hydro, nuclear and wind). The electricity is generated considering the availability of the fuel used by the power plants connected to the grid. Therefore the carbon emission factor of the grid already reflects the availability of the baseline fuel.

In case of thermal energy, the facilities which will receive the thermal energy from the Project activity have used domestically produced coal for fuel source. China is the world's largest coal producer. The output of coal in China has kept a steady increase. The production volume of coal has reached a historical record level of 1.95 billion tons in 2004 and this situation will not change for a long period time. The facilities that will receive the thermal energy from the Project activity have not faced any supply constraints. Therefore, it can be considered that the baseline fuel for thermal energy generation is available in abundance in China.

Step 3: Step 2 and/or Step 3 of the latest approved version of the "Tool for demonstration and assessment of addtionality"

Investment analysis - step 2 of the latest approved version of the "Tool for demonstration and assessment of additionality" is applied in this step to show that the Project activity scenario (M1, P1 and H1) is not financially attractive scenario. The details of the investment analysis are described in the section B.5 below. According to the investment analysis, the Project activity scenario is not financially attractive. Therefore, scenarios M1, P1 and H1 are excluded from further consideration as a baseline scenario.

Also it is clear that M2 is less financially attractive than M3 because the installation of landfill gas capture/flaring system does not generate any additional income.

Step 4

There is only one credible and plausible alternative for each component. Therefore, Step 4 is not applied.

As a result of the procedure for the selection of the most plausible baseline scenario, following scenarios are selected as baseline scenario for each component of the project activity.

M3. Disposal of the waste on a landfill without the capture of landfill gas
P6. Existing and/or new grid-connected power plants
H4. Existing or new construction of on-site or off-site fossil fuel based boilers

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):

As the per "Specific guideline for completing the Project Design Document (CDM-PDD)", it is required to provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the Project activity since the starting data of the Project activity is before the date of validation.

The possibility of the Project activity as a CDM project activity was considered before the start of the construction.

As described in the paragraphs below, the proposed Project activity is not economically attractive without the additional revenue from CERs sales. To seek additional income sources from the Project activity, the project developer entered into a CDM consulting agreement with a CDM consultant in August 2006. As a result of the consultancy, the Project developer recognized that the Project activity is highly eligible for a CDM project activity and can gain additional income from CERs sales. With the confidence that the Project activity can gain additional income from CDM assistance, the project developer decided to commence construction of the Project activity in September, 2006.. A contractual agreement that has been completed before the start of the construction between Shaoxing National Environmental New Energy Co., Ltd and the CDM consultant are provided to DOE during the validation process.

The additionality of the Project activity is assessed and demonstrated using “Tool for the demonstration and assessment of additionality” (version 03) (additionality tool) as follows:

STEP 1 – Identification of alternatives to the project activity consistent with current laws and regulations
STEP 2 – Investment analysis
STEP 4 – Common practice analysis

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

As described in Section B.4, following realistic and credible alternatives available to the Project activity are identified for each component of the Project activity.

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

Disposal/Treatment of the fresh waste

M1. The Project activity (i.e. incineration of MSW and sludge) not implemented as a CDM project;
M2. Disposal of waste at a landfill where landfill gas captured is flared;
M3. Disposal of waste on a landfill without the capture of landfill gas.

Electricity generation

P1. Power generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity;
P6. Existing and/or new grid-connected power plants

Thermal energy generation

H1. Heat generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity
H4. Existing or new construction of on-site or off-site fossil fuel based boilers;

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

All the alternatives for each project component are in compliance with mandatory legislation and regulations taking into account the enforcement in China. For alternative M2, as described in the Section B.4, the existing laws and regulation are systematically not enforced and that non-compliance with these requirements is widespread in China.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

Since the Project activity generates financial benefits, the benchmark analysis (Option III) is applied in the following analysis.

Sub-step 2b. Option III. Apply benchmark analysis

According to the "Methodology and Parameter of Economic evaluation of the Construction Project, 2006, third edition" published by NDRC and the Ministry of Construction, minimum of 8 % is required to justify the investment into the energy generation project (electricity and thermal energy) using waste. Therefore, 8 % of benchmark is applied to the Project activity. Since this required rate is for the total investment, project IRR is calculated to compare with benchmark of 8 %.

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

As mentioned above, the required rate of return on total investment is used as a benchmark. Therefore, project IRR is calculated using following parameters and assumptions.

Item	Assumptions/Sources	Value
Financial Details		
Costs		
Initial capital cost	Supplied by Project developer based on quotes and current prices	508,913,800 RMB
Fuel cost/ year1 (coal & diesel oil)	Coal price: 750 RMB/t (average local price) Diesel oil price: 3846.2 RMB/t (average local price)	16,484,270 RMB/yr
Fuel cost/ year2 (coal & diesel oil)	Coal price: 750 RMB/t Diesel oil price: 3846.2 RMB/t (average local price)	53,861,348 RMB/yr
Fuel cost/ year3 (coal & diesel oil)	Coal price: 750 RMB/t Diesel oil price: 3846.2 RMB/t (average local price)	82,609,810 RMB/yr
Fuel cost/(year 4 onwards) (coal & diesel oil)	Coal price: 750 RMB/t Diesel oil price: 3846.2 RMB/t (average local price)	95,023,272 RMB/yr
O&M cost/yr	Maintenance expenses is estimated as 3.5% of the cost of the initial capital cost	17,811,983 RMB/yr
	Operation labor costs is calculated by 120 people, and the wages of 35,000 RMB	4,200,000 RMB/yr
Revenues		
Electricity tariff	Average local price	0.3586 RMB/kWh
Electricity sales (year 1)	Assuming the electricity delivered to the grid is 76,507 MWh/year in operation 180 days in a year	27,435,482 RMB/yr
Electricity sales (year 2)	Assuming the electricity delivered to the grid is 173,195 MWh/year in operation 330 days in a year	62,107,569 RMB /yr
Electricity sales (year 3)	Assuming the electricity delivered to the grid is 256,133 MWh/year in operation 330 days in a	91,849,222 RMB /yr

	year	
Electricity sales (year 4 onwards)	Assuming the electricity delivered to the grid is 267,110 MWh/year in operation 330 days in a year	95,785,617 RMB /yr
Thermal energy tariff	Average local price	30.97 RMB /GJ
Thermal energy sales (year 2)	There will be no thermal energy sales in year 1. Assuming capacity factor of 2,376,000 GJ/yr and 15% exported in year 2.	11,037,708 RMB/yr
Thermal energy sales (year 3)	Assuming capacity factor of 2,376,000 GJ/yr and 30% exported in year 3.	22,075,416 RMB/yr
Thermal energy sales (year 4 onwards)	Assuming capacity factor of 2,376,000 GJ/yr and 50% exported in year 4.	36,792,360 RMB/yr
MSW disposal fee (year 1)	MSW disposal fee 90,000 t/yr, for 41 RMB/t	3,690,000 RMB/yr
MSW disposal fee (year 2)	MSW disposal fee 198,000 t/yr, for 41 RMB /t	8,118,000 RMB /yr
MSW disposal fee (year 3)	MSW disposal fee 330,000 t/yr, for 41 RMB/t	13,530,000 RMB /yr
MSW disposal fee (year 4 onwards)	MSW disposal fee 396,000 t/yr, for 41 RMB/t	16,236,000 RMB /yr
Sludge disposal fee (year 1)	Sludge disposal fee 81,000 t/yr, for 80 RMB/t	6,480,000 RMB/yr
Sludge disposal fee (year 2)	Sludge disposal fee 264,000 t/yr, for 80 RMB/t	21,120,000 RMB/yr
Sludge disposal fee (year 3)	Sludge disposal fee 330,000 t/yr, for 80 RMB/t	26,400,000 RMB/yr
Sludge disposal fee (year 4 onwards)	Sludge disposal fee 330,000 t/yr, for 80 RMB/t	26,400,000 RMB/yr
Raw material sales (ash sold to cement plants) (year 1)	Supplied by Project developer based on current price of 21 Yuan/ton and production of 10,800 tons/year	226,800 RMB /yr
Raw material sales (ash sold to cement plants) (year 2)	Supplied by Project developer based on current price of 21 Yuan/ton and production of 29,700 tons/year	623,700 RMB /yr
Raw material sales (ash sold to cement plants) (year 3)	Supplied by Project developer based on current price of 21 Yuan/ton and production of 39,600 tons/year	831,600 RMB /yr
Raw material sales (ash sold to cement plants) (year 4 onwards)	Supplied by Project developer based on current price of 21 Yuan/ton and production of 49,500 tons/year	1,039,500 RMB /yr
Project life	Minimum projected life	22 year
Project IRR (without CERs)		6.080%
Project IRR (with CERs)	Assuming CER price of 9 Euro/CER	11.057%

Value added tax (VAT)：17% of electricity tariff, 13% of Thermal energy tariff

Water conservancy projects fund：1% of the sales income
Urban construction tax：7% of the VAT;
Additional Education expenses：5% of the VAT;
Income Tax：25% of the profit;
Depreciation method：Average life depreciation method for 12 years (8.0 % per year), residual rate of 4 %

The project IRR of the Project activity is estimated to be 6.080% without considering the revenue from CERs sales. This is lower than the benchmark of 8 %. Therefore, the Project activity cannot be considered as financially attractive. However, the project IRR including the revenue from CERs sales is 11.057%, which is higher than the benchmark of 8 %, which justify the investment into the Project activity.

