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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Avoidance of methane emissions from closed landfills by on-site aeration of existing wastes at the Bei Tian Tang landfill in China
Version 01
Date: March 30, 2009

A.2. Description of the project activity:

The Bei Tian Tang landfill site is located in southwest suburb of Beijing city, where municipal solid wastes were disposed of. It has three districts where District I is not subject to the project, both of District II and III are subject to the project. The operational period of the District II was from November 1995 to October 2002 and that of District III was from November 2002 to June 2005. Two target landfill districts are already closed. Currently only minimum gas release pipes have been installed in the landfill for safety reason with no liner sheet under the landfill bottom, then polluted exhaust and contaminated drainage are being emitted to the ambient local environment. Thus landfill spaces are abandoned without any land use so far.

The objectives of the proposed project activity are avoiding of methane emissions from untreated municipal solid waste landfill, remediation of environmental soil condition and drainage quality, and accelerate stabilizing of landfill body by the Aerobic Degradation Method.
The aerobic degradation method is realized in closed landfill by on-site aeration of existing wastes where partial or total atmospheric release of methane gas emissions will occur in the absence of the project activity. The on-site aeration system consists of venting equipments and blower machines for air injection and extraction. Beside suitable moisture balance for aerobic degradation of existing wastes in the landfill will be kept by water providing system.

The project activity will bring about good effects in community areas as follows:

- The methane gas generation through anaerobic decomposition of the landfilled municipal solid wastes will be avoided at the root;
- The toxic elements elution from the existing waste materials under aerobic condition in the landfill body will be also avoided at the root;
- The chemical oxygen demand level and contamination of drainage leachate from the landfill will be highly reduced;
- The stability of landfill site will be achieved in relatively short period of time and land use such as green space will be facilitated.

The China government and the Beijing authority accept the possible good effect of this project; however, domestic credibility of this method is not necessarily established yet because there is never practice application of this method in China so far. Simultaneously they appreciate proper landfill management and land use for appropriate purposes such as green space. Therefore the realization of this project with CDM will drive the diffusion of this method as proper landfill management technique then contribute to environmental improvement and sustainable development in both of urban and local communities in China.

A.3. Project participants:

A list of the involved parties and project participants is indicated below:

Parties (including host country)	Project participants such as private and/or public entities	Indicate if the party involved wishes to be considered as project participants (Yes/No)
People's Republic of China (host)	Public entity: Beijing regime Private entity: Green Castle Environmental Inc	No
Japan	Private entity: Pacific Consultants Co., Ltd.	No

The contact information is provided in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

People's Republic of China

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

Hebei Province

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

Beijing City

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

The Bei Tian Tang landfill is located in southwest from the central Beijing at latitude 39° 54' 20" N, longitude 116° 23' 29" E.

Figure 4.1(1) Map of China and location of Beijing

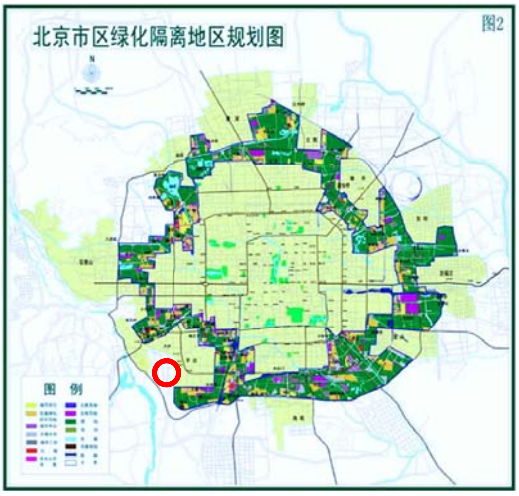


Figure 4.1(2) Map of Beijing and location of Bei Tian Tang District

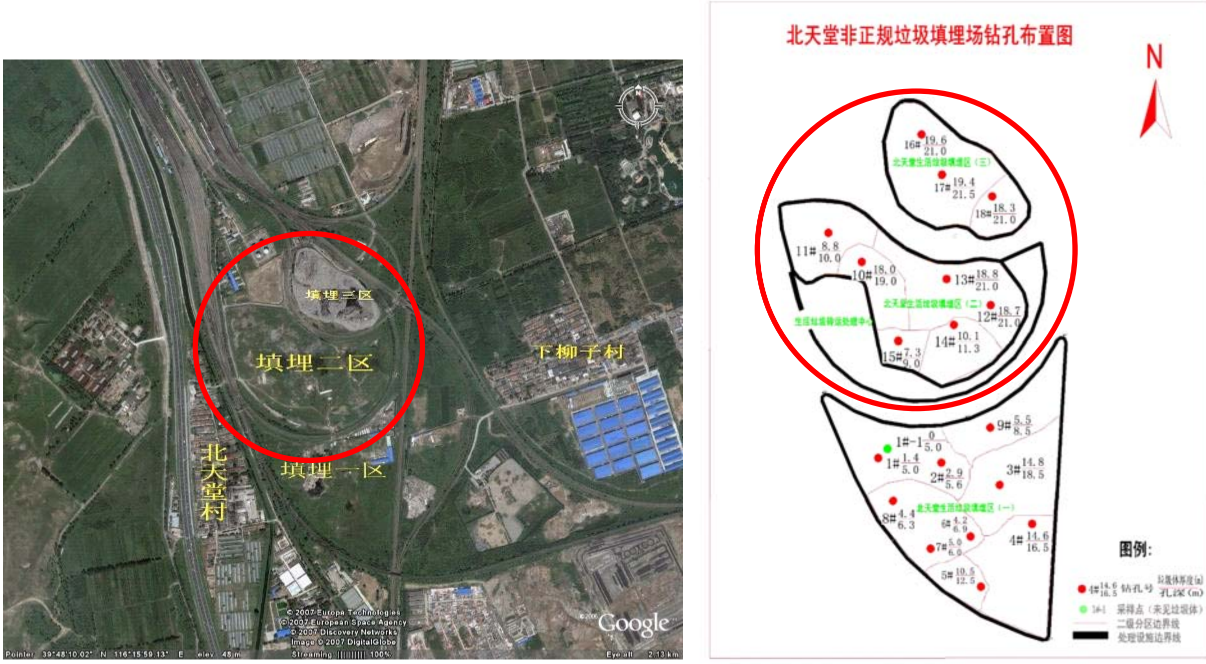


Figure 4.1(3) The Bei Tian Tang landfill site

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

Scope Number: 13, Sectoral Scope: Waste handling and disposal

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

Aerobic condition where aerobic degradation of non-fossilized and biodegradable organic matter such as municipal solid wastes is activated by aerobically growing bacteria will be created by providing adequate oxygen and keeping moisture balance in the landfill body. Consequently amount of residual methane emissions will be negligible.

Figure 4.2(1) A conceptual figure and a example photo of the Aerobic Degradation Method

On-site aeration system consists of venting equipments installed in landfill body and blower machines settled at landfill site. Besides water supply system will be used to maintain appropriate moisture balance in landfill body. Key devices employed in this method are as follows:

- Air injection and extraction wells
- Air delivery and connecting pipes
- SVE/AI compressor (blower) system
- Water supply system
- Control and monitoring system

