MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Montalban Landfill Methane Recovery and Power Generation Project
Reference number of the project activity	1853
Version number of the monitoring report	1
Completion date of the monitoring report	27/04/2012
Registration date of the project activity	10/03/2009
Monitoring period number and duration of this monitoring period	1; 09/03/2010 – 31/03/2012
Project participant(s)	Montalban Methane Power Corporation and Carbon Capital Markets Limited
Host Party(ies)	Philippines
Sectoral scope(s) and applied methodology(ies)	Sectoral Scopes: 1: Energy industries (renewable/non-renewable sources); 13: Waste handling and disposal; Applied methodologies: ACM0001 "Consolidated baseline methodology for landfill gas project activities" (Version 6); AMS-I.D. "Grid connected renewable electricity generation" (Version 12)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	1,086,475.58
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	296,970.56

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>> The primary purpose of the project is to collect and capture land fill gas "LFG" from the Montalban landfill through installation of an LFG collection system and destruction of methane contained in LFG through flaring or generation of electricity. The project has seen the installation of both a power generation system and flaring systems. The project as a whole has been designed to support a total capacity of up to 15MW and for that net power production from the system to be exported to the local grid.

The LFG collection system consists of HDPE pipes, which connect the LFG wells to three centrifugal blowers. The blowers provide adequate vacuum to the collection pipelines and delivers the LFG to the power generating plant and/or to three 3,000 Nm^3/h capacity flaring stacks. Condensate traps and a liquid separator equipped with a demister capture any occasional leachate that is present in the LFG. Leachate from the liquid separator is pumped to the landfill where it is collected and stored in a lagoon. The systems are equipped with adequate instruments, which indicate, transmit and register process parameters, which are further described in the monitoring plan of the project activity. The process is controlled by a PLC (programmable logic controller) and is monitored by a supervisory system, installed in a computer. All electronic records of operation are kept in an inviolable data logger. More details about the installed technology are presented in Section C.

	Date
Installation	2007
Commissioning	Gas blowers and flaring system: July 2008 Generators: 1st batch September 2008; 2nd batch April 2010
Continuous operations period	01st June 2009 -31st March 2012

The Emission Reductions (ER) achieved for the period from 09/03/2010 to 31/03/2012 is 296,970.56 t CO_2e.

A.2. Location of project activity

>> The project activity is located in the municipality of Rodriguez, province of Rizal, Philippines near the landfill operated by the private company International Solid Waste Integrated Management Systems, Inc. The geographical coordinates are Latitude: from 14°46'36''N to 14°46'32''N, Longitude: from 121°08'44"E to 121°08'41''E.

The landfill gas is collected from areas of deposited waste adjacent to and or in the region surrounding the power plant compound

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Philippines	Montalban Methane Power Corporation (MMPC)	No
UK	Carbon Capital Markets Limited	No

A.4. Reference of applied methodology

>> ACM0001 "Consolidated baseline methodology for landfill gas project activities" (Version 6)
Tools referenced in this methodology:
"Tool for the demonstration and assessment of additionality"
"Tool to determine project emissions from flaring gases containing Methane"

AMS-I.D. "Grid connected renewable electricity generation" (Version 12)
Tools referenced in this methodology:
"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
"Tool to calculate the emission factor for an electricity system"

A.5. Crediting period of project activity

>> The start date of the crediting period corresponding to this monitoring period is 09/03/2010. The length of the crediting period is 10 years (fixed).

SECTION B. Implementation of project activity

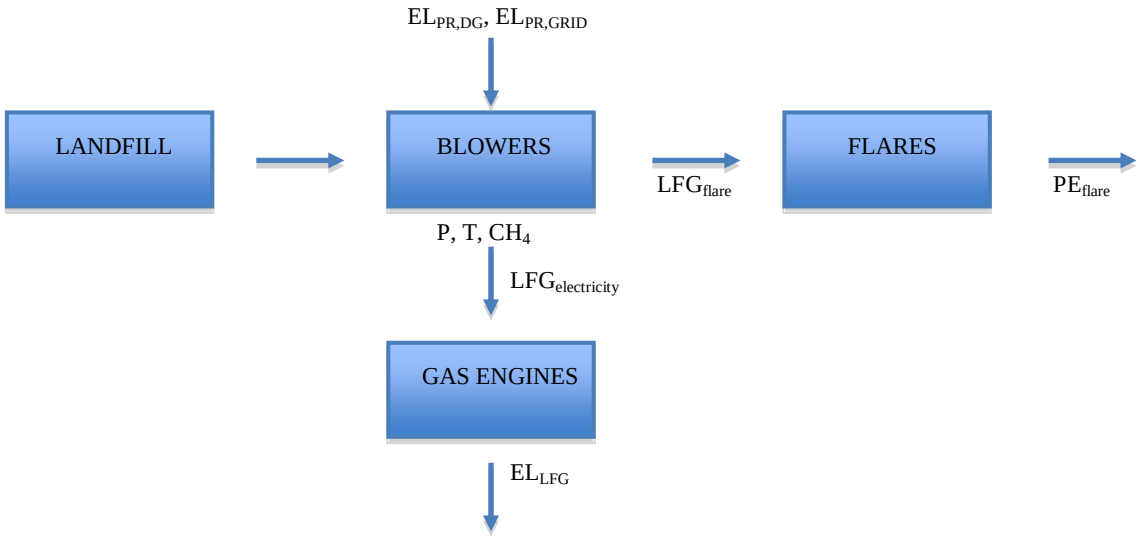
B.1. Description of implemented registered project activity