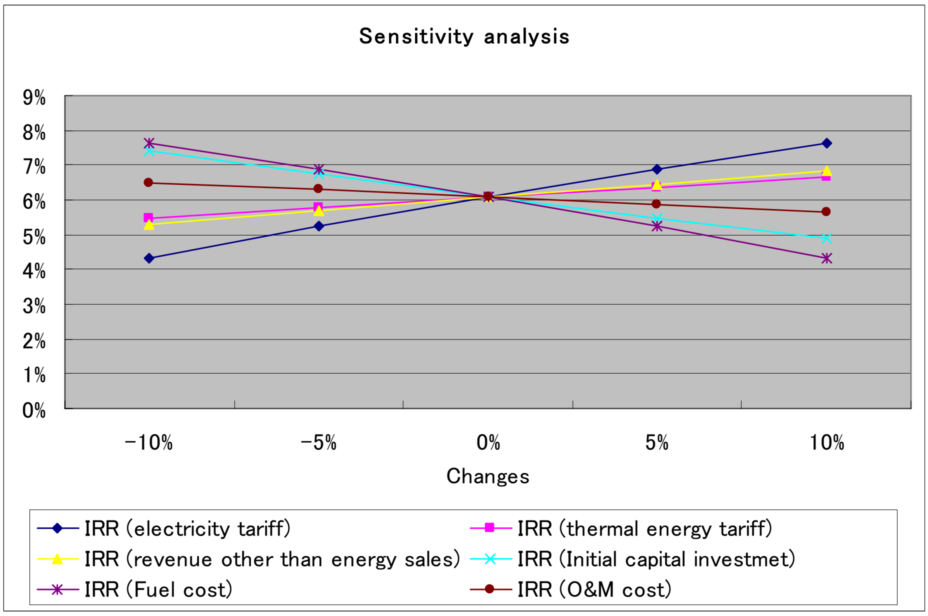
Sub-step 2d. Sensitivity analysis

To check whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions, following sensitivity analysis are conducted.

1) Electricity tariff varies from -10 % to + 10%
2) Thermal energy tariff varies from -10 % to +10%
3) Revenue other than energy sales varies from -10% to +10%
4) Initial capital cost varies from -10 % to +10%
5) Fuel cost varies from -10 % to +10%
6) O&M cost varies from -10 % to + 10%

Following table and graph show the result of sensitivity analysis.

Changes	-10%	-5%	0%	5%	10%
IRR (sensitivity analysis 1)	4.346%	5.239%	6.080%	6.882%	7.650%
IRR (sensitivity analysis 2)	5.489%	5.788%	6.080%	6.367%	6.647%
IRR (sensitivity analysis 3)	5.301%	5.696%	6.080%	6.456%	6.825%
IRR (sensitivity analysis 4)	7.422%	6.728%	6.080%	5.471%	4.894%
IRR (sensitivity analysis 5)	7.647%	6.882%	6.080%	5.237%	4.339%
IRR (sensitivity analysis 6)	6.505%	6.293%	6.080%	5.865%	5.647%



Even applying the 6 different favourable conditions, the project IRR is still below the benchmark of 8%. Therefore it is concluded that the Project activity is unlikely to be financially attractive.

Step 4. Common practice analysis

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

Project activities that combust MSW/sludge to produce energy are still very rare in China. In fact, waste incineration (most of which does not involve energy generation projects) accounts for less than 3.72% of all MSW disposal. Also these projects only incinerate MSW and the Project activity is first of its kind in sludge incineration in for energy generation in China.

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

As mentioned above, the similar activities are not widely observed and commonly carried out.

Since the Sub-steps 4a and 4b are satisfied, the Project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Project emissions

As per the guidelines in AM0025 (version 10), project emissions are calculated as follows:

$PE_y = PE_{elec,y} + PE_{fuel,on\text{-}site,y} + PE_{i,y} + PE_{w,y}$

where:

PE_y	Project emissions during the year y (tCO_2e)
$PE_{elec,y}$	Emissions from electricity consumption on-site due to the project activity in year y (tCO_2e)
$PE_{fuel,on\text{-}site,y}$	Emissions from fossil fuel consumption on-site due to the project activity in year y (tCO_2e)
$PE_{i,y}$	Emissions from waste incineration in year y (tCO_2e)
$PE_{w,y}$	Emissions from waste water treatment in year y (tCO_2e)

There are no emissions from composting process, anaerobic digestion process, gasification process and combustion of RDF/stabilized biomass since the Project activity only involves the incineration of waste.

Emissions from electricity use ($PE_{elec,y}$)

In case the Project activity involves electricity consumption, CO_2 emissions are calculated as follows:

$$PE_{elec,y} = EG_{PJ,FF,y} * CEF_{elec}$$

where:

$EG_{PJ,FF,y}$	Amount of electricity generated in an on-site fossil fuel power plant or consumed from the grid as a result of the Project activity, measured using an electricity meter (MWh)
CEF_{elec}	Carbon emission factor for electricity generation in the Project activity (tCO_2/MWh)

The electricity consumed at the Project site will be generated by the Project activity. The project emissions related to the auxiliary fossil fuels used to increase the temperature of the incinerator and fossil-based waste are calculated in the emissions from fuel use on-site and emission from fossil-based waste below, respectively. In case the electricity is imported from the grid, the monitored amount electricity consumption and the carbon emission factor calculated according to the “Tool for calculation of emission factor for electrical systems” will be used to calculate the emissions from electricity use.

Emissions from fuel use on-site ($PE_{fuel,on\text{-}site,y}$)

Emission from on-site fuel consumption (other than electricity generation, e.g. vehicles used on-site, auxiliary fossil fuels need to be added into incinerator to increase the temperature of the incinerator, etc) are calculated as follows:

$$PE_{fuel,\ on\text{-}site,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel}$$

where:

$PE_{fuel,\ on\text{-}site,y}$	CO_2 emissions due to on-site fuel combustion in year y (tCO_2)
$F_{cons,y}$	fuel consumption on site in year y (kg)
NCV_{fuel}	net caloric value of the fuel (MJ/kg)
EF_{fuel}	CO_2 emissions factor of the fuel (tCO_2/MJ)

Local values will be preferred as default values for the net calorific values and CO_2 emission factors. If local values are not available, IPCC default values for the net calorific values and CO_2 emission factors may be used.

Emissions from waste incineration ($PE_{i,y}$)

Emissions from waste incineration are calculated as follows:

$PE_{i,y} = PE_{i,f,y} + PE_{i,s,y}$

where:

$PE_{i,f,y}$	fossil-based waste CO_2 emissions from waste incineration in year y (tCO_2e)
$PE_{i,s,y}$	N_2O and CH_4 emissions from the final stacks from waste incineration in year y (tCO_2e)

Emissions from fossil-based waste ($PE_{i,f,y}$)

The CO_2 emissions are calculated based on the monitored amount of fossil-based waste fed into the waste incineration plant, fossil-derived carbon content and combustion efficiency.

$$PE_{i,f,y} = \sum_i A_i \times CCW_i \times FCF_i \times EF_i \times \frac{44}{12}$$

where:

A_i	Amount of waste type i fed into the waste incineration plant (t/yr)
CCW_i	Fraction of carbon content in waste type i (fraction)
FCF_i	Fraction of fossil carbon in waste type i (fraction)
EF_i	Combustion efficiency for waste type i (fraction)
44/12	Conversion factor (tCO_2/tC)

N_2O and CH_4 emissions from the final stacks from waste incineration ($PE_{i,s,y}$)

Among the two options described in ACM0025, option 2 is chosen to calculate N_2O and CH_4 emissions from the final stack from waste incineration.

$PE_{i,s,y} = Q_{biomass,y} \cdot (EF_{N2O} \cdot GWP_{N2O} + EF_{CH4} \cdot GWP_{CH4}) \cdot 10^{-3}$

where:

$Q_{biomass,y}$	The amount of waste incinerated in year y (tonnes/yr)
EF_{N2O}	The aggregated N_2O emission factor for waste combustion (kgN_2O/tonne of waste)
EF_{CH4}	The aggregated CH_4 emission factor for waste combustion ($kgCH_4$/tonne of waste)

The values from IPCC 2006 guideline will be used to estimate EF_{N2O} and EF_{CH4}. If IPCC default emission factor is used, an appropriate conservativeness factor depending on the uncertainty range will be applied to account the uncertainty of the IPCC default values.

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

Wastewater generated by the Project activity will be treated using aerobic treatment method that does not result in any methane emission. ($PE_{w,y} = 0$)

However, in case the wastewater is treated anaerobically or released untreated, CH_4 emission are estimated as follows:

$$PE_{CH4,w,y} = Q_{COD,y} * P_{COD,y} * B_0 * MCF_p$$

where:

$PE_{CH4,w,y}$	Methane emissions from the wastewater treatment in year y (tCH_4/y)
$Q_{COD,y}$	Amount of wastewater treated anaerobically or released untreated from the Project activity in year y (m^3/yr), which shall be measured monthly and aggregated annually
PCOD,y	Chemical Oxygen Demand (COD) of wastewater ($tCOD/m^3$), which will be measured monthly and averaged annually
B_0	Maximum methane producing capacity ($tCH_4/tCOD$)
MCF_p	Methane conversion factor (fraction), preferably local specific value should be used. In absence of local values, MCF_p default values can be obtained from table 6.3, chapter 6, volume 4 from IPCC 2006 guidelines.

IPCC 2006 guideline specifies the value for B_0 as 0.25 $kgCH_4/kg$ COD. Taking into account the uncertainty of this estimate, a value of 0.265 kg CH_4/kg COD as a conservative assumption for B_0 will be used.

In case of all the CH_4 are emitted into air directly, then

$$PE_{w,y} = PE_{CH4,w,y} * GWP_{CH4}$$

If flaring occurs, the "Tool to determine project emissions from flaring gases containing methane" will be used to estimate methane emissions.

Baseline emissions

Baseline emissions are calculated as follows:

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

where:

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

Adjustment Factor (AF)

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

where:

AF Adjustment Factor for MB_y (%)

As mentioned in the section B.4, the legal or regulatory requirements of landfill gas capturing and flaring are systematically not enforced in China. In addition, in the landfill sites where MSW/sludge has been landfilled and would be landfilled in the absence of the Project activity, landfill gas collection and destruction system is not installed. Therefore, during the first crediting period, 0 is applied to AF. The AF will be revised at the start of each new crediting period taking into account the amount of GHG flaring that occurs as part of common industry practice and/or regulation at that point in the future.

Rate of compliance

In case where there are regulations that mandate the use of one of the project activity treatment options and which is not being forced, the baseline scenario is identified as a gradual improvement of waste management practices to the acceptable technical options expected over a period of time to comply with the MSW Management Rules. The adjusted baseline emissions ($BE_{y,a}$) are calculated as follows:

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

where:

$RATE^{Compliance}{}_y$ State-level compliance rate of the MSW Management Rules in that year y. The compliance rate shall be lower than 50%l if it exceeds 50% the Project activity shall receive no further credit.

In such cases $BE_{y,a}$ will replace BE_y to estimate emission reductions.

The compliance ratio $RATE^{Compliance}{}_y$ will be monitored *ex post* based on the official reports for instance annual reports provided by the municipal bodies.