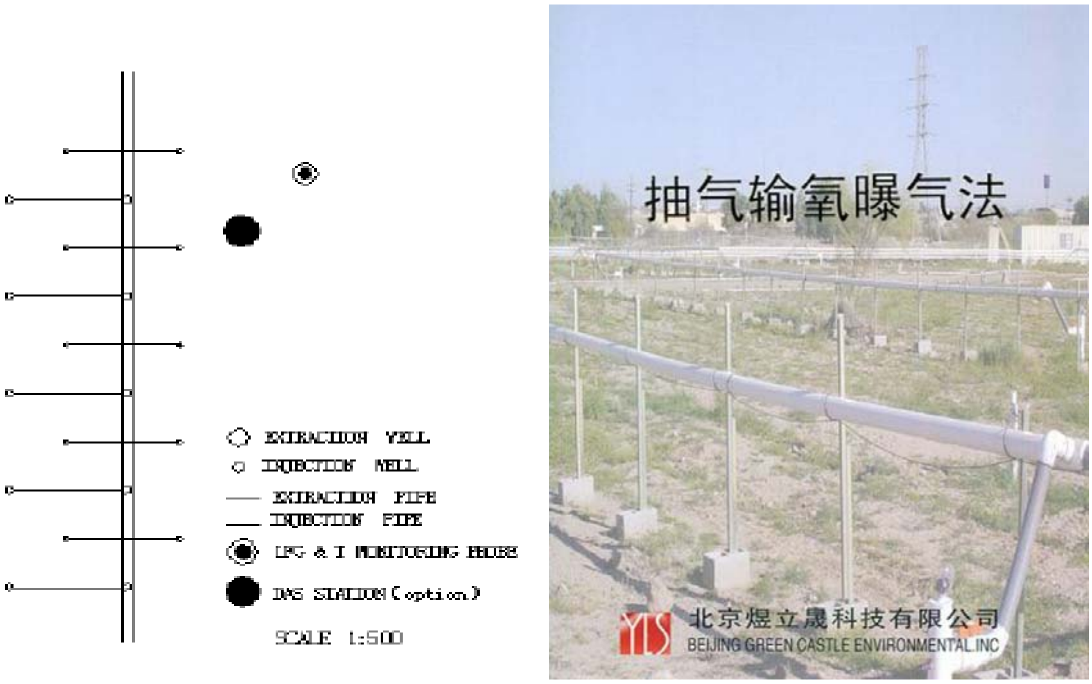


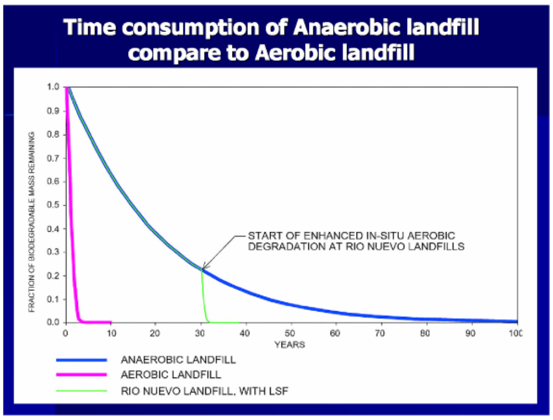
Figure 4.2(2) System layout for air injection/extraction and monitoring (DAS: Data Acquisition System)

Estimated electricity consumption by employed systems in this method is listed in the table below. As evidenced by the table, most electricity consumption will be occurred by air supply system.

Table 4.2(1) Estimated electricity consumption in on-site aeration system

Electricity Consumption							
No.	**System**	**Equipment/device**	**Unit**	**Number**	**Rated Power (kW)**	**Working Hours (h)**	**Electricity Consumption (kWh)**
1	Air supply system	SVE/AI compressor systen	set	1	400	1051.2	420,480
		Exhaust gas biofilter	set	3	30	1051.2	94,608
2	Water supply syst	Leachate circulation pump	each	60	10	131.4	78,840
		Cooling water collector	set	15	2	1051.2	31,536
3	Monitoring systen	Monitoring devices	set	1	3	3504	10,512
						Total	635,976

At the Rio Nuevo Landfill US as pilot project, effectiveness of the Aerobic Degradation Method was proved because both of fractions of biodegradable mass remaining in existing wastes and CH_4 fraction in LFG dramatically reused immediately after implementation of this method at pilot project. The pilot project brought about a land for public utilization on treated Rio Nuevo landfill without any safety or sanitary or environmental problem.



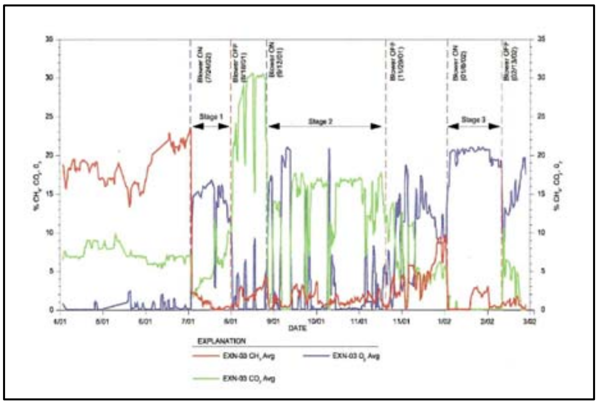


Figure 4.2(2) Charts proving effectiveness of the Aerobic Degradation Method in the pilot project

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

Table 4.4(1) Estimated emission reductions

Year	Estimated emission reductions (tCO_2e)
2010	150,659
2011	136,262
2012	123,235
2013	111,448
2014	100,782
2015	91,131
2016	82,399
Total (tCO_2e)	795,916
Crediting period (years)	7
Annual average during the crediting period (tCO_2e)	113,702

A.4.5. Public funding of the project activity:

The project will not receive or divert from any public funding or Official Development Assistance.

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:

Proposed new methodology "Avoidance of methane emissions from closed landfills by on-site aeration of existing wastes" is applied to this project.
This methodology applies the same approach as ACM0001 and AM0025 from the aspect of estimating baseline emissions based on the First Order Decay model. However this methodology proposed on-site aeration technique to avoid methane gas emissions by remedying of anaerobic condition in landfill body instead of methane gas collection from the landfill site.
This methodology also refers to the latest approved versions of the following tools:

- "Tool for the demonstration and assessment of additionality"
- "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
- "Tool to calculate the emission factor for an electricity system"
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"

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

The methodology is applicable under the following conditions:

"This methodology applies to project activities that aerobic treatment of existing wastes is realized through on-site aeration aiming at remediation of biochemical condition in landfills and avoiding methane generation from anaerobic degradation process of organic matters";
"Dumping of wastes at the landfill site has already been finished and the landfill is closed";

This project is aiming at reduction of methane emissions from the existing waste disposed of in closed landfill trough on-site aeration technique which will remediate biochemical condition in landfill body. The Bei Tian Tang landfill is already closed, and then currently abandoned without any treatment or control activity except only minimum gas release pipes which is for safety measures. The same situation in closed landfill is common practice in Beijing so far.

"Biodegradable materials mainly constitute existing wastes (e.g., municipal solid wastes)";
"For project proponents sampling and monitoring technologies are available to identify wastes biochemical characteristic and to ensure landfills aerobic condition being realized";
"Related equipments and machinery (e.g., venting pipes and blower machines) and energy (electricity and/or fossil fuel) necessary to project activity are available";

The Bei Tian Tang landfill received mainly municipal solid wastes which consist of approximately 55% of urban waste and 45% of construction waste during operating period. And in China a technical guidance for sampling and monitoring of waste entitled "Testing method of municipal solid waste degradation" is now available. Besides the project participants in host country has sufficient experience and knowledge of the on-site aeration method thorough pilot project in US. For that they know also about what to procure and how to procure to realize the proposed method in China.

"Mandatory environmental regulations requiring collection and flaring of LFG do not exist or the collection and flaring rates do not exceed 50%";
"Project proponents should identify or assume the land use planning after completion of the project activity based on proper basis;"
"Finally, this methodology is only applicable if the application of the procedure to identify the baseline scenario results in that the total or partial atmospheric release of methane generated from landfills is the most plausible baseline scenario".

There is no regulation that stipulates for controlling landfill gas emission level under 50% in China so far. Thus atmospheric release of land fill gas prevails as common practice in closed landfill sites. The Bei Tian Tang landfill site is placed at suburban village in Beijing where land use is planned as public area such as green space and sports park, and construction of high building is prohibited as shown below. Thus commercial uses such as residential development, commercial establishment will be unreal social and economic scenarios. Therefore total or partial atmospheric release of methane emissions from the landfill as conventional way is the most plausible baseline scenario (for details, refer to section B.4), and the project activity is not profitable because land use revenue is uncalculated or limited.