>> The project activity consists of capturing and flaring the landfill gas and/or combusting the landfill gas to generate electricity. Landfill gas is generated by the decomposition of the wastes accepted in the landfill.

The project design includes an active gas recovery system composed of a collection and transportation pipeline network, a gas flaring system and a power generating plant.

Gas wells installed in the landfill site are equipped with sampling points that allow measurement of LFG flow and composition. The wells are connected to HDPE pipes which transport LFG to the gas capturing system. HDPE pipes are connected to manifolds, which in turn are connected to main collection headers. Three centrifugal blowers generate adequate vacuum to collect the LFG and deliver the extracted gas to the gas engines and/or to the three enclosed flares. The LFG is flared under controlled temperature conditions. Field instrumentation feed the PLC (programmable logic controller) continuously with LFG temperature, pressure, flow and composition. The entire process is controlled by the PLC and is monitored by a supervisory system, installed in a computer.

A simplified diagram of the project activity is shown below:



Measurements:
P – Pressure of the landfill gas
T – Temperature of the landfill gas
CH_4 – CH_4 concentration of the landfill gas
LFG_{flare} – Volume of the landfill gas going to flare
$LFG_{electricity}$ – Volume of the landfill gas going to power generating plant
$EL_{PR,DG}$ – Electricity used from diesel generator
$EL_{PR,GRID}$ – Electricity used from local grid
EL_{LFG} – Electricity produced from landfill gas

Sources of emissions:
Project emissions from flaring
Emissions from electricity use of diesel generator
Emissions from electricity use of local grid

In addition to its efforts in reducing the levels of GHG emissions, the project activity promotes local sustainable development as it foresees the future possibility of energy generation from a renewable source.

The project started to supply electricity to the local grid in June 2009, with the collection and flaring of the LFG generated at the existing cells and at new cells located next to the waste disposal areas.

The following table summarizes the availability of the flaring system during the monitoring period covered by this report:

Month	**Operating Hours**	
	Hours	**%**
2010		
March 2010	87.42	11.75
April 2010	148.36	20.61
May 2010	289.37	38.89
June 2010	342.17	47.52
July 2010	339.79	45.67
August 2010	699.5	94.02
September 2010	574.4	79.78
October 2010	684.6	92.02

November 2010	689.78	95.80
December 2010	740.06	99.47
Total, 2010	**4,595.45**	**62.57**
2011		
January 2011	710.64	95.52
February 2011	652.52	97.10
March 2011	742.72	99.83
April 2011	718.36	99.77
May 2011	721.61	96.99
June 2011	648.87	90.12
July 2011	693.85	93.26
August 2011	730.03	98.12
September 2011	669.74	93.02
October 2011	740.59	99.54
November 2011	709.28	98.51
December 2011	742.55	99.81
Total, 2011	**8,480.76**	**96.81**
2012		
January 2012	717.76	96.47
February 2012	685.57	98.50
March 2012	738.59	99.27
Total, 2012	**2,141.92**	**98.07**

(*) Starting in 09/03/2010

(**) Until 31/03/2012

All operations are registered in forms and in electronic spreadsheets. All maintenance procedures in the critical pieces of equipment (flare, blowers, gas analyser, air compressor) are also registered.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

>>No deviations from the registered monitoring plan or applied methodology have yet been submitted to the Executive Board.

B.2.2. Corrections

>> No corrections have yet been submitted to the Executive Board.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

>> No revisions from the registered monitoring plan or applied methodology have yet been submitted to the Executive Board.

B.2.4. Changes to project design of registered project activity

>> No revisions from the project design have yet been submitted to the Executive Board.

B.2.5. Changes to start date of crediting period

>> A change in the starting date from 10/03/2009 to 09/03/2010 has been approved on 19/04/2012.