Methane generation from the landfill in the absence of the project activity (MB_y)

The amount of methane that is generated each year (MB_y) is calculated as per the “Tool to determine methane emissions avoided from dumping waste at solid waste disposal site” (version 02).

$MB_y = BE_{CH4,SWDS,y}$

where:

$BE_{CH4,SWDS,y}$ Methane generation from the landfill in the absence of the Project activity at year y, calculated as per the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”. The tool estimates methane generation adjusted for, using adjustment factor (f) any landfill gas in the baseline that would have been captured and destroyed to comply with relevant regulations or contractual requirements, or to address safety and odor concerns. As this is already accounted for in the baseline emissions calculated, “f” in the tool shall be assigned a value of 0.

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

φ	Model correction factor to account for model uncertainties (0.9)
f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner (As mentioned above, 0 is applied)
GWP_{CH4}	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose
MCF	Methane correction factor
$W_{j,x}$	Amount of organic waste type j prevented from disposal in the SWDS in the year x (tons)
DOC_j	Fraction of degradable organic carbon (by weight) in the waste type j
k_j	Decay rate for the waste type j
j	Waste type category (index)
x	Year during the crediting period: x runs from the first year of the first crediting period (x=1) to the year y for which avoided emissions are calculated (x=y)
y	Year for which methane emissions are calculated

Where different waste types j are prevented from disposal, determine the amount of different waste types ($W_{j,x}$) through sampling and calculate mean from the sample, as follows:

$$W_{j,x} = W_x \cdot \frac{\sum_{n=1}^{z} p_{n,j,x}}{z}$$

where:

W_x	Total amount of organic waste prevented from disposal in year x (tons)
$p_{n,j,x}$	Weight fraction of the waste type j in the sample n collected during the year x
z	Number of samples collected during the year x

At the renewal of the crediting period, the following data will be updated according to default values suggested in the most recently published IPCC Guidelines for National Greenhouse Gas Inventories:

- Oxidation factor (OX)
- Fraction of methane in the SWDS gas (F)
- Fraction of degradable organic carbon (DOC) that can decompose (DOC_f)
- Methane correction factor (MCF)

- Fraction of degradable organic carbon (by weight) in each waste type j (DOC_j)
- Decay rate for the waste type j (k_j)

Baseline emissions from generation of energy displaced by the project activity

The Project activity corresponds to the scenario1 described in AM0025.

$BE_{EN,y} = BE_{elec,y} + BE_{thermal,y}$

where:

$BE_{elec,y}$	baseline emissions from electricity generated utilizing the combustion heat from incineration in the Project activity and exported to the grid (tCO_2e)
$BE_{thermal,y}$	baseline emissions from thermal energy produced utilizing the combustion heat from incineration in the Project activity displacing thermal energy from onsite/offsite fossil fuelled boilers (tCO_2e)

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

where:

$EG_{d,y}$	Amount of electricity generated utilizing the combustion heat from incineration in the Project activity and exported to the grid during the year y (MWh)
CEF_d	Carbon emissions factor for the displaced electricity source in the project scenario (tCO_2/MWh)

$$BE_{thermal,y} = \frac{Q_y}{\varepsilon_{boiler} \cdot NCV_{fuel}} \cdot EF_{fuel,b}$$

where:

Q_y	Quantity of thermal energy produced utilizing the combustion heat from incineration in the Project activity displacing thermal energy from onsite/offsite fossil fuelled boilers during the year y in GJ
ε_{boiler}	Energy efficiency of the boiler used in the absence of the Project activity to generate the thermal energy
NCV_{fuel}	Net calorific value of fuel, as identified through the baseline identification procedure, used in the boiler to generate the thermal energy in the absence of the Project activity in GJ per unit of volume or mass
$EF_{fuel,b}$	Emission factor of the fuel, as identified through the baseline identification procedure, used in the boiler to generate the thermal energy in the absence of the Project activity in tons CO_2 per unit of volume or mass of the fuel

To estimate the boiler efficiency, option A (Highest value among the following three values as a conservative approach) in AM0025 is chosen:

1. Measured efficiency prior to project implementation

2. Measured efficiency during monitoring
3. Manufacture’s information on the boiler efficiency

As per the guideline in AM0025, CEF_d is calculated according to the “Tool to calculate the emission factor for an electricity system” since the generated electricity from combustion heat from incineration will displace the electricity that would have been generated by other power plants in the grid in the baseline. The calculation procedures are as follows:

STEP 1. Identify the relevant electric power system

The Chinese DNA - Office of Climate Change under the National Development and Reform Commission - has published a delineation of the project electricity system and connected electricity system. According to the delineation, the local grid to which the Project activity is connected is East China grid. East China grid has imported electricity from North China grid and Central China grid while North China grid has imported electricity from North East China grid. In calculating the emission factors for net electricity imports from above mentioned grid systems, the operating margin emission factor is calculated using option (c) – the simple operating margin emission rate of the exporting grid.[2]

STEP 2. Select an operating margin (OM) method

Among the options for the calculation of the operating margin emission factor, simple OM is chosen. As shown in the table below, low-cost/must-run resources constitute less than 50% of total East China grid generation in average of the five most recent years.

Year	Low-cost/must-run (hydro, nuclear, wind, etc.) (10^8kWh)	Total generation (10^8kWh)	% Low-cost/must run
2001	344.99	3270.15	11 %
2002	436.09	3678.14	12 %
2003	470.15	4291.27	11 %
2004	515.84	4879.86	11 %
2005	686.12	5744.67	12 %

Source: China Electric Power Yearbooks 2002, 2003, 2004, 2005 and 2006

In calculating the simple OM, ex-ante option – A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period – is chosen. For the calculation, years of 2003, 2004 and 2005, which is the most recent data, are chosen.

STEP 3. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generation power plants serving the system, not including

[2] The fact that the low-cost/must-run resources constitute less than 50% of total grid generation in exporting grids is shown in annex 3. In calculating the simple operating margin emission factor of the exporting grids, ex-post option is applied.

low-cost/must-run power plants/units. It is calculated based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C) because the necessary data for option A or option B is not available, nuclear and renewable power generation are considered as low-cost/ must-run power sources and the quantity of electricity supplied to the grid by these sources is known. Electricity imports are treated as one power plant.

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	CO2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units in year y (MWh)
i	All fossil fuel types combusted in power sources in the project electricity system in year y
y	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)

STEP 4. Identify the cohort of power units to be included in the build margin: and
STEP 5. Calculate the build margin emission factor

Since the plant specific data for East China grid is not available, the capacity addition from one year to another year and the efficiency of the best available technology are used as basis for determining the build margin of East China grid, which was clarify by EB[3]. Build margin emission factor will be calculated *ex-ante* based on the most recent information available at the time of CDM-PDD submission to the DOE for validation and applied during the first crediting period. For second crediting period, the build margin emission factor will be updated based on the most recent information available at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period will be used. (Option 1)

The procedure to calculate the Build Margin emission factor conservatively is as follows:

1) Using the latest statistical data available determining the two years with added capacity closest to 20% (above 20%)

- The capacity of each previous year is compared with the capacity of the most recent year.

[3] http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

$$\text{Capacity increase}(\%) = \left(\frac{\text{Capacity of the most recent year}}{\text{Capacity of the previous year}} - 1\right) \times 100$$

- Select the year of which the capacity increase is closest to and above 20% for build margin emission factor calculation

2) Calculate the build margin emission factor for that year with the efficiency of the best available technology

- Calculate the emission factor of each fuel source with the efficiency of the best available technology. For each fuel source, emission factor is calculated as follows:

$$\text{emission factor} = 3.6 / \text{best efficiency} / 1000 \times CO_2 \times \text{Oxidation factor}$$

- Calculate the weight of each emission sources as the ratio of emission by source to total emission in the most recent year

$$\text{weight for each fuel} = \frac{CO_2 \text{ Emission by each fuel}}{\text{Total } CO_2 \text{ emission}}$$

- Calculate the emission factor for thermal power generation.

$$\text{Emission factor for thermal power} = \sum_i \text{emission factor}_i \times \text{weight}_i$$

- Calculate the capacity addition ratio of each energy source (j: thermal, hydro, nuclear, wind, etc) between the most recent year and the selected year in step 1)

$$\text{capacity addition ratio}_j = \frac{\text{capacity addition}_j}{\text{Total capacity addition}}$$

$$\text{capacity addition}_j = \text{capacity of the most recent year}_j - \text{capacity of the year selected}_j$$

- Calculate the Build Margin emission factor

$$EF_{BM} = \sum \text{emission factor}_j \times \text{capacity addition ratio}_j$$

* Emission factor of 0 will be applied for the emission factors other than thermal power generation.

STEP 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

$EF_{gird,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{gird,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

The following default values will be applied for w_{OM} and w_{BM}:

- $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period.

Leakage

The sources of leakage considered are CO_2 emission from off-site transportation of waste material. There is no leakage from the leakage emissions from the residual waste from anaerobic digester, the gasifier, the processing/combustion of RDF/stabilized biomass, or compost in case it is disposed of in landfill and leakage emissions from end use of stabilized biomass since the Project activity only involves in the incineration of the waste.

$L_y = L_{t,y}$

where:

L_y	Leakage emissions in year y (tCO_2e)
$L_{t,y}$	Leakage emissions from increased transport in year y (tCO_2e)

Emissions from transportation ($L_{t,y}$)

The Project may result in a change in transport emission. In case it is likely that the transport emissions will increase significantly, such emissions will be incorporated as leakage and calculated as follows:

$$L_{t,y} = \sum_{i}^{n} NO_{vehicle,i,y} \times DT_{i,y} \times VF_{cons,i} \times NCV_{fuel} \times D_{fuel} \times EF_{fuel}$$

where:

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

Emissions Reductions

Emissions reductions will be calculated as follows:

$ER_y = BE_y – PE_y – L_y$

where:

ER_y	Emission reduction in year y (tCO_2e)
BE_y	Emissions in the baseline scenario in year y (tCO_2e)
PE_y	Emissions in the project scenario in year y (tCO_2e)

L_y Leakage in year y (tCO_2e)

If the sum of PE_y and L_y is smaller than 1% of BE_y in the first full operation year of a crediting period, a fixed percentage of 1 % for PE_y and L_y combined can be applied for the remaining years of the crediting period.

