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:

Montalban Landfill Methane Recovery and Power Generation Project
Version Number 05
12/11/2008

A.2. Description of the project activity:

The Montalban Sanitary Landfill Methane Recovery and Power Generation CDM Project ("Project Activity") will be undertaken in the Montalban landfill in the municipality of Rodriguez, province of Rizal, Philippines. Rodriguez is approximately 50 kilometers northeast of Metro Manila. The Project Activity is based on an area 14 hectares in size, which receives approximately 3,000 tonnes of solid waste per day and has been in operation from January 2002.

The objective of the Project Activity is to collect methane ("CH_4") in landfill gas ("LFG") to generate clean electricity, by installing an onsite LFG collection system, power generation system and flaring system. The electricity generated will be evacuated to the local grid system. By capturing the LFG, direct greenhouse gas ("GhG") emissions are reduced, local environmental impacts are mitigated, and the operational safety of the site is increased. At the same time generation of electricity from captured methane to displace the grid electricity produced from more carbon intensive sources will be reducing the GHG emission potential load of the grid system.

In particular, the project will be commencing in phases, with the first phase as commencement of LFG capture and flaring of methane on December 12th 2007 and the second phase as commencement of electricity generation on April 1st 2008. The operational period will be for 12 years.

The Project Activity has been conceived to improve the environment, respond to the need for clean energy, and contribute towards local and national sustainable development through economic and environmental contributions.

In its present state, this extensive landfill area:

- Has cells of between 80-100 metres in depth from ground level
- The landfill is actively managed
- The only surface area of waste exposed is that which is actively receiving waste that day
- Surface areas are covered with dirt to prevent waste from moving and to discourage waste picking
- There is no authorised waste picking at the landfill site; however waste pickers are active on the site

Implementation of the Project Activity will have the following impact:

- **Greenhouse gas emission reduction**: The Global Warming Potential of methane, the main component of LFG, is 21 times that of carbon dioxide (“CO2”). By destroying the methane gas the Project Activity has a positive impact on reducing climate change.

- **Landfill site safety**: Where methane concentrations increase on the landfill site there is a significant risk of explosions. By installing a state-of-the-art collection system to remove the harmful gas will reduce the risk of future explosions.

- **Energy generation**: Methane is a clean fuel. The recovery of LFG and generation of power will contribute to the sustainable development of the Rodriguez Municipality.

- **Job creation**: The Project Activity will be designed, constructed and operated using local resources and supported by international experts. Employment will be created both during construction and whilst the project is operational.

- **Demonstration**: The Project Activity will be one of the first CDM landfill projects in the Philippines, thus building significant experience in the country for LFG technology.

- **Education**: An education centre will be constructed to provide information about the Clean Development Mechanism, LFG to Energy (“LFGTE”) projects, clean energy technologies and the Project Activity

This Project Activity assumes that a LFGTE module installed is expected to initially total 15 MW and the CDM project activity will be restricted only up to 15 MW installed capacity.

Finally, the Project Activity will develop and implement a social programme that addresses the needs of the local waste picking community that will be affected by the landfill remediation. All social projects will be funded by a percentage of the proceeds generated by the sale of Certified Emission Reductions (“CERs”).

A.3. Project participants:

Names of Party Involved	Private and/or public project participants	Does the Party involved wish to be considered as project participant
Philippines	Montalban Methane Project Corporation (MMPC)	No
UK	Carbon Capital Markets Ltd	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

The landfill is located in the municipality of Rodriguez, province of Rizal, Philippines.

A.4.1.1. Host Party(ies):

Philippines (the "Host Country")

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

Rizal

A.4.1.3. City/Town/Community etc:

Rodriguez

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

The Montalban landfill is a solid, non-hazardous waste disposal facility located in Rizal. The Project Activity will be located within the Montalban Solid Waste Disposal Facility, an existing government approved sanitary landfill.

The Project Activity will benefit from receiving distinct, world class technology.

- **Energy generation**: Methane is a clean fuel. The recovery of LFG and generation of power will contribute to the sustainable development of the Rodriguez Municipality.
- **Flaring units**: LFG not utilised for electricity generation will be fed into enclosed flares which have been designed to destroy LFG efficiently and at high temperature to ensure the maximum destruction efficiency and minimum noise pollution.
- **Landfill gas capture system**: the landfill capture system is made up of a vertical piping system that spread the space of the landfill. The system has been expertly designed to ensure that the maximum quantity of LFG is extracted from the system to ensure that the site is safe and the power generation system can operate efficiently.

The landfill site is located at the following coordinates: 14 45'58.31"N, 121 7'56.67"E. There are no publicly available aerial photographs of the landfill. The following images provide a view of the landfill site.

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

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

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

The Project Activity involves the installation of an active gas collection system, an efficient gas flaring plant, collection of leachates and improvement of the landfill covering system, and grid connected power generation.

- **Landfill covering**: In order to effectively trap and collect LFG the landfill surface will be covered with a layer of compacted soil.

- **Gas collection system**: The Project Activity will employ a modern landfill gas collection system, consisting of branch pipes, head pipes and extraction wells for effective collection of LFG.

- **Electricity generation and grid connection system**: Gas engines will be installed with an initial capacity of 15 MW. Electric transformers will be installed to convert the generated power to the correct voltage and amperage.

- **Flaring system**: LFG not utilised for electricity generation will be destroyed in the flaring system associated with the power generators. For this project, three enclosed flares will be installed.

- **Monitoring and protection system**: The Project Activity will install onsite monitoring facilities and protection facilities for onsite technology (e.g., such as electricity generators and flares). Monitoring procedures will be international best practice and in accordance with ACM0001 and AMS I.D.

- **Data recording and archiving system**: The system will be designed in accordance with the requirements of ACM0001 and AMS I.D monitoring methodologies.

The technology employed will be state of the art, meeting the highest international standards and best practices. Accordingly, all staff will be suitably trained to operate, maintain and monitor all equipment. Technology will be procured from the following regions and meet the following standards:

Table 1: Standards of the Technology to be used

Component	Imported or locally manufactured	Standard
Wells	Locally manufactured	According to EU Standards
Gas collection system	Partly Locally manufactured and partly imported.	According to US or EU Standards (operational safety and environmental aspects)
Flaring system	Imported from EU or US	According to EU Standards
Gas engine and generator sets	Imported from EU or US	According to EU Standards
Monitoring and control systems	Imported from EU or US	According to EU Standards

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

By flaring and electricity generation of the LFG captured at the site and displacement of grid electricity, the Project Activity is expected to generate 5,899,931 tonnes of emission reductions expressed as tonnes of CO_2e over the 10-year crediting period.

The project crediting period is from January 1st 2008 until December 31st 2017.The table below indicates the annual expected amount of emission reductions generated over the selected project crediting period:

Table 2: Expected ERs for the selected Crediting Period

Year	Annual estimation of emission reductions in tonnes CO_2e
2008	371,694
2009	441,853
2010	492,194
2011	539,442
2012	583,941
2013	625,352
2014	662,298
2015	695,964
2016	728,150
2017	759,041
Total reductions	**5,899,931**
Total number of crediting years	10
Annual Average of Emission reductions (CO_2e tons)	**589,993**

A.4.5. Public funding of the project activity:

The Project Activity will not receive any public funding.

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:

The baseline and monitoring methodology to be applied for the proposed project activity is the approved consolidated baseline methodology ACM0001, version 6: ***"Consolidated baseline methodology for landfill gas project activities"*** and ***"Consolidated monitoring methodology for landfill gas project activities"***. For emissions reductions associated with electricity generation using LFG, this PDD also incorporates the small-scale CDM methodology AMS I.D Version 12 ***"Grid connected renewable electricity generation"***.

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

The ACM0001 methodology (Version 6) is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include situations as:

a. the captured gas is flared; and/or
b. the captured gas is used to produce energy (e.g. electricity/thermal energy);
c. the captured gas is used to supply consumers through natural gas distribution network.

In the case of the Project Activity, the baseline scenario is the total atmospheric release of the gas, and the Project Activity is the flaring/destruction and energy production (i.e. electricity) of captured gas (a and b); ACM0001 is, therefore, applicable to the Project Activity.

The ACM0001 methodology (Version 6) also provides the option towards calculation of emission factor for baseline grid electricity as –

"In case the baseline is electricity generated by plants connected to the grid the emission factor should be calculated according to methodology ACM0002. If the thresholds for small-scale projects activities apply, AMS-I.D may be used."

As the Project Activity generates grid connected electricity utilising Land Fill Gas captured from the sanitary landfill through gas turbine generators of total installed capacity up to 15 MW, thus, AMS-1.D methodology is applicable for the project activity and the emission factor for the baseline grid electricity will be used to determine the emissions reductions from the power generation of this Project Activity.

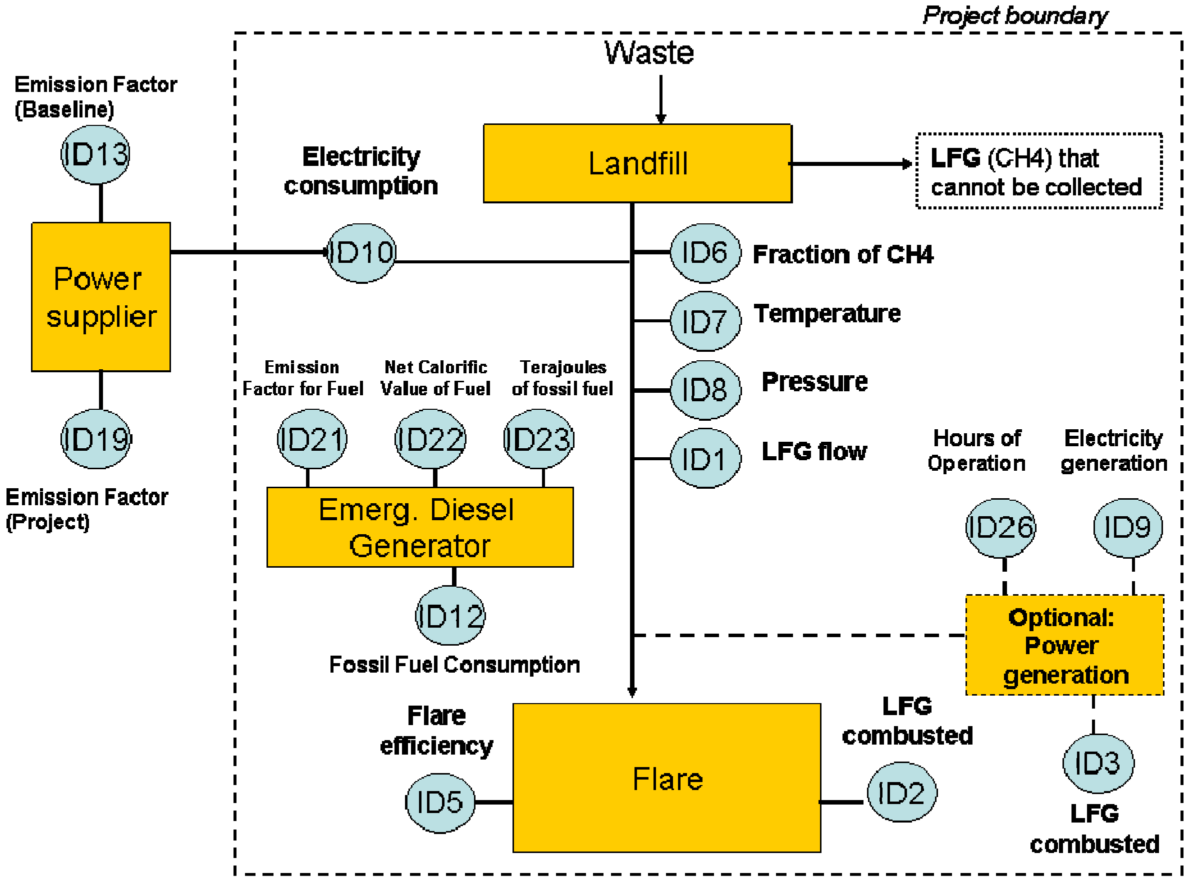
To determine the ex-ante calculations, we are using official 2006 power generation data for grid power as published by the Philippines' Department of Energy http://www.doe.gov.ph/EP/Powerstat.htm.

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

	Source	**Greenhouse Gas**	**Included/ Excluded**	**Justification**
Baseline	Landfill waste gas	CO_2	Excluded	Not an emissions source
		CH_4	Included	Main emissions source
		N_2O	Excluded	Not an emissions source
Project Activity	Combustion of LFG in flares	CO_2	Excluded	Not an emissions source
		CH_4	Included	Main emissions reduction source
		N_2O	Excluded	Not an emissions source
	Combustion of LFG in generators	CO_2	Excluded	Not an emissions source
		CH_4	Included	Main emissions reduction source
		N_2O	Excluded	Not an emissions source

	Fossil Fuel use[1]	CO_2	Included	Secondary emissions source
		CH_4	Excluded	Not an emissions source
		N_2O	Excluded	Not an emissions source
	Grid electricity imported / exported	CO_2	Included	Main emissions source
		CH_4	Excluded	Not an emissions source
		N2O	Excluded	Not an emissions source

The following diagram below illustrates the various emission sources in the project boundary. The parameters are defined in Section B.7.1.



The project boundary covers the following components of the LFGTE Project Activity:

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[1] In the rare event that there is no power grid transmission into the site, a stand-alone diesel engine may be used on-site.

- **Gas collection system**: The Project Activity will employ a modern landfill gas collection system, consisting of branch pipes, head pipes and extraction wells for effective collection of LFG.

- **Electricity generation and grid connection system**: Gas engines will be installed. Electric transformers will be installed to convert the generated power to the correct voltage and amperage. Additionally, a small onsite diesel generator will be installed for emergency back-up use, in the case where power from the grid fails to be delivered to activate the onsite gas collection system.

- **Flaring system**: LFG not utilised for electricity generation will be destroyed in the flaring system associated with the power generators.

- **Monitoring and protection system**: The Project Activity will install onsite monitoring facilities and protection facilities for onsite technology.

As the electricity generated by the Project Activity will be evacuated to the Luzon Grid system of Philippines, thus for the purpose of estimation of baseline emissions the Luzon Grid has been considered with in the project boundary.

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

According to methodology ACM0001, the baseline is the atmospheric release of the gas and the baseline methodology considers that "*some of the methane generated by the landfill may be captured and destroyed to comply with regulations or contractual requirements, or to address safety and odour concern*".

In the case of the Project Activity, the baseline scenario is the continued uncontrolled release of LFG to the atmosphere, which is what occurs at landfill sites throughout the Host Country.

The baseline scenario is set and additionality is demonstrated according to ACM0001 Version 6.

Step 1: Identification of alternative scenarios

ACM0001 version 6 states that Step 1 of the Tool for demonstration and assessment of additionality Version 3 (*"Additionality Tool"*) to identify all realistic and credible baseline alternatives. Thus, according to Step 1 of the Additionality Tool, the realistic and credible alternatives to the project activities that can be the baseline scenario should be defined through the following sub-steps:

Disposal or treatment of waste in absence of the project activity:

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

In line with ACM0001 version 6 the following are alternatives to the Project Activity:
LFG1. The project activity (i.e. capture of landfill gas and its flaring and/or its use) undertaken without being registered as a CDM project activity;

LFG2. Atmospheric release of the landfill gas or partial capture of landfill gas and destruction to comply with regulations or contractual requirements or to address safety and odour concerns.

No other realistic, credible alternatives can be included as none of the other options (eg incineration, composting, thermochemical gasification and biothanantion) are realistic alternative options, given that the Montalban landfill is obliged to continue operating. Moreover the landfill may even see an increase in the quantity of waste it accepts in the future and the Metro Manila region runs out of space for depositing waste (see Section B.5). Each of the aforementioned options would involve substantial capital investment and have higher operating costs. For example, the composting option, which is likely to be the cheapest alternative waste disposal option remains prohibitively expensive in non-Annex 1 countries such as the Philippines compared to a landfill[2]. Finally, there is only limited experience with these more expensive alterative technologies in Annex 1 countries, and almost no experience in such technologies in non-Annex 1 countries.