B.2.6. Types of changes specific to afforestation or reforestation project activity

>>Not applicable

SECTION C. Description of monitoring system

>>The simplified process and instrumentation diagram (P&ID), **Figure 1 and 2**, shows the instrumentation and measurement points of the system.

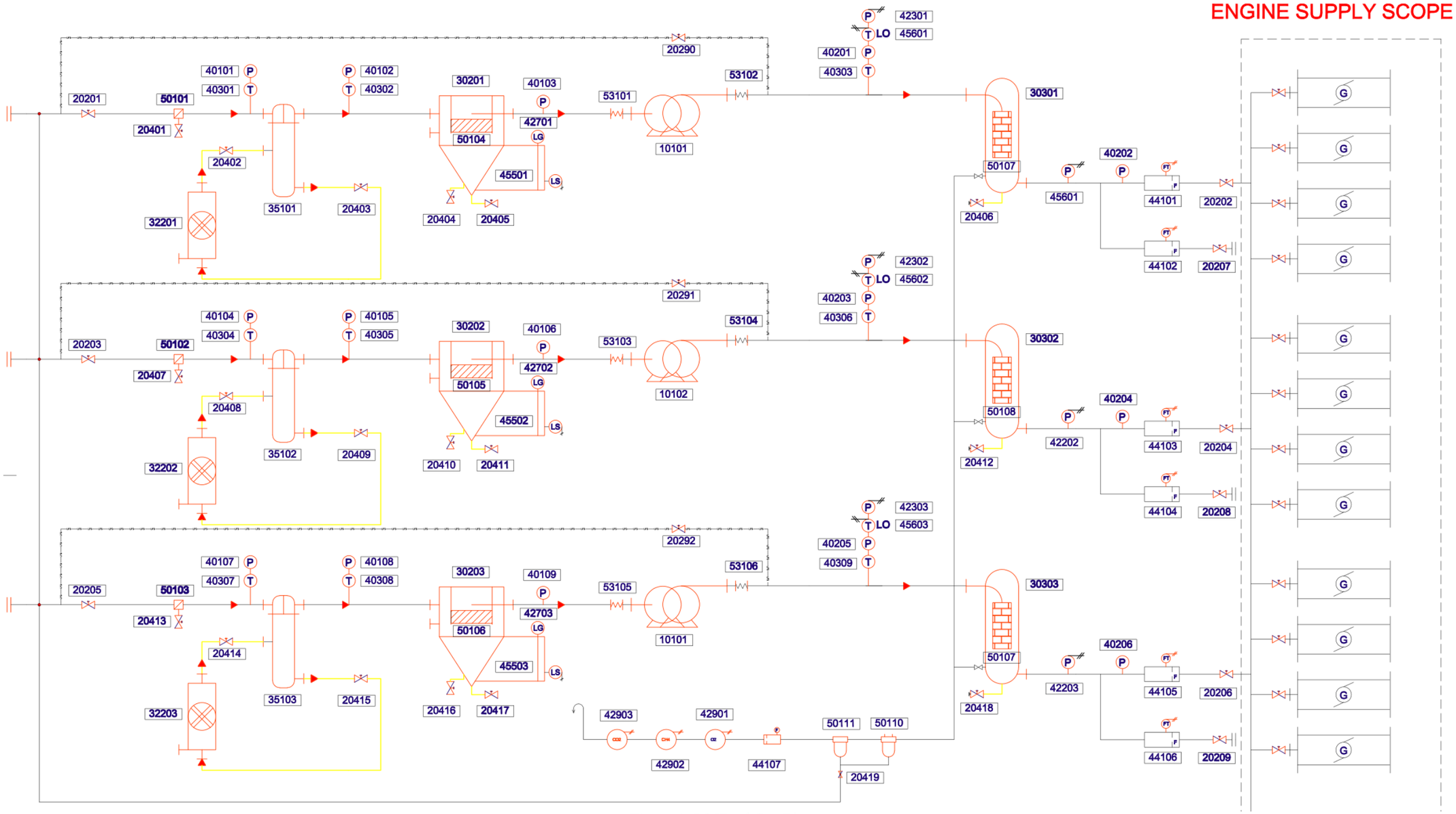


Figure 1: P&ID of Gas Blowers

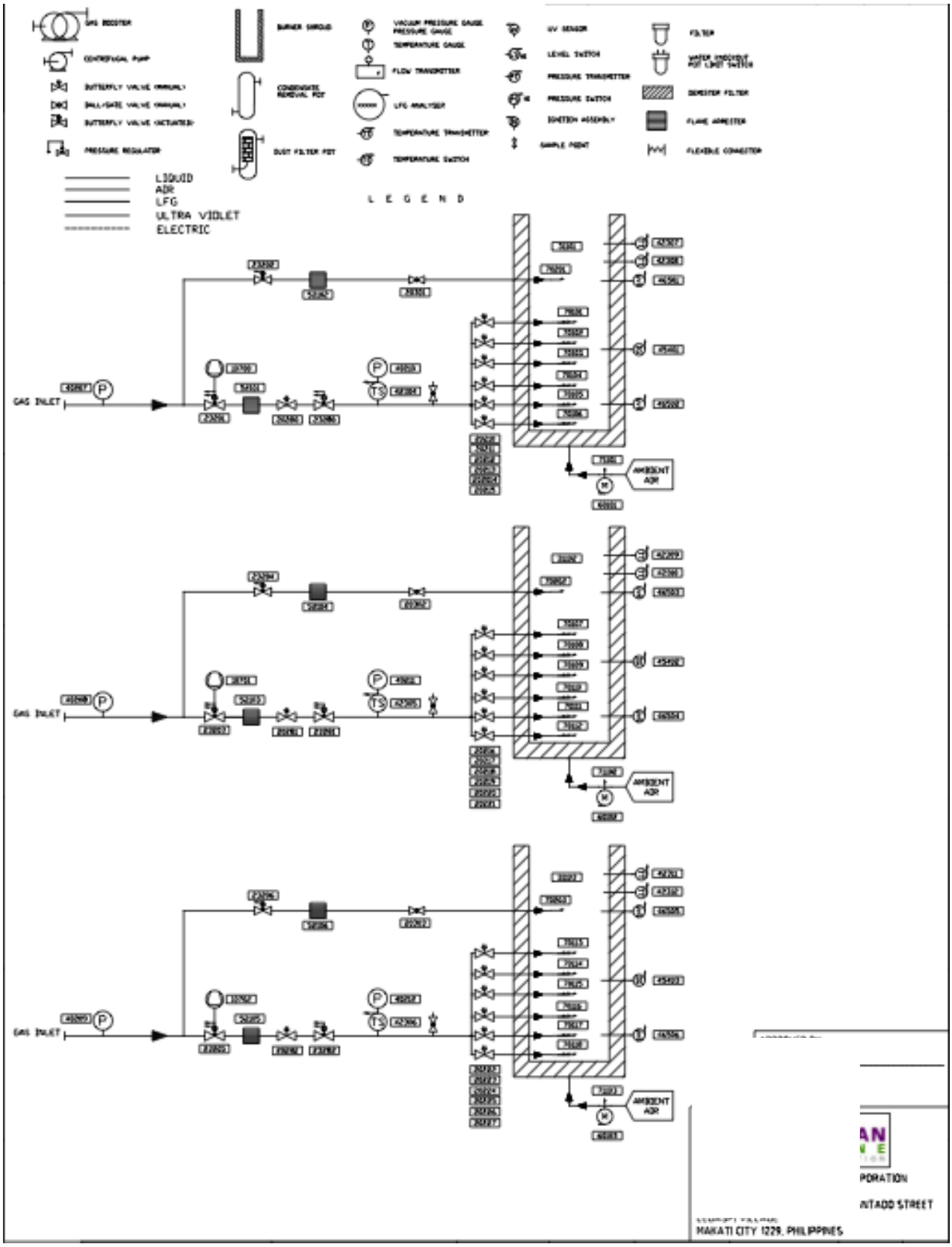


Figure 2: P&ID of Flaring System

Three Gas Delivery Units (GDUs), each having individual blowers and flaring stacks, capture LFG from the landfill and deliver it to either the power generating plant or to the flaring stacks. Each GDU is equipped with two flow meters, one for power generation and one for flaring. The flow meters measure the LFG flow rate to the power plant ($\mathbf{LFG}_{\mathbf{electricity,y}}$)and to the flare ($\mathbf{LFG}_{\mathbf{flared,y}}$). A common gas analyser measures the methane concentration of the landfill gas. The sampling point of the analyser is located between the blowers and the flow meters. Two thermocouples measure the temperature in the exhaust gas of each flare (T_{flare}).

An on-site diesel generator and the local grid provide the electricity required by the project activity on start-up. The electricity consumption of the diesel generator ($\mathbf{EL}_{\mathbf{PR, DG,y}}$) is measured by a power meter and the electricity consumption supplied by the local grid ($\mathbf{EL}_{\mathbf{PR, grid,y}}$) is measured by the utility company's import meter. The electricity generated using LFG ($\mathbf{EL}_{\mathbf{LFG}}$) is measure by the utility company's export meter.

A data book contains detailed technical information of all equipment and instruments used in the LFG capturing and flaring system. The instruments used to monitor the project activity were kept calibrated, according to the established monitoring plan. Calibration certificates are kept in files and are available for the verification process.

The operation and maintenance procedures are described in the operation and maintenance manual ("Operations & Maintenance Manual" prepared by Organics Asia, Co. Ltd., ref.# PS 4441).

Daily written records of operation are kept in an operations logbook. Minimal mandatory information include: start time and end time of each working shift, conditions of the GDUs in the beginning and in the end of the shift, recognition of the operation records of the previous shift, records of alarms and shutdowns.

Electronic records of operation are automatically saved in a data logger. The CDM Manager weekly export data from the data logger to a CD, which is then stored offsite, as well as upload data to an offsite server.

The operators perform hourly readings of the instruments installed at the LFG capturing and flaring system (pressure, temperature, composition, flow rate).

Daily readings at the LFG extraction network (pressure, methane, oxygen and carbon dioxide concentrations) are performed with a portable instrument. These records are kept in files. Monitoring points include each collection line and each LFG well.

All operators were trained for operation, maintenance and safety procedures.

MMPC has the following organizational structure for operations:

- Plant Manager: responsible for conducting internal audits, scheduling maintenance and calibration routines, orientation of staff and reporting to the Management;
- Operations and Maintenance Manager: scheduling maintenance of gas engines, overseeing power generation operations and reporting to the Plant Manager;
- Gas and CDM Manager: scheduling of maintenance and calibration of gas capturing and flaring systems, overseeing gas capturing and flaring system operations, back-up of data from the data logger, computation of ERs and reporting to the Plant Manager;
- Mechanical and Electrical Technicians: responsible for operating the gas engines, reading of process parameters, gas engine maintenance and reporting to the Operations and Maintenance Manager;
- Gas Technicians: responsible for operating the LFG capturing and flaring system, reading field instrumentation, field and gas blower maintenance, reading LFG data in the LFG extraction pipelines and reporting to the Gas Manager;

The following additional internal procedures and instructions were prepared by MMPC to assure satisfactory monitoring of the project activity, compliant with the Project Design Document:

- Data download and backup
- Instrument maintenance and calibration
- Quality assurance and quality control

SECTION D. Data and parameters
D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	GWP CH_4
Unit	t CO_2e/t CH_4
Description	Global warming potential of methane
Source of data	IPCC
Value(s) applied	21
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	AF
Unit	%
Description	Adjustment factor
Source of data	Registered Project Design Document
Value(s) applied	0
Purpose of data	Calculation of baseline emissions
Additional comment	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. Moreover, there are no contractual requirements imposed on neither 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. Changes in the law shall be monitored as a matter of procedure.

Data/Parameter	$NCV_{fuel,PR}$
Unit	TJ/Gg
Description	Calorific value of fossil fuel
Source of data	IPCC
Value(s) applied	43.33 TJ/Gg
Purpose of data	Calculation of project emissions
Additional comment	None

Data/Parameter	$EF_{fuel,PR}$
Unit	t CO_2e/TJ
Description	Emission factor for diesel generator sets
Source of data	IPCC
Value(s) applied	69.57 t CO_2e/TJ (converted from 3.2 kg CO_2/kg diesel)
Purpose of data	Calculation of project emissions
Additional comment	None

Data/Parameter	$\varepsilon_{gen,PR(DG)}$
Unit	%
Description	Efficiency of the captive power generation through the diesel generator
Source of data	Manufacturer's specifications
Value(s) applied	36.6 %
Purpose of data	Calculation of the project emissions
Additional comment	This value is fixed for the duration of the crediting period. A letter declaring the manufacturer's consideration has been supplied separately to the DOE.

Data/Parameter	$CEF_{elec,PR,y (DG)}$
Unit	t CO_2e/MWh
Description	CO_2 emissions factor for onsite electricity generation through diesel generator set
Source of data	Calculation
Value(s) applied	0.725
Purpose of data	Calculation of project emissions
Additional comment	This value is fixed for the duration of the crediting period. The calculation has been provided separately to the DOE.

Data/Parameter	D_{CH4}
Unit	t CH_4/m^3 CH_4
Description	Methane density
Source of data	ACM0001 Version 6
Value(s) applied	0.0007168
Purpose of data	Calculation of project emissions
Additional comment	None

D.2. Data and parameters monitored

Data/Parameter	$LFG_{total,y}$
Unit	m^3
Description	Total amount of landfill gas captured
Measured/Calculated /Default	Calculated
Source of data	Field instruments
Value(s) of monitored parameter	38,676,561.93
Monitoring equipment	Flow meter 44101, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010 Flow meter 44102, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010 Flow meter 44103, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010 Flow meter 44104, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010
Measuring/Reading/ Recording frequency	Flow rates are measured and read continuously. Instantaneous flow rates are recorded every 15 minutes.
Calculation method (if applicable)	The flow rates of all individual flow meters (flaring and electricity) are summed together.
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data, which are measured and used in the calculations of this parameter.
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	$LFG_{flared,y}$
Unit	m^3
Description	Total amount of landfill gas flared
Measured/Calculated /Default	Measured
Source of data	Field instruments
Value(s) of monitored parameter	3,201,507.54
Monitoring equipment	Flow meter 44102, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010 Flow meter 44104, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010
Measuring/Reading/ Recording frequency	Flow rates are measured and read continuously. Instantaneous flow rates are recorded every 15 minutes.
Calculation method (if applicable)	N/A
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data measured.
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	$LFG_{electricity,y}$
Unit	m^3
Description	Total amount of landfill gas combusted in power plant
Measured/Calculated /Default	Measured
Source of data	Field instruments
Value(s) of monitored parameter	35,475,054.39
Monitoring equipment	Flow meter 44101, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010 Flow meter 44103, Venturi-type, Accuracy of transmitter +- 0.065%, Serial Number FE–101, annual calibration, last calibration – 03/08/2010
Measuring/Reading/ Recording frequency	Flow rates are measured and read continuously. Instantaneous flow rates are recorded every 15 minutes.
Calculation method (if applicable)	N/A
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data measured.
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	$PE_{flare,y}$
Unit	t CO_2e
Description	Project emissions from flaring of the residual gas stream
Measured/Calculated /Default	Calculated
Source of data	N/A
Value(s) of monitored parameter	24,140.71
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Data used in the calculation are measured and read continuously and recorded every 15 minutes. The parameter is calculated every hour.
Calculation method (if applicable)	Determined according to Annex 13 "Tool to determine project emissions from flaring gases containing methane"
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data, which are measured and used in the calculations of this parameter.
Purpose of data	Calculation of project emissions
Additional comment	None

Data/Parameter	$w_{CH4,y}$
Unit	m^3 CH_4/ m^3 LFG
Description	Methane fraction in the landfill gas
Measured/Calculated /Default	Measured
Source of data	Field instrument
Value(s) of monitored parameter	Refer to the daily Excel worksheets
Monitoring equipment	CH_4 Analyser 42902, infrared analyser, Accuracy +-2%, Serial Number 32415, last calibration 08/08/2011
Measuring/Reading/ Recording frequency	Methane concentration is measured and read continuously. Instantaneous methane concentration is recorded every 15 minutes.
Calculation method (if applicable)	N/A
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data measured.
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	T
Unit	ºC
Description	Temperature of the landfill gas
Measured/Calculated /Default	Measured
Source of data	Field instruments
Value(s) of monitored parameter	Refer to the daily Excel worksheets
Monitoring equipment	Temperature transmitter 42301, head mounted, Accuracy +-0.1 C, Serial Number 114949-0039, annual calibration, last calibration – 22 May 2011, due on – 21 May 2012. Temperature transmitter 42302, head mounted, Accuracy +-0.1 C, Serial Number 113926-0039, annual calibration, last calibration – 22 May 2011, due on – 21 May 2012. Temperature transmitter 42303, head mounted, Accuracy +-0.1 C, Serial Number 113547-0039, annual calibration, last calibration – 22 May 2011, due on – 21 May 2012.
Measuring/Reading/ Recording frequency	Temperature of the landfill gas is measured and read continuously. Instantaneous temperature of the landfill gas is recorded every 15 minutes.
Calculation method (if applicable)	N/A
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data measured.
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	P
Unit	Mbar
Description	Pressure of the landfill gas
Measured/Calculated /Default	Measured
Source of data	Field instruments
Value(s) of monitored parameter	Refer to the daily Excel worksheets
Monitoring equipment	Pressure transmitter 42201, Accuracy 0.1%, Serial Number 2483177/2006, annual calibration, last calibration – 22 May 2011, due on – 21 May 2012. Pressure transmitter 42202, Accuracy 0.1%, Serial Number Z01722/09, annual calibration, last calibration – 22 May 2011, due on – 21 May 2012. Pressure transmitter 42203, Accuracy 0.1%, Serial Number Z01722/13, annual calibration, last calibration – 22 May 2011, due on – 21 May 2012.
Measuring/Reading/ Recording frequency	Pressure of the landfill gas is measured and read continuously. Instantaneous pressure of the landfill gas is recorded every 15 minutes.
Calculation method (if applicable)	N/A
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data measured.
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	EL_{LFG}
Unit	MWh
Description	Net amount of electricity generated using LFG
Measured/Calculated /Default	Measured
Source of data	Field instrument
Value(s) of monitored parameter	50,801.14
Monitoring equipment	Energy meter from the utility company, ABB/ELSTER – serial number 401JE001226. The utility company is responsible for its maintenance and calibration.
Measuring/Reading/ Recording frequency	Electricity generation is measured and read continuously. The utility company verifies the readings once per month and the electricity generation is recorded in the monthly bills that the Project Participant receives from the utility company.
Calculation method (if applicable)	N/A
QA/QC procedures	Responsibility of the utility company
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	$EL_{PR,DG,y}$
Unit	MWh
Description	Amount of electricity generated in an on-site DG sets as a result of the project activity
Measured/Calculated /Default	Measured
Source of data	Field instrument
Value(s) of monitored parameter	12.54
Monitoring equipment	Power meter, Gossen Metrawatt – serial number RE4211870005, annual external calibration.
Measuring/Reading/ Recording frequency	Instantaneous electricity is measured and read continuously. Values are recorded weekly.
Calculation method (if applicable)	N/A
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data measured.
Purpose of data	Calculation of project emissions
Additional comment	None

Data/Parameter	$EL_{PR,grid,y}$
Unit	MWh
Description	Amount of electricity imported from the grid as a result of the project activity
Measured/Calculated /Default	Measured
Source of data	Field instrument
Value(s) of monitored parameter	0
Monitoring equipment	Energy meter from the utility company, ABB/ELSTER – serial number 401JE000841. The utility company is responsible for its maintenance and calibration.
Measuring/Reading/ Recording frequency	Electricity import is measured and read continuously. The utility the electricity import is recorded in the monthly bills that the Project Participant receives from the utility company.
Calculation method (if applicable)	N/A
QA/QC procedures	Responsibility of the utility company
Purpose of data	Calculation of project emissions
Additional comment	None

Data/Parameter	$CEF_{elec, BL,y}$
Unit	t CO_2e/MWh
Description	CO_2 emissions factor for baseline grid electricity
Measured/Calculated /Default	Calculated
Source of data	Department of Energy of the Philippines (Power Statistics for the Region of Luzon)
Value(s) of monitored parameter	0.6138
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Annual calculation
Calculation method (if applicable)	The emission factor was developed based on official emission and generation data of all the generating units in Luzon, the region where Montalban is.
QA/QC procedures	N/A
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	$CEF_{elec, PR,y (GRID)}$
Unit	t CO_2e/MWh
Description	CO_2 emissions factor for imported grid electricity
Measured/Calculated /Default	Calculated
Source of data	Department of Energy of the Philippines (Power Statistics for the Region of Luzon)
Value(s) of monitored parameter	0.6138
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Annual calculation
Calculation method (if applicable)	The emission factor was developed based on official emission and generation data of all the generating units in Luzon, the region where Montalban is.
QA/QC procedures	N/A
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	η_{flare}
Unit	None
Description	Efficiency of the flare combustion
Measured/Calculated /Default	Calculated
Source of data	Field instruments
Value(s) of monitored parameter	Refer to the daily Excel worksheets
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Data used in the calculation are measured and read continuously and recorded every 15 minutes. The parameter is calculated every hour.
Calculation method (if applicable)	Determined according to "Tool to Determine Project Emissions from Flaring Gases Containing Methane"
QA/QC procedures	Calibration of equipment as per manufacturer's specifications to ensure validity of data, which are measured and used in the calculations of this parameter.
Purpose of data	Calculation of project emissions
Additional comment	None

Data/Parameter	Regulatory requirements relating to landfill gas projects
Unit	None
Description	Regulatory requirements relating to landfill gas projects
Measured/Calculated /Default	N/A
Source of data	Valid Permit to Operate
Value(s) of monitored parameter	N/A
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	The information though recorded annually, is used for changes to the adjustment factor suggested by the DNA (AF) or directly $MD_{reg,y}$ at renewal of the credit period. Data to be aggregated yearly and archived in electronic format during the crediting period and two years after.
Calculation method (if applicable)	N/A
QA/QC procedures	Director's Report
Purpose of data	Calculation of baseline emissions
Additional comment	None

Data/Parameter	Operations of the energy plant
Unit	hr
Description	Operations of the energy plant
Measured/Calculated /Default	Measured
Source of data	Data register
Value(s) of monitored parameter	15218.13
Monitoring equipment	Clock installed on the power plant control panel
Measuring/Reading/ Recording frequency	Values are accumulated and recorded
Calculation method (if applicable)	N/A
QA/QC procedures	N/A
Purpose of data	Calculation of baseline emissions
Additional comment	None

D.3. Implementation of sampling plan
>>Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks
E.1. Calculation of baseline emissions or baseline net GHG removals by sinks
>> Refer to section E.2, since the baseline emissions are calculated together with the project emissions, using $MD_{reg,y}$, which is calculated with the Adjustment Factor.

E.2. Calculation of project emissions or actual net GHG removals by sinks
>> The project emissions calculation is as follows, according to ACM0001 Version 6:

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

$ET_{LFG,y} * CEF_{ther,BL,y} = 0$ (no thermal energy generation)
$ET_{PRy} * EF_{fuel,PR,y} = 0$ (no fossil fuel consumption during the project activity)
$EL_{PR,y} * CEF_{elec,\,PR,y} = (EL_{PR,y(GRID)} * CEF_{elec,\,PR,y(GRID)}) + (EL_{PR,y(DG)} * CEF_{elec,\,PR,y(DG)})$ (electricity imported from grid plus electricity generated by an on-site diesel generator as a result of the project activity)

Final customized equation:

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

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

$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y}$
$MD_{thermal,y} = 0$

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

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

$$MD_{electricity,y} = LFG_{electricity,y} * w_{CH4,y} * D_{CH4} \quad \text{(Equation 5)}$$

$PE_{flare,y} = \sum TM_{RG,h} * (1- \eta_{flare,h}) * GWP_{CH4} / 1000$ (Equation 6)

$AF = 0\%$[1]
$GWP_{CH4} = 21$[2]
$D_{CH4} = 0.0007168\ tCH4/m^3_{CH4}$ [2]

$PE_{flare,y}$ is calculated according to the methodological "Tool to determine project emissions from flaring gases containing methane" – Annex 13 – EB28".

The control system of the flaring unit automatically records the parameters described in Table D.2.

ERy is obtained using the recorded data, Equation 1 (above) and the methodological "Tool to determine project emissions from flaring gases containing methane" – Annex 13 – EB28".

Monthly ER totalization spreadsheets are calculated.

The flare efficiency is measured continuously, as described in the methodology ACM0001 Version 6 and the "Tool to determine project emissions from flaring gases containing methane" by measuring the flow rate and methane content of the landfill gas going into the flare in accordance with the flare operating envelope.

During the monitoring period, the gas analyser 42902 was continuously on-line during the operation of the landfill gas capturing, power generation and flaring system.

The ER from avoided CH4 emissions is 265,797.91 tCO_2e
The ER from displaced power is obtained from the utility company invoices and from the electricity emissions factor:
$EL_{LFG,y} \times CEF_{elec,BL,y} = 50,801.14 * 0.6138 = 31,181.74\ tCO_2e$

Emissions due to electricity consumption from the grid are obtained from the utility company invoices and from the electricity emissions factor:
$EL_{PR,\ grid,y} \times CEF_{elec,PR,y\ (GRID)} = 0 * 0.6138 = 0\ tCO_2e$

Emissions due to electricity consumption from the on-site generator are obtained from the power meter of the generator and from the emissions factor for electricity generation through DG sets:
$EL_{PR,\ DG,y} \times CEF_{elec,PR,y\ (DG)} = 12.54 * 0.725 = 9.09\ tCO_2e$

The CER is finally calculated:

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

Hence:

$ER_y = 296,970.56\ tCO_2e$

Therefore, the net ERs are 296,970.56 tCO_2e.

[1] Source: PDD
[2] ACM0001 Version 06

E.3. Calculation of leakage
>>Not applicable.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Parameter	Unit	Value			Total Emission Reduction
		09/03/2010 - 31/12/2010	2011	01/01/2012- 31/03/2012	
$MD_{project, y}$	t CH_4	0	0	0	**0**
MD_{reg}	t CH_4	3,854.56	7,367.30	1,453.19	**12,657.04**
GWP_{CH4}	t CO_2e/t CH_4	21			-
$EL_{LFG,y}$	MWh	12,982.17	31,844.49	5,974.48	**50,801.14**
$CEF_{elect,BL,y}$	t CO_2e/MWh	0.6138			-
$EL_{PR,y(GRID)}$	MWh	0	0	0	**0**
$CEF_{elec, PR,y(GRID)}$	t CO_2e/MWh	0.6138			-
$EL_{PR,y(DG)}$	MWh	11.71	0.77	1.17	**12.54**
$CEF_{elec, PR,y(DG)}$	t CO_2e/MWh	0.6138			-
Total Emission Reduction	**t CO_2e**	**88,905.72**	**174,258.81**	**33,806.56**	**296,970.56**

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	1,086,475.58	296,970.56

E.6. Remarks on difference from estimated value in registered PDD
>>The actual emission reductions achieved during this monitoring period is lower than the value estimated in the registered PDD.

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
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