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 CH_4
Source of data used:	IPCC
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions.
Any comment:	

Data / Parameter:	**GWP_{N2O}**
Data unit:	tCO_2e/tN_2O
Description:	Global warming potential of N_2O
Source of data used:	IPCC
Value applied:	310
Justification of the choice of data or description of measurement methods and procedures actually applied :	310 for the first commitment period. Shall be updated according to any future COP/MOP decisions.
Any comment:	

Data / Parameter:	**EF_{N2O}**
Data unit:	gN_2O/tonne waste incinerated (wet basis)
Description:	Aggregate N_2O emission factor for waste incineration
Source of data used:	IPCC
Value applied:	MSW: 68.5 Sludge: 1,233
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since country or project specific data are not available, IPCC default values for continuous incinerators are used. A conservativeness factor for greater than 100 % (1.37) is applied.
Any comment:	

Data / Parameter:	**EF_{CH4}**
Data unit:	gCH_4/tonne waste incinerated (wet basis)
Description:	Aggregate CH_4 emission factor for waste incineration
Source of data used:	IPCC
Value applied:	MSW: 0 Sludge: 13.289
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since country or project specific data are not available, IPCC default values for fluidised bed type continuous incinerators are used. A conservativeness factor for greater than 100 % (1.37) is applied.
Any comment:	

Data / Parameter:	**NCV_{fuel}**
Data unit:	MJ/kg
Description:	Net calorific value of fuel, which would be used in the baseline scenario to generate thermal energy
Source of data used:	China energy statistical yearbook 2006
Value applied:	Coal: 20.908 Diesel oil: 42.652
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the project specific data is not available, country specific value is used.
Any comment:	

Data / Parameter:	**EF_{fuel}**
Data unit:	tCO_2/MJ
Description:	CO_2 emission factor of fuel
Source of data used:	IPCC
Value applied:	Other bituminous coal: $94.6 * 10^{-6}$ Diesel: $74.1 * 10^{-6}$
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the project specific data and country specific data is not available, IPCC default values are used.
Any comment:	

Data / Parameter:	φ
Data unit:	-
Description:	Model correction factor to account for model uncertainties

Source of data used:	Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**OX**
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	IPCC
Value applied:	0.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value for the managed solid waste disposal sites is used.
Any comment:	

Data / Parameter:	**F**
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	IPCC
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	A default value recommended by IPCC is used.
Any comment:	

Data / Parameter:	**DOC_f**
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC
Value applied:	0.5
Justification of the choice of data or description of measurement methods	IPCC default value is used.

and procedures actually applied :	
Any comment:	

Data / Parameter:	**MCF**
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value for anaerobic managed solid waste disposal sites is used.
Any comment:	

Data / Parameter:	**DOC_j**
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data used:	IPCC
Value applied:	(see table below)
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default values are used.
Any comment:	

Waste type j	DOC_j (% wet waste)	DOC_j (% dry waste)
Wood and wood products	43	50
Pulp, paper and cardboard	40	44
Food, food waste, beverage and tobacco	15	38
Textiles	24	30
Garden, yard and park waste	20	49
Glass, plastic, metal, other inert waste	0	0
Sewage sludge	10	50

Data / Parameter:	**k_j**
Data unit:	-
Description:	Decay rate for the waste type j
Source of data used:	IPCC
Value applied:	Pulp, paper, cardboard: 0.06 Wood, wood products and straw: 0.03 Other (non-food) organic putrescible garden and park waste: 0.10 Food, food waste, sewage sludge, beverages and tobacco: 0.185

Justification of the choice of data or description of measurement methods and procedures actually applied :	Default values for wet boreal and temperate climate zone are used. The climate information of the project sites is as follows: MAT: 17.4℃ MAP: 1,591 mm PET: 1,464.3 mm
Any comment:	

Data / Parameter:	**B_0**
Data unit:	tCH_4/tCOD
Description:	Maximum methane producing capacity
Source of data used:	IPCC
Value applied:	0.265
Justification of the choice of data or description of measurement methods and procedures actually applied :	Taking into account the uncertainty of this estimate, a value of 0.265 kg CH_4/kg COD as a conservative assumption for B_0 will be used.
Any comment:	In case the wastewater is treated anaerobically or released untreated, this value will be used to calculate the project emissions from wastewater.

Data / Parameter:	**MCF_p**
Data unit:	%
Description:	Methane conversion factor (fraction)
Source of data used:	IPCC
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value will be used.
Any comment:	This parameter will be applied only in case the wastewater is treated anaerobically or released untreated. A default value for the relevant treatment system will be used to calculate the project emissions from wastewater.

Data / Parameter:	ε_{boiler}
Data unit:	%
Description:	Energy efficiency of boilers used for generating thermal energy in the absence of the Project activity
Source of data used:	Measured or Manufacture’s information
Value applied:	75
Justification of the choice of data or	Option A – Use the highest among the following three values as a conservative approach – is chosen

description of measurement methods and procedures actually applied :	1. Measured efficiency prior to project implementation 2. Measured efficiency during monitoring 3. Manufacturer's information on the boiler efficiency According to manufacturers' information on boiler efficiency (designed efficiency), the highest efficiency of the boilers used is 75%. The actual measured efficiency of the boilers is 60% due to the low load, frequent start-up and shutdown and lack of skilled professional operators. Therefore 75% of efficiency is chosen.
Any comment:	Measured efficiency during monitoring is not applied since the boilers will not be used after project implementation.

B.6.3 Ex-ante calculation of emission reductions:

Project emissions

As per the guidelines in AM0025 (version 10), project emissions are calculated as follows:

$PE_y = PE_{elec,y} + PE_{fuel,on\text{-}site,y} + PE_{i,y} + PE_{w,y}$
=

Emissions from electricity use ($PE_{elec,y}$)

There are no project emissions from this source since the electricity used by the Project activity will be generated by the Project activity. ($PE_{elec,y} = 0$)

Emissions from fuel use on-site ($PE_{fuel,on\text{-}site,y}$)

Following table shows the auxiliary coal consumption of the Project activity and relevant project emissions. ($PE_{fuel,\ on\text{-}site,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel}$)

	Coal consumption (t/yr)	NCV (MJ/t)	Oxidation factor	CO_2 emission factor (tCO_2/TJ)	CO_2 emission (tCO_2/yr)
2009	71,610	20,908	1	94.6	141,637
2010	109,890	20,908	1	94.6	217,351
2011 onwards	126,390	20,908	1	94.6	249,986

	Diesel oil consumption (t/yr)	NCV (MJ/t)	Oxidation factor	CO_2 emission factor (tCO_2/TJ)	CO_2 emission (tCO_2/yr)
2009	40	42,652	1	74.1	126
2010	50	42,652	1	74.1	158
2011 onwards	60	42,652	1	74.1	190

Emissions from fuel use on-site

2009: 141,763 tCO_2/yr
2010: 217,509 tCO_2/yr
2011 onwards: 250,176 tCO_2/yr

Emissions from waste incineration ($PE_{i,y}$)

$PE_{i,y} = PE_{i,f,y} + PE_{i,s,y}$
=
Emissions from fossil-based waste ($PE_{i,f,y}$)

$$PE_{i,f,y} = \sum_i A_i \times CCW_i \times FCF_i \times EF_i \times \frac{44}{12}$$

Following tables shows the expected amount of each waste type to be combusted in each year, values applied for project emission calculation and relevant project emissions.

Waste type (A_i)	2009	2010	2011 onwards
Wood and wood product	1,935	3,226	3,871
Pulp, paper and cardboard	6,166	10,276	12,331
Food, food waste, beverage and tobacco	48,312	80,520	96,624
Textiles	3,500	5,834	7,001
Garden, year and part waste	0	0	0
Nappies	0	0	0
Glass, metal	6,554	10,923	13,108
Plastic	13,009	21,681	26,017
Other, inert waste	39,739	66,231	79,477
Rubber/ Leather	0	0	0
Sewage sludge	52,800	66,000	66,000

Unit: tonne/year (dry matter)

* The amount of each waste type is estimated by the sampling before the project implementation. After the project implementation, amount of each waste type will be monitored and the monitored data will be used ex-post project emission calculation.

Waste type	CCW_i	FCF_i	EF_i
Wood and wood product	0.50	0	1
Pulp, paper and cardboard	0.46	0.01	1
Food, food waste, beverage and tobacco	0.38	0	1
Textiles	0.50	0.20	1
Garden, year and part waste	0.49	0	1
Nappies	0.70	0.10	1
Glass, metal	NA	NA	1

Plastic	0.75	1	1
Other, inert waste	0.03	1	1
Rubber/ Leather	0.67	0.20	1
Sewage sludge	0.50	0	1

Year	CO_2 emission
2009	41,265
2010	68,776
2011 onwards	82,531

N_2O and CH_4 emissions from the final stacks from waste incineration ($PE_{i,s,y}$)

Following table shows the parameters used for the calculation of N_2O and CH_4 emissions from the final stacks from waste incineration and the results.

Year	$Q_{biomass,y}$ (tonnes of wet waste)		EF_{CH4} (gCH_4/t waste)		EF_{CH4} (gN_2O/t waste)		Stack gas emission (tCO_2/yr)
	MSW	Sludge (water content 40%)	MSW	Sludge	MSW	Sludge	
2009	198,000	88,000	0	13.289	68.5	1,233	37,865
2010	330,000	110,000	0	13.289	68.5	1,233	49,084
2011 onwards	396,000	110,000	0	13.289	68.5	1,233	50,485

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

Wastewater generated by the Project activity will be treated using a chemical treatment method that does not result in any methane emission. ($PE_{w,y} = 0$)

Baseline emissions

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

Adjustment Factor (AF)

In the landfill sites where MSW/sludge has been landfilled and would be landfilled in the absence of the Project activity, landfill gas collection and destruction system is not installed. Therefore, during the first crediting period, 0 is applied to AF.

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

Rate of compliance

At present, there are no regulations that mandate the use of one of the project activity treatment options. ($RATE^{Compliance}_{y} = 0$)

Methane generation from the landfill in the absence of the project activity (MB_y)

$MB_y = BE_{CH4,SWDS,y}$

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

Following tables shows the expected amount of each waste type to be treated by the Project activity in each year, applied values for baseline emission calculation and relevant baseline emissions.