As the Project Activity is not financially viable (see Section B.5 – Table 5 as this is discussed in Step 2- Investment Analysis) without CER revenues, consequently, LFG2 is the only realistic alternative.

The most plausible LFG2 baseline scenario is atmospheric release of landfill gas instead of partial capture of landfill gas and destruction due to lack of implementation of legislation relating to the capture and destruction of landfill gas- known as the Ecological Solid Waste Management Act (RA 9003) and Philippine Clean Air Act (RA 8749). This is further discussed in Section B.5

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

LFG2 is in compliance with all mandatory applicable legal and regulatory requirements of the host country. The Project Activity is also in compliance with mandatory laws and regulations.

Power generation in absence of the project activity:

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

In line with ACM0001 version 6 the following realistic and credible alternatives may include:

P1. Power generated from landfill gas undertaken without being registered as 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 or Construction of a new on-site or off-site renewable based captive power plant;
P6. Existing and/or new grid-connected power plants.

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[2] International Source Book on Environmentally Sound Technologies (ESTs) for Municipal Solid Waste Management (MSWM), Report of United Nations Environmental Programme, Division of Technology, Industry, and Economics. http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/sp/sp4/sp4_1.asp

Analysis of each alternative is presented in Table 3:

Table 3: Analysis of Power Generation Alternatives

Alternative Scenario	Explanation	Is it a credible and realistic alternative scenario?
P1	As the Project Activity is not financially viable (see Section B, Table 5, as this is discussed in Step 2-Investment Analysis) without CER revenues despite the selling of electricity to the grid.	No, remove from scenarios
P2	The high cost of captive fossil fuel fired cogeneration plants would not be competitive compared to purchasing from the grid. According to the 2006 Philippine Energy Plan, the capacity additions from 2006-2014 in the Luzon grid are expected to be a wind power project, a coal fired power project and expansion of two combined cycle power projects. In addition, the 2006 Power Statistics from the Department of Energy indicates that there are no existing cogeneration plants in the Luzon grid[3]. Thus, there is currently no existing or construction of a new on-site or off-site fossil fuel fired cogeneration plant in the Luzon grid[4].	No, remove from scenarios
P3	Other renewable sources are not available to the project site, thus no existing or construction of a new on-site renewable based cogeneration plant. There is currently no construction of an off-site renewable based cogeneration plant.	No, remove from scenarios
P4	The high cost of captive fossil fuel fired plants would not be competitive compared to purchasing from the grid. There is currently no existing or construction of a new on-site fossil fuel fired captive power plant as there has been no power development in and around the Project Activity's location, this is evidenced by the list of power plants in Luzon for the year 2006, none indicates a power development in Montalban/Rosario or Rizal[5]..As for off-site plants, there are a number of these in the Philippines (pulp and paper and industrial parks), but servicing industrial installations, for	No, remove from scenarios

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[3] Source: Power Statistics Spreadsheet ('2006 Gross Gen' worksheet) http://www.doe.gov.ph/EP/Powerstat.htm, Accessed last 26 November 2007.

[4] Source: 2006 Philippine Energy Plan, Department of Energy: http://www.doe.gov.ph/PEP/pdp%20supplement.htm. Accessed last: 23 November 2007, Table 6 and 7.

[5] Source: Power Statistics Spreadsheet ('2006 Existing PP' worksheet) http://www.doe.gov.ph/EP/Powerstat.htm, Accessed last 26 November 2007.

	example the United Pulp and Paper's coal fired boiler power plant; Carmelray Industrial Park's diesel power plant; Bataan Paper Factory's power plant; LaFarge Cement's heavy fuel oil power plant and Nestle Philippine's heavy fuel oil power plant[6].	
P5	Other renewable sources are not available to the project site, thus no existing or construction of a new on-site or off-site renewable based captive power plant. There is currently no construction of an off-site renewable based cogeneration plant.	No, remove from scenarios
P6	There are existing and/or new grid-connected power plants	Yes. This is the realistic credible alternative for power generation.

The Project Activity does not propose to generate and or use any thermal heat. Consequently there are no realistic and credible alternatives for heat generation that should be considered.

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

P6 is in compliance with all mandatory applicable legal and regulatory requirements. The Project Activity is also in compliance with mandatory laws and regulations.

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

The fuel for the baseline energy source is the generation mix from the grid electricity, in this case the Luzon grid (see Section B.5). The 2006 generation mix for the Luzon grid is as follows: 18% hydro; 1% oil thermal; 40% coal thermal; 1% diesel; 18% geothermal; and 22% combined cycle[7]. Thus, the Luzon grid is fossil fuel intensive.

According to the 2006 Philippine Energy Plan[8], it is expected that 1,989 MW of capacity will be added into the Luzon grid by 2014, of which 600 MW is coal, 1150 MW is natural gas and 30 MW is wind. This indicates that supply is sufficient for the Luzon grid if these capacity additions are made.

The Project Activity is limited to producing a maximum of 15 MW of power generation. Consequently, AMS-I.D is employed to determine reductions from the offsetting of fossil fuel power from the grid.

In accordance with ACM0001 Version 6, AMS-1.D is used since the baseline is electricity generated by plants connected to the grid and the threshold for small-scale project applies. The grid factor for CO2e emissions has been calculated as per one of the options in AMS-1.D (baseline option 9b): to calculate the weighted average emissions (in kg CO2e/kWh) of the current generation mix using data from an official source where publicly available. Available data for calculating the grid factor is produced using official

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[6] Source: http://www.energy.poyry.com/power/power_5.html?AreaId=1&Page=1, Accessed last 26 November 2007.

[7] Source: http://www.transco.ph/aboutus.asp. Accessed last: 2 Oct 2007.

[8] Source: 2006 Philippine Energy Plan, Department of Energy: http://www.doe.gov.ph/PEP/pdp%20supplement.htm. Accessed last: 23 November 2007.

power generation 2006 data from the Philippines' Department of Energy (www.doe.gov.ph/EP/Powerstat.htm). The WRI's GHG Calculation Tool for 'Indirect CO2 Emissions from the Consumption of Purchased Electricity' (www.ghgprotocol.org/includes/getTarget.asp?type=d&id=MTczNDM) provides the emission factors (in kg CO2/kWh) prepared by International Energy Agency (IEA) that are specific to Philippines and fuel type (i.e., coal, gas, oil).

Step 3: Barrier Analysis

According to ACM0001, Step 3 will come from the Additionality Tool, where it is determined whether the alternatives should be excluded from further consideration (e.g. alternatives facing prohibitive barriers or those clearly economically unattractive).

This has already been done in Step 1, thus only LFG2 and P6 have been shortlisted as the realistic and credible scenarios for waste disposal/treatment and power generation respectively.

Step 4:

In accordance to ACM0001, Step 4 will identify the plausible alternative for each component of the Project Activity. This is summarised below:

Table 4: Combinations of baseline options and scenarios applicable to this methodology

Scenario	Baseline		Description of Situation
	Landfill gas	Electricity	
1	LFG2	P6	The atmospheric release of landfill gas and the electricity is obtained from the grid.

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): >>

Disposal/treatment of the waste in the absence of the project activity:

The Project Activity represents one of the first of its kind in this country. The regulations pertaining to LFG in the Philippines can be summarised as follows:

- **Ecological Solid Waste Management Act (RA 9003)**: This act came into law in 2002 and makes provisions for a national, integrated, environmentally-friendly framework for solid waste management. It also provides for institutional mechanisms and waste management targets for the local government, including penalties for non-compliance. The act requires that:

  '*Gas control and recovery system – a series of vertical wells or horizontal trenches containing permeable materials and perforated piping placed in the landfill to collect gas for treatment or* *productive use as an energy source*'.[9] To date this is not complied with since there are no sanitary landfills in the Philippines, with the exception of the Montalban site.

- **Philippine Clean Air Act (RA 8749)[10]**: Local government units are affected by the Philippine Clean Air Act which took effect in 1999 to prohibit vehicular and industrial sources from emitting pollutants in amounts that cause significant deterioration of air quality. The six Kyoto-regulated GHGs not regulated by the Act. Consequently, the Project Activity is destroying pollutants that are not currently regulated in the Philippines.

Generally, the existing regulations pertaining to the Ecological Solid Waste Management Act and the Philippine Clean Air Act are not complied with and remain un-enforced. A host of articles have been published in the Philippines regarding non-compliance with environmental laws. A recent article state 'our books overflow with environmental laws languishing in the sickbed of non-compliance'[11]. Indeed, non-compliance with the Ecological Solid Waste Management Act is so widespread that the Philippine Bar Association is presently suing at least three Metro Manila Mayors with for their 'alleged' non-compliance with the Act[12].

In the recent publication of 'The Garbage Book: Solid Waste Management in Metro Manila' originally printed by the Asian Development Bank in 2004, a number of relevant observations were published pertaining to RA 9003 and the state of metro Manila landfills:

"RA 9003 is an enlightened piece of legislation, yet few local governments are familiar with it… Significantly, the required Solid Waste Management Fund has not been set aside as mandated by law, limiting the level of interest… The garbage crisis is real, serious and poses even grave threats to the public health if not resolved."[13]

"The people of Metro Manila are facing much more lethal, much more immediate threats to their health and well-being. These threats come from the mountains of garbage that dot almost every other block of the metropolis… Metro Manila's dump sites are dangerous, exposed, and generate potentially toxic liquids called 'leachate'… waste fires at these sites are common, which sends plumes of toxic emissions into the air. Other sites are critically unstable, presenting the possibility of another deadly garbage slide." [14]

"Based on current approximations, the majority of Metro Manila's dump sites will reach capacity in 2004. The ramifications of this are potentially serious, and could trigger another crisis in garbage collection and disposal, and the hasty development of substandard dump sites throughout the metropolis."[15]

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[9] http://www.elac.org.ph/envilawtoolkit/pollution/ra9003.pdf

[10] http://www.tanggol.org/environmental_laws/cleanair.html

[11] 'Seeing Green' Doris, Gaskell Nuyda, Philippine Daily Inquirer, November 7 2003

[12] 'Mayors Respond to Garbage Raps' Gerry Botril, Philippine Star, May 12, 2005

[13] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 20, Asian Development Bank, 2004

[14] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 19, Asian Development Bank, 2004

[15] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 52, Asian Development Bank, 2004

"Issues: about 27% of waste is illegally dumped or burned. Little motivation and incentives to reduce waste generation. Lack of public awareness to reduce and recycle."
Regulations and enforcement: Historically, regulations have been fragmented and enforcement practices poorly implemented…Recent regulations mandate widespread reforms throughout the sectors….Regulatory reform is in progress…..
Issues: Slow progress on enforcing recent regulations…..Legal impediments to problem solving."[16]

"*RA 9003 is a sweeping legislation that has the potential to radically transform and improve the solid waste management sector. Key elements include a national ecology center to provide information, training, and networking services; mandatory segregation and recycling of solid waste management boards at the provincial, city and municipality levels; and forming multipurpose environmental cooperatives in every local government. The National Solid Waste Management is tasked with developing a national status report and framework. Local governments are required to formulate 10-year solid waste management plans; divert 25% of all solid waste through reuse, recycling and composting by 2006; and estimate reclamation and buy-back… for recyclables. RA 9003 has the potential to effectively address solid waste management. However implementation is behind the schedule….*"[17]

Thus in the absence of the Project Activity, it is probable that the disposal and treatment of wastes in Metro Manila will continue to be undertaken through a number of open dumpsites (whether controlled or uncontrolled, without the implementation of RA 9003) which are the lack of waste covering, passive LFG venting or open burning of wastes. Thus, despite legislation banning burning and waste disposal in open dumpsites, this practice is likely to continue in the Philippines.

Power generation in absence of the project activity:

Through the implementation of the Project Activity emissions will be indirectly reduced through the displacement of fossil fuel electricity from the Philippines national grid.

The Philippine's national grid can be divided into three component grids: Luzon, Visayas and Mindanao, which serves the respective geographical areas. Based on the Philippine National Transmission Corporation (Transco)[18], the national grid system is composed of the following assets:

- Transmission line length of 20,236 circuit kilometres (ckt-kms);
- Total of 376.3 MVAR capacitors and 685 MVAR reactors with 93 substations;
- Total substation capacity of 24,489 MVA.

The total power generation for 2006 was at 56,784Gwh, with a power loss of 12%[19]. The 2006 generation mix for the Philippines is broken down as follows: 24%- hydro, 1%- oil thermal, 29%- coal thermal, 6% diesel, 26%- geothermal, 15% combined cycle.

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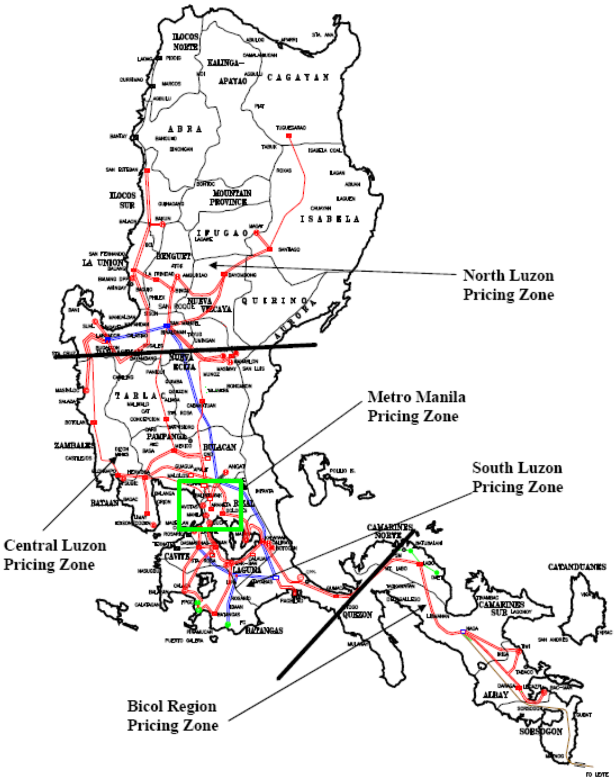
[16] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 60, Asian Development Bank, 2004

[17] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 77, 78, Asian Development Bank, 2004

[18] National Transmission Corporation, 2007 Transmission Development Plan: Discussion Draft, September 2007.

[19] Source: http://www.doe.gov.ph/EP/Powerstat.htm. Accessed last 3 Oct 2007.

The Luzon grid serves 10 areas (including Rizal), which has the biggest coverage and customer base in the Philippines. It covers the island of Luzon which represents the northern area of the Philippines. The total transmission length in the Luzon grid is about half of the national length, at 9,840 ckt-kms. About 40% of the capacitors and 90% of the reactors installed nationwide are in the Luzon grid, at 150 MVAR capacitors and 570 MVAR reactors, bringing the substation capacity at the Luzon grid to 19,121 MVA. In 2006, the power generation for the Luzon grid was at 41,241Gwh. According to Transco[20], the Luzon grid has N-1 capability, which means should a major line fail; there is enough power to keep the grid operational[21]. The Luzon grid is depicted below:



Source: 'Market Simulation – Luzon Grid Using Market Management System' Philippine Electricity Market Corporation Market Operations Group, August 2005

Transco has initiated the expansion and rehabilitation of the Luzon grid in response to the increasing power demand in the Luzon area. According to Transco, this is expected to increase the total substation capacity to 1,200 MVA and increase reliability of the transmission service.

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[20] Source: http://www.transco.ph/aboutus.asp. Accessed last: 2 Oct 2007.

[21] 'Market Simulation – Luzon Grid Using Market Management System' Philippine Electricity Market Corporation Market Operations Group, August 2005

The 2006 generation mix for the Luzon grid is as follows: 18% hydro; 1% oil thermal; 40% coal thermal; 1% diesel; 18% geothermal; and 22% combined cycle. According to the 2006 Philippine Energy Plan[22], it is expected that 1,989 MW of capacity will be added into the Luzon grid by 2014, of which 600 MW is coal, 1150 MW is natural gas and 30 MW is wind.