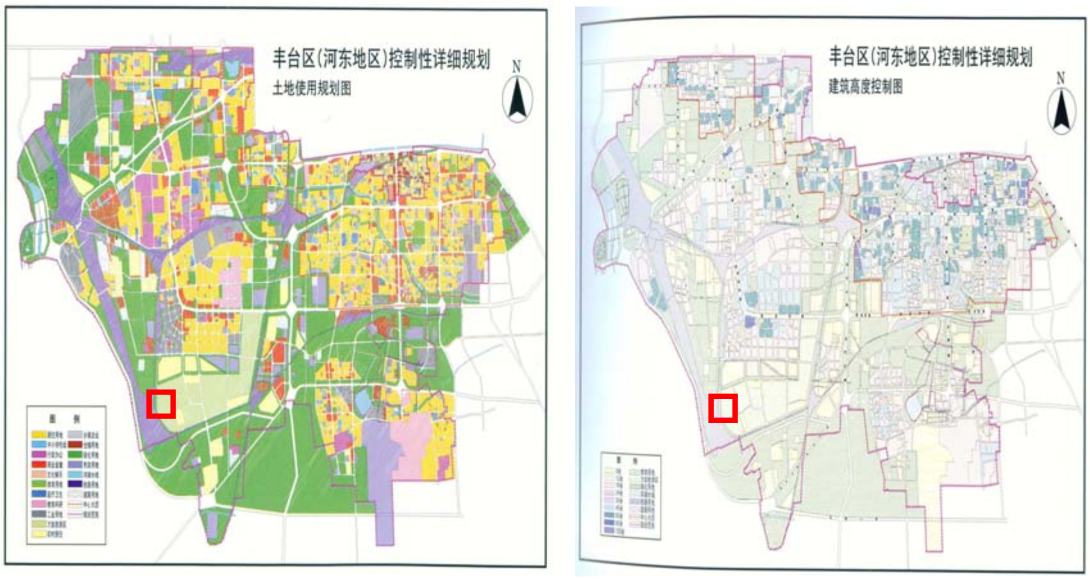


Figure B.2(1) The map of land use planning in Bei Tian Tang district

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

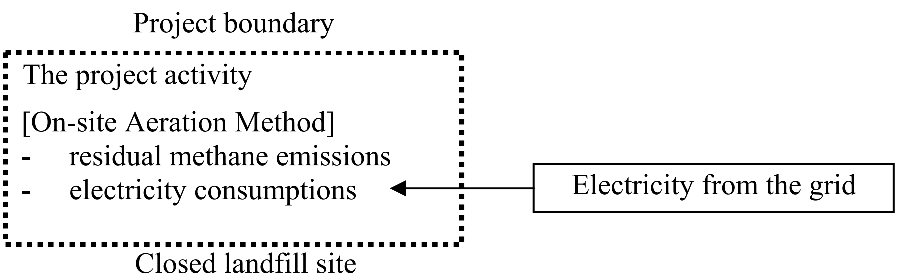


Figure B.3(1) Conceptual figure of project boundary

The spatial extent of the project boundary encompasses the physical delineation of landfill site where wastes are treated, and on-site electricity consumption and/or generation. The greenhouse gases included in or excluded from the project boundary are shown in Table B.3(1) below. Major baseline emission source is methane gas generated from landfill body in anaerobic condition. Project emissions sources include residual methane gas from the landfill body that will be ideally negligible in aerobic condition, and on-site energy use to activate aeration equipments.

Table B.3(1) Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Emissions from decomposition of waste at the landfill site	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted
		CH_4	Yes	The major source of emissions in the baseline
		N_2O	No	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative
Project activity	Residue emissions from decomposition of waste at the landfill site	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted
		CH_4	Yes	May not be aerobic degradation process completed. Residual CH_4 emission may be occurred.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from on-site electricity use	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	On-site fossil fuel consumption due to the project activity	CO_2	Yes	May be an important emission source.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	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:

Based on the latest version of the “Tool for the demonstration and assessment of additionality” the project participants should apply the following steps to identify the alternative scenarios and the baseline scenario to the project activity.

Step 1: Identification of alternative scenarios

Project participants should use Step 1 of the latest version of the “Tool for the demonstration and assessment of additionality”, to identify all realistic and credible baseline alternatives. In doing so, relevant mandatory laws and regulations related to the management of landfill sites should be taken into account. Alternative scenarios for treatment and/or control measures of closed landfill sites should include the followings:

- Case A: The atmospheric release of LFG generated from anaerobic degradation process of organic waste matter at the landfill site (business-as-usual);
- Case B: The retrofitting with landfill gas collection and combustion system to comply with laws and regulations or contractual requirements with energy generation;
- Case C: The composting treatment of existing wastes excavated from the landfill for recycling or re-disposing;
- Case D: The project activity (on-site aerobic treatment of existing wastes) without registration as a CDM project activity.

Case A: The atmospheric release of LFG is plausible alternative because no mandatory laws and regulations being obligating LFG collection-combustion or alternative treatment of wastes so far.

Case B: Although retrofitting with a LFG collection system needs sizable amount of investment, in general, the energy generation revenue is likely to be not only limited but also declining along with anaerobic digestion process of landfilled waste is progressing. Therefore the retrofitting is not plausible alternative without CDM incentives and/or other subsidiary payments. In China all landfill retrofitting cases are implemented as CDM projects. (The relevant list of China's LFG collection CDM project is provided in Annex 3.)

Case C: The composting treatment also needs sizable amount of operation costs to activate systems such as excavators, transport vehicles, composting plants, though the products sale income is likely to be limited. Therefore the composting is not plausible alternative without CDM incentives and/or other subsidiary payments. In China all composting cases are implemented as CDM projects. (The relevant list of China's waste composting CDM project is provided in Annex 3)

Case D: Currently in China the on-site aeration activity as an alternative treatment measure of landfilled wastes is not obligated by laws and regulations. Besides the project activity won't derive any incomes through energy generations or product sales or immovable transactions. Therefore the project participants do not have any obligation and incentive to realizing project activity without CDM and then this case is not plausible alternative.

Step 2: Step 2 and/or Step 3 of the latest approved version of the "Tool for demonstration and assessment of additionality" shall be used to assess which of these alternatives should be excluded from further consideration (e.g. alternatives facing prohibitive barriers or those clearly economically unattractive).

As mentioned in previous Step 1, Case B, Case C and Case D are clearly economically unattractive; therefore these alternatives should be excluded from further consideration.

Step 3: Where more than one credible and plausible alternative remains, project participants shall, as a conservative assumption, use the alternative baseline scenario that result in the lowest baseline emissions as the most likely baseline scenario. The least emission alternative will be identified for each component of the baseline scenario. In assessing these scenarios, any regulatory or contractual requirements should be taken into consideration.

Under current national/local situation the only Case A (business as usual) is identified as the most likely baseline scenario for the proposed project activity. Therefore it is unnecessary to compare among plural alternative baseline cases with different estimated emissions.

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

The proposed new methodology requires the use of the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, as follows:

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

As mentioned in the section B.4, alternative scenarios for treatment and/or control measures of closed landfill sites should include the followings:

- Case A: The atmospheric release of LFG generated from anaerobic degradation process of organic waste matter at the landfill site (business-as-usual);

- Case B: The retrofitting with landfill gas collection and combustion system to comply with laws and regulations or contractual requirements with energy generation;

- Case C: The composting treatment of existing wastes excavated from the landfill for recycling or re-disposing;

- Case D: The project activity (on-site aerobic treatment of existing wastes) without registration as a CDM project activity.

As mentioned in the section B.4, Case B, Case C and Case D are all technically feasible, however economically unattractive. Meanwhile Case A is compliant with current national/local mandatory laws and regulations and economically feasible. Therefore the only Case A (business as usual) is identified as the most likely baseline scenario for the proposed project activity.

Step 2: Investment analysis

In investment analysis, the project participants should demonstrate that the project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive. If there is some expectation that the project participants derive revenues from the project, the assessment should rely on identifying the financial indicator of alternative scenarios, such as IRR, NPV and the like. Then project participants should consider revenues by utilizing of land after finishing of project activity (i.e. on-site aerobic treatment at landfills). The revenues should be estimated by considering possible land use plan and land value. Meanwhile if there is not any expectation that the project participants derive revenues from the project, simple cost analysis is applicable without land use revenues after project activity.

Option I: Simple cost analysis

As mentioned in the section B.2, The Bei Tian Tang landfill site is placed at suburban village in Beijing where land use is planned as public area such as green space and sports park, and construction of high building is prohibited as shown below. Thus commercial uses such as residential development, commercial establishment will be not expected. Costs in each project stages (investment and operation) are estimated as Table B.5(1) below.

Table B.5(1) Estimated costs for simple cost analysis

Project stages	Estimated costs
Investment (e.g., including air and moisture injection system, leachate recirculation system, monitoring system, etc.)	35,800,000 RMB
Operation (e.g., including Air and moisture injection system, leachate recirculation system, monitoring system, etc.)	5,600,000 RMB/year

Option III: Benchmark analysis

If applicable, the project participants should consider revenues by land use after the project activity (i.e. on-site aeration). The land use revenues will be estimated by considering the city plan and the average neighbourhood land value. As Table B.5(2) indicates, although Internal Rate of Return without CDM credits will be only 1.2%, that with CDM credits will be improved even 36.2%. Besides the project participants will be able to recover the investment costs at early year with CDM credits. Therefore CDM credits will become important financial incentive to realize the proposed project activity.

Under the benchmark analysis, the Internal Return Rate (IRR) of the project activity should be compared with a reasonable benchmark. The selected benchmark is the interest rate of credit for investment by commercial banks in China, which is thought to be appropriate considering of the project activity characteristics. That value at the time of the PDD completion is 5.94–7.72% in March 2009, according to the open-to-public website by the People's Bank of China, the China's central bank.

Table B.5(2) Estimation of incomes and expenditures for benchmark analysis (in millions of RMB)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Investment costs	35.8									
Operation costs		5.6	5.6	5.6	5.6	5.6	5.6			
CDM credits	15.1	13.6	12.3	11.1	10.1	9.1	8.2			
Land use revenues								25.0	25.0	25.0
Summary with CDM	-20.7	8.0	6.7	5.5	4.5	3.5	2.6	25.0	25.0	25.0
IRR (with CDM) = 36.2%										
Summary without CDM	-35.8	-5.6	-5.6	-5.6	-5.6	-5.6	-5.6	25.0	25.0	25.0
IRR (without CDM) = 1.2%										

Step 3: Common practice analysis

In common practice analysis, the project participants should demonstrate that the technology applied to project activity to deal with municipal solid wastes at closed landfills (i.e. on-site aeration of existing wastes) is state of the art and not common practice in the host country.
Under current situation in China, in general, closed landfill sites are dealt with as follows;

- Untreated landfill sites where the atmospheric release of LFG generated from anaerobic degradation process dominate almost all actual landfill sites since no mandatory laws and regulations stipulate for control and/or treatment of LFG from closed landfills.

- All cases where the retrofitting with landfill gas collection is employed or the composting treatment of existing wastes is employed are realized by using CDM incentives and/or other public funds. (The relevant list of China's LFG collection and/or waste composting CDM project is provided in Annex 3.)

- The on-site aerobic treatment of existing wastes is not employed anywhere.

As mentioned above untreated landfilling is common practice and the project activity without CDM or other public fund is impossible. Therefore the proposed project activity is demonstrated as additional measures.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{(1)}$$

Where:

ERy Emission reductions in year y (tCO2e/yr)

BEy Baseline emissions in year y (tCO2e/yr)

PE_y Project emissions in year *y* (t CO_2/yr)

If the sum of PE_y is smaller than 1% of BE_y in the first full operation year of a crediting period, the project participants may assume a fixed percentage of 1% for PE_y combined for the remaining years of the crediting period.

Baseline emissions

To calculate the baseline emissions project participants shall use the following equation:

$$BE_y = (MB_y - MD_{reg,y}) \quad (2)$$

Where:

BE_y Is the baseline emissions in year y (tCO_2e)

MB_y Is the methane produced in the absence of project activity in year y (tCO_2e)

$MD_{reg,y}$ Is methane that would be destroyed in the absence of the project activity in year y (tCO_2e)

$$MD_{reg,y} = MB_y * AF \tag{3}$$

Where:

AF Is Adjustment Factor for MB_y (%)

In cases where regulatory of contractual requirements do not specify MD_{reg}, an Adjustment Factor (AF) shall be used and justified, taking into account the project context. In doing so, the project participant should take into account that some of the methane generated by the landfill may be captured and destroyed to comply with other relevant regulations or contractual requirements, or to address safety and odour concerns. However as mentioned in section B.4, there is not any laws or regulatons to stipulate for a specific system for collection and destruction of methane in China, the project particpants could regard AF as a value 0 in the proposed project activity.

The amount of methane that is generated each year (MB_y) is calculated as per the latest version of the approved "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" considering the following additional equation:

$$MB_y = BE_{CH4,SWDS,y} \tag{4}$$

Where:

$BE_{CH4,SWDS,y}$ Is the 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 disposal of 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 odour concerns. As this is already accounted for in Equation (1), "f" in the tool shall be assigned a value 0. (tCO_2e)

Option A

The ex ante estimation of the amount of methane that would have been generated in the absence of the project activity during the year y could be calculated, considering the following additional equation:

$$A_{j,x} = A_x \cdot \frac{\sum_{n=1}^{z} p_{n,j,x}}{z} \tag{5}$$

Where:

$A_{j,x}$	Is the amount of organic waste type j of existing wastes disposed of into the landfill in the year x (tonnes/year), this is the value to be used for variable $W_{j,x}$ in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site".
A_x	Total amount of existing waste disposed of into landfill in year x (tons)
x	Year during the landfill operation period: x runs from the first year of the landfill operation period (x=1) to the year y for which avoided emissions are calculated (x=y)
$p_{n,j,x}$	Weight fraction of the waste type j in the sample n collected from the existing waste layers which is disposed of into the landfill in year x
z	Number of samples collected from the existing waste layers disposed of in year x

The project participants optionally could apply Option B and/or Option C in the proposed new methodology to raise the precision of baseline emissions calculation when the project activity is actually implemented.

Project emissions

Project emissions include emissions from electricity consumption, emission from fossil fuel combustion (if applicable), and emission of residual methane gas generated from the landfill (if any). Project emissions are calculated as follows:

$$PE_y = PE_{FC,y} + PE_{EC,y} + PE_{RM,y} \qquad (6)$$

Where:

PE_y	Project emissions in year *y* (tCO_2/yr)
$PE_{EC,y}$	Project emissions from electricity consumption in year y (tCO_2/yr)
$PE_{FC,y}$	Project emissions from fossil fuel combustion in year *y* (tCO_2/yr)
$PE_{RM,y}$	Project emissions of residual methane gas generated from the landfill in incomplete aerobic condition (tCO_2e/yr)

Project emissions are calculated in the following steps:

Step 1: Determination of project emissions from electricity consumption;

Step 2: Determination of project emissions from fossil fuel combustion (if applicable);

Step 3: Determination of project emissions of residual methane gas generated from the landfill in incomplete aerobic condition (if any);

Sub-step 3a: Ex-ante estimation of methane emissions is based on the FOD model, and the emissions should be negligible since methane correction factor (MCF) for the landfill in aerobic condition can be assumed to be value 0;

Sub-step 3b: Actual residual methane emissions should be ensured to be negligible by monitoring of LFG from air extraction wells and surface of landfills after implementation of project activity (on-site aeration).

Step 1: Determination of project emissions from electricity consumption

Where the project activity involves electricity consumption, CO_2 emissions are calculated as follows:

$PE_{EC,y} = EG_{PJ,FF,y} * CEF_{elec}$ (7)

Where:

$EG_{PJ,FF,y}$ Is the amount of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid as a result of the project activity, measured using an electricity meter (MWh)

CEF_{elec} Is the carbon emission factor for electricity generation in the project activity (tCO_2/MWh)

In cases where electricity generated in an on-site fossil fuel fired power plant, project participants should use, as CEF_{elec}, the default emission factor for diesel generator with a capacity of more than 200kW for small-scale project activities (0.8tCO^2/MWh, see AMS-I.D, Table I.D.1 in the simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories).

In cases where electricity is procured from the grid, the emission factor CEF_{elec} should be calculated according to latest version of the "Tool to calculate the emission factor for an electricity system" In this project activity the emission factor based on "2008 Baseline Emission Factors for Regional Power Grids in China" (CEF_{elec} = 0.9928tCO_2/MWh $EF_{grid,OM,y}$ = 1.1169tCO_2/MWh, $EF_{grid,BM,y}$ = 0.8687tCO_2/MWh) is applied.

Step 2: Determination of project emissions from fossil fuel combustion

Project participants shall account for CO_2 emissions from any on-site fuel combustion. Emissions are calculated from the quantity of fuel used and the specific CO_2-emission factor of the fuel, as follows:

$PE_{FC,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel}$

Where:

$F_{cons,y}$ Is the fuel consumption on-site in year y (l or kg)

NCV_{fuel} Is the net calorific value of the fuel (MJ/l or MJ/kg)

EF_{fuel} Is the CO_2 emission factor of the fuel (tCO_2/MJ)

Local values should be preferred as default values for the net calorific values and CO_2 emission factors. If local values are not available, project participants may use IPCC default values for the net calorific values and CO_2 emission factors.

This step is not applied since the fuel consumption could be negligible in the proposed project activity where electricity will be procured from the grid.

Step 3: Determination of project emissions from of residual methane gas generated from the landfill

Theoretically no methane generation occur from landfill in aerobic condition realized through on-site aeration. However project participants should ensure the complete avoidance of methane emissions from the landfill in the project activity, and should take into account of residual methane emissions from the landfill in accidentally incomplete aerobic condition, during the crediting period.

<u>Ex-ante estimation of methane emissions based on the FOD model</u>

Option A

Ex-ante estimation of the project emissions at any year "y" during the crediting period are calculated using the same formula as provided in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site". The "MCF" value for the First Order Decay Model is depending on landfill site type, project participants can take it that the project emissions are negligible by assuming "MCF" value to be 0.0 in aerobic condition.

$MCF_{PJ,Ea}$ Methane correction factor in Ex-ante estimation of project emissions from landfills in aerobic condition. If the existing waste is treated aerobically, emissions are assumed to be zero.

The project participants optionally could apply Option B and/or Option C in the proposed new methodology to raise the precision of project emissions calculation when the project activity is actually implemented.

Leakage

No leakage effects need to be accounted under this methodology. On-site aeration is implemented within the landfill site and the treated waste will not transferred.

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

Data / Parameter:	Regulatory requirements relating to landfill gas projects
Data unit:	--
Description:	Regulatory requirements relating to landfill gas projects
Source of data used:	The DNA shall be contacted to provide information regarding host country regulation.
Value applied:	--
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no regulation that stipulates for controlling landfill gas in China so far. Thus atmospheric release of land fill gas prevails as common practice in closed landfill sites.
Any comment:	The information though recorded annually, is used for changes to the adjustment factor (AF) or directly $MD_{reg,y}$ at renewal of the credit period. Relevant regulations for LFG project activity shall be updated at renewal of each credit period. Changes to regulation should be converted to the amount of methane that would have been destroyed/combusted during the year in the absence of the project activity ($MD_{reg,y}$). Project participants should explain how regulations are translated into that amount of gas.

Data / Parameter:	AF
Data unit:	%
Description:	Methane destroyed due to regulatory or other requirements.
Source of data used:	Local and/or national authorities
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no regulation that stipulates for controlling landfill gas in China so far. Thus atmospheric release of land fill gas prevails as common practice in closed landfill sites.
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.

Data / Parameter:	$RATE^{Compliance}{}_{y}$
Data unit:	Number
Description:	Rate of compliance
Source of data used:	Municipal bodies
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually	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.

applied :	
Any comment:	

Data / Parameter:	$BE_{CH4,SWDS,y}$
Data unit:	tCO_2e
Description:	Methane generation from the landfill in the absence of the project activity at year y
Source of data used:	Calculated as per the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site”
Value applied:	Information is provided in section B.6.3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site”
Any comment:	Used for ex ante estimation of the amount of methane that would have been avoided during the year

Data / Parameter:	A_a
Data unit:	tons
Description:	Total amount of waste disposals in the landfill in year a.
Source of data used:	Recorded data of waste disposals
Value applied:	Information is provided in section B.6.3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	It shall be obtained from recorded data of waste disposals, or estimated according to the level of the activity that generated the wastes (tons)
Any comment:	

Data / Parameter:	$MCF_{PJ,Ea}$
Data unit:	--
Description:	Methane correction factor in Ex-ante estimation of project emissions
Source of data used:	Project participants
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value “0.0” for completely aerobic managed solid waste disposal sites is used for $MCF_{PJ,Ea}$
Any comment:	

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:	CEF_{elec}
Data unit:	tCO_2/MWh
Description:	Emission factor for the production of electricity in the project activity
Source of data used:	"2008 Baseline Emission Factors for Regional Power Grids in China"
Value applied:	0.9928
Justification of the choice of data or description of measurement methods and procedures actually applied :	A default of 0.8 can be used if electricity in the project is produced using captive power plant. In case the project source is grid, emission factor shall be estimated as described in "Tool to calculate the emission factor for an electricity system".
Any comment:	

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

Baseline emissions

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

The amount of methane that is generated each year (MBy) is calculated as per the latest version of the approved "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (hereafter 'the tool')". For ex-ante estimation of baseline emissions, parameters applied in the tool are respectively assigned to values as Table 6.3(1) shows below.

$$MB_y = BE_{CH4,SWDS,y} \quad (4)$$

Where:

$BE_{CH4,SWDS,y}$ Is the 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 disposal of 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 odour concerns. As this is already accounted for in Equation (1), "f" in the tool shall be assigned a value 0. (tCO_2e)

Table 6.3(1) parameters applied in the tool and values assigned to

parameter	value	source of data used
φ = Model correction factor to account for model	0.9	default value of the tool
f = Fraction of methane captured at the SWDS and flared, combusted or used in another manner	0	no regulation or law
GWP_{CH4} = Global Warming Potential of methane, valid for the relevant commitment period	21	IPCC 2006 GNGGI
OX = Oxidation factor	0.1	IPCC 2006 GNGGI
F = Fraction of methane in the SWDS gas	0.5	default value of the tool
DOC_f = Fraction of degradable organic carbon that can decompose	0.5	IPCC 2006 GNGGI
MCF = Methane correction factor	1	IPCC 2006 GNGGI
x = Year during the operation periods: x runs from the first year of the operation period (x = 1) to the year y for which avoided emissions are calculated (x = y)	1995 - 2016	project participants
y = Year for which methane emissions are calculated	2010 - 2016	project participants
j = Waste type category	-	index of the tool
$W_{j,x}$ = Amount of organic waste type j disposed of in the SWDS in the year x (tons)	289,150	project participants
DOC_j = Fraction of degradable organic carbon (by weight) in the waste type j	0.266	project participants
k_j = Decay rate for the waste type j	0.10	IPCC 2006 GNGGI

Project emissions

Step 1: Determination of project emissions from electricity consumption

Where the project activity involves electricity consumption, CO_2 emissions are calculated as follows:

$$PE_{EC,y} = EG_{PJ,FF,y} * CEF_{elec} \quad (7)$$

Where:

$EG_{PJ,FF,y}$ Is the amount of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid as a result of the project activity, measured using an electricity meter (MWh) Electricity consumptions yearly in the project activity are showed by Table 6.3(2) below.

Table 6.3(2) Electricity consumptions yearly in the project activity

No.	System	Equipment/device	Unit	Number	Rated Power (kW)	Working Hours (h)	Electricity Consumption (kWh)
1	Air supply system	SVE/AI compressor system	set	1	400	1051.2	420,480
		Exhaust gas biofilter	set	3	30	1051.2	94,608
2	Water supply syst	Leachate circulation pump	each	60	10	131.4	78,840
		Cooling water collector	set	15	2	1051.2	31,536
3	Monitoring system	Monitoring devices	set	1	3	3504	10,512
						Total	635,976

CEF_{elec} Is the carbon emission factor for electricity generation in the project activity (tCO_2/MWh) In this project activity the emission factor based on "2008 Baseline

Emission Factors for Regional Power Grids in China" (CEF_{elec} = 0.9928tCO_2/MWh $EF_{grid,OM,y}$ = 1.1169tCO_2/MWh, $EF_{grid,BM,y}$ = 0.8687tCO_2/MWh) is applied.

Step 2: Determination of project emissions from fossil fuel combustion

Project participants shall account for CO_2 emissions from any on-site fuel combustion. Emissions are calculated from the quantity of fuel used and the specific CO_2-emission factor of the fuel.

However in the proposed project activity no fossil fuel combustion would take place.

Step 3: Determination of project emissions from of residual methane gas generated from the landfill

Theoretically no methane generation occur from landfill in aerobic condition realized through on-site aeration. However project participants should ensure the complete avoidance of methane emissions from the landfill in the project activity, and should take into account of residual methane emissions from the landfill in accidentally incomplete aerobic condition, during the crediting period.

However for ex-ante estimation the project participants could assume that the residual methane emissions are negligible by assuming "MCF" value in the tool to be 0.0 in complete aerobic condition.

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

Table 6.3(1) Ex-ante calculation of emission reductions (tCO_2e)

Year	Baseline emissions	Project emissions		Emission reductions
		Residual methane	Electricity consumption	
2010	151,290	0	631	150,659
2011	136,893	0	631	136,262
2012	123,866	0	631	123,235
2013	112,079	0	631	111,448
2014	101,413	0	631	100,782
2015	91,762	0	631	91,131
2016	83,030	0	631	82,399
Total	800,333	0	4,417	795,916

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

Proposed new methodology "Avoidance of methane emissions from closed landfills by on-site aeration of existing wastes" is applied to the monitoring plan in the proposed project activity.

B.7.1 Data and parameters monitored:

In this project activity the monitoring plan mainly consists of sampling and/or measurement of data and parameters as following:

- The baseline emissions should be estimated ex-ante based on the FOD model and IPCC default values. Optionally parameters adopted the FOD model could be assessed and redefined on-site by waste sampling and (if applicable) laboratory analysis for determination of DOC_f*DOC_j. And just before project activity F*MCF could be assessed and redefined by monitoring of vented methane emissions on-site.

- The project emissions also should be estimated ex-ante based on the FOD model. Optionally during project activity F*MCF could be assessed and redefined by monitoring of vented methane emissions on-site. Besides by monitoring both of vented methane emissions and (if applicable) surface emission the project participants could measure project emissions themselves directly.

- The procedures of monitoring methane emissions from venting pipes and landfills surface are provided in the proposed new methodology based on international standards.

The project boundary

The project activity [On-site Aeration Method]

- Degradable organic carbon (DOC_j)
- Residual methane emissions
  - Venting methane emissions (F, $VE_{CH4,m,y}$, $VD_{CH4,m,y}$)
  - Surface methane emissions ($SE_{CH4,n,y}$, $SD_{CH4,n,y}$)
- Electricity consumptions ($EG_{PJ,FF,y}$) ← Electricity from the grid

Closed landfill site (Bei Tian Tang landfill)

Figure 7.1(1) The project boundary and major monitoring data

Data / Parameter:	$A_{j,x}$
Data unit:	tons/year
Description:	Amount of existing organic waste type j disposed of in the landfill in the year x
Source of data to be used:	The actual disposal records provided by the landfill operator and /or on-site measurement by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Identified once before the begging of project activity. For ex-ante estimation of baseline emissions $A_{j,x}$ = 289,150 tons/year is assigned to.
Description of measurement methods and procedures to be applied:	If the actual disposal records are not available, project participant should measure the extent and the depth of the landfill by surveying and boring.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	A_x
Data unit:	tons
Description:	Total amount of existing organic waste disposed of into landfill in year x
Source of data to be used:	The actual disposal records provided by the landfill operator and /or on-site measurement by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Identified once before the begging of project activity. For ex-ante estimation of baseline emissions A_x = 2,891,500 tons is assigned to.
Description of measurement methods and procedures to be applied:	If the actual disposal records are not available, project participant should measure the extent and the depth of the landfill by surveying and boring.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$P_{n,j,x}$
Data unit:	-
Description:	Weight fraction of the waste type j in the sample n collected from the existing waste layers to have been disposed of into the landfill in year x
Source of data to be used:	Sample measurements by project participants.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Identified once before the begging of project activity.
Description of measurement methods and procedures to be applied:	Sample the existing waste, using the waste categories j, as provided in the table for DOC_j and k_j, and weigh each waste fraction. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	
Any comment:	This parameter only needs to be monitored if the existing wastes in disposal include several waste categories j, as categorized in the tables for DOC_j and k_j.

Data / Parameter:	Z
Data unit:	-
Description:	Number of samples collected from the existing waste layers disposed of in year x
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Identified once before the begging of project activity.
Description of measurement methods and procedures to be applied:	The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	
Any comment:	This parameter only needs to be monitored if the existing wastes in disposal include several waste categories j, as categorized in the tables for DOC_j and k_j.

Data / Parameter:	DOC_f*DOC_j
Data unit:	-
Description:	Actual fraction of degradable organic carbon content (i.e. biochemical methane potential) by weight in the existing municipal solid waste type j
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Determine for the first time before the project activity begging and the second time before the project activity finishing. For ex-ante estimation of baseline emissions $DOC_f = 0.5$, $DOC_j = 0.266$, $DOC_f*DOC_j = 0.133$ are assigned to.

Description of measurement methods and procedures to be applied:	Determine through the laboratory analyzing of wastes samples from the landfill. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	
Any comment:	More frequent sampling is encouraged

Data / Parameter:	F*MCF
Data unit:	m^3CH_4/m^3LFG
Description:	Fraction of methane in the LFG (volume fraction) from venting wells installed into the landfill body
Source of data to be used:	To be measured continuously or periodically by project participants using certified equipment (e.g. a flow meter and a flame ionization detector).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Monitored continuously or periodically (at least quarterly). For ex-ante estimation of baseline and project emissions the values are assigned as follows: (BE) F = 0.5, MCF = 1.0, F*MCF = 0.5; (PE) F = 0.0, MCF = 0.0, F*MCF = 0.0.
Description of measurement methods and procedures to be applied:	Shall be measured using equipment that can directly measure methane content in the LFG, estimation of methane content of LFG based on measurement of other constituents of the LFG such as CO_2 is not permitted. Preferably measured by continuous gas quality analyzer. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	The gas analyser should be subject to a regular maintenance and testing regime to ensure accuracy
Any comment:	The fraction of methane in the LFG should be measured with a continuous analyzer or, alternatively, conducting periodical measurements with a minimum 4 quarterly measurements per year.

Data / Parameter:	$VE_{CH4,m,y}$
Data unit:	m^3
Description:	Volume of venting methane emissions from venting well m during the year y
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured continuously or periodically (at least quarterly). For ex-ante estimation of project emissions $VE_{CH4,m,y}$ = 0 is assigned to.
Description of measurement methods and procedures to be applied:	Measured by a flow meter. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	Flow meters should be subjected to a regular maintenance and testing regime to ensure accuracy
Any comment:	More frequent sampling is encouraged

Data / Parameter:	$VD_{CH4,m,y}$

Data unit:	tCH_4/m^3
Description:	Methane concentration of venting emissions from venting well m during the year y
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured continuously or periodically (at least quarterly). For ex-ante estimation of project emissions $VD_{CH4,m,y}$ = 0 is assigned to.
Description of measurement methods and procedures to be applied:	Measured by a continuous gas quality analyser or a flame ionisation detector. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	Flame ionisation detectors or gas quality analyser should be subjected to a regular maintenance and testing regime to ensure accuracy
Any comment:	More frequent sampling is encouraged

Data / Parameter:	$SE_{CH4,n,y}$
Data unit:	m^3
Description:	Volume of surface methane emissions from surface area n during the year y
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured continuously or periodically (at least quarterly). For ex-ante estimation of project emissions $SE_{CH4,n,y}$ = 0 is assigned to.
Description of measurement methods and procedures to be applied:	Measured by a flow meter to be attached a flux box. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	Flow meters should be subjected to a regular maintenance and testing regime to ensure accuracy
Any comment:	More frequent sampling is encouraged

Data / Parameter:	$SD_{CH4,n,y}$
Data unit:	tCH_4/m^3
Description:	Methane concentration of surface emissions from surface area n during the year y
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured continuously or periodically (at least quarterly). For ex-ante estimation of project emissions $SD_{CH4,n,y}$ = 0 is assigned to.
Description of measurement methods and procedures to be applied:	Measured by a continuous gas quality analyser or a flame ionisation detector to be attached a flux box. Data to be aggregated yearly. The samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
QA/QC procedures to be applied:	Flame ionisation detectors should be subjected to a regular maintenance and testing regime to ensure accuracy

Any comment:	More frequent sampling is encouraged

Data / Parameter:	T
Data unit:	°C
Description:	Temperature of the landfill gas
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured continuously or periodically (at least quarterly).
Description of measurement methods and procedures to be applied:	Measured to determine the density of methane. No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters.
QA/QC procedures to be applied:	Measuring instruments should be subjected to a regular maintenance and testing regime in accordance to appropriate national/international standards.
Any comment:	More frequent sampling is encouraged

Data / Parameter:	P
Data unit:	Pa
Description:	Pressure of the landfill gas
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured continuously or periodically (at least quarterly).
Description of measurement methods and procedures to be applied:	Measured to determine the density of methane. No separate monitoring of pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters.
QA/QC procedures to be applied:	Measuring instruments should be subjected to a regular maintenance and testing regime in accordance to appropriate national/international standards.
Any comment:	More frequent sampling is encouraged

Data / Parameter:	$EG_{PJ,FF,y}$
Data unit:	MWh/year
Description:	Quantity of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid as a result of the project activity during the year y
Source of data to be used:	On-site measurements and electricity invoices
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured continuously. For ex-ante estimation of project emissions $EG_{PJ,FF,y}$ = 635.976 MWh/year is assigned to.
Description of measurement methods and procedures to be applied:	Electricity meter

QA/QC procedures to be applied:	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. Measurement results should be cross-checked with the quantity of invoices from the grid operator.
Any comment:	

Data / Parameter:	CEF_{elec}
Data unit:	tCO_2/MWh
Description:	Emission factor for the production of electricity in the project activity
Source of data to be used:	Publicly available documents from utility or electricity regulator
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Identified annually or ex-ante. For estimation of project emissions CEF_{elec} = 0.9928 tCO_2/MWh is assigned to.
Description of measurement methods and procedures to be applied:	A default of 0.8 can be used if electricity in the project is produced using captive power plant. In case the project source is grid, emission factor shall be estimated as described in "Tool to calculate the emission factor for an electricity system".
QA/QC procedures to be applied:	Calculated as per appropriate methodology at the start of crediting period
Any comment:	

Data / Parameter:	$F_{cons,v}$
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	Identified annually. For estimation of project emissions $F_{cons,v}$ = 0 (l or kg) is assigned to.
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	The amount of fuel will be derived from the paid fuel invoices (administrative obligation).
Any comment:	

Data / Parameter:	NCV_{fuel}
Data unit:	MJ/l or MJ/kg
Description:	Net calorific value of fossil fuel
Source of data to be used:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default value. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	Identified annually or ex-ante.
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	For fossil fuel that is used in the project electricity generation

Data / Parameter:	EF_{fuel}
Data unit:	tCO_2/MJ
Description:	CO_2 emission factor of fossil fuel
Source of data to be used:	The source of data should be the following, in order of preference: project specific data, country specific data or IPCC default value. As per guidance from the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Identified annually or ex-ante.
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Fossil fuel that is used in the project captive power plant

B.7.2. Description of the monitoring plan:

The operational and management structure that the project operator will implement in order to monitor emission reductions in the project activity is showed by Figure 7.2(1) below. Particularly CDM project manager and Data recording team have the responsibilities for data collection and archiving that would be available for the verification by DOE.

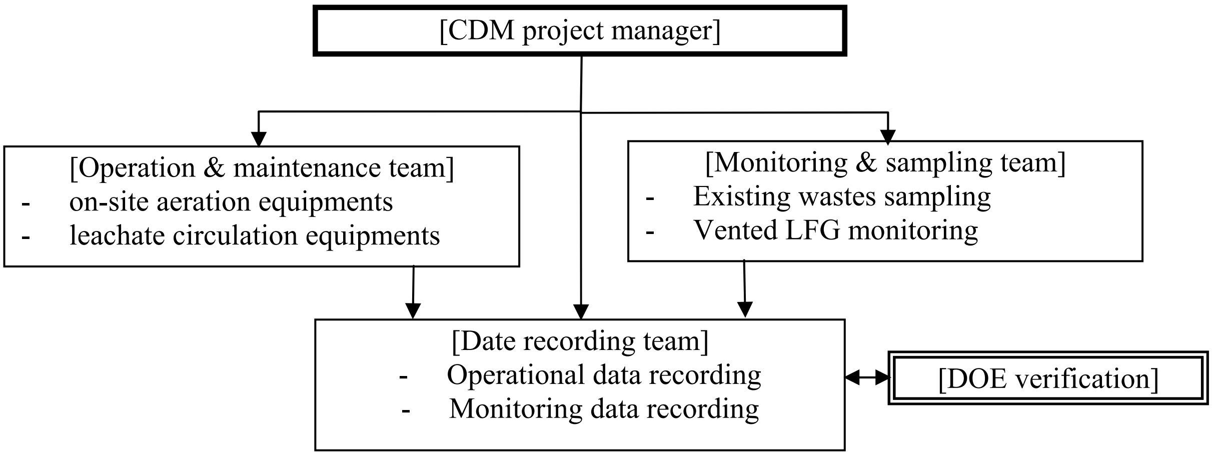


Figure 7.2(1) The operational and management structure

The relevant further background information is provided in Annex 4.

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

Date of completion of the application of the methodology to the project activity is 30/03/2009.

Contact information of the person(s)/entity(ies) responsible for the application of the baseline and monitoring methodology to the project activity are listed below.

- Akifumi NISHIHATA, Pacific Consultants Co. LTD.
- Phone: *81-42-372-7132, Fax: *81-42-372-1857, E-mail: akifumi.nishihata@tk.pacific.co.jp

The above person is not a project participant. The relevant information is provided in Annex 1.

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:

January 2010

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

7 years

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

C.2.1. Renewable crediting period:

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

Not applicable

C.2.1.2. Length of the first crediting period:

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

January 2010

C.2.2.2. Length:

7 years

SECTION D. Environmental impacts

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

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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:

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SECTION E. Stakeholders' comments

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

>>

E.2. Summary of the comments received:

>>

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

>>

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 do not involve any public funding from Annex 1 countries.

Annex 3

BASELINE INFORMATION

A general view of common practice

1) Methane recovery & utilization in CDM project

	Approval status	Project Name	Project Type	Project Owner	CER Buyer	Estimated Ave. GHG Reduction
1	20060721	Nanjing Tianjinwa Landfill Gas to Electricity Project	Methane recovery & utilization	Nanjing Green Waste Recovery Engineering Co., Ltd.	EcoSecurities Ltd (UK)	265,032
2	20060721	Meizhou Landfills Gas Recovery and Utilization as Energy Project	Methane recovery & utilization	Shenzhen PhasCon Technologies Co., Ltd.	Austrian JI/CDM Programme, Kommunalkredit Public Consulting Gmbh	278,000
3	20060616	Anding Landfill Gas Recovery and Utilization Project	Methane recovery & utilization	Beijing Erqing Environment Engineering Group	Energy Systems International B.V. (ESI)	90,000
4	20060721	Shenzhen Xiaping landfill Gas Collection and Utilization Project	Methane recovery & utilization	Shenzhen Lisai Development Co. Ltd	Climate Change Capital Carbon Fund s.a.r.l	749,186
5	20060721	Jiaozishan Landfill Gas Recovery and Utilisation Project	Methane recovery & utilization	Nanjing Yunsheng New Energy Development Co.Ltd	CAMCO International Limited (UK)	147,880
6	20061109	Wuxi Taohuashan Landfill Gas to Electricity Project	Methane recovery & utilization	Wuxi Tianshun Environmental Technology Co.,Ltd	Toyota Tsusho Corporation	75,316
7	20061109	Guangzhou Xingfeng Langfill Gas Recovery and Electricity Generation Project	Methane recovery & utilization	Guangzhou Huijing Environmnent Protection Technology Co., Ltd.	ICECAP Ltd.	626,834
8	20061215 No. 20	Shandong Jinan Landfill Gas to Energy Project	Methane recovery & utilization	Shandong Shifang New Energy Ltd	EcoSecurities Group Ltd	150,158
9	20070131 No. 20	Nanning Landfill Gas to Energy Project	Methane recovery & utilization	Guangxi Gettop Science & Technology Co.,Ltd	Biogas Technology Ltd.(UK)	195,208
10	20070306 No. 9	Kunming Wuhua Landfill Gas to Energy Project in Yunnan Province	Methane recovery & utilization	Kunming Huan Ye Environmental Protection Engineering Development Co.,	Biogas Technology Ltd (UK)	201,586
11	20070402 No. 5	Hunan Changsha Qiaoyi Landfill Gas Recovery and Electricity Generation Project	Methane recovery & utilization	Changsha Huiming Environment Energy Co.,Ltd	Trading Emissions PLC(UK)	238, 319
12	20070402 No. 2	Fuzhou Hongmiaoling Landfill Gas to Electricity Project	Methane recovery & utilization	Fujian Tianyi Renewable Energy Technology & Utilization Co.,Ltd	Eco Bank Ltd(Japan)	181, 234
13	20070713 No. 3	Kunming Dongjiao Baishuitang LFG Treatment and Power	Methane recovery & utilization	Kunming Huan Ye Project Development Co.,Ltd.	Asja Ambiente Italia S.P.A(Italy)	64,302

	Approval status	Project Name	Project Type	Project Owner	CER Buyer	Estimated Ave. GHG Reduction
14	20071108 No.28	Shenyang Daxin Landfill Gas to Electricity Project	Methane recovery & utilization	Shenyang Xinxin Tomorrow Renewable Co.,Ltd	Danish Ministry of Foreign Affairs(Denmark)	195,436
15	20071108 No.21	Nanchang Maiyuan Landfill Gas Recovery and Utilization	Methane recovery & utilization	Nanchang Xinguan Energy Development Co.,Ltd	One Carbon B.V. (Netherlands)	150,599
16	20071108 No.23	Mianyang Landfill Gas Utilization Project	Methane recovery & utilization	Mianyang Taidu Environment Energy Technical Development	Sindicatum Carbon Capital Ltd (UK)	103,204
17	20071227 No.38	Shenyang Laohuchong LFG Power Generation	Methane recovery & utilization	Shenyang Laohuchong Municipal Solid Waste	Asja Ambiente Italia S.p.A (Italy)	126,179
18	20080326 No.8	Luoyang Landfill Site LFG Recovery to Electricity Project	Methane recovery & utilization	Shanghai BCCY NewPower Industry Co.,Ltd	Renaissance Carbon Investment Ltd (UK)	86,770
19	20080326 No.7	Nanyang Landfill Site LFG Recovery to Electricity Project	Methane recovery & utilization	Shanghai BCCY NewPower Industry Co.,Ltd	Renaissance Carbon Investment Ltd (UK)	57,167
20	20080624 No.8	Changchun City Landfill Gas Power Generation	Methane recovery & utilization	Jilin Province Shijie Renewable Energy Co.,Ltd	EcoSecurities Group PLC (UK)	150,330
21	20080718 No.34	Xiamen Dongfu Landfill Gas-to-Energy Project	Methane recovery & utilization	Xiamen Perfect New Energy Co.,Ltd	Marubeni Corporation (Japan)	94,084
22	20080718 No.16	Shanxi Taiyuan Shanzhuangtou Landfill Gas Recovery and Utilization Project	Methane recovery & utilization	Taiyuan Kaitian Renewable Energy & Environment Co.,Ltd	Asja Environment International B.V. (Switzerland)	41,653
23	20080718 No.15	Liaoning Landfill Gas Recovery and Utilization Project	Methane recovery & utilization	Liaoning Kaitian Renewable Energy & Environment Co.,Ltd	Cantor Fitzgerald Europe (UK)	69,961
24	20080718 No.14	Shanxi Taiyuan Xingou Landfill Gas Recovery and Utilization Project	Methane recovery & utilization	Taiyuan Kaitian Renewable Energy& Environment Co.,Ltd	Asja Environment International B.V. (Switzerland)	46,648
25	20080902 No.38	Hefei Longquanshan Landfill Gas Power Generation	Methane recovery & utilization	Hefei Xinguan Energy Development Co.,Ltd	OneCarbon International BV.(The Netherlands)	130,881
26	20081030 No.19	Dalian Maoyingzi Landfill Gas Recovery for Power Generation Project	Methane recovery & utilization	Dalian PhasCon Technologies Co.,Ltd	The Netherlands represented by its Ministry of Housing, Spatial Planning and the Environment acting through in its Capacity as a Trustee of the IFC-Netherlands Carbon Facility (INCaF)	287,433
27	20081030 No.18	Huangshi Landfill Gas Recovery for Power Generation	Methane recovery & utilization	Shenzhen PhasCon Technologies Co.,Ltd.	Vitol S.A.(Switzerland)	93,365
28	20081111 No.37	Huizhou Landfill Gas Recovery and Utilization Project	Methane recovery & utilization	Shenzhen PhasCon Technologies Co.,Ltd	The Netherlands represented by its Ministry of Housing, Spatial Planning and the Environment acting through in its Capacity as a Trustee of the IFC-Netherlands Carbon Facility (INCaF)	136,250

2) Other treatment in CDM project

	Approval status	Project Name	Project Type	Project Owner	CER Buyer	Estimated Ave. GHG Reduction (tCO2e/y)
1	20070131 No.19	Composting of Organic Waste in Wuzhou	Methane recovery & utilization	Teresa Environmental Industry Co.,Ltd.,Wuzhou	RWE Power AG(Germany)	46,274
2	20071016 No.20	Municipal Solid Waste Composting Project in Urumqi, China	Castoff disposal	Xinjiang Urban Construction & Environmental Protection Co.,Ltd	RWE Power Aktiengesells	51,712

Site specific data of of BeiTianTang landfill

1) Basic information of BeiTianTang landfill

District	Area*10^4 (m^2)	Average depth (m)	Volume*10^4 (m^3)	Service Life
I District	17.0	10.09	172.59	1988.03-1997.10
II District	10.0	16.34	172.87	1995.11-2002.10
III District	5.7	20.44	116.28	2002.11-2005.6

2) Organic Content of the Waste

District	Sample numbers	Organics (%)
I District	2007-7-10-1	5.31
	2007-7-10-2	6.01
	2007-7-10-3	2.21
	2007-7-10-4	9.11
II District	2007-7-10-5	21.03
	2007-7-10-6	33.23
	2007-7-10-7	34.12
	2007-7-10-8	25.32
	2007-7-10-9	16.5
	2007-7-10-10	18.73
	2007-7-10-11	23.5
	2007-7-10-12	30.42
III District	2007-7-10-13	35.03
	2007-7-10-14	28.91
	2007-7-10-15	15.46
	2007-7-10-16	32.15
	2007-7-10-17	28.07
	2007-7-10-18	30.22

Annex 4

MONITORING INFORMATION

1) Sampling & (if applicable) analysis of existing wastes
- Degradable organic carbon (DOC_j)
- Decay rate (k_j)

2) Monitoring of landfill gas & landfill body
- Venting methane emissions (F, $VE_{CH4,m,y}$, $VD_{CH4,m,y}$)
- (if applicable) Surface methane emissions ($SE_{CH4,n,y}$, $SD_{CH4,n,y}$)
- Temperature and pressure of LFG
- Temperature and moisture in landfill body

3) Measurement of electricity consumption
- Electricity consumptions ($EG_{PJ,FF,y}$)
- Emission factor (CEF_{elec}) based on China's official statement as blow:

"2008 Baseline Emission Factors for Regional Power Grids in China"

四、 排放因子数值

	$EF_{grid,OM,y}$ (tCO_2/MWh)	$EF_{grid,BM,y}$ (tCO_2/MWh)
华北区域电网	1.1169	0.8687
东北区域电网	1.2561	0.8068
华东区域电网	0.9540	0.8236
华中区域电网	1.2783	0.6687
西北区域电网	1.1225	0.6199
南方区域电网	1.0608	0.6816
海南省电网	0.8944	0.7523

注：表中 OM 为 2004-2006 年电量边际排放因子的加权平均值；BM 为截至 2006 年的容量边际排放因子。

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