MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/05/2010

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 1 and date 27/05/2011

Loma Los Colorados Landfill Gas Project
Registration N° 0822
Monitoring period 4 and dates (first and last days included (01/09/2009 - 31/08/2010)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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Purpose of the project activity and the measures taken to reduce greenhouse gas emissions;

Loma Los Colorados Landfill Gas Project aims to develop and operate a landfill gas (LFG) collection and utilization/destruction system. This involves investing in and operating a system for landfill gas collection and electricity generation and/or flaring. Landfill gas collected and flared and now used for electricity generation leads to additional GHG emissions reductions —from fossil fuel replacement — and would be claimed within the context of this Clean Development Mechanism (CDM) project.

Brief description of the installed technology and equipments;

Currently, 291 LFG wells are installed over a 50 Ha surface and they are connected to the flaring station, through an active gas extraction system. The flaring system of the Landfill is operating according to the manufacturer's specifications. All the LFG flaring system has been provided by LFG Specialities L.L.C.

Installation of two Waukesha Generation Engines for a total of 2 MW installed capacity was done during the first half of 2009. Testing of the generation equipment started in June 7th, 2009 and connection to the grid was done in November 26th, 2009. CERs from electricity generation will be claimed from January 2010. Now the project proponent is implementing the next steps of the project activity which considers the first 7 units of 1.4 MW each which are under construction and would be put in operation after August 1st, 2011, so to supply the energy to the SIC (or in English, Central Interconnected System) in the Punta Peuco existing substation.

Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.).

The project in its 4th period includes important changes which is a notification of change of the PDD. The project from the beginning is under continued operation, without stops and is growing based on a planned structure. For this period a first step of the energy generation facility was implemented (2 MW) and now is growing for a second step of 9.8 MW of a total of 34 MW to be implemented on 2025. In the following table a brief description shows the actual implementation:

Event	System size	Date
Facilities construction and equipment installation	----------	01-12-2006
Control system design and implementation	----------	01-12-2006
System Start-up	5,097 m^3/h	26-02-2007
Flare Start-up nº 2	5,097 m^3/h	12-03-2008
Construction (wells drilling, pipeline construction)	15 wells	29-12-2007
Construction (shallow wells and pipe lines)	56	28-02-2008

Event	System size	Date
Operating wells	181	12-03-2008
Internal Audit	----------	19-03-2008 11-08-2008 09-01-2009 20-04-2009 21-04-2010
External Audit (AENOR)	----------	26/28-02-2008 2/4-06-2008 25-11-2008 30-07-2009 21-09-2010
Testing of Waukesha Engines (2 units)	1 MW each	07/06/2009
Connection to the CDEC-SIC grid of the 2 Waukesha units	----------	26/11/2009

Total emission reductions achieved in this monitoring period.

The total ER's achieved in this monitoring period of September 01, 2009 till August 31, 2010 is tabulated as follows:

Period	CER (tCO_{2e})
September 01, 2009 until August 31, 2010	**472,669**

A.2. Project Participants

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As stated on the UNFCCC register (see http://cdm.unfccc.int/Projects/DB/DNV-CUK1166695034.41/view) and on the PDD the Project participants are:

Chile (host): KDM S.A.
Japan: The Kansai Electric Power Co., Inc.
Spain: Urbaser S.A.

A.3. Location of the project activity:

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The Loma Los Colorados Landfill is located in the administrative district ("Comuna") of Til-Til, 63.5 km north of Santiago, Chile, near a village named Montenegro. Til-Til is located 578 meters above the sea level. According to the last census (2002), it has a population of 18,000 inhabitants covering an area of 667.3 km^2. The distance between the landfill and the nearest settlement, Montenegro, is 3 km. Montenegro has a population of about 600 inhabitants.

The coordinates in decimal notation are:
-32.9564, -70.8013

A.4. Technical description of the project

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The following sections are a general description of the flare systems and their associated equipment.