A summary table of the structure of the national grid and its components in 2006 are presented below:

Area	**Number of Areas Served**	**Power Generation (in Gwh)**	**Transmission Line Length (in ckt-kms)**	**Substation Capacity (in MVA)**	**Capacitors Capacity (in MVAR)**	**Reactors Capacity (in MVAR)**
Philippines	*20*	*56,784*	*20,236*	*24,489*	*376.3*	*685*
Luzon	10	41,241	9,840	19,121	150	570
Visayas	4	8,129	4,844	3,268	111.3	115
Mindanao	6	7,414	5,552	2,099	115	0

Thus in the absence of the project activity, the continuation of the power generation would have occurred by the existing and/or new power plants connected to the Luzon Grid system, as the Project Activity is located in Luzon Island, where the only available grid to service the transmission and distribution of electricity is the Luzon grid. In addition, with the 2006 generation mix comprised of at least 42% (not including combined cycle) fossil fuel sources, the addition of the Project Activity's power generation would displace 15 MW of power which would otherwise come from fossil fuel fired sources.

Based on the information that is publicly available about the activities and management of landfill sites across Manila, it can be assumed that no direct or indirect GhG emissions would have been reduced in the absence of the proposed Project Activity.

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[22] Source: 2006 Philippine Energy Plan, Department of Energy: http://www.doe.gov.ph/PEP/pdp%20supplement.htm. Accessed last: 23 November 2007.

The baseline scenario is set and additionality is demonstrated according to the following methodology: Tool for the demonstration and assessment of additionality – Version 3 ("*Additionality Tool*").

<u>The additionality tool is fully applied as follows:</u>

Table 5: Application of Additionality Tool

Step	**Title**	**Description**
Step 1	**Identification of alternatives to the project activity consistent with current laws and regulations**	
Sub-step 1a	Define alternatives to the project activity	Please see Section B.4
Sub-step 1b	Consistency with mandatory laws and regulations	Please see Section B.4 and B.5 It should be noted that due to lack of implementation of RA 9003, there is no pressure from the Philippine government that landfill sites capture landfill gas, thus it is unlikely that the Project Activity will be undertaken just to comply with Philippine legislation. In addition, there is no legal requirement to produce electricity from the capture landfill gas. Presently, common practice shows that existing landfills in the country do not capture and flare or utilise their landfill gas for health and safety, power generation, or heat production purposes. Despite examples of considerable environmental damages caused by landfill site in the Philippines they remain active and without proper management. Hence even passive venting or partial flaring of LFG remains highly unlikely. Finally, those landfill sites that are proposing LFG capture and destruction projects are doing so for the purpose of gaining CDM registration.
Step 2	Investment Analysis	According to the tool for the demonstration and assessment of additionality, one of three options must be applied for this step: (1) simple cost analysis (where no benefits other than CDM income exist for the project); (2) investment comparison analysis (where comparable alternatives to the project exist); or (3) benchmark analysis.
Sub-step 2a	Determine appropriate analysis method	Scenario 1 represents the atmospheric release of landfill gas and the electricity is obtained from an existing/new fossil based captive power plant or from the grid. (See Table 4): LFG2 and P6 Scenario 2 represents the Project Activity, without the benefits associated with CER revenues. According to the methodology for determination of additionality, if the alternative scenarios to the Project Activity do not include investment of comparable scale to the Project Activity, then Option III of the tool must be used. As this is the case for

<table>
<tr><th>Step</th><th>Title</th><th>Description</th></tr>
<tr><td></td><td></td><td>the proposed Project Activity, Option III is applied.</td></tr>
<tr><td>Sub-step 2b: for Scenario 2</td><td>Option III. Apply benchmark analysis</td><td>In the case of Scenario 2, securing revenues from electricity generation would increase the IRR of the project activity, though not to an IRR high enough to warrant the investment. The likelihood of the development of this project, as opposed to the continuation of current activities (i.e., no collection and combustion of landfill gas for purposes other than CER generation), will be determined by examining its IRR in Sub-step 2c (below).
To compare the proposed Project Activity with other investment benchmarks in the Philippines, a review has been carried out of Philippine government bond rates. A range of government bond rates have been identified ranging in return value from 6.5% to 14.5%. To be conservative the seven year Philippine treasury bond rate of 6.5% was assumed as they were recently reported[23]. The benchmark value compares potential investment alternatives to the proposed investment returns from Scenario 2(the Project Activity without CERs). This makes reference to the value of Government Bonds being issued by the Philippine Government. The value of these bonds was compared to the projected IRR generated by the Project Activity without the revenues secured by CERs (6.7%). In summary, the return on capital is 6.5% were it invested in government bonds over 7 years. This compares favourably with the base case Project Activity (without CER revenues) IRR of 6.7% over a longer period of 12 years. Given the additional risks that the project developer would be exposed to through developing the Project Activity, it would be more favourable to purchase government bonds rather than invest in the Project Activity without the revenue proposed by the sale of CERs.</td></tr>
<tr><td>Sub-step 2c: for Scenario 2</td><td>Calculation and comparison of financial indicators</td><td>The table below shows the financial analysis for Scenario 2 (i.e., the Project Activity with and without CER revenue).

Table: Financial results of Scenario 2in the case of the electricity generation (without carbon finance). The NPV uses 10% discount rate which is in line with commercial expectations. Given that a Power Purchase Agreement is currently under negotiation, the electricity tariff is assumed to be 0.129 USD/kWh which is consistent with average prices in the Philippines.[24]

<table>
<tr><th></th><th>Scenario 2: Without Carbon Revenues</th><th>Scenario 2: With Carbon Revenues</th></tr>
<tr><td>Net Present Value (USD)</td><td>(4,977,729)</td><td>44,423,673</td></tr>
<tr><td>IRR (%)</td><td>6.7%</td><td>33.4%</td></tr>
<tr><td>Discount Rate (%)</td><td>10%</td><td>10%</td></tr>
</table>

Below are the assumptions underlying the IRR calculations:</td></tr>
</table>

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[23] 'Treasury sets 7-year bond coupon at 6.50%, raises P7B', Inquirer, 2007, http://business.inquirer.net/money/topstories/view_article.php?article_id=92047

[24] 'Philippines: Power Sector Profile and Roadmap', Staff Consultant Report, Asian Development Bank, 2005

<table>
<tr><th>Step</th><th>Title</th><th>Description</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Parameters</th><th>Unit</th><th>Value</th></tr>
<tr><td>Total CAPEX</td><td>US$</td><td>35,323,275</td></tr>
<tr><td>Total OPEX</td><td>US$</td><td>51,982,539</td></tr>
<tr><td>Total Royalty</td><td>US$</td><td>22,540,890</td></tr>
<tr><td>Depreciation</td><td>US$</td><td>17,034,404</td></tr>
<tr><td>Taxes</td><td>US$</td><td>27,659,908</td></tr>
<tr><td>Project operational lifetime</td><td>Years</td><td>12</td></tr>
<tr><td>Expected LFG capture</td><td>m^3</td><td>923,278,772</td></tr>
<tr><td>Expected electricity exported to the grid</td><td>MWh</td><td>1,194,514</td></tr>
<tr><td>Electricity tariff rate</td><td>USD/KWh</td><td>0.129</td></tr>
<tr><td>Exchange rate for electricity tariff rate</td><td>USD/PHP</td><td>46.78</td></tr>
<tr><td>Annual average emission reduction for 10 years crediting period</td><td>tCO2</td><td>589,993</td></tr>
<tr><td>Predictable CER price</td><td>Euro/CER</td><td>12</td></tr>
<tr><td>Exchange rate for CER price</td><td>EU/USD</td><td>1.35</td></tr>
</table>
<p>The detailed IRR calculations are presented in Annex 3.</p>
</td></tr>
<tr><td>Sub-step 2d: for Scenario 2</td><td>Sensitivity analysis</td><td>
<p>For Scenario 2a sensitivity analysis may be conducted by altering those parameters which were most likely to fluctuate over time:</p>

Original scenario: the project activity.
Increase in Project Revenue: A 10% increase in project revenue assuming increase in price of electricity sold to the grid.
Reduction in project operating costs: Reduction in project capital on running costs as a result of having too conservative assumptions regarding 10% reduction of project operational cost.
Reduction in project revenue: A fall of 10% in project revenue from power sale may result from decrease in expected power generation.

</td></tr>
</table>

<table>
<tr><th>Step</th><th>Title</th><th>Description</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Scenario 2</th><th>% Change</th><th>IRR (%)</th><th>NPV (USD)</th></tr>
<tr><td>1) Original</td><td>0</td><td>6.7%</td><td>(4,977,729)</td></tr>
<tr><td>2) Increase in Project Revenue due to increase in power tariff.</td><td>10</td><td>11.6%</td><td>2,537,911</td></tr>
<tr><td>3) Reduction in project operating costs</td><td>(10)</td><td>8.5%</td><td>(2,247,974)</td></tr>
<tr><td>4) Reduction in Project Revenue due to decreased power generation</td><td>(10)</td><td>0.6%</td><td>(12,493,369)</td></tr>
</table>
<p>Sensitivity analysis shows that the project does not have viable returns even when the revenue from power increases or the project costs decrease. Consequently, Scenario 2 cannot be considered as financially attractive.</p>
<p>The IRR calculations are presented in Annex 3.</p>
</td></tr>
<tr><td>Step 3</td><td>Barrier Analysis</td><td>Step 3 can be skipped since Step 2 indicates that Scenario 2 is not financially attractive.</td></tr>
<tr><td>Step 4</td><td>Common Practice Analysis</td><td><i>Applicable to Scenario 1 and 2</i></td></tr>
<tr><td>Sub-step 4a</td><td>Analyze other activities similar to the proposed project activity</td><td>
<p>As a sanitary landfill, the Project Activity is the first of its kind in the Philippines currently seeking CDM registration.</p>
<p>However, there is a single similar project at controlled dumpsite in Philippines currently seeking CDM registration. The project may be referred to at the following destination:</p>
<p>Quezon City Controlled Disposal Facility Biogas Emission Reduction Project (currently in request for registration stage with UNFCCC)
(http://cdm.unfccc.int/Projects/Validation/DB/5NDQA20R242WZEJ88W2NDIMO5KGXU6/view.html)</p>
<p>Apart from the above mentioned project activity in Payatas controlled dumpsite (which according to the ‘Additionality Tool’ should be excluded from the analysis), all other solid waste management facilities are considered open dump sites / controlled dumpsites and sanitary landfill sites. According to the National Solid Waste Management Commission - Solid Waste Inventory of Philippines as of 1st Quarter Updates 2007 there are still about 677 open dumpsites, 343 controlled dumpsites and</p>
</td></tr>
</table>

Step	Title	Description
		21 landfill sites existing nationwide[25]. As was reflected earlier in Section B.5 'The Garbage Book: Solid Waste Management in Metro Manila' published by the Asian Development Bank highlights the issues surrounding the non-compliance of environmental rules by landfill sites in the metro Manila region: *"RA 9003 is an enlightened piece of legislation, yet few local governments are familiar with it… Significantly, the required Solid Waste Management Fund has not been set aside as mandated by law, limiting the level of interest… The garbage crisis is real, serious and poses even grave threats to the public health if not resolved."*[26] *"The people of Metro Manila are facing much more lethal, much more immediate threats to their health and well-being. These threats come from the mountains of garbage that dot almost every other block of the metropolis… Metro Manila's dump sites are dangerous, exposed, and generate potentially toxic liquids called 'leachate'… waste fires at these sites are common, which sends plumes of toxic emissions into the air. Other sites are critically unstable, presenting the possibility of another deadly garbage slide."* [27] *"Based on current approximations, the majority of Metro Manila's dump sites will reach capacity in 2004. The ramifications of this are potentially serious, and could trigger another crisis in garbage collection and disposal, and the hasty development of substandard dump sites throughout the metropolis."*[28] *"Issues: about 27% of waste is illegally dumped or burned. Little motivation and incentives to reduce waste generation. Lack of public awareness to reduce and recycle."* *Regulations and enforcement: Historically, regulations have been fragmented and enforcement practices poorly implemented…Recent regulations mandate widespread reforms throughout the sectors….Regulatory reform is in progress…..* *Issues: Slow progress on enforcing recent regulations…..Legal impediments to problem solving."*[29]

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[25] National Solid Waste Management Commission - Solid Waste Inventory of Philippines as of 1st Quarter Updates 2007 (available at http://www.denr.gov.ph/nswmc/6.php)

[26] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 20, Asian Development Bank, 2004

[27] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 19, Asian Development Bank, 2004

[28] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 52, Asian Development Bank, 2004

[29] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 60, Asian Development Bank, 2004

Step	Title	Description
		"*RA 9003 is a sweeping legislation that has the potential to radically transform and improve the solid waste management sector. Key elements include a national ecology center to provide information, training, and networking services; mandatory segregation and recycling of solid waste management boards at the provincial, city and municipality levels; and forming multipurpose environmental cooperatives in every local government. The National Solid Waste Management is tasked with developing a national status report and framework. Local governments are required to formulate 10-year solid waste management plans; divert 25% of all solid waste through reuse, recycling and composting by 2006; and estimate reclamation and buy-back… for recyclables. RA 9003 has the potential to effectively address solid waste management. However implementation is behind the schedule….*"[30] It can be concluded that there are no existing enforced regulations requiring LFG to be collected/destroyed and there are no equivalent project activity in sanitary landfill site being undertaken either in the Metro Manila region or in the Philippines for any other commercial purpose other than under the Kyoto Protocol, and specifically the CDM. Consequently, the Project Activity will be one of the first projects of its kind in the country whereby sanitary landfill gas is captured and destroyed specifically to generate clean power for grid evacuation.
Sub-step 4b	Discuss any other similar options that are occurring	As described above, there are two landfills seeking CDM registration in the Philippines; all other landfills in the Philippines are considered open or unmanaged dumps. According to the report of the National Solid Waste Management Commission, there are still about 734 open dumpsites existing nationwide[31].
Conclusion		In accordance with the *Additionality Tool*, sub-step 4a and 4b are satisfied; that is, similar activities cannot be observed, then the Scenario 4, the Project Activity, is additional because: Finally, the methodology is applicable because: • the most plausible baseline scenario for the LFG is the atmospheric release of LFG; and • without the Project Activity electricity is obtained from the existing grid.

CDM Consideration:

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[30] 'The Garbage Book: Solid Waste Management in Metro Manila', pg 77, 78, Asian Development Bank, 2004

[31] 'Ecological Solid Waste Management Act of 2000 (RA 9003): A Major Step to Better Solid Waste Management in the Philippines' Sapuay, G., Development of Soild Waste Act, 2006

This Project Activity has considered CDM as an integral part to increase its financial viability since the inception stage. As per the milestone activities, an initial agreement was signed in 16 March 2007[32], a CDM feasibility study completed in May 2007[33] and a final agreement on rights to the carbon credits in June 2007[34] show early and continuous CDM consideration for this Project Activity. In 31 July 2007, engineering and supply contracts were signed with project equipment suppliers[35] subsequently construction activities for the project activity began during August 2007. Parallel to that CDM validation assignment agreement with DOE was signed on 14 August 2007 and the PDD was web-hosted for International Stakeholder Consultation Procedure during 16th August 2007 to 14th September 2007.

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[32] Deed of assignment for for rights, interests and obligations under the Contract for Recovery to effect the prompt implementation of the project signed between Karbon Kredit Philippines, Inc. and Montalban Methane Power Corporation dated 16th March 2007.

[33] “Rodriguez Landfill Methane Recovery And Electricity Generation CDM Project - Feasibility Study Report” conducted by Japan Engineering Consultants Co., Ltd. dated May 2007

[34] Tripartite Agreement signed by The Province of Rizal, The Municipality of Rodriguez, Rizal and International Solid Waste Integrated Management Specialist Inc. dated 4th June 2007

[35] Design, manufacture, supply & installation of materials, equipment & services to complete the landfill gas fired power generating plant contract signed between MMPC and Monark Equipment Corporation dated 31 July 2007.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Step 1

The GhG emissions reduction achieved by the Project Activity has been derived from the emission reduction equation stipulated in ACM0001 version 6.

$$ER_y = (MD_{project,\ y} – MD_{reg})*GWP_{CH4} + EL_{LFG,y}*CEF_{elect,BL,y} – EL_{pr,y} * CEF_{elec,\ PR,y} + ET_{LFG,y} * CEF_{ther,BL,y} - ET_{PRy}*EF_{fuel,PR,y}$$

ER_y	GhG emissions reduction (in year y), in tonnes of CO_2 equivalents (tCO_2) as a result of project implementation
$MD_{project,\ y}$	The amount of methane that would have been destroyed/combusted during the year, in, tonnes of methane (tCH_4)
$MD_{reg,\ y}$	The amount of methane that would have been destroyed/combusted during the year in absence of the project, in, tonnes of methane (tCH_4)
GWP_{CH4}	Global Warming Potential value for methane for the first commitment period is 21 tCO_2e/CH_4
$EL_{LFG,y}$	Net quantity of electricity produced using LFG, exported which in the absence of the project activity would have been produced by power plants connected to the grid or by an on-site/off-site fossil fuel based captive power generation, during year y, in megawatt hours (MWh).
$CEF_{elecy,\ BLy}$	CO2 emissions intensity of the baseline source of electricity displaced, in tCO2e/MWh.
$EL_{PR,y}$	Is the amount of electricity generated in an on-site fossil fuel fired power plant or imported from the grid as a result of the project activity, measured using an electricity meter (MWh).
$CEF_{elect,PR,y}$	Is the carbon emissions factor for electricity generation in the project activity (tCO2/MWh).
$ET_{LFG,y}$	the quantity of thermal energy produced utilizing the landfill gas, which in the absence of the project activity would have been produced from onsite/offsite fossil fuel fired boiler, during the year y in TJ
$CEF_{ther,BL,y}$	CO_2 emissions intensity of the fuel used by boiler to generate thermal/mechanical energy which is displaced by LFG based thermal energy generation, in tCO_2e/TJ.
$ET_{PR,y}$	is the fossil fuel consumption on site during project activity in year y (tonne)
$EF_{fuel,,PR,y}$	CO2 emissions factor of the fossil fuel used by boiler to generate thermal energy in the project activity year, y

The equation has been customised for the Project Activity is the following way:

1) **ET_{LFG} * $CEF_{ther,BL,y}$**: is not applicable since there is no requirement of thermal energy generation utilising the landfill gas in the project scenario or previous to the Project Activity there was no onsite boiler generator that would have been displaced by the implementation of the Project Activity .

2) **ET_{PRy}*$EF_{fuel,PR,y}$**: is not applicable since fossil fuel consumption on site during the project activity will not take place (including in any boilers). Moreover, fossil fuel consumed by the emergency back up generator to produce electricity is captured by the formula $EL_{pr,y} * CEF_{elec, PR,y}$ as expressed below (3)
3) **$EL_{pr,y} * CEF_{elec, PR,y}$**: has been applied to:
    a. Electricity imported from the grid as a result of the project activity. The formula is expressed as $EL_{pr,y(GRID)} * CEF_{elec, PR,y(GRID)}$
    b. Electricity produced by onsite fossil fuel diesel generator (emergency backup only). The formula is expressed as $EL_{pr,y(DG)} * CEF_{elec, PR,y(DG)}$

The final customised equation is therefore expressed as:

$$ER_y = (MD_{project, y} - MD_{reg})*GWP_{CH4} + EL_{LFG,y}*CEF_{electy,BL,y} - ((EL_{pr,y(GRID)} * CEF_{elec, PR,y(GRID)}) + (EL_{pr,y(DG)} * CEF_{elec, PR,y(DG)})) \quad (1)$$

Where:

ER_y	GhG emissions reduction (in year y), in tonnes of CO_2 equivalents (tCO_2) as a result of project implementation
$MD_{project, y}$	The amount of methane that would have been destroyed/combusted during the year, in, tonnes of methane (tCH_4)
$MD_{reg, y}$	The amount of methane that would have been destroyed/combusted during the year in absence of the project, in, tonnes of methane (tCH_4)
GWP_{CH4}	Global Warming Potential value for methane for the first commitment period is 21 tCO_2e/CH_4
$EL_{LFG,y}$	Net quantity of electricity produced using LFG, exported which in the absence of the project activity would have been produced by power plants connected to the grid or by an on-site/off-site fossil fuel based captive power generation, during year y, in megawatt hours (MWh).
$CEF_{elecy, BLy}$	CO2 emissions intensity of the baseline source of electricity displaced, in tCO2e/MWh. This is estimated as per equation (6) below.
$EL_{PR,y(GRID)}$	Is the amount of electricity generated in an on-site fossil fuel fired power plant or imported from the grid as a result of the project activity, measured using an electricity meter (MWh). *Specifically, electricity imported from the grid*
$CEF_{elect,PR,y(GRID)}$	Is the carbon emissions factor for electricity generation in the project activity (tCO2/MWh). *Specifically, electricity imported from the grid during plant start up*. This is estimated as per equation (8a) below
$EL_{PR,y(DG)}$	Is the amount of electricity generated in an on-site fossil fuel fired power plant or imported from the grid as a result of the project activity, measured using an electricity meter (MWh). *Specifically, electricity generated by the emergency backup diesel generator*
$CEF_{elect,PR,y(DG)}$	Is the carbon emissions factor for electricity generation in the project activity (tCO2/MWh). *Specifically, electricity generated by the emergency backup diesel generator*. This is estimated as per equation (8b) below

According to ACM0001, no leakage is expected for such project activities.

Step 2

The amount of methane that would have been destroyed/consumed in the absence of the Project Activity is as:

$$MD_{reg} = MD_{project,y} * AF \quad (2)$$

The Adjustment factor ("AF") is defined as the ratio of the destruction efficiency of the collection and destruction system mandated by regulatory or contractual requirements to that of the collection and destruction system in the Project Activity.

There is a complete and widespread lack of compliance with RA 9003 (as explained above under Section B). Moreover, there are no contractual requirements imposed on MMPC or the landfill operator to vent and destroy the LFG. Finally, the baseline scenario chosen concludes that all landfill gas would be released into the atmosphere. Consequently, the AF applied to the Project Activity is 0. Therefore, MD_{reg} is = 0.

Step 3

The Project Activity does not include thermal energy generation from LFG, then the amount of methane that would have been destroyed / combusted during the year will be the addition of the following terms:

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal} \quad (3)$$

Both components of this equation are expressed separately in Step 4 and Step 7.

The methane destroyed by the project activity ($MD_{project,y}$) during a year is determined by monitoring the quantity of methane actually flared and gas used to generate electricity and the total quantity of methane captured.

The sum of the quantities fed to the flares and the power generation units will be estimated using equation 3 and compared annually to the total quantity of methane generated. The lowest value of the two will be that adopted as $MD_{project,y}$.

The working hours of the energy plant will be monitored and no emission reduction could be claimed for methane destruction during non-operation hours of the energy plant, if the total quantity of the methane generated is higher than the methane destroyed by the project activity.

There is no boiler onsite either prior to the Project Activity, or once the Project Activity has completed construction. Consequently, $MD_{thermal}$ has been excluded from this equation. The equation will therefore be expressed as:

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} \quad (3)$$

Step 4

$MD_{flared,y}$ is the quantity of methane destroyed by each flare used in the Project Activity. For each of the three flares $MD_{flared,y}$ is calculated as follows:

$$MD_{flared,y} = (LFG_{flare,y} * W_{CH4y} * D_{CH4}) - (PE_{flare,y} / GWP_{CH4}) \quad (4)$$

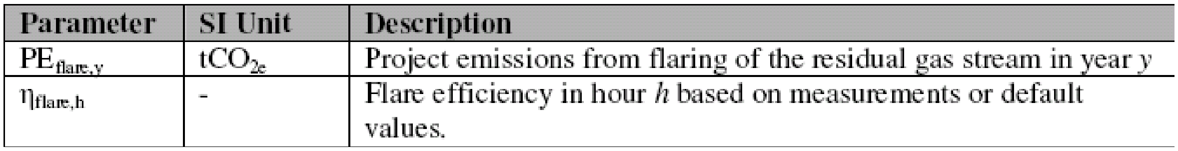
$LFG_{flare,y}$	The quantity of landfill gas fed to the flare during the year measured in cubic meters (m^3)
W_{CH4}	The average methane fraction of the landfill gas as measured* during the year and expressed as a fraction (in m^3 CH_4 / m^3 LFG)
D_{CH4}	The methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4)**
$PE_{flare,y}$	The project emissions from flaring of the residual gas stream in the year y (tCO_2)

(*) Methane fraction of the landfill gas to be measured on wet basis
(**) At standard temperature and pressure (101.325 kPa and 273.15 K) the density of methane is 0.0007168 tCH_4/m^3CH_4) as per ACM0001 ver 06.

The calculation will be applied separately for each of the three enclosed flares to be used in the Project Activity.

The Project Emissions (PE) for each enclosed flare will be determined following the procedure described in the "*Tool to determine project emissions from flaring gases containing Methane - EB28*"

Tool to determine project emissions from flaring gases containing Methane provides procedures to determine the following parameters:



Parameter	SI Unit	Description
$PE_{flare,y}$	tCO_{2e}	Project emissions from flaring of the residual gas stream in year *y*
$\eta_{flare,h}$	-	Flare efficiency in hour *h* based on measurements or default values.

The following data are required by this tool:

Parameter	SI Unit	Description
$fv_{i,h}$	-	Volumetric fraction of component *i* in the residual gas in the hour *h* where i = CH_4, CO, CO_2, O_2, H_2, N_2
$FV_{RG,h}$	m^3/h	Volumetric flow rate of the residual gas in dry basis at normal (NTP) conditions[2] in the hour *h*
$t_{O2,h}$	-	Volumetric fraction of O_2 in the exhaust gas of the flare in the hour *h* (only in case the flare efficiency is continuously monitored)
$fv_{CH4,FG,h}$	mg/m^3	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour *h* (only in the case the flare efficiency is continuously monitored)
T_{flare}	°C	Temperature in the exhaust gas of the enclosed flare
		Any other parameters required to monitor proper operation of the flare according to the manufacturer's specification (only in the case of use of a default value for the flare efficiency of enclosed and open flares)

Project emissions from flaring of the residual gas stream are calculated based on the flare efficiency and the mass flow rate of methane in the residual gas stream that is flared. The flare efficiency depends on both the actual efficiency of combustion in the flare and the time that the flare is operating. The efficiency of combustion in the flare is calculated from the methane content in the exhaust gas of the flare, corrected for the air used in the combustion process, and the methane content in the residual gas.

In the project activity, three enclosed type flaring system will be installed thus the temperature in the exhaust gas of the flare is measured to determine whether the flare is operating or not. The "*Tool to determine project emissions from flaring gases containing Methane*" offers two options for enclosed flares. This Project Activity will use the 90% default efficiency factor with continuous monitoring of manufacturer's specifications (temperature and flow rate of residual gas at the inlet of the flare). If in any specific hour, any parameter is out of the limit of manufacturer's specifications, an efficiency of 50% will be used. In the ex ante calculations it is assumed that flaring will destroy 5% of the total captured LFG.

This tool involves the following seven steps for calculation of project emissions from flaring:

STEP 1: Determination of the mass flow rate of the residual gas that is flared
STEP 2: Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas
STEP 3: Determination of the volumetric flow rate of the exhaust gas on a dry basis
STEP 4: Determination of methane mass flow rate of the exhaust gas on a dry basis
STEP 5: Determination of methane mass flow rate of the residual gas on a dry basis
STEP 6: Determination of the hourly flare efficiency
STEP 7: Calculation of annual project emissions from flaring based on measured hourly values or based on default flare efficiencies.

The specific equations used for Steps 1-7 of the tool are given in the "Tool to determine project emissions from flaring gases containing Methane"

According to the Step 7, the equation towards calculation of annual project emissions from flaring (PEflare):

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times \left(1 - \eta_{flare,h}\right) \times \frac{GWP_{CH4}}{1000} \quad (5)$$

Where:

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

Step 5

$MD_{electricity}$ represents the quantity of methane destroyed for the generation of electricity in the Project Activity and is expressed by the following equation:

$$MD_{electricity,\,y} = LFG_{electricity,\,y} * W_{CH4y} * D_{CH4} \quad (6)$$

$LFG_{electricity\ y}$	Quantity of landfill gas used to generate electricity during a year measured in cubic meters (m^3)
W_{CH4y}	Average methane fraction of the LFG as measured during the year and expressed as a fraction ($m^3\ CH_4/m^3$ LFG)
D_{CH4}	Density of methane expressed in tonnes of methane (tCH_4/m^3 LFG)

Step 6: *Determination of $CEF_{elec,BL,y}$*

In accordance with ACM0001 Version 6, AMS-1.D is used since the baseline is electricity generated by plants connected to the grid and the threshold for small-scale project applies. The grid factor for CO2e emissions (***$CEF_{elec,BL,y}$***) has been calculated as per one of the options in AMS-1.D (baseline option 9b): to calculate the weight average emissions (in kg CO2e/kWh) of the current generation mix using data from an official source where publicly available.

CO2 emissions intensity of the baseline electricity source was calculated using the weighted average emissions (in kgCO2e/kwh) of the current generation mix.

Baseline electricity is generated by plants connected to the grid, as per AMS.I.D version 12. The approach taken is:

Grid emission factor calculation approach

Methodology for determination of CEFelec,BL,y according to ACM0001 (Version 6): in the case where the baseline is electricity generated by plants connected to the grid, the emission factor (CEFelec,BL,y) should be calculated according to methodology ACM0002 or AMS-I.D (where the thresholds for small-scale project activities apply). Since the threshold (15MW) is applicable to the Project Activity, AMS-1.D was used to develop the CEF. One of the options in AMS-1.D is to use the weighted average emissions (in kg CO2e/kWh) of the current generation mix based on data from an official source and made publicly available.

CEFelect,BL,y = $\sum(\text{kWh}_i * \text{emission factor}_i)/\text{kWh}_{\text{total}}$

Where, i = fuel or energy type

Given that the power generated in the project is connected to the Luzon grid, the official power generation data for Luzon from the Philippine Department of Energy (www.doe.gov.ph/EP/Powerstat.htm) was used to derive the weighted average emissions. Data on power generation (MWh) by fuel type from all generating stations in Luzon is available from the DOE web site. Fuel types in Luzon grid include coal, gas, diesel, nuclear, hydro and other renewable. Fuel-specific emission factors (tonnes CO2/MWh) for Philippine, developed by IEA, are available from the calculation tool of WRI's GHG Calculation Tool for 'Indirect CO2 Emissions from the Consumption of Purchased Electricity' (www.ghgprotocol.org/includes/getTarget.asp?type=d&id=MTczNDM). Using the official generation data and the best available emission factors, the weighted average CEFelec,BL,y was developed and used for ex-ante emission reduction calculations.

The CEFelec,BL,y is calculated as 0.6138 tCO_2 e/MWh. The calculation spreadsheet for CEFelec,BL,y has been provided separately to the DOE.

Step 7: *Determination of CEF$_{ther,BL,y}$*

$$CEF_{therm,BL,y} = \frac{EF_{fuel,BL}}{\varepsilon_{boiler} \cdot NCV_{fuel,BL}} \qquad (7)$$

This step has been nullified since previous to the Project Activity there was no onsite boiler generator that would have been displaced by the implementation of the Project Activity.

Step 8: *Determination of CEF$_{elec,PR,y}$*

It should be noted that the Project Activity will require power from the grid to initiate operation, after which self-generation (i.e., power generated from the capture of gas from the Montalban landfill) will be used. If for any reason (e.g., blackout) the grid cannot be used to re-start, a backup diesel generator will be utilised in its place. Thus the carbon emission factor for the electricity consumption at the project scenario will be calculated as CEF for grid electricity and CEF for onsite DG set electricity.

Step 8(a): *CEF$_{elec,PR,y(GRID)}$*

CO2 emissions intensity of the grid electricity purchased was calculated using the weighted average emissions (in kgCO2e/kwh) of the current generation mix as per AMS.I.D version 12 and the procedure is same as ***$CEF_{elec,BL,y.}$***

Step 8(b): *$CEF_{elec,PR,y(DG)}$*

An on-site generator will be kept for backup electricity generation, thus CO2 emissions intensity of the fossil fuel emergency diesel generator:

$$CEF_{elec,PR,y} = \frac{EF_{fuel,PR}}{\varepsilon_{gen,PR} \cdot NCV_{fuel,PR}} * 3.6 \qquad (8)$$

As the ex-ante approach Given that the emissions factor for diesel generators is well documented, it has been assumed to be 3.2kg CO2 per kg diesel as per IPCC 1996 Revised Guidelines (as referenced in AMS 1.D - Table 1.D.1 - Emission Factor for Generator System).
The quantity of electricity produced was calculated based on the capacity of the diesel generator (0.6 MW) and a conservative assumption that the backup generator is used 5% of the time in a year.

As the diesel generators will be used mainly due to emergency purpose thus at the ex-post scenario the CO2 emissions intensity of the fossil fuel emergency diesel generator will be calculated on the real time data basis.

The calculation spreadsheet for CEFelec,BL,y has been provided separately to the DOE.

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

Data / Parameter:	**GWP CH_4**
Data unit:	tonne CO_2e/tonne of CH_4
Description:	Global Warming Factor (“GWP”) value for 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 :	The IPCC approved is GWP is 21 tonnes of CO_2e/tonne of CH_4
Any comment:	

Data / Parameter:	**AF**
Data unit:	-
Description:	Adjustment Factor
Source of data used:	-
Value applied:	0.00
Justification of the choice of data or	The Adjustment factor (“AF”) is defined as the ratio of the destruction efficiency of the collection and destruction system mandated by regulatory or

description of measurement methods and procedures actually applied :	contractual requirements to that of the collection and destruction system in the Project Activity. There is a complete and widespread lack of compliance with RA 9003. Moreover, there are no contractual requirements imposed on MMPC nor the landfill operator to vent and destroy the LFG. Finally, the baseline scenario chosen concludes that all landfill gas would be released into the atmosphere. Consequently, the AF applied to the Project Activity is 0.
Any comment:	Changes in the law shall be monitored as a matter of procedure

Data / Parameter:	**$CEF_{elec, BL,y}$**
Data unit:	Tonnes of CO_2e/MWh
Description:	CO_2e emissions factor for baseline grid electricity
Source of data used:	Power Statistics for the Region of Luzon from the Department of Energy of Philippines
Value applied:	0.6138
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor was developed based on official emission and generation data of all the generating units in Luzon, the region where Montalban is, in 2006. An Excel spreadsheet has been provided to the DOE separately detailing the calculation that has derived the value.
Any comment:	This value will be reviewed annually on an ex-post vintage basis (and specifically, when data becomes available)

Data / Parameter:	**$NCV_{fuel,PR}$**
Data unit:	TJ / Gg
Description:	Calorific value of fossil fuel
Source of data to be used:	The IPCC default net calorific value for gas/diesel oil is 43.33 TJ/Gg.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	43.33 TJ/Gg.
Description of measurement methods and procedures to be applied:	The emission factor is a standard factor that does not change over time.
QA/QC procedures to be applied:	See above.
Any comment:	

Data / Parameter:	**$EF_{fuel,PR}$**
Data unit:	t CO_2 / TJ
Description:	Emission factor of diesel for DG sets
Source of data to be	As per methodology AMS 1.D - Table 1.D.1 - Emission Factor for Diesel

used:	Generator System (using an emission factor of 3.2 kg CO2 per kg of diesel from revised 1996 IPCC Guidelines).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	69.57 t CO_2e/TJ (converted from 3.2 kg CO2 per kg diesel)
Description of measurement methods and procedures to be applied:	The emission factor is a standard factor that does not change over time.
QA/QC procedures to be applied:	See above.
Any comment:	

Data / Parameter:	$\boldsymbol{\varepsilon}_{\mathbf{gen,PR(DG)}}$
Data unit:	Efficiency %
Description:	Efficiency of the captive power generation through the diesel generator
Source of data to be used:	Manufacturer's specification
Value of data applied for the purpose of calculating expected emission reductions in section B.5	36.6%
Description of measurement methods and procedures to be applied:	This value is fixed for the duration of the crediting period
QA/QC procedures to be applied:	See above.
Any comment:	A letter declaring the manufacture's consideration has been supplied separately to the DOE

Data / Parameter:	$\mathbf{CEF_{elec,PR,y\ (GRID)}}$
Data unit:	T CO_2e/MWh
Description:	CO_2e emissions factor for grid electricity
Source of data used:	Power Statistics for the Region of Luzon from the Department of Energy of Philippines in accordance with AMS I.D Version 12
Value applied:	0.6138
Justification of the choice of data or description of measurement methods and procedures actually applied:	The emission factor was developed based on official emission and generation data of all the generating units in Luzon, the region where Montalban is, in 2006. An Excel spreadsheet has been provided to the DOE separately detailing the calculation that has derived the value.
Any comment:	This value will be reviewed annually on an ex-post vintage basis (and

	specifically, when data becomes available)

Data / Parameter:	**$CEF_{elec,PR,y\ (DG)}$**
Data unit:	Kg CO_2e/kWh
Description:	CO_2e emissions factor for onsite electricity generation through DG set
Source of data used:	Calculation
Value applied:	0.725
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor was developed based on official emission and generation data of all the generating units in Luzon, the region where Montalban is, in 2006. An Excel spreadsheet has been provided to the DOE separately detailing the calculation that has derived the value.
Any comment:	This value will be fixed for the duration of the project. The calculation has been provided separately to the DOE.

Data / Parameter:	**η_{flare}**
Data unit:	--
Description:	Efficiency of the flare combustion
Source of data used:	Default value from "Tool to Determine Project Emissions from Flaring Gases Containing Methane"
Value applied:	90%
Justification of the choice of data or description of measurement methods and procedures actually applied :	A default value for closed flares can be used under this Tool when substantiated with continuous measurements of the manufacturer's specifications (temperature and flow rate of residual gas at flare inlet). In any hour where these parameters fall out of specification, an efficiency value of 50% will be used
Any comment:	

Data / Parameter:	**D_{CH4}**
Data unit:	$tCH_4/m^3\ CH_4$
Description:	Methane Density
Source of data used:	Conversion factor provided by Revision to the approved consolidated baseline methodology ACM0001, Version 6, Page 7: (*"At standard temperature and pressure (0 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH4/m3CH4."*)
Value applied:	0.0007168
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the value adopted in the approved consolidated methodology is used, the selected data are considered to be appropriate.
Any comment:	Changes in the approved methodology shall be checked for in monitoring.

B.6.3 Ex-ante calculation of emission reductions:

According to ACM0001 version 06, the expected total Land Fill Gas generation potential from the landfill site has been estimated on the basis of LandGEM - Landfill Gas Emissions Model of U.S. Environmental Protection Agency.

US EPA Decay Model Used to Estimate Emission Reductions

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where:

Q_{CH4} = annual methane generation in the year of the calculation (m^3/year)

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate ($year^{-1}$)

L_o = potential methane generation capacity (m^3/Mg)

M_i = mass of waste accepted in the i^{th} year (Mg)

t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year

Waste acceptance rates are in line with the technical prefeasibility study undertaken. The prefeasibility study (provided separately to the DOE) assumes a waste acceptance rate of approximately 3,000 tonnes per day; with an annual 2% growth factor applied based on expert on-the-ground review of the operations and expected future delivery of waste to the site.

The ex-ante calculation of emission reductions were calculated accordingly:

I. Baseline Emission:

(a) Baseline Emission Reductions due to CH_4 destruction through flaring (**$BE_{flare,y}$**):

MD_{flared}

$MD_{flared} = MI_{flared,y} - PE_{flared,y}$			
Variable	Description	Unit of Measurement	Data Source
MD_{flared} =	CH_4 destroyed in project	tCH_4	calculation

MI_{flared} =	CH_4 fed to flaring in project	tCH_4	Calculation
$PE_{flared,y}$ =	emissions in project from flaring	tCH_4	calculation

The amount of methane flared (MD_{flared}) was calculated by subtracting project emissions (i.e., $PE_{flared,y}$ = residual emissions from flaring) from CH_4 fed to flaring (i.e., $MI_{flared,y}$) in project.

$MI_{flared,y}$

$MI_{flared,y} = LFG_{Total} * F\_CapF * R\_flared * w_{CH4} * D_{CH4}$

Variable	Description	Unit of Measurement	Data Source
$MI_{flared,y}$ =	CH_4 fed to flaring in project	tCH_4	calculation
LFG_{total} =	total LFG captured	m^3	based on LandGEM outputs
F_CapF =	fraction of LFG captured for flaring	%	expert estimate
R_flared =	number of operating hours of flaring unit	hours	project assumption
w_{CH4} =	average CH_4 fraction of LFG	%	generic assumption
D_{CH4} =	CH_4 density at standard temperature and pressure	tCH_4/m^3CH_4	Constant

To calculate the amount of CH4 fed to flaring (MIflared,y), the total amount of LFG captured, modeled by LandGEM, was mulitplied by the fraction of LFG captured for flaring and number of operating hours of the flaring unit, CH4 fraction of LFG, and CH4 density at standard temperature and pressure. This approach is consistent with equation 4 in the ACM0001. The expected Baseline Emission Reductions due to CH_4 destruction through flaring has been calculated (as ex-ante basis) for the entire crediting period as 356,760 tCO2e.

(b) Baseline Emission Reductions due to CH_4 destruction through power generation (**$BE_{ele\text{-}LFG,y}$**):

$MD_{electricity,y}$ and **$LFG_{electricity,y}$**

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

$LFG_{electricity,y} = LFG_{Total} * F\_CapP * Eff\_P * R\_P$

Variable	Description	Unit of Measurement	Data Source
$MD_{electricity,y}$ =	CH_4 destroyed for generation of electricity in project	tCH4	calculation
$LFG_{electricity,y}$ =	LFG combusted for generation of electricity in project	m^3	calculation
w_{CH4} =	average CH_4 fraction of LFG	%	generic assumption
D_{CH4} =	CH_4 density at standard temperature and pressure	tCH_4/m^3CH_4	constant
F_CapP =	fraction of LFG captured for generation of electricity	%	expert estimate
Eff_P =	efficiency of CH_4 destruction by generating units	%	generic assumption
R_P =	number of operating hours of generating unit	hours	project assumption

To calculate the methane destruction from electricity generation ($MD_{electricity,y}$), the amount of LFG captured for electricity ($LFG_{electricity,y}$) is multiplied by the concentration of CH4 in LFG and the density of CH4. This approach is consistent with equation 5 of ACM0001. To estimate $LFG_{electricity,y}$, the total amount of LFG captured is multiplied by fraction of LFG captured for generation of electricity, efficiency of CH_4 destruction by generating units, and the number of operating hours of the units. The expected Baseline Emission Reductions due to CH_4 destruction through power generation has been calculated (as ex-ante basis) for the entire crediting period as 4,985,494 tCO2e.

(c) Baseline Emission Reductions due to displacement of equivalent amount of power from the Grid System (**$BE_{ele\text{-}grid,y}$**):

$BE_{ele\text{-}grid,y}$ and **$EL_{LFG,y}$**

$BEy = EL_{LFG,y} * CEF_{elec,BL,y}$			
$EL_{LFG,y} = LFG_{Total} * F\_CapP / P\_Conv * R\_P * (1 - ParaL)$			
Variable	Description	Unit of Measurement	Data Source
BE_y =	baseline emissions	tCO_2	calculation
$EL_{LFG,y}$ =	net electricity produced using LFG	MWh	calculation
$CEF_{elec,BL,y}$ =	CO_2 emission intensity of baseline electricity displaced	tCO_2e/MWh	official statistics and calculation according to AMS-I.D
LFG_{total} =	total LFG captured	m^3	based on Landgem outputs
F_CapP =	fraction of LFG captured for generation of electricity	%	expert estimate
P_Conv =	amount of LFG per hour required to support 1 MW unit	m^3 LFG/hour	expert estimate
R_P =	number of operating hours of generating unit	hours	project assumption
ParaL =	percentage of power for parasitic load	%	project assumption

In accordance with equation 1 in ACM0001, the baseline emissions (BE_y) was calculated by applying the baseline emission factor ($CER_{elec,BL,y}$) to the net electricity produced using LFG. To calculate $EL_{LFG,y}$, the total LFG captured was multiplied by the fraction of LFG captured for generation of electricity, divided by the amount of LFG per hour required to support 1MW unit, and then multiplied by the percentage of power for parasitic load. The amount of LFG per hour required to support 1MW unit (P_Conv) is a conversion factor provided by an expert. The expected Baseline Emission Reductions due to displacement of equivalent amount of power from the Grid System has been calculated (as ex-ante basis) for the entire crediting period as 5, 95,258 tCO2e.

Total Baseline Emission Reduction:

The total Baseline Emission Reduction (**BE_y**) of the project activity has been calculated as the summation of Baseline Emission Reductions due to CH_4 destruction through flaring (**$BE_{flare,y}$**), Baseline Emission Reductions due to CH_4 destruction through power generation (**$BE_{ele\text{-}LFG,y}$**) and Baseline Emission Reductions due to displacement of equivalent amount of power from the Grid System (**$BE_{ele\text{-}grid,y}$**).

BE_y = <u>$BE_{flare,y}$</u> + <u>$BE_{ele-LFG,y}$</u> + <u>$BE_{ele-grid,y}$</u>

The expected total <u>Baseline Emission Reductions has been calculated (as ex-ante basis) for the entire crediting period as 5, 937,512 tCO2e.</u>

<u>II. Project Emissions (</u>PE_y<u>):</u>

To calculate the GHG emissions due the project activity, the emissions due to Flaring of LFG, on-site power consumptions which would be imported from the grid for plant start up and would be generated by diesel generator during emergency backup. It should be noted that the Project Activity will require power from the grid to initiate operation, after which self-generation (i.e. power generated from the capture of gas from the Montalban landfill) will be used. If for any reason (e.g. blackout) the grid cannot be used to re-start, a backup diesel generator will be utilised in its place.

$PE_y = PE_{grid,y} + PE_{DG,y} + PE_{flared,y}$			
Variable	Description	Unit of Measurement	Data Source
PE_y =	project emissions	tCO_2	Calculation
$PE_{grid,y}$ =	project emissions due to electricity imported from grid	tCO_2e	Calculation
$PE_{DG,y}$ =	project emissions due to electricity generated by onsite diesel generator	tCO_2e	Calculation
$PE_{flared,y}$ =	emissions in project from flaring	tCO_2e	Calculation

In the project, the on-site electricity use is met by electricity imported from grid ($PE_{grid,y}$) and a small backup generation using diesel is also onsite for emergency use only. Therefore, two "PE_y" variables (i.e., $PE_{grid,y}$ and $PE_{DG,y}$) are used in this PDD to make the distinction. The expected total <u>Project Emission Reductions has been calculated (as ex-ante basis) for the entire crediting period as 37,582 tCO2e.</u>

$PE_{flared,y} = LFG_{total,,y}$ * F_Cap * w_{CH4} * D_{CH4} * (1-EFF_flared)			
Variable	Description	Unit of Measurement	Data Source
$PE_{flared,y}$ =	emissions in project from flaring	tCH_4	calculation
LFG_{total} =	total LFG captured	m^3	based on LandGEM outputs
F_CapF =	fraction of LFG captured for flaring	%	expert estimate
w_{CH4} =	average CH_4 fraction of LFG	%	generic assumption
D_{CH4} =	CH_4 density at standard temperature and presssure	tCH_4/m^3CH_4	constant
Eff_flare =	efficiency of CH_4 destruction by flaring	%	according to approved methodology

To calculate the project emissions from flaring ($PE_{flared,y}$), the total amount of LFG captured, modelled by LandGEM, was multiplied by the fraction of LFG captured for flaring and number of operating hours of the flaring unit, CH_4 fraction of LFG, CH_4 density at standard temperature and pressure, and the efficiency of CH_4 destruction by flaring. The expected Project Emission from flaring has been calculated (as ex-ante basis) for the entire crediting period as 35,676 tCO2e.

$PE_{grid,y}$

$PE_{grid,y} = EL_{pr\_grid,y} * CEF_{elec\_grid, pr, y}$			
Variable	Description	Unit of Measurement	Data Source
$PE_{grid,y}$ =	project emissions due to electricity imported from grid	tCO_2e	Calculation
$EL_{pr\_grid,y}$	electricity imported from grid	MWh	Calculation
$CEF_{elec\_grid, pr, y}$	emission factor for electricity from grid in project	tCO_2e/MWh	official statistics and calculation

To calculate the project emissions due to electricity imported from grid ($PE_{grid,y}$), the emission factor ($CER_{elec\_grid,pr,y}$) was applied to the amount of electricity imported from grid ($EL_{pr\_grid,y}$). It should be noted that prior to on-site power generation there will be no grid connectivity at the site and the backup diesel generator will be utilised during initial operation. No project emissions due to electricity imported from grid has been considered during ex-ante calculation project emission reduction, but the import of grid power will be directly monitored by energy meters after project implementation at the ex-post scenario and the project emission due to electricity imported from grid will be calculated on the basis of real time data.

$PE_{DG,y}$

$PE_{DG,y} = EL_{pr\_DG,y} * CEF_{DG, pr, y}$			
Variable	Description	Unit of Measurement	Data Source
$PE_{DG,y}$ =	project emissions due to electricity generated by onsite diesel generator	tCO_2e	Calculation
$EL_{pr\_DG,y}$	electricity generated by onsite diesel generator	MWh	Calculation
$CEF_{DG, pr, y}$	emission factor for electricity from onsite diesel generator in project	tCO_2e/MWh	official statistics and calculation

To calculate the project emissions due to electricity from onsite generator ($PE_{DG,y}$), the emission factor ($CER_{elec\_DG,pr,y}$) was applied to the amount of electricity imported from grid ($EL_{pr\_DG,y}$). $CEF_{elec\_DG,pr,y}$ was calculated according to equation 8 in ACM0001. The use of the back-up diesel generator for ex-ante calculation purpose has been accounted for in the 5% usage per year. As the diesel generators will be used mainly due to emergency purpose thus at the ex-post scenario the CO2 emissions intensity of the fossil fuel emergency diesel generator will be calculated on the real time data basis. The expected Project Emission from electricity generated by onsite diesel generator has been calculated (as ex-ante basis) for the entire crediting period as 1,906 tCO2e.

III. Leakage Emissions (L_y):

According to ACM0001 version 6, no leakage effect has been considered during calculation of emissions reduction calculation.

IV. Emissions Reduction (ER_y):

$ER_y = BE_y – PEy – Ly$			
$= BEy – PEy – 0$			
$= BEy – PEy$			
Variable	Description	Unit of Measurement	Data Source
ER_y =	emission reductions due to electricity displacement	tCO_2	Calculation
BE_y =	baseline emissions	tCO_2	Calculation
PE_y =	project emissions	tCO_2	Calculation
L_y =	Leakage emissions		

The expected Emission Reductions from the project activity has been calculated (as ex-ante basis) for the entire crediting period as 5,899,931 tCO2e.

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

The ex-ante estimation of baseline emissions are calculated based on the methodology in section B.6.3. Project emissions will be from landfill gas collection efficiency, flare combustion efficiency and use of a stationary combustion diesel engine for on-site power. The on-site generator is 600 kW in capacity and is predicated to operate 5% of the year (conservative estimate).

The ex-ante estimation of emission reductions shown below are, therefore, the baseline emissions discounted by using a 50% collection efficiency and a 90% flare efficiency. The project emissions from the use of diesel are expected to be minor compared to the combusted landfill gas. These will be accounted for once the LFG collection system has been designed (e.g., power for the blowers, etc).

The ex-ante estimation of emission reductions as a consequence of the Project Activity is shown in the table below. Once the Project Activity is operating, these emissions reductions will be obtained through the measurement of actual parameters, in accordance with ACM0001 methodology version 6 and AMS I.D Version 12.

Year	Estimation of project activity emissions (tCO2 e)	Estimation of baseline emissions (tCO2 e)	Estimation of leakage (tCO2 e)	Estimation of overall emission reductions (tCO_2 e)
2008	10,236	382,121	0	371,694
2009	2,024	444,068	0	441,853
2010	2,253	494,637	0	492,194
2011	2,467	542,100	0	539,442

2012	2,669	586,801	0	583,941
2013	2,860	628,403	0	625,352
2014	3,041	665,529	0	662,298
2015	3,213	699,368	0	695,964
2016	3,378	731,719	0	728,150
2017	3,536	762,767	0	759,041
Total (tonnes of CO2 e)	**35,676**	**5,937,512**	0	**5,899,931**

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

B.7.1 Data and parameters monitored:

Note: whilst only the parameters monitored are listed below, each parameter has retained its original ID Number to remain in line with ACM0001.

Data / Parameter:	**$LFG_{total,y}$**
Data unit:	m^3
Description:	Total amount of landfill gas captured
Source of data to be used:	On-line LFG Flow meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	see section B.6.3
Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a hour Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured. Low Uncertainly level of data
Any comment:	Monitoring ID Number 1

Data / Parameter:	**$LFG_{flare,y}$**
Data unit:	m^3
Description:	Amount of landfill gas flared
Source of data to be used:	On-line LFG flow meter for each flare
Value of data applied for the purpose of calculating expected emission reductions in	see section B.6.3

section B.5	
Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a hour Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured. Low Uncertainly level of data
Any comment:	Monitoring ID Number 2

Data / Parameter:	**$LFG_{electricity,y}$**
Data unit:	m^3
Description:	Amount of landfill gas combusted in power plant
Source of data to be used:	On-line LFG Flow meter for each power plant
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:	Measured continuously and recorded once a month Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured. Low uncertainly level of data
Any comment:	Monitoring ID Number 3

Data / Parameter:	**$PE_{flare, y}$**
Data unit:	tCO_2e
Description:	Project emissions from flaring of the residual gas stream, determined according to “Tool to determine project emissions from flaring gases containing methane”
Source of data to be used:	i) LFG analyser conducts a. Volumetric fraction of component i in the residual gas in the hour h where i = CH4, CO, CO2, O2, H2, N2 ii) Flow meter in the residual gas conducts a. Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h iii) Thermocouple Type N a. Measure the temperature of the exhaust gas stream in the flare (“TEX”) (K)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	$\eta_{flare} = 90\%$

Description of measurement methods and procedures to be applied:	Continuous monitoring of the methane destruction efficiency of the flare measured hourly. Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured. LFG analysers must be periodically calibrated according to the manufacturer's recommendation. The thermocouples will be replaced or calibrated every year. Medium Uncertainly level of data
Any comment:	As a simplified approach towards Volumetric fraction of component i in the residual gas it will only measure the methane content of the residual gas and consider the remaining part as N2. If the temperature of the exhaust gas of the flare (T_{flare}) is below 500ºC during the hour h the flare efficiency value will be $\eta_{flare,h}$ = 0% If the parameters fall outside manufacturer's specifications for any specific hour, a default of $\eta_{flare,h}$ = 50%. Manufacturer's specifications are detailed in Annex 3. Monitoring ID Number 5

Data / Parameter:	**$W_{CH4,y}$**
Data unit:	m^3 CH_4/m^3 LFG
Description:	Methane fraction in the landfill gas
Source of data to be used:	On-line LFG analyzer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50%
Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a hour Data archive: Electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured. Low Uncertainly level of data
Any comment:	Monitoring ID Number 6

Data / Parameter:	**T**
Data unit:	ºC / K
Description:	Temperature of the landfill gas
Source of data to be used:	Thermometer Measured On line

Value of data applied for the purpose of calculating expected emission reductions in section B.5	For ex-ante estimation of emission reductions, the pressure of landfill gas is not required for the Landgem model that was used. This parameter is needed and will be used for monitoring during the project period.
Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a hour Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured.
Any comment:	Monitoring ID Number 7 Note that the Esters flow meter will have an integrated pressure and temperature measurement to deliver the normalized m³/h

Data / Parameter:	**P**
Data unit:	Pa
Description:	Pressure of the landfill gas
Source of data to be used:	Pressure gauge Measured On line
Value of data applied for the purpose of calculating expected emission reductions in section B.5	For ex-ante estimation of emission reductions, the pressure of landfill gas is not required for the Landgem model that was used. This parameter is needed and will be used for monitoring during the project period.
Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a hour Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured.
Any comment:	Monitoring ID Number 8 Note that the Esters flow meter will have an integrated pressure and temperature measurement to deliver the normalized m³/h

Data / Parameter:	**EL_{LFG}**
Data unit:	MWh
Description:	Net amount of electricity generated using LFG
Source of data to be used:	Electricity meter Measured on site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	79,062 MWh

Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a month Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured.
Any comment:	Monitoring ID Number 9

Data / Parameter:	**$EL_{PR, DG,y}$**
Data unit:	MWh
Description:	Amount of electricity generated in an on-site DG sets as a result of the project activity
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured on site
Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a month Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured.
Any comment:	Monitoring ID Number 10

Data / Parameter:	**$EL_{PR, grid,y}$**
Data unit:	MWh
Description:	Amount of electricity imported from the grid as a result of the project activity
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured on site
Description of measurement methods and procedures to be applied:	Measured continuously and recorded once a month Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Calibration of equipment as per manufacturer specifications to ensure validity of data measured.
Any comment:	

Data / Parameter:	**$F_{DG,y}$**

Data unit:	Tonne
Description:	Total amount of fossil fuel required to meet needs of 600 kW diesel generator
Source of data to be used:	Electronic meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured on site
Description of measurement methods and procedures to be applied:	Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	Metering
Any comment:	Monitoring ID Number 12

Data / Parameter:	**$CEF_{elecy,BL}$**
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the grid electricity.
Source of data to be used:	Philippines Department of Energy (DOE) – Philippines Power Statistics for the region of Luzon (as per Excel calculation in accordance with
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.6138
Description of measurement methods and procedures to be applied:	Data archive: electronic Length of archiving: during the crediting period plus two years post crediting period.
QA/QC procedures to be applied:	This value will be reviewed annually on an ex-post vintage basis and will be calculated on weighted average emissions (in kg CO2e/kWh) of the current generation mix based on data from an official source and made publicly available.
Any comment:	Monitoring ID Number 13

Data / Parameter:	**Regulatory requirements relating to landfill gas projects**
Data unit:	--
Description:	Regulatory requirements relating landfill gas projects
Source of data to be used:	National laws, standards, requirements, and communication with the DNA of Philippines.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	No enforced regulations relating to landfill gas recovery and power generation projects.
Description of	The information will be checked and recorded twice a year.

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Confirmation with the relevant government departments at the end of each year.
Any comment:	Monitoring ID Number 25

Data / Parameter:	**Operations of the energy plant**
Data unit:	Hours
Description:	Operations of the energy plant
Source of data to be used:	On-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	8760
Description of measurement methods and procedures to be applied:	On-site measurement of the operating hours of the generators. 100% of all data are measured and archived electronically, recording frequency will be annual.
QA/QC procedures to be applied:	The meter will be calibrated regularly according to manufacturer's regulations.
Any comment:	Monitoring ID Number 26

B.7.2 Description of the monitoring plan:

The monitoring plan will be described in detail in an Operational Manual. It will be the responsibility of the site manager and undertaken by site staff responsible for the maintenance and care of the landfill gas collection system and flaring unit.

Given that the Project Activity is still being developed project management plans are still being developed. However, MMPC will have overall authority and responsibility for all project management aspects of the Project Activity. Carbon Capital Markets Ltd, in partnership with MMPC is responsible for and has authority of the registration of the Project Activity.

The monitoring plan covers:

- responsibility of members of the monitoring team;
- routine reminders for site staff;
- QA/QC procedures;
- service forms for data reporting;
- corrective action plans;
- maintenance plans; and
- monitoring schedules.

Measurements will be taken using state-of-the-art technology such as continuous flow meters.

The site manager will ensure the measurements are recorded and calibration/maintenance actions are performed per schedule, review the results of the measurements, ensure proper records are kept and transmit data for archiving.

Carbon Capital Markets Ltd will perform quality assurance on the data and ensure archiving of the data for the specified period (crediting period plus two years). At the time of verification, training materials and information about the timing of completed trainings would be provided to the DOE.
For detail information please refer 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)

10/08/2007

Kevin Lok
Carbon Capital Markets Ltd
Carbon Logistics
Level 3, 15 Berkeley Street
London, W1J 8DY
United Kingdom

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:

31/07/2007[36]

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

12 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:

C.2.1.2. Length of the first crediting period:

C.2.2. Fixed crediting period:

A ten-year fixed crediting period will be used for this project.

C.2.2.1. Starting date:

01/01/2008 or from the date of project registration under UNFCCC, whichever is later.

C.2.2.2. Length:

10 (ten) years

SECTION D. Environmental impacts

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

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[36] The date of Design, manufacture, supply & installation of materials, equipment & services to complete the landfill gas fired power generating plant contract signed between MMPC and Monark Equipment Corporation.

The Project Activity was granted an Environmental Compliant Certificate (ECC) on August 25, 2004 by the Local Government of Rodriguez. Additionally, the Project Activity has received a letter of no objection by the Department of Environmental and Natural Resources, the respective DNA office.

The Project Activity will collect and destroy LFG that is currently released to the atmosphere, thereby reducing harmful global and local environmental effects. Apart from contributing to global warming and stratospheric ozone layer depletion, LFG emissions pose serious health and safety problems to the local environment, affecting the neighbouring population and causing damage to crops, plants and to the local fauna.

Despite the numerous positive effects of the Project Activity, the following environmental issues have been considered in the development of the project in consultation with the proposed technology provider:

- Risks from collection, pumping and treatment of LFG (such as risk of fire from installation of flaring equipment) will be properly controlled through various equipment safety precautions (temperature and air intake control equipment, alarms, safety valves, automatic shutdown, etc) that are incorporated into the capture and flaring equipment. As well, a preventative maintenance plan for on-site equipment will be put in place to ensure the equipment continues to work according to manufacturer's specifications. Lastly, personnel working near the equipment will be provided with appropriate training for personal safety as well as proper equipment maintenance and operation.
- Noise and vibration caused by LFG collection equipment will not affect the local populations. Moreover, the equipment will incorporate enclosed acoustic housings for sound reduction as much as possible.
- Air pollution resulting from combustion of LFG, such as SO_2, NO_X, VOC, CO, is possible; however, these emissions are expected to be minimal because the Project Activity includes a high-temperature, high efficiency combustion system congruent with EU standards. The majority of these emissions will be destroyed and the remainder will be minimal and significantly less harmful than the continued uncontrolled release of LFG.

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

The Project Activity results in positive environmental impacts. Of the possible environmental issues that have been considered in the development of the project, these are minimized by the use of appropriate technology, procedures and area characteristics.

- To minimise noise pollution that may be generated by the Project Activity acoustic housing will be used where appropriate.
- Safety training and equipment will be provided to the personnel who will be working in close proximity to the flare and capture system.
- Since the landfill site will remain active for a number of years maximum consideration will be made for the safety aspects of this Project Activity. Specifically, preventative measures will be taken to ensure that flares and associated equipment will be secure, tamper proof and separated from local peoples.

According to regulations in Philippines, an Environmental Impact Assessment is not required for the implementation of LFG collection and flaring systems in open dumps and power generation. The Project Activity meets all regulatory requirements at municipal, state and national level in the Host country.

The Project Activity was granted an Environmental Compliant Certificate (ECC) on August 25, 2004 by the Local Government of Rodriguez. Additionally, the Project Activity has received a letter of no objection by the Department of Environmental and Natural Resources, the respective DNA office.

SECTION E. Stakeholders' comments

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

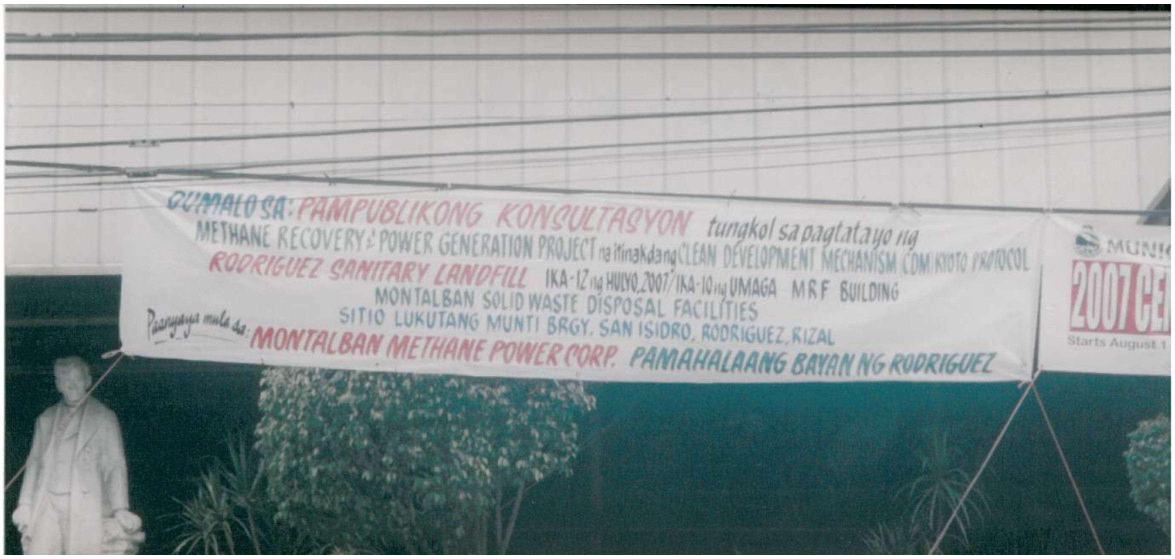
The main stakeholder consultation was held on 12 July 2007 at the Montalban Landfill facilities in Rodriguez where the Project Activity will take place.

Individual invitations were sent to relevant stakeholders. In addition, the stakeholder consultation information was circulated among the press who attended on the day. Prior to the main stakeholder consultation more than six articles have been written about the Project Activity, many of which also refer to the Kyoto Protocol and the impacts of the CDM. The articles produced by the media have been provided to the DOE for review. Additionally, the consultation was promoted by using banners that were located within the vicinity of the site and in the surrounding communities (see below).

Finally, the consultation was promoted through the distribution of leaflets promoting the consultation. Leaflets were distributed by hand and posted to targets local communities and potentially affected stakeholders.

More than 300 individuals participated in the stakeholder consultation, including representatives of the Municipality, local community members and waste pickers. A full list of participants, an agenda, evidence of the promotion of the stakeholder consultation and the presentation made has been provided to the DOE for review.

After a Power Point Presentation was made to the audience questions were invited by the audience. Questions were proposed and answers discussed on the Project Activity and related social and environmental impacts were received for almost two hours following the presentation.



E.2. Summary of the comments received:

No material comments were received.

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

No negative comments were received. None of the comments received necessitated a change to the PDD approach.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project will not receive any public funding.

Annex 3

BASELINE INFORMATION

Landfill Gas:

Year	Landfill Gas Generated (m3/year)
2007	80,708,518
2008	94,611,960
2009	107,579,601
2010	119,712,625
2011	131,102,397
2012	141,831,434
2013	151,974,287
2014	161,598,327
2015	170,764,460
2016	179,527,771
2017	187,938,098

1) based on Landgem input assumptions below and methodology in section B.6.3
2) using a GWP of 21
3) assuming a 50% capture efficiency
4) assuming a 90% flare efficiency

Parameters used in Landgem:

k = 0.104
Lo = 92

Power Generation

CER Estimate for Montalban in Rizal, Luzon (Philippines)

Key Parameters:

MW

load factor

Hours

MWh

Emission Factor:

0.6138 tonnes CO2/MWh

Emission Reductions:

-	**tonnes CO2**
-	**CERs**

Emission Factor for Luzon

	MW*	CO2 coefficient** (tonnes CO2/MWh)
Coal	14,099,158	0.90922
Gas	16,365,960	0.72380
Diesel	1,711,415	0.37884
Nuclear	-	-
Hydro	5,492,271	-
Other RE	3,572,653	-
Overall	41,241,457	**0.6138**

Source:

* Philippines Department of Energy - Philippines Power Statistics http://www.doe.gov.ph/EP/Powerstat.htm

**IEA Data (from WRI GHG Protocol's Calculation Tool)

2006 GROSS POWER GENERATION

in MWh

	January	February	March	April	May	June	July	August	September	October	November	December	Total
LUZON													
Coal	1,145,535	1,223,095	1,149,934	1,382,471	1,464,471	1,444,884	1,219,386	896,689	1,152,515	959,411	1,007,678	1,053,088	14,099,158
Oil-based	58,977	75,029	118,743	133,049	150,436	205,820	144,326	67,311	73,800	101,886	172,717	409,321	1,711,415
Combined Cycle	0	0	1,423	0	8,507	15,170	17,181	3,927	0	25,684	35,683	131,295	238,870
Diesel	58,977	75,029	117,320	131,572	131,023	173,526	127,145	63,384	73,800	76,202	113,723	173,366	1,315,067
Gas Turbine	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil Thermal	0	0	0	1,477	10,906	17,124	0	0	0	0	23,311	104,660	157,478
Natural Gas	1,087,901	1,161,296	1,228,863	1,354,924	1,323,377	1,397,245	1,432,762	1,533,891	1,523,795	1,529,127	1,666,163	1,126,616	16,365,960
Geothermal	397,560	368,036	340,689	407,208	354,563	360,382	236,492	236,076	259,565	186,136	164,981	207,729	3,519,417
Hydro	479,117	545,602	299,973	270,861	265,153	300,077	423,513	744,527	679,352	445,809	546,180	492,107	5,492,271
Wind	3,116	6,288	4,090	2,893	2,239	2,168	3,112	2,579	1,427	7,001	6,159	12,163	53,235
Total Generation	3,172,207	3,379,346	3,142,291	3,551,406	3,560,240	3,710,576	3,459,591	3,481,074	3,690,454	3,229,369	3,563,878	3,301,025	41,241,457
VISAYAS													
Coal	56,595	54,893	53,895	58,160	52,130	59,647	65,033	66,567	66,079	69,165	46,085	70,414	718,663
Oil-based	94,207	95,789	100,601	103,214	105,894	106,571	104,070	115,163	107,035	113,003	123,313	112,906	1,281,766
Diesel	86,779	83,555	88,854	97,824	99,555	99,327	95,300	102,404	97,520	100,266	112,188	102,127	1,165,700
Gas Turbine	0	0	84	0	0	0	0	0	0	91	9	10	193
Oil Thermal	7,428	12,234	11,663	5,390	6,339	7,244	8,770	12,759	9,515	12,647	11,116	10,769	115,873
Geothermal	528,199	535,545	487,366	547,535	529,521	562,701	521,044	502,080	516,442	405,276	550,575	413,918	6,100,202
Hydro	2,834	3,623	2,734	1,433	1,257	1,792	1,914	2,494	3,142	2,680	2,559	1,630	28,093
Total Generation	681,837	689,850	644,596	710,341	688,801	730,711	692,061	686,305	692,697	590,124	722,533	598,867	8,128,723
MINDANAO													
Coal	0	0	0	0	907	12,517	13,849	41,724	65,861	96,228	98,183	146,976	476,245
Oil-based	84,593	124,874	116,934	175,068	189,473	161,620	163,609	194,097	128,883	86,790	109,342	136,336	1,671,619
Diesel	84,550	124,866	116,924	175,056	189,452	161,584	163,562	194,070	128,875	86,773	109,335	136,328	1,671,376
Oil	42	7	10	12	21	36	47	27	7	18	7	8	242
Geothermal	74,767	78,459	70,565	78,958	70,092	75,607	72,191	50,910	62,204	66,765	71,114	74,029	845,660
Hydro	420,118	397,024	369,033	370,702	364,363	376,271	356,676	347,808	377,499	369,723	374,546	295,286	4,419,049
Solar	95	106	111	139	124	115	105	114	126	89	135	118	1,376
Total Generation	579,573	600,462	556,643	624,867	624,960	626,129	606,431	634,653	634,571	619,596	653,320	652,745	7,413,949
PHILIPPINES													
Luzon	3,172,207	3,379,346	3,142,291	3,551,406	3,560,240	3,710,576	3,459,591	3,481,074	3,690,454	3,229,369	3,563,878	3,301,025	41,241,457
Visayas	681,837	689,850	644,596	710,341	688,801	730,711	692,061	686,305	692,697	590,124	722,533	598,867	8,128,723
Mindanao	579,573	600,462	556,643	624,867	624,960	626,129	606,431	634,653	634,571	619,596	653,320	652,745	7,413,949
Total	4,433,616	4,669,659	4,343,530	4,886,615	4,874,001	5,067,416	4,758,083	4,802,032	5,017,723	4,439,089	4,939,731	4,552,637	56,784,130
PHILIPPINES per Fuel Type													
Coal	1,202,131	1,277,988	1,203,829	1,440,631	1,517,508	1,517,048	1,298,268	1,004,980	1,284,454	1,124,804	1,151,947	1,270,478	15,294,066
Oil-based	237,777	295,692	336,277	411,331	445,803	474,010	412,005	376,572	309,718	301,680	405,372	658,563	4,664,799
Combined Cycle	0	0	1,423	0	8,507	15,170	17,181	3,927	0	25,684	35,683	131,295	238,870
Diesel	230,307	283,451	323,097	404,451	420,030	434,437	386,007	359,858	300,196	263,241	335,247	411,822	4,152,144
Gas Turbine	0	0	84	0	0	0	0	0	0	91	9	10	193
Oil	7,470	12,241	11,673	6,879	17,266	24,404	8,817	12,786	9,522	12,664	34,434	115,437	273,593
Natural Gas	1,087,901	1,161,296	1,228,863	1,354,924	1,323,377	1,397,245	1,432,762	1,533,891	1,523,795	1,529,127	1,666,163	1,126,616	16,365,960
Geothermal	1,000,526	982,039	898,620	1,033,700	954,176	998,690	829,728	789,066	838,211	658,177	786,670	695,675	10,465,279
Hydro	902,070	946,250	671,740	642,996	630,773	678,140	782,103	1,094,830	1,059,992	818,212	923,284	789,023	9,939,413
Wind/Solar	3,211	6,394	4,201	3,032	2,363	2,282	3,217	2,693	1,552	7,090	6,294	12,281	54,612
Total Generation	4,433,616	4,669,659	4,343,530	4,886,615	4,874,001	5,067,416	4,758,083	4,802,032	5,017,723	4,439,089	4,939,731	4,552,637	56,784,130

IRR Calculation Sheet: Base IRR

Montalban Financial Summary - "Base Case" CER Profile (50% collection efficiency)

US$	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue													
CERs	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0	6,550,294	9,865,376	11,080,207	12,218,829	13,289,646	14,163,902	14,499,773	14,499,773	14,499,773	14,499,773	14,499,773	14,499,773
Total Revenue	**0**	**6,550,294**	**9,865,376**	**11,080,207**	**12,218,829**	**13,289,646**	**14,163,902**	**14,499,773**	**14,499,773**	**14,499,773**	**14,499,773**	**14,499,773**	**14,499,773**
Operating Expenses	1,826,884	3,432,019	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603
Royalties	71,540	1,177,544	1,815,907	1,848,310	1,877,138	1,902,829	1,925,762	1,946,264	1,964,622	1,981,084	1,995,881	2,009,963	2,024,045
EBITDA	**-1,898,424**	**1,940,731**	**3,801,866**	**4,984,294**	**6,094,089**	**7,139,213**	**7,990,536**	**8,305,905**	**8,287,547**	**8,271,085**	**8,256,289**	**8,242,206**	**8,228,124**
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
EBIT	**-2,475,656**	**-308,346**	**1,368,380**	**2,550,808**	**3,660,602**	**4,705,727**	**5,557,050**	**6,449,650**	**8,103,138**	**8,271,085**	**8,256,289**	**8,242,206**	**8,228,124**
EBT	**-2,475,656**	**-308,346**	**1,368,380**	**2,550,808**	**3,660,602**	**4,705,727**	**5,557,050**	**6,449,650**	**8,103,138**	**8,271,085**	**8,256,289**	**8,242,206**	**8,228,124**
Taxes	0	0	0	0	0	0	0	3,934,889	4,584,285	4,707,645	4,761,609	4,811,094	4,860,385
Net Income	**-2,475,656**	**-308,346**	**1,368,380**	**2,550,808**	**3,660,602**	**4,705,727**	**5,557,050**	**2,514,761**	**3,518,852**	**3,563,440**	**3,494,680**	**3,431,112**	**3,367,739**
Capex	25,593,406	9,729,869	0	0	0	0	0	0	0	0	0	0	0
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
Project Free Cash Flows	**-27,491,830**	**-7,789,138**	**3,801,866**	**4,984,294**	**6,094,089**	**7,139,213**	**7,990,536**	**4,371,016**	**3,703,262**	**3,563,440**	**3,494,680**	**3,431,112**	**3,367,739**

Project IRR	**6.7%**
NPV	**-4,977,729**

IRR Calculation Sheet: +10% E Price IRR

Montalban Financial Summary - "High Electricity Price Scenario" CER Profile (50% collection efficiency)

US$	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue													
CERs	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0	7,205,323	10,851,914	12,188,228	13,440,712	14,618,610	15,580,292	15,949,750	15,949,750	15,949,750	15,949,750	15,949,750	15,949,750
Total Revenue	**0**	**7,205,323**	**10,851,914**	**12,188,228**	**13,440,712**	**14,618,610**	**15,580,292**	**15,949,750**	**15,949,750**	**15,949,750**	**15,949,750**	**15,949,750**	**15,949,750**
Operating Expenses	1,826,884	3,432,019	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603
Royalties	71,540	1,177,544	1,815,907	1,848,310	1,877,138	1,902,829	1,925,762	1,946,264	1,964,622	1,981,084	1,995,881	2,009,963	2,024,045
EBITDA	**-1,898,424**	**2,595,760**	**4,788,404**	**6,092,315**	**7,315,971**	**8,468,178**	**9,406,927**	**9,755,882**	**9,737,524**	**9,721,063**	**9,706,266**	**9,692,184**	**9,678,101**
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
EBIT	**-2,475,656**	**346,683**	**2,354,918**	**3,658,829**	**4,882,485**	**6,034,691**	**6,973,440**	**7,899,628**	**9,553,115**	**9,721,063**	**9,706,266**	**9,692,184**	**9,678,101**
EBT	**-2,475,656**	**346,683**	**2,354,918**	**3,658,829**	**4,882,485**	**6,034,691**	**6,973,440**	**7,899,628**	**9,553,115**	**9,721,063**	**9,706,266**	**9,692,184**	**9,678,101**
Taxes	0	0	0	0	0	0	0	3,934,889	4,584,285	4,707,645	4,761,609	4,811,094	4,860,385
Net Income	**-2,475,656**	**346,683**	**2,354,918**	**3,658,829**	**4,882,485**	**6,034,691**	**6,973,440**	**3,964,738**	**4,968,830**	**5,013,417**	**4,944,657**	**4,881,090**	**4,817,716**
Capex	25,593,406	9,729,869	0	0	0	0	0	0	0	0	0	0	0
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
Project Free Cash Flows	**-27,491,830**	**-7,134,109**	**4,788,404**	**6,092,315**	**7,315,971**	**8,468,178**	**9,406,927**	**5,820,993**	**5,153,239**	**5,013,417**	**4,944,657**	**4,881,090**	**4,817,716**

Project IRR	**11.6%**
NPV	**2,537,911**

IRR Calculation Sheet: -10% Cost IRR

Montalban Financial Summary - "Low Cost Scenario" CER Profile (50% collection efficiency)

US$	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue													
CERs	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0	6,550,294	9,865,376	11,080,207	12,218,829	13,289,646	14,163,902	14,499,773	14,499,773	14,499,773	14,499,773	14,499,773	14,499,773
Total Revenue	**0**	**6,550,294**	**9,865,376**	**11,080,207**	**12,218,829**	**13,289,646**	**14,163,902**	**14,499,773**	**14,499,773**	**14,499,773**	**14,499,773**	**14,499,773**	**14,499,773**
Operating Expenses	1,644,195	3,088,817	3,822,843	3,822,843	3,822,843	3,822,843	3,822,843	3,822,843	3,822,843	3,822,843	3,822,843	3,822,843	3,822,843
Royalties	71,540	1,177,544	1,815,907	1,848,310	1,877,138	1,902,829	1,925,762	1,946,264	1,964,622	1,981,084	1,995,881	2,009,963	2,024,045
EBITDA	**-1,715,735**	**2,283,933**	**4,226,627**	**5,409,054**	**6,518,849**	**7,563,973**	**8,415,297**	**8,730,665**	**8,712,307**	**8,695,846**	**8,681,049**	**8,666,967**	**8,652,885**
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
EBIT	**-2,292,967**	**34,855**	**1,793,140**	**2,975,568**	**4,085,363**	**5,130,487**	**5,981,811**	**6,874,411**	**8,527,898**	**8,695,846**	**8,681,049**	**8,666,967**	**8,652,885**
EBT	**-2,292,967**	**34,855**	**1,793,140**	**2,975,568**	**4,085,363**	**5,130,487**	**5,981,811**	**6,874,411**	**8,527,898**	**8,695,846**	**8,681,049**	**8,666,967**	**8,652,885**
Taxes	0	0	0	0	0	0	0	3,934,889	4,584,285	4,707,645	4,761,609	4,811,094	4,860,385
Net Income	**-2,292,967**	**34,855**	**1,793,140**	**2,975,568**	**4,085,363**	**5,130,487**	**5,981,811**	**2,939,521**	**3,943,613**	**3,988,200**	**3,919,440**	**3,855,873**	**3,792,499**
Capex	25,593,406	9,729,869	0	0	0	0	0	0	0	0	0	0	0
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
Project Free Cash Flows	**-27,309,141**	**-7,445,937**	**4,226,627**	**5,409,054**	**6,518,849**	**7,563,973**	**8,415,297**	**4,795,776**	**4,128,022**	**3,988,200**	**3,919,440**	**3,855,873**	**3,792,499**

Project IRR	**8.5%**
NPV	**-2,247,974**

IRR Calculation Sheet: -10% Power IRR

Montalban Financial Summary - "Low Power Gen Case" CER Profile (50% collection efficiency)

US$	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue													
CERs	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0	5,895,264	8,878,839	9,972,187	10,996,947	11,960,681	12,747,512	13,049,795	13,049,795	13,049,795	13,049,795	13,049,795	13,049,795
Total Revenue	**0**	**5,895,264**	**8,878,839**	**9,972,187**	**10,996,947**	**11,960,681**	**12,747,512**	**13,049,795**	**13,049,795**	**13,049,795**	**13,049,795**	**13,049,795**	**13,049,795**
Operating Expenses	1,826,884	3,432,019	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603
Royalties	71,540	1,177,544	1,815,907	1,848,310	1,877,138	1,902,829	1,925,762	1,946,264	1,964,622	1,981,084	1,995,881	2,009,963	2,024,045
EBITDA	**-1,898,424**	**1,285,701**	**2,815,329**	**3,876,273**	**4,872,206**	**5,810,248**	**6,574,146**	**6,855,928**	**6,837,570**	**6,821,108**	**6,806,311**	**6,792,229**	**6,778,147**
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
EBIT	**-2,475,656**	**-963,376**	**381,842**	**1,442,787**	**2,438,719**	**3,376,762**	**4,140,660**	**4,999,673**	**6,653,160**	**6,821,108**	**6,806,311**	**6,792,229**	**6,778,147**
EBT	**-2,475,656**	**-963,376**	**381,842**	**1,442,787**	**2,438,719**	**3,376,762**	**4,140,660**	**4,999,673**	**6,653,160**	**6,821,108**	**6,806,311**	**6,792,229**	**6,778,147**
Taxes	0	0	0	0	0	0	0	3,934,889	4,584,285	4,707,645	4,761,609	4,811,094	4,860,385
Net Income	**-2,475,656**	**-963,376**	**381,842**	**1,442,787**	**2,438,719**	**3,376,762**	**4,140,660**	**1,064,784**	**2,068,875**	**2,113,463**	**2,044,702**	**1,981,135**	**1,917,762**
Capex	25,593,406	9,729,869	0	0	0	0	0	0	0	0	0	0	0
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
Project Free Cash Flows	**-27,491,830**	**-8,444,168**	**2,815,329**	**3,876,273**	**4,872,206**	**5,810,248**	**6,574,146**	**2,921,038**	**2,253,284**	**2,113,463**	**2,044,702**	**1,981,135**	**1,917,762**

Project IRR	**0.6%**
NPV	**-12,493,369**

IRR Calculation Sheet: IRR with CERs

Montalban Financial Summary - "Base Case + CER Revenue" CER Profile (50% collection efficiency)

US$	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue													
CERs	0	5,901,022	7,014,866	7,814,073	8,564,186	9,270,651	9,928,096	10,514,639	11,049,123	11,560,117	12,050,529	0	0
Electricity	0	6,550,294	9,865,376	11,080,207	12,218,829	13,289,646	14,163,902	14,499,773	14,499,773	14,499,773	14,499,773	14,499,773	14,499,773
Total Revenue	**0**	**12,451,315**	**16,880,242**	**18,894,280**	**20,783,015**	**22,560,297**	**24,091,998**	**25,014,412**	**25,548,895**	**26,059,890**	**26,550,302**	**14,499,773**	**14,499,773**
Operating Expenses	1,826,884	3,432,019	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603	4,247,603
Royalties	71,540	1,177,544	1,815,907	1,848,310	1,877,138	1,902,829	1,925,762	1,946,264	1,964,622	1,981,084	1,995,881	2,009,963	2,024,045
EBITDA	**-1,898,424**	**7,841,753**	**10,816,732**	**12,798,367**	**14,658,274**	**16,409,864**	**17,918,632**	**18,820,544**	**19,336,669**	**19,831,203**	**20,306,818**	**8,242,206**	**8,228,124**
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
EBIT	**-2,475,656**	**5,592,675**	**8,383,246**	**10,364,880**	**12,224,788**	**13,976,378**	**15,485,146**	**16,964,289**	**19,152,260**	**19,831,203**	**20,306,818**	**8,242,206**	**8,228,124**
EBT	**-2,475,656**	**5,592,675**	**8,383,246**	**10,364,880**	**12,224,788**	**13,976,378**	**15,485,146**	**16,964,289**	**19,152,260**	**19,831,203**	**20,306,818**	**8,242,206**	**8,228,124**
Taxes	0	0	0	0	0	0	0	3,934,889	4,584,285	4,707,645	4,761,609	4,811,094	4,860,385
Net Income	**-2,475,656**	**5,592,675**	**8,383,246**	**10,364,880**	**12,224,788**	**13,976,378**	**15,485,146**	**13,029,400**	**14,567,975**	**15,123,557**	**15,545,209**	**3,431,112**	**3,367,739**
Capex	25,593,406	9,729,869	0	0	0	0	0	0	0	0	0	0	0
Depreciation	577,232	2,249,077	2,433,486	2,433,486	2,433,486	2,433,486	2,433,486	1,856,254	184,409	0	0	0	0
Project Free Cash Flows	**-27,491,830**	**-1,888,116**	**10,816,732**	**12,798,367**	**14,658,274**	**16,409,864**	**17,918,632**	**14,885,655**	**14,752,384**	**15,123,557**	**15,545,209**	**3,431,112**	**3,367,739**

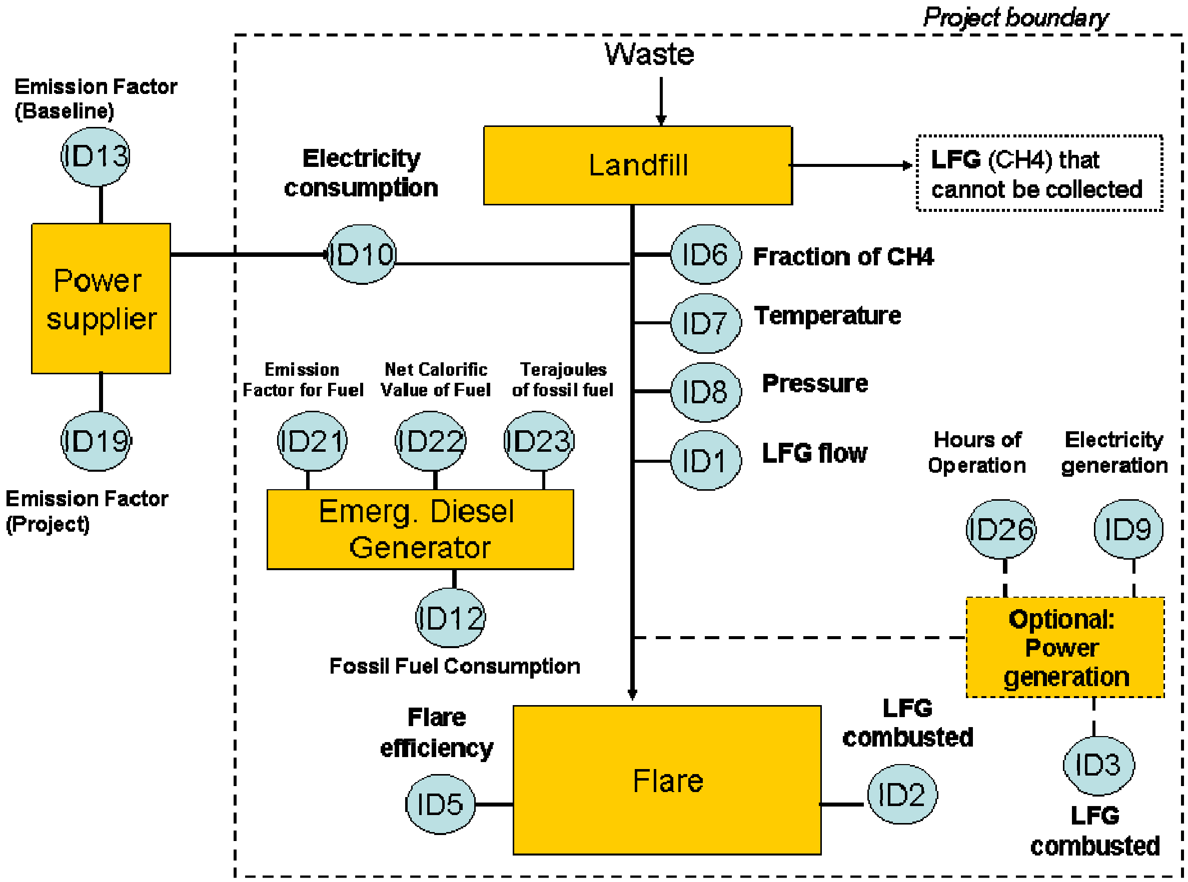
Project IRR	**33.4%**
NPV	**44,423,673**

Annex 4

MONITORING INFORMATION

1) Monitoring Methodologies

The monitoring plan covers procedures for the systematic surveillance of the CDM Project Activity's performance by measuring and recording performance-related indicators relevant to the project in accordance with the Monitoring Methodology ACM0001 and AMS.I.D. The plan provides for continuous measurement of the quantity and quality of LFG captured and destroyed and electricity generated. The specific variables monitored are highlighted below:



2) Monitoring indicators

Monitoring indicators are required to meet the Host Country's 'Sustainable Development Benefits Description' ("SDBD") project information form. The SDBD requires that economic, environmental and social indicators are recognised and monitored. Key indicators that the Project Activity will monitor include are:

- **Environmental**: The main pollutants generated as a result of implementation of the project activity are sulphur dioxide and nitrous oxide emissions, odour and condensate, and noise pollution.

- **Social**: The number of jobs created and the improvement of qualifications and attendance of training programmes will be monitored. Additionally, electricity supply to the local grid will be evaluated.

- **Economic**: During the period that the Project Activity is in operation tax revenue, electricity revenue, employee incomes, CER revenues will be indicated.

3) Monitoring management

All monitoring of the CDM aspects of the Project Activity will be organised and managed by the designated CDM Monitoring Manager. The CDM Monitoring Manager will be responsible for the supervision and collection of data, for staff that undertake relevant CDM monitoring activities, for organising training programmes, and for hosting monthly reporting meetings. All monitoring management activities described below will fall under the remit of the CDM Monitoring Manager.

- **Routine Reminders for site staff:** All site staff will be issued with a reminder list to guide them through their daily, weekly and monthly routine. In addition, archived data will be checked to ensure it is being appropriately maintained.

- **Corrective Actions:** There will be quality assurance measures to handle and correct nonconformities in the implementation of the Project or this Monitoring Plan. In case such nonconformities are observed:
    - An analysis of the nonconformity and its causes will be carried out,
    - Appropriate corrective actions to eliminate the non-conformity and its causes will be identified, and
    - The implementation of corrective actions will be reported.

- **Service Forms:** Service sheets will be used to ensure all aspects of the monitoring are completed and recorded. These sheets will serve as a procedural reminder and record of the monitoring that is required for the CDM project activity.

- **Calibration of measurement equipment:** Calibration of measurement equipment will be defined and scheduled by the technology provider.

- **Operational Manual**: All the information about monitoring procedures and quality assurance measures will be included in an Operational Manual. The Operational Manual will include procedures for training, capacity building, proper handling and maintenance of equipment, emergency plans.

There will be a team that will cover all aspects of the monitoring. The team members will be responsible for collecting, reviewing, recording and archiving the data. There will be a CDM Monitoring Manager who shall perform a quality check of the team's work ensuring that the monitoring is performed correctly and on time. The manager will report monthly to Carbon Capital Markets about project performance and data. He/She will inform Carbon Capital markets immediately in the event of non-conformance and technical problems. The manager will be the one of the main contacts for the verifier, DNA of Philippines, and local authorities, during the crediting period.

A CDM Project Team will be formed for monitoring purposes for the Project Activity and report to the CDM Monitoring Manager. The project team comprises at least one representative of Carbon Capital Markets, the MMPC chief engineer, and the site manager. It will gather at least monthly, face-to-face or by conference call, to discuss the performance of the Project Activity. In case of non-conformance, each member of the team could call for a meeting. All meeting minutes will be recorded.

The monitoring tools that will be available to the team and the CDM Monitoring Manager include:

- Operational Manual (see above) including procedures on what is to be monitored, frequency of the monitoring, equipment to be used, maintenance required on instrumentation, corrective actions, etc.
- This Project Design Document
- UNFCCC baseline and monitoring methodology (ACM0001 and AMS 1.D)
- Service sheets (see above)
- Spreadsheets

The spreadsheets will serve as a registry of the all data collected by the different measuring equipments distributed all over the facilities. They will also be used to quantify CERs achieved by the Project Activity during specific time periods through the use of auxiliary equations.

For the purposes of QA/QC and archiving data will be transmitted electronically to MMPC and Carbon Capital Markets Ltd on a weekly basis as well as a reporting of any anomalies, equipment failures or any other causes of data loss. A final data quality check of the information will be made before an archived copy is created.

4) Verification

The verification procedure of the Project Activity will be carried out by an independent third party on a regular basis. To ensure the swift and accurate completion of the verification process the Project Activity will ensure all documents are correctly managed and archived as per the ACM0001 and AMS I.D monitoring methodologies.