Waste type (W_j)	2009	2010	2011 onwards
Wood and wood product	1,935	3,226	3,871
Pulp, paper and cardboard	6,166	10,276	12,331
Food, food waste, beverage and tobacco	48,312	80,520	96,624
Textiles	3,500	5,834	7,001
Garden, year and part waste	0	0	0
Glass, plastic, metal, other inert waste	59,301	98,835	118,602
Sewage sludge	52,800	66,000	66,000

Unit: tonnes/year (dry matter)
* The amount of each waste type is estimated by the sampling before the project implementation. After the project implementation, amount of each waste type will be monitored and the monitored data will be used ex-post project emission calculation.

Waste type (W_j)	DOCj	kj
Wood and wood product	0.5	0.03
Pulp, paper and cardboard	0.44	0.06
Food, food waste, beverage and tobacco	0.38	0.185
Textiles	0.3	0.06
Garden, year and part waste	0.49	0.1
Glass, plastic, metal, other inert waste	0	0
Sewage sludge	0.5	0.185

* The Project site belongs to wet boreal and temperate climate zone. (MAT: 17.4℃, MAP: 1,591 mm, PET: 1,464.3 mm)

φ	f	GWP_{CH4}	OX	F	DOC_f	MCF

0.9	0	21	0.1	0.5	0.5	1

* For OX and MCF, default values for anaerobic managed solid waste disposal sites are used.

Year	CH_4 avoidance (tCO_2e)
2009	44,267
2010	100,196
2011	153,264
2012	197,668
2013	234,853
2014	266,024

Baseline emissions from generation of energy displaced by the project activity

$BE_{EN,y} = BE_{elec,y} + BE_{thermal,y}$

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

$$BE_{thermal,y} = \frac{Q_y}{\varepsilon_{boiler} \cdot NCV_{fuel}} \cdot EF_{fuel,b}$$

Following tables shows the expected energy generation in each year, values used to calculate baseline emissions and relevant baseline emissions.

CEF_d (tCO_2/MWh)	Baseline fuel for thermal energy generation	$EF_{fuel,b}$ (tCO_2/t of coal)	NCV_{fuel} (GJ/t)	ε_{boiler}
0.89245	Coal (other bituminous coal)	1.978	20.908	0.75

	Net Electricity generation ($EG_{d,y}$) (MWh/yr)	Net Thermal energy generation (Q_y) (GJ/yr)	$BE_{elec,y}$	$BE_{thermal,y}$	$BE_{EN,y}$
2009	173,195	356,400	154,567	44,954	199,521
2010	256,133	712,800	228,586	89,908	318,494
2011 onwards	267,110	1,188,000	238,382	149,846	388,229

Grid emission factor calculation

Grid emission factor for East China grid is calculated according to the procedures described in the “Tool to calculate the emission factor for an electricity system” as follows:

STEP 1. Identify the relevant electric power system

The local grid to which the Project activity is connected is East China grid. East China grid has imported electricity from North China grid and Central China grid while North China grid has imported electricity from North East China grid. In calculating the emission factors for net electricity imports from above mentioned grid systems, the operating margin emission factor is calculated using option (c) – the simple operating margin emission rate of the exporting grid.

STEP 2. Select an operating margin (OM) method

Among the options for the calculation of the operating margin emission factor, simple OM is chosen. In calculating the simple OM, ex-ante option is chosen.

STEP 3. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C) as follows:

Fuel consumption and CO_2 emission in 2003 (East China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxidation factor	NCV ($MJ/t,km^3$)	CO_2 emission (tCO_2/yr)
Raw coal	169,018,100	89.5	1	20,908	316,277,824
Coke oven gas	205,000,000	37.3	1	16,726	127,895
Other coal gas	6,634,000,000	37.3	1	5,227	1,293,412
Diesel	299,600	72.6	1	42,652	927,722
Fuel oil	2,896,200	75.5	1	41,816	9,143,616
Refinery gas	14,500	48.2	1	46,055	32,188
Other petroleum products	392,500	72.2	1	38,369	1,087,320
Other energy	127,600	0	1	0	0
Total					328,889,977

Fuel consumption and CO_2 emission in 2004 (East China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxidation factor	NCV ($MJ/t,km^3$)	CO_2 emission (tCO_2/yr)
Raw coal	194,803,000	89.5	1	20,908	364,528,231
Other washed coal	100,900	89.5	1	8,363	75,522
Coke oven gas	259,000,000	37.3	1	16,726	161,585
Other coal gas	7,246,000,000	37.3	1	5,227	1,412,732
Diesel	360,900	72.6	1	42,652	1,117,540
Fuel oil	3,397,400	75.5	1	41,816	10,725,959
Refinery gas	13,200	48.2	1	46,055	29,302
Natural gas	14,000,000	54.3	1	38,931	29,595
Other petroleum products	474,800	72.2	1	38,369	1,315,311
Other energy	219,100	0	1	0	0
Total					379,395,776

Fuel consumption and CO_2 emission in 2005 (East China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxidation factor	NCV ($MJ/t,km^3$)	CO_2 emission (tCO_2/yr)
Raw coal	227,274,800	89.5	1	20,908	425,291,606
Coke	300	89.7	1	28,435	765

Coke oven gas	477,000,000	37.3	1	16,726	297,591
Other coal gas	13,875,000,000	37.3	1	5,227	2,705,169
Crude oil	270,100	71.1	1	41,816	803,039
Diesel	234,400	72.6	1	42,652	725,828
Fuel oil	2,332,800	75.5	1	41,816	7,364,902
Refinery gas	14,000	48.2	1	46,055	31,078
Natural gas	356,000,000	54.3	1	38,931	752,567
Other petroleum products	641,800	72.2	1	38,369	1,777,941
Other energy	276,500	0	1	0	0
Total					439,750,485

Imported electricity to East China grid and CO_2 emissions

		2003	**2004**	**2005**
Imported (North China grid)	Imported electricity (MWh/yr)	10,705,870	11,649,610	77,244,000
	Simple OM[4] (tCO_2/MWh)	1.0614		
	CO_2 emission (tCO_2/yr)	11,363,461	12,365,169	81,988,590
Imported (Central China grid)	Imported electricity (MWh/yr)	13,756,040	26,933,850	160,410,000
	Simple OM (tCO_2/MWh)	1.2202		
	CO_2 emission (tCO_2/yr)	16,785,343	32,865,121	195,734,887

Electricity generation and CO_2 emission

Year	**Electricity generation (including imported electricity) (MWh/yr)**	**CO_2 emission (including CO_2 emission from imported electricity) (tCO_2/yr)**
2003	385,310,464	357,038,781
2004	453,378,723	424,626,066
2005	714,971,698	717,473,963

Simple OM = 0.9649 (tCO_2/MWh)

STEP 4. Identify the cohort of power units to be included in the build margin: and STEP 5. Calculate the build margin emission factor

CO_2 emission by each fuel type

Fuel type	**CO_2 emissions (tCO_2)**
Raw coal	425,291,606
Clean coal	0
Other washed coal	0
Coke	765
Crude oil	803,039

[4] Simple OM calculation for North China grid and Central China grid is provided in Annex 3.

Gasoline	0
Diesel	725,828
Fuel oil	7,364,902
Other petroleum products	1,777,941
Natural gas	752,567
Coke oven gas	297,591
Other coal gas	2,705,169
Refinery gas	31,078
Total	439,750,485

Emission factor for each fossil fuel

Fuel type	Best efficiency	CO_2 emission factor (tCO_2/TJ)	Oxidation factor	Emission Factor (tCO_2/MWh)	CO_2 Emission weight	Weighted emission factor
Raw coal	35.82%	89.5	1	0.8995	96.71%	0.8699
Clean coal	35.82%	89.5	1	0.8995	0.00%	0.0000
Other washed coal	35.82%	89.5	1	0.8995	0.00%	0.0000
Coke	35.82%	89.7	1	0.9015	0.00%	0.0000
Crude oil	47.67%	71.1	1	0.5369	0.18%	0.0010
Gasoline	47.67%	67.5	1	0.5098	0.00%	0.0000
Diesel	47.67%	72.6	1	0.5483	0.17%	0.0009
Fuel oil	47.67%	75.5	1	0.5702	1.67%	0.0095
Other petroleum products	47.67%	72.2	1	0.5452	0.40%	0.0022
Natural gas	47.67%	54.3	1	0.4101	0.17%	0.0007
Coke oven gas	47.67%	37.3	1	0.2817	0.07%	0.0002
Other coal gas	47.67%	37.3	1	0.2817	0.62%	0.0017
Refinery gas	47.67%	48.2	1	0.3640	0.01%	0.0000
Total						0.8862

Capacity addition in East China grid

Generation typ	**Capacity in 2003 (MW)**	**Capacity in 2004 (MW)**	**Capacity in 2005 (MW)**	**Capacity addition (2004 ~ 2005)**	**Capacity addition/Total capacity addition**
Thermal	65036.5	79424.1	104077	24652.5	92.53%
Hydro	13602.5	14417.8	16069.4	1651.6	6.20%
Nuclear	2406	3056	3066	10	0.04%
Wind	51.7	72.6	401.3	328.7	1.23%
Total	81096.7	96970.5	123613	26642.8	
Capacity addition	34.39%	**21.55%**			

BM = 0.8862 * 0.9253 + 0 * 0.062 + 0 * 0.0004 + 0 * 0.0123 = 0.8200

STEP 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$
$$= 0.9649 * 0.5 + 0.8200 * 0.5 = 0.89245$$

Leakage

$L_y = L_{t,y}$

Emissions from transportation ($L_{t,y}$)

$$L_{t,y} = \sum_{i}^{n} NO_{vehicle,i,y} \times DT_{i,y} \times VF_{cons,i} \times NCV_{fuel} \times D_{fuel} \times EF_{fuel}$$

Since the project site is closer to the waste collection site than the baseline landfills, it is expected that the transportation emissions will be reduced by the Project activity. Therefore, emissions from transportation is assumed to be zero ($L_{t,y}$ = 0).

Emissions Reductions

$ER_y = BE_y – PE_y – L_y$

Emission reductions are shown in the table in Section B.6.4 below.

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

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emission reductions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of emission reductions (tCO_2e)
2009	220,894	243,789	0	22,895
2010	335,368	418,689	0	83,321
2011	383,192	541,493	0	158,301
2012	383,192	585,896	0	202,704
2013	383,192	623,082	0	239,890
2014	383,192	654,253	0	271,061
2015	383,192	680,411	0	297,219
TOTAL	2,472,222	3,747,613	0	1,275,391

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$F_{cons,y}$**
Data unit:	Mass or volume units of fuel
Description:	Fuel consumption on-site during year y of the crediting period
Source of data to be used:	Purchase invoices and/or metering
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Coal consumption 2009: 71,610 tonnes 2010: 109,890 tonnes 2011 onwards: 126,390 tonnes Diesel oil consumption 2009: 40 tonnes 2010: 50 tonnes 2011 onwards: 60 tonnes
Description of measurement methods and procedures to be applied:	Fossil fuel consumption on-site will be will be measured annually.
QA/QC procedures to be applied:	The amount of fuel will be derived from the paid fuel invoices.
Any comment:	

Data / Parameter:	**A_i**
Data unit:	tonnes/yr
Description:	Amount of waste type ‘i’ fed into the waste incineration plant
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	(see table below)
Description of measurement methods	This parameter will be measured annually with calibrated scales/load cells.

Waste type	2009	2010	2011 onwards
Wood and wood product	1,935	3,226	3,871
Pulp, paper and cardboard	6,166	10,276	12,331
Food, food waste, beverage and tobacco	48,312	80,520	96,624
Textiles	3,500	5,834	7,001
Garden, year and part waste	0	0	0
Glass, plastic, metal, other inert waste	59,301	98,835	118,602
Sewage sludge	52,800	66,000	66,000

and procedures to be applied:	
QA/QC procedures to be applied:	Regular sorting & weighing of waste (initially quarterly) by project proponent will be carried out.
Any comment:	

Data / Parameter:	**CCW_i**
Data unit:	Fraction (% in dry weight)
Description:	Fraction of carbon content in waste type i
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Paper/cardboard: 46 Textiles: 50 Food waste: 38 Wood: 50 Garden and Park waste: 49 Nappies: 70 Rubber and Leather: 67 Plastics: 75 Metal: NA Glass: NA Other, inert waste: 3 Sewage sludge: 50
Description of measurement methods and procedures to be applied:	Default values from Table 2.4, chapter 2, Volume 5 and table 5.2, chapter 5, Volume 5, 2006 IPCC Guideline for National Greenhouse Gas Inventories are used. The values will be confirmed annually.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**FCF_i**
Data unit:	Fraction
Description:	Fraction of fossil carbon
Source of data to be used:	Project participant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Paper/cardboard: 1 Textiles: 20 Food waste: 0 Wood: 0 Garden and Park waste: 0 Nappies: 10 Rubber and Leather: 20 Plastics: 100 Metal: NA Glass: NA Other, inert waste: 100

	Sewage sludge: 0
Description of measurement methods and procedures to be applied:	To be determined through sampling where the samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95 % confidence level. This parameter will be monitored annually.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**EF_i**
Data unit:	Fraction
Description:	Combustion efficiency for waste type 'i'
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	For all waste types: 100
Description of measurement methods and procedures to be applied:	IPCC default value for waste incineration (section 5.4.1.3, Chapter 5, Volume 5, 2006 IPCC Guideline for National Greenhouse Gas Inventories) is used.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**MB_y**
Data unit:	tCH_4
Description:	Methane produced in the landfill in the absence of the Project activity in year y
Source of data to be used:	Calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	(see table below)
Description of measurement methods and procedures to be applied:	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"

Year	**MB_y**
2009	2,107,96
2010	4,771.22
2011	7,298.31
2012	9,412.75
2013	11,183.48
2014	12,667.82
2015	13,913.46

QA/QC procedures to be applied:	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"
Any comment:	

Data / Parameter:	**f**
Data unit:	Fraction
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data to be used:	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	-
Any comment:	A value of 0 will be applied since it is already reflected in the emission reduction calculation equation in AM0025.

Data / Parameter:	$\mathbf{W_x}$
Data unit:	tons
Description:	Total amount of organic waste prevented from disposal in year x (tons)
Source of data to be used:	Measurement by project participant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	(see table below)
Description of measurement methods and procedures to be applied:	This parameter will be monitored continuously, aggregated at least annually. This parameter is same as A_i.
QA/QC procedures to be applied:	Regular sorting & weighing of waste (initially quarterly) by project proponent will be carried out.
Any comment:	

Years	MSW	Sludge (water content 40%)
2009	198000	88,000
2010	330000	110,000
2011 onwards	396000	110,000

Data / Parameter:	$\mathbf{p_{n,j,x}}$
Data unit:	Fraction

Description:	Weight fraction of the waste type j in the sample n collected during the year x
Source of data to be used:	Sample measurements by project participant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Wood and wood products: 1.15% Pulp, paper and cardboard: 3.46% Food, food waste, beverage and tobacco: 61% Textiles: 2.21% Garden, year and park waste: 0% Nappies: 0% Glass, metal: 3.31% Plastic: 6.57% Other inert waste: 22.3% Rubber/Leather: 0%
Description of measurement methods and procedures to be applied:	Sample the waste prevent from disposal, using the waste categories j, as provided in the table for DOC_j and k_j, and weigh each waste fraction. The size and frequency of sampling should be statistically significant with a maximum uncertainty range of 20% at a 95% confidence level. As a minimum, sample should be undertaken four times per year. For sewage sludge, there is no need to monitor this parameter since the sewage sludge will be separately treated and the full amount of treated sewage sludge will be monitored.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**z**
Data unit:	-
Description:	Number of samples collected during the year x
Source of data to be used:	Project participant
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:	This parameter will be monitored continuously, aggregated annually.
QA/QC procedures to be applied:	
Any comment:	

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

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	This parameter will be renewed at renewal of crediting period.
QA/QC procedures to be applied:	
Any comment:	Changes in regulatory requirements, relating to the baseline landfill(s) need to be monitored in order to update the adjustment factor (AF) or directly MD_{reg}. This is done at the beginning of each crediting period. As per the guideline in AM0025, a value of 0 will be applied to the variable "f" in the "Tool to determine methane emissions avoided from dumping waste as a solid waste disposal site".

Data / Parameter:	**$EG_{d,y}$**
Data unit:	MWh
Description:	Amount of electricity generated utilizing the combustion heat from incineration in the Project activity displacing electricity in the baseline during the year y
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2009: 173,195 2010: 256,133 2011 onwards: 267,110
Description of measurement methods and procedures to be applied:	This parameter will be monitored continuously.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**CEF_d**
Data unit:	tCO_2/MWh
Description:	Emission factor of displaced electricity by the Project activity
Source of data to be used:	Calculated as per "Tool to calculate the emission factor for an electricity system"
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.89245
Description of	This parameter will be calculated once for each crediting period.

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**$FC_{i,y}$**
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data to be used:	China Energy Statistical Yearbook 2004, 2005 and 2006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please refer to the section B.6.3
Description of measurement methods and procedures to be applied:	These values are the official data from Chinese DNA – Office of Climate Change under the National Development and Reform Commission. This parameter is monitored once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation. (ex-ante option)
QA/QC procedures to be applied:	
Any comment:	-

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	GJ/ mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type i in year y
Source of data to be used:	China Energy Statistical Yearbook 2006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please refer to the section B.6.3
Description of measurement methods and procedures to be applied:	National average default values are used from Office of Climate Change under the National Development and Reform Commission of China. This parameter is monitored once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation. (ex-ante option)
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ

Description:	CO_2 emission factor of fossil fuel type i in year y
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please refer to the section B.6.3
Description of measurement methods and procedures to be applied:	This parameter is monitored once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation. (ex-ante option)
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid in project electricity
Source of data to be used:	China Electric Power Yearbook 2004, 2005 and 2006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please refer to the section B.6.3
Description of measurement methods and procedures to be applied:	This parameter is monitored once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation. (ex-ante option)
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**$RATE^{Compliance}_y$**
Data unit:	Number
Description:	Rate of compliance
Source of data to be used:	Municipal bodies
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be	The compliance rate is based on the annual reporting of the municipal bodies issuing these reports. The state-level aggregation involves all landfill sites in the country. If the rate exceeds 50%, no CERs can be claimed. This parameter will

applied:	be monitored annually.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**$Q_{COD,y}$**
Data unit:	m^3/yr
Description:	Amount of wastewater treated anaerobically or released untreated from the Project activity in year y
Source of data to be used:	Measured value by flow meter
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:	This parameter will be measured monthly and aggregated annually.
QA/QC procedures to be applied:	The monitoring instrument will be subject to regular maintenance and testing to ensure accuracy.
Any comment:	Only in case the wastewater is treated anaerobically or released untreated, this parameter will be monitored. If the wastewater is treated aerobically, emissions are assumed to be zero and this parameter does not need to be monitored.

Data / Parameter:	**$P_{COD,y}$**
Data unit:	tCOD/m^3
Description:	Chemical Oxygen Demand (COD) of wastewater
Source of data to be used:	Measured value by purity meter
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:	This parameter will be measured monthly and aggregated annually.
QA/QC procedures to be applied:	The monitoring instrument will be subject to regular maintenance and testing to ensure accuracy.
Any comment:	Only in case the wastewater is treated anaerobically or released untreated, this parameter will be monitored. If the wastewater is treated aerobically, emissions are assumed to be zero and this parameter does not need to be monitored.

Data / Parameter:	**f_i**

Data unit:	%
Description:	Fraction of waste diverted from the landfill to all project activities: composting/gasification/anaerobic digestion/RDF/stabilized biomass/ incineration
Source of data to be used:	Plant records
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:	This parameter will be monitored monthly.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**Q_y**
Data unit:	TJ
Description:	Net quantity of thermal energy supplied by the Project activity in year y
Source of data to be used:	Steam meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2009: 356.4 2010: 712.8 2011 onwards: 1,118
Description of measurement methods and procedures to be applied:	The enthalpy of steam and feed water will be determined at measured temperature and pressure and the enthalpy difference will be multiplied with quantity measured by steam meter. This parameter will be monitored monthly.
QA/QC procedures to be applied:	In case of monitoring steam, it will be calibrated for pressure and temperature of steam at regular intervals. The meter will be subject to regular maintenance and testing to ensure accuracy.
Any comment:	-

B.7.2 Description of the monitoring plan:

Purpose

The monitoring plan is designed to monitor parameters listed in B.7.1, which are required for calculation of the actual GHG emission reduction achieved by the Project.

Monitoring framework

Figure 3 below outlines the operational and management structure that CECIC will implement to monitor emission reductions and any leakage effects generated by the Project activity. CECIC will form an operational and management team, which will be responsible for monitoring of all the aforementioned monitoring parameters. This team will compose of a general manager and a group of operators. The group of operators, under the supervision of the general manager, will be assigned for monitoring of different parameters on a timely basis and will perform the recording and archiving of data in an orderly manner. Monitoring reports will be forwarded to and reviewed by the general manager on a monthly basis in order to ensure the Project follows the requirements of the monitoring plan.

The performance of the Project will be reviewed and analyzed by the consultants on a regular basis.

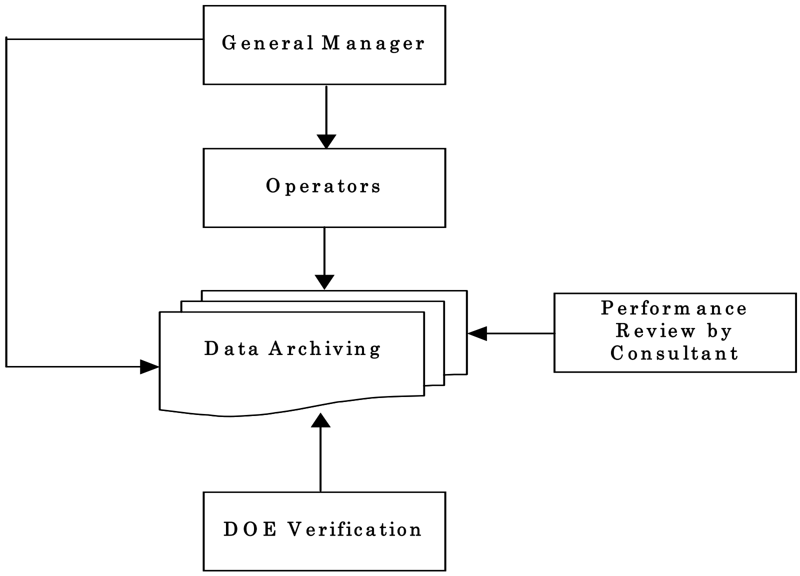


Figure 3. Operational and management structure for monitoring the Project activity.

Monitoring equipment and installation

The Project activity requires the monitoring of the following items:

- Electricity generation by the Project activity (the total amount, the amount used by the project activity, and the amount exported to the grid);
- Thermal generation from the Project activity (the amount exported to customers)
- The amount of waste consumed by the Project;
- The NCV of the waste;
- Waste fraction of the different waste types;
- Data on the relative amounts of MSW and coal combusted in the incinerator;
- Data needed to calculate CO_2 emissions from combustion of fossil-based waste;
- Data needed to calculate CO_2 emissions from the transportation of waste to the Project plant;
- Data needed to calculate CO_2 emissions from on-site consumption of fossil fuels;
- Data needed to calculate CH_4 and N_2O emissions from the boiler stacks;

- Data on analysis of residue left over from the combustion process;
- Rate of compliance by landfills in China with the national regulations regarding methane capture.

The monitoring methodologies for each are stated in the respective sections of B.7.2.

Data collection

This monitoring plan includes MSW composition analysis, MSW properties analysis, and measuring of the quantity of MSW, electricity, and fuel consumption. Additionally, monitoring of laws and regulations, as well as compliance are included in this monitoring plan. The data to be collected is listed below:

(1) The MSW composition analysis, waste type by weight, and analysis of MSW properties.
(2) Electricity consumption, import and export will be recorded continuously and aggregated monthly. The time and date each monitoring period starts and ends will be recorded.
(3) The project proponent will keep all relevant receipts for electricity sales and receipts for the income from MSW handling, as well as all relevant receipts for the purchase of electricity and fuel. These receipts (or photocopies) will be made available to the auditor at verification.
(4) Annual fossil fuel consumption will be monitored from the fuel purchase invoices.
(5) The administration department will monitor MSW treatment laws, regulatory information and compliance statistics, as well as national and international publications (such as the IPCC guidelines). Administration will submit an annual report on the above to the general manager.

Calibration

Regular calibration will be necessary for the monitoring equipment. The necessary calibration will be performed according to the manufacturer’s guidelines, or according to the applicable regulations, by a suitably skilled technician at the required frequency (at least once a year). A certificate of calibration will be provided for each piece of equipment after completion.

Data management

All data collected as part of monitoring plan should be archived electronically and be kept for at least 2 years after the end of the last crediting period.

Monitoring report

A monitoring report in line with CDM regulations and the requirements of this monitoring methodology will be issued annually by the general manager.

The monitoring report will contain a summary of the whole monitoring plan, and will describe the implementation of the monitoring plan in that particular year, present the relevant results and data, and calculate emission reductions for the period.

The report will include:

- Quality assurance reports for the monitoring equipment;
- Calibration reports for the monitoring equipment (including relevant standards and regulations);

- Any maintenance and repair of monitoring equipment;
- The qualifications of the persons responsible for the monitoring and calculations;
- The tests performed and data obtained;
- Emission reduction calculations;
- A summary of the monitoring plan in that particular year;
- Any other information relevant to the monitoring plan.

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 was completed on 06/02/2008 by

Clean Energy Finance Committee
Mitsubishi UFJ Securities Co., Ltd.
Tokyo, Japan

Phone: +81 3 6213 6860
Fax: +81 3 6213 6175
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Mitsubishi UFJ Securities Co., Ltd. is the CDM advisor to the Project. Mitsubishi UFJ Securities Co., Ltd. is not a project participant of the Project activity.

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:

28/02/2007

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

22 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:

01/01/2009

C.2.1.2. Length of the first crediting period:

Seven (7) years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

An environmental impact report for the Project activity was completed in accordance with the relevant laws and regulations. The report has been approved by the Environment Protection Bureau of Zhejiang Province. The main requirements that the report placed on the Project activity are as follows:

1) The percentage of bituminous coal will not exceed 20% of the total fuel. An automatic monitoring device is included in the feeder to measure the relative amounts of MSW/sewage and bituminous coal. In addition, a device which separates alkali metals and discarded batteries will be installed.
2) The MSW/sewage sludge storage pool will be non-permeable and a wastewater capture device will be installed. Any leachate from the MSW/sewage sludge will be combusted in the boiler.
3) The sulphur (S) content of bituminous coal is to be below 1.52% (0.46% of mixed fuels), desulphurization of the waste gases will result in the removal of at least 90% of the sulphur, and an additional filtration process will remove at least 99.8% of the dust from the waste gases. Stack gas emissions will meet *MSW Combustion Emission Standard* GB18484-2001, and stench emissions will meet *Stench Emission Standard* GB 14554-93. The chimney will be at least 120 m tall.
4) The wastewater will be separated into two waste streams: sanitary wastewater and industrial wastewater. The wastewater shall be recycled as much as possible, and any that is released will have been treated to meet the highest level of *Integrated Wastewater Emission Standard* GB8978-1996.
5) Anti-noise measures will be taken to ensure that the noise at the plant boundary meets the second level of *Industrial Enterprise Boundary Noise Standard* GB12348-90; the noise during project construction shall meet *Construction Boundary Noise Limitation* GB12523-90.
6) Residual waste from the incinerator will be sold as a replacement for clinker in cement manufacture. Any waste that is not utilized will be treated as hazardous waste.
7) A stack gas emission monitoring device will be installed according to national requirements, as stated in *Technical Guideline of Stack Gas Emission Monitoring in Coal/Oil-Fired Power Plant*.

According to the environmental impact report, the Project activity will meet all of the above requirements, and in response to a requirement of GB 18485-2001, the content of the waste will be monitored and a report submitted periodically to the local Environmental Protection Department.

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:

As mentioned above, the Project activity will meet all of the requirements and be expected to any no significant environmental impacts. In addition, the Project activity will reduce greenhouse gas emissions by approximately 147,000 tonnes CO_2e annually, when compared with the baseline scenario of coal-based generation and environmentally harsh methods of waste disposal. Additionally, the Project activity will significantly reduce harmful emissions such as SO_x, NO_x and particulate matter as well as lead to other benefits for the local community such as improvements in the area's scenery and the reduction of noxious smells from the waste.

SECTION E. Stakeholders' comments

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

Public consultation was undertaken as a part of the development of the Project activity. The public consultation was held at Yuedu Hotel in Shaoxing City on 30th December, 2006. The announcement of the meeting was made in a local daily newspaper (Shaoxing Daily) as well as through the internet (www.cecic-consulting.com.cn). A total of 25 people participated in the meeting.

Throughout the meeting, followings were presented to the participants.

- Purposes of the Project activity
- General description of the Project activity
- Environmental impact of the Project activity
- Benefits of the Project activity including benefits from CDM application

E.2. Summary of the comments received:

Participants agreed that the implementation of the Project activity will improve the local environment and economy by adopting of new MSW/sludge treatment system as well as the energy generation. However, following concerns were also raised by the participants.

- Land occupation
- Emission of dioxin

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

To the concerns raised by the stakeholders, following answers/measures were provided by the project developer. To the answers/measures, the stakeholders were satisfied.

- Land occupation: There will be no additional land occupation by the Project activity from the local resident.
- Emission of dioxin: the emission of dioxin from the Project activity (0.0048Ng~0.003 Ng) will be much lower than the national standard (0.1Ng). This will be achieved through technology control such as temperature control to reduce production of dioxin and filter installed in gas treatment to reduce the gas pollution.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The financial plans for the Project activity does not involve ODA from Annex I countries.

Annex 3

BASELINE INFORMATION

< Calculation of CO_2 emission factor of Central China grid >

Central China grid exports electricity to East China grid to which the Project activity delivers electricity. The operating margin emission factor of Central China grid is calculated as simple operating margin emission rate of Central China grid using ex-ante option. The choice of the simple OM is justified since low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years as follows:

Year	Low-cost/must-run (hydro, nuclear, wind, etc.) (10^8kWh)	Total generation (10^8kWh)	% Low-cost/must run
2001	1035.54	2817.11	37 %
2002	1124.4	3127.88	36 %
2003	1264.48	3672.89	34 %
2004	1698.19	4435.36	38 %
2005	1916.05	4964.30	39 %

Following tables show the fuel consumption, CO_2 emission and electricity generation from Central China grid.

Fuel consumption and CO_2 emission in 2003 (Central China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	138,516,600	89.5	1	20,908	259,201,404
Other washed coal	1,477,800	89.5	1	8,363	1,106,116
Coke	12,200	89.7	1	28,435	31,118
Coke oven gas	93,000,000	37.3	1	16,726	58,021
Crude oil	19,400	71.1	1	41,816	57,678
Diesel	57,300	72.6	1	42,652	177,431
Fuel oil	48,600	75.5	1	41,816	153,435
Refinery gas	89,500	48.2	1	46,055	198,677
Natural gas	224,000,000	54.3	1	38,931	473,526
Other energy	272,400	0	1	0	0
Total					261,457,406

Fuel consumption and CO_2 emission in 2004 (Central China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	171,441,000	89.5	1	20,908	320,811,714
Clean coal	23,400	89.5	1	26,344	55,172
Other washed coal	2,428,700	89.5	1	8,363	1,817,854
Coke	1,096,100	89.7	1	28,435	2,795,734
Coke oven gas	202,000,000	37.3	1	16,726	126,024
Other coal gas	261,000,000	37.3	1	5,227	50,886
Crude oil	10,800	71.1	1	41,816	32,110

Gasoline	700	67.5	1	43,070	2,035
Diesel	84,400	72.6	1	42,652	261,348
Fuel oil	143,700	75.5	1	41,816	453,676
Refinery gas	57,900	48.2	1	46,055	128,529
Natural gas	227,000,000	54.3	1	38,931	479,867
Other energy	530,700	0	1	0	0
Total					327,014,950

Fuel consumption and CO_2 emission in 2005 (Central China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	178,277,500	89.5	1	20,908	333,604,624
Clean coal	200	89.5	1	26,344	472
Other washed coal	2,281,100	89.5	1	8,363	1,707,377
Coke	1,309,500	89.7	1	28,435	3,340,036
Coke oven gas	151,000,000	37.3	1	16,726	94,206
Other coal gas	1,332,000,000	37.3	1	5,227	259,696
Crude oil	11,800	71.1	1	41,816	35,083
Gasoline	400	67.5	1	43,070	1,163
Diesel	94,900	72.6	1	42,652	293,861
Fuel oil	88,700	75.5	1	41,816	280,035
Refinery gas	66,600	48.2	1	46,055	147,842
Natural gas	300,000,000	54.3	1	38,931	634,186
Other coking products	15,000	87.3	1	28,435	37,236
Other energy	374,200	0	1	0	0
Total					340,435,817

CO_2 emission factor of each year (Central China grid)

	Electricity generation (MWh/yr)	CO_2 emission (tCO_2/yr)
2003	225,987,719	261,457,406
2004	249,074,186	327,014,950
2005	286,203,305	340,435,817

Simple OM = 1.2202

< Calculation of CO_2 emission factor of North China grid >

North China grid exports electricity to East China grid to which the Project activity delivers electricity. It also imports electricity from North East China grid. The operating margin emission factor of North China grid is calculated as simple operating margin emission rate of North China grid using ex-ante option. The choice of the simple OM is justified since low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years as follows:

Year	Low-cost/must-run (hydro, nuclear, wind, etc.) (10^8kWh)	Total generation (10^8kWh)	% Low-cost/must run
2001	29.27	3611.19	0.81
2002	36.25	4075.45	0.89
2003	39.79	4616.53	0.86

2004	40.32	5308.04	0.76
2005	30.41	5148.15	0.59

Following tables show the fuel consumption, CO_2 emission and electricity generation from North China grid.

Fuel consumption and CO_2 emission in 2003 (North China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	225,359,400	89.5	1	20,908	421,707,383
Clean coal	94,100	89.5	1	26,344	221,868
Other washed coal	7,327,000	89.5	1	8,363	5,484,175
Coke	28,000	89.7	1	28,435	71,417
Coke oven gas	308,000,000	37.3	1	16,726	192,155
Other coal gas	3,943,000,000	37.3	1	5,227	768,755
Crude oil	296,800	71.1	1	41,816	882,421
Gasoline	100	67.5	1	43,070	291
Diesel	139,500	72.6	1	42,652	431,967
Fuel oil	258,000	75.5	1	41,816	814,534
Refinery gas	11,000	48.2	1	46,055	24,418
Natural gas	158,000,000	54.3	1	38,931	334,005
Other energy	490,400	0	1	0	0
Total					430,933,389

Fuel consumption and CO_2 emission in 2004 (North China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	272,282,900	89.5	1	20,908	509,513,733
Clean coal	400,000	89.5	1	26,344	943,115
Other washed coal	7,459,100	89.5	1	8,363	5,583,051
Coke	2,200	89.7	1	28,435	5,611
Coke oven gas	1,554,000,000	37.3	1	16,726	969,509
Other coal gas	6,807,000,000	37.3	1	5,227	1,327,141
Diesel	58,900	72.6	1	42,652	182,386
Fuel oil	148,200	75.5	1	41,816	467,883
Refinery gas	19,700	48.2	1	46,055	43,731
Natural gas	56,000,000	54.3	1	38,931	118,381
Other energy	1,582,600	0	1	0	0
Total					519,154,542

Fuel consumption and CO_2 emission in 2005 (North China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	321,585,300	89.5	1	20,908	601,771,638

Clean coal	421,800	89.5	1	26,344	994,515
Other washed coal	6,563,600	89.5	1	8,363	4,912,779
Coke	3,200	89.7	1	28,435	8,162
Coke oven gas	2,348,000,000	37.3	1	16,726	1,464,870
Other coal gas	9,103,000,000	37.3	1	5,227	1,774,786
Crude oil	7,300	71.1	1	41,816	21,704
Gasoline	100	67.5	1	43,070	291
Diesel	41,400	72.6	1	42,652	128,197
Fuel oil	125,400	75.5	1	41,816	395,901
Refinery gas	90,200	48.2	1	46,055	200,231
Natural gas	312,000,000	54.3	1	38,931	659,553
Other energy	2,364,100	0	1	0	0
Total					612,332,626

Imported electricity and CO_2 emission from North East China grid to North China grid

Year	Imported electricity (MWh)	CO_2 emission (tCO_2)
2003	4,244,380	4,977,379
2004	4,514,550	5,294,207
2005	23,423,000	27,468,124

Electricity generation and CO_2 emission (North China grid)

Year	Electricity generation (MWh/yr)	CO_2 emission (tCO_2/yr)
2003	429,609,286	435,910,769
2004	493,687,660	524,448,750
2005	584,263,797	639,800,750

*Electricity generation and CO2 emission include the imported electricity and CO2 emission from the imported electricity from North East China grid, respectively.

Simple OM = 1.0614

< Calculation of CO_2 emission factor of North East China grid >

North East China grid exports electricity to North China grid. The operating margin emission factor of North China grid is calculated as simple operating margin emission rate of North East China grid using ex-ante option. The choice of the simple OM is justified since low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years as follows:

Year	Low-cost/must-run (hydro, nuclear, wind, etc.) (10^8kWh)	Total generation (10^8kWh)	% Low-cost/must run
2001	99.58	1418.66	7.0 %
2002	81.37	1496.82	5.4 %
2003	75.68	1658.17	4.6 %
2004	118.23	1830.90	6.5 %
2005	154.86	1941.55	8.0 %

Following tables show the fuel consumption, CO_2 emission and electricity generation from North East China grid.

Fuel consumption and CO_2 emission in 2003 (North East China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	83,267,900	89.5	1	20,908	155,816,390
Clean coal	738,300	89.5	1	26,344	1,740,755
Other washed coal	6,863,500	89.5	1	8,363	5,137,251
Coke oven gas	166,000,000	37.3	1	16,726	103,564
Other coal gas	531,000,000	37.3	1	5,227	103,528
Crude oil	33,900	71.1	1	41,816	100,789
Diesel	6,600	72.6	1	42,652	20,437
Fuel oil	198,900	75.5	1	41,816	627,949
LPG	15,500	61.6	1	50,179	47,911
Refinery gas	44,900	48.2	1	46,055	99,671
Natural gas	451,000,000	54.3	1	38,931	953,393
Other energy	293,800	0	1	0	0
Total					164,751,637

Fuel consumption and CO_2 emission in 2004 (North East China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	95,399,000	89.5	1	20,908	178,516,905
Clean coal	907,200	89.5	1	26,344	2,138,985
Other washed coal	6,529,300	89.5	1	8,363	4,887,106
Coke oven gas	774,000,000	37.3	1	16,726	482,883
Other coal gas	6,152,000,000	37.3	1	5,227	1,199,438
Diesel	34,400	72.6	1	42,652	106,521
Fuel oil	174,500	75.5	1	41,816	550,915
LPG	21,900	61.6	1	50,179	67,693
Refinery gas	109,300	48.2	1	46,055	242,630
Natural gas	256,000,000	54.3	1	38,931	541,172
Other energy	320,400	0	1	0	0
Total					188,734,248

Fuel consumption and CO_2 emission in 2005 (North East China grid)

Fuel type	Fuel consumption (t or m^3)	Emission factor (tCO_2/TJ)	oxdidation factor	NCV (MJ/t,km3)	CO_2 emission (tCO_2/yr)
Raw coal	101,347,500	89.5	1	20,908	189,648,131
Other washed coal	5,681,600	89.5	1	8,363	4,252,612

Coke oven gas	528,000,000	37.3	1	16,726	329,409
Other coal gas	2,099,000,000	37.3	1	5,227	409,236
Crude oil	11,600	71.1	1	41,816	34,488
Diesel	32,300	72.6	1	42,652	100,018
Fuel oil	133,300	75.5	1	41,816	420,842
LPG	1,200	61.6	1	50,179	3,709
Refinery gas	68,000	48.2	1	46,055	150,950
Natural gas	308,000,000	54.3	1	38,931	651,098
Other energy	161,800	0	1	0	0
Total					196,000,493

Electricity generation and CO_2 emission (North East China grid)

Year	Electricity generation (MWh/yr)	CO_2 emission (tCO_2/yr)
2003	145,975,752	164,751,637
2004	158,425,475	188,734,248
2005	164,164,426	196,000,493

Simple OM = 1.1727

Annex 4

MONITORING INFORMATION

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