A. Enclosed Flares (equipment provided by LFG Specialities L.L.C.)

Flaring Station and HDPE Piping

Flare Stack: Carbon steel construction with ANSI 150 lb flanged inlet connection. Top portion of flare stack is 304 stainless steel. Carbon steel shell (10' diameter, 45' height) is internally insulated with ceramic fiber insulation (to resist operation temperatures, reaching values of 1095°C), and painted inside and out with high temperature paint. According to manufacturer's specification, the flare has a flow range between 500 –3000 scfm (800 – 5097 Nm3/h). On section C it is included the discrimination range of valid data (Biogas flow, Temperature, and methane content) and the data collection architecture diagram.

Burner Assembly: All 304 stainless steel construction. Burner is suitable for operation over a 6:1 turndown range. (Proper blower and drive selection is required to realize the full 6:1 turndown range) Igniter Assembly: The igniter is a small burner used to light the main burner. Typically fueled with bottled propane gas, the igniter assembly consists of a 304 stainless steel burner tube with spark plug ignition and type K thermocouple for flame confirmation. The spark plug is supplied with high temperature leads and a transformer in a NEMA 4 enclosure.

Flame Supervision: Typically consists of an ultraviolet flame detector to confirm flame integrity.
Temperature Control: – A dedicated closed loop temperature controller is used to maintain flare temperature setpoint. Process temperature is selectable from among multiple thermocouples (Pyromation), and control is maintained by modulating combustion air dampers at the flare base.

Flare System Controllers: Enclosed flares all use the Flame-Trol IV PLC (programmable logic controller) based control system. This is a technically advanced, fully automatic flare system controller specifically designed for maximum operating flexibility and efficiency.

Sample Ports: Sample ports are provided near the flare top as per EPA requirements to allow for emissions compliance testing.

Flame Arrestor: This device prevents flame flash back in the event of high oxygen concentrations in the landfill gas. The standard flame arrestor is equipped with an aluminium core assembly.

Standard Insulation: The enclosed flare interior is insulated with a nominal 2 inches of ceramic fiber blanket insulation. This amount of insulation Hill result in a hot metal skin temperature which is useful in preventing acid gas condensation from occurring on the metal shell ID.

B. Condensate Knock-Out Pot (KOP)

A 60 inch diameter x 90 inch OAH LFG Specialties L.L.C. KOP with 150# flanged 24 inch Inlet and 18 inch outlet connections. KOP to have:

- Internal coating of hi-build epoxy to resist acidic condensate
- External finish with rust resistant primer and industrial enamel color coat
- Stainless steel mist extraction pad with a 98% filtration efficiency of free liquids and solid particles of 20 microns or larger
- Removable lid to facilitate inspection and repair of coating if necessary
- Heavy duty gage glass liquid indicator
- Drain connection with manual ball valve and plug
- Liquid level switch for high condensate level alarm/shutdown

C. Blowers

System include 3 each landfill gas blowers, with 380 V, 3 phase, 50 Hz power requirement. Each blower is direct coupled centrifugal type, sparkproof, cast iron construction, cast aluminum impellers, with 75 HP TEFC motor. The impellers, inlet & outlet heads, and blower casing are coated with resistant phenolic coating. Each blower will deliver 3000 SCFM gas flow with 60 in. w.c. inlet vacuum and 15 in. w.c. discharge pressure.

Blower station

D. Automatic shut-off valves

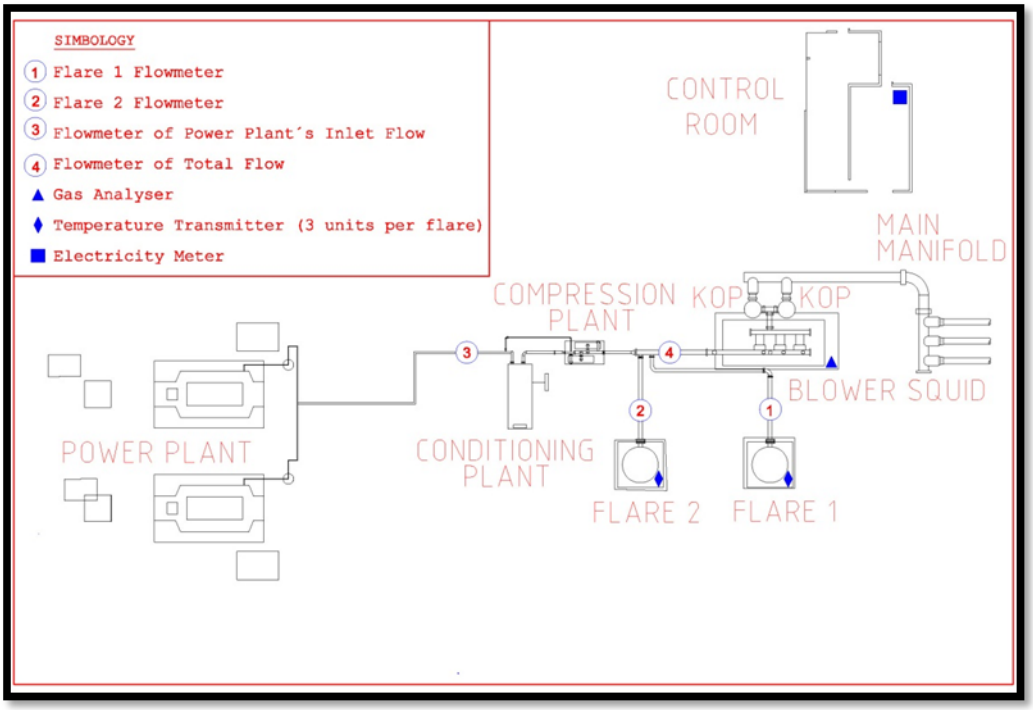
1 each 12 in. bubble-tight carbon steel wafer type butterfly valve with Teflon seat materials and stainless steel shafts and discs with a Bettis CB Series or equal pneumatic actuator and 3 way solenoid valve. Unit will have a spring operated "fail safe" closing in case of a power failure.

E.Thermal Mass Flowmeter & chart recorder

2 thermal mass Flowmeter (one for each flare) and two more as backup, provided by Fluid Components International L.L.C. The thermal mass flowmeter provides a NCMH reading without the need for separate compensating pressure or temperature transducers. The meter will have a local flow reading in NCMH and a 4 to 20mA linear output signal wired to the flare control panel. Unit is equipped with a Yokogawa FX112 digital paperless chart recorder to keep accurate record of gas flow as well as accurate time record of flare activities like operation and down time.

From December 1st, 2009 the energy and generation flowmeter begins data collection for CER claim purposes. Nonetheless CERs generated during December 2009 by generation means were not taken in account due to difficulties to demonstrate the supply to the grid. From January 2010 the situation was normalized and data could be justified by the different bills to clients (according CDEC-SIC report available for the audit team).

This new changes requires, based on the methodology, a gas totalizer flowmeter, shown on the following image (4), from the same brand, calibrated previous their installation as shown on the device table.



F. Pressure/Vacuum transmitters & Variable frequency drives

1 each Yokogawa vacuum transmitter and 2 each Yokogawa pressure transmitters. The transmitters have a local display reading in percent of full scale and a 4 to 20mA linear output wired to the flare control panel. The flare control panel manipulates the signals from the transmitters and in turn sends a command signal to the variable frequency drives. The variable frequency drives controls the speed of the gas blower motors based on this signal. The vacuum and pressure is also recorded by the chart recorder.

G. Gas Analyzer

1 each Siemens Ultramat 23 gas analyzer. The gas analyzer continuously monitors the methane, oxygen, and carbon dioxide composition of landfill gas and sends an alarm to the flare control panel if the landfill gas content is out of the user-adjustable range. The gas analyzer also sends a 4 to 20mA linear output signal wired to the chart recorder to keep record of gas composition.

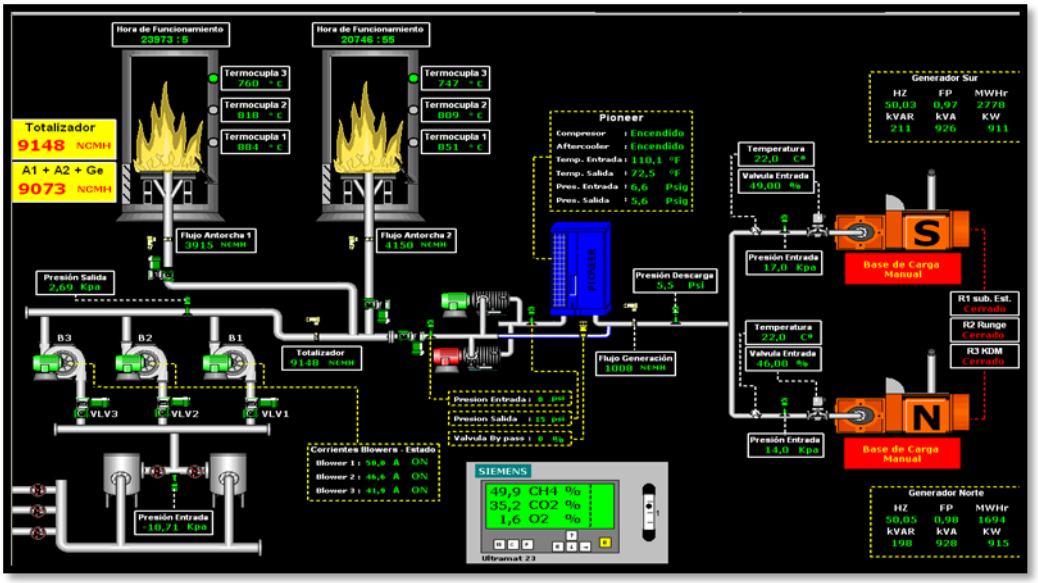
Gas Analyzer

H. Piping

Include all on-skid interconnecting piping and valves between KOP and flare as follows:

- Piping unless otherwise stated will be standard schedule 40, carbon steel pipe with flanged connections for equipment and valving. Pipe internal will be coated with hi-solid epoxy to resist acidic condensate.
- Piping system to be fully supported employing base mountings and pipe stands.
- Valves will be Flow Line or equal cast iron wafer style butterfly type with Buna seat materials and stainless steel shafts and discs.
- Miscellaneous equipment including required vacuum and pressure gauges and temperature gauges.

A general view of the Scada system (below a real operation image) illustrates the project activity:



The following sections are a general description of the energy generation system and their associated equipment.

A. Energy Units

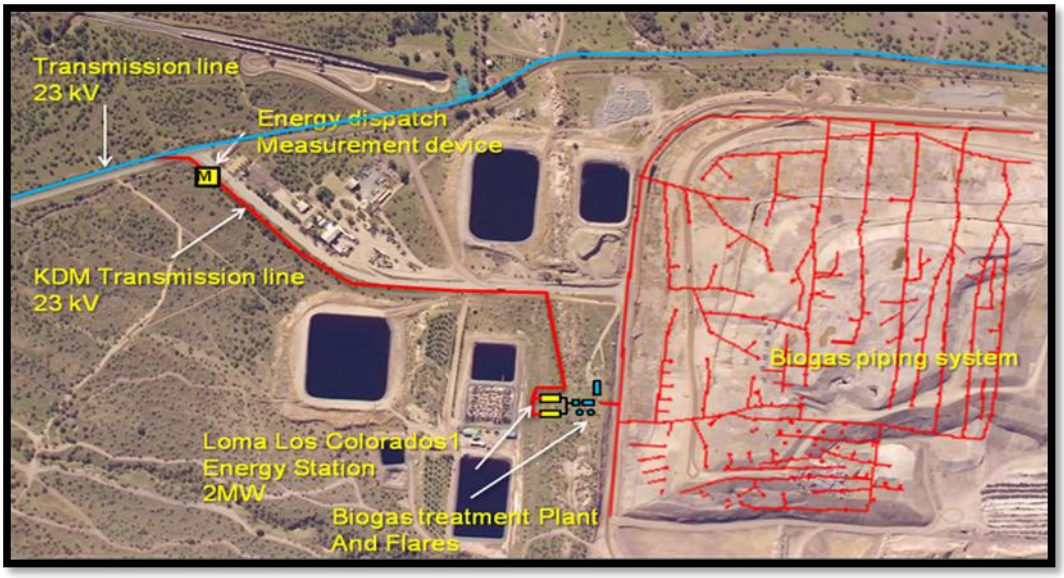
The first step of the implementation of the generation units are the Waukesha engines, each one is from 1 MW, the commissioning dates for them are from June 7th, 2009. Includes a chiller unit and special blowers for the generation activities.

The following images show one of the Waukesha engine:

The following image shows the complete generation system with the generation units in their respective soundproof container:

B. Energy Transmission

A new transmission line of 1 km approximately, was constructed and implemented for the energy dispatch, from the both installed energy engines. The line reach the existing transmission line as described on the following photomontage, to supply the energy to the SIC grid.



General lay-out with the Landfill facilities and the project activity

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Approved consolidated baseline methodology ACM0001, version 4, 28 July 2006: "Consolidated baseline methodology for landfill gas project activities".

Approved consolidated baseline methodology ACM0002 version 6, 19 May 2006 – "Consolidated methodology for grid-connected electricity generation from renewable sources"

A.6. Registration date of the project activity:

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17/03/2007

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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The PP has opted for a crediting period of 7 years (renewable) starting from 17/03/2007 ending the 16/03/2014. Before this date, the plant was in commissioning from 26/02/2007. The official start up flare Nº2 is the 12/03/2008. The official start up from the Waukesha engines is the 07/06/2009 and begins their claim of emissions reductions in 01/12/2009 (estimated date).

A.8. Name of responsible person(s)/entity(ies):

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Responsible persons for the submission of the monitoring report:

Prepared by: Jose Zuñiga I. - Landfill Environmental Supervisor, e-mail: jzuniga@guk.cl

Revised by: Alejandro Keller H. – Project Manager, e-mail: akeller@guk.cl

Approved by: Sergio Durandeau S., General Manager, e-mail: sdurandeau@guk.cl

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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This section should include a description of the implementation and operational status of the project as of this monitoring period in accordance with the latest version of the CDM Validation and Verification Manual (CDM-VVM)[1]. The description should include *inter alia*:

1. **The starting date of operation of the project activity.**
   The project activity started its crediting period the same day of registration (17/03/2007). The project is still under construction to achieve the steps of implementation described on the registered PDD. The landfill gas collection and flaring systems is growing according an implementation plan. The electricity generation system finished its implementation in late 2009 with 2 Waukesha engines with a total nameplate capacity of 2 MW, connected to the grid for electricity export. A second stage facility for electricity generation is under construction, comprising a 9.8 MW nameplate electric capacity. All the changes occurred and planned for the implementation of the electricity generation system are to be addressed under a Notification of Changes process as per the applicable CDM rules
2. **The information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc.**
   Two special events which affect the whole operation occurs during this monitoring period:
   1. Exchange of the Gas analyser Siemens ULTRAMAT 23 S/N: U6-477, on 24/09/2009 by a calibrated backup analyser of the same brand/type S/N: N1-W2-678.
   2. Malfunctioning of the Gas analyser ULTRAMAT 23 S/N: N1-W2-678 from 06/05/2010 until 11/05/2010. A solution was provided according to the guidelines described on procedure I-RSL-013 due to a device fault.

   A Table of events is included (Flaring and Generation).

Flares	
02-09-2009	Flare stop due to verification of the SIEMENS analyzer
06-09-2009	Flare stop due to energy blackout, comes into work emergency generation unit. Restriction of flow due to high Oxygen content 3.6%
17-09-2009	Flare stop due to verification of the SIEMENS analyzer
24-09-2009	Flare stop due to general maintenance of the system. SIEMENS Gas analyzer is changed due to electrical problems.
05-10-2009	Problems in the air compressor. Flare stop due to energy blackout, comes into work emergency generation unit.
08-10-2009	Flow restriction for Flare 1, for exhaust gas measurement of the flare 2 by AIRON
26-10-2009	Flare stop due to energy failure. Fail in flare 1 thermocouples, change of it
02-11-2009	Flare stop due to electrical maintenance in the electrical power lines
05-11-2009	Flare stop due to KOP n°2 installation and change in the flame arrestor of Flare 1. Energy blackout comes into work emergency generation unit.
06-11-2009	Flow restriction due to high oxygen content. Flare stop due to KOPn°2 installation
10-11-2009	Wells pipelines disconnection

[1] http://cdm.unfccc.int/Reference/Manuals/index.html

	Flare stop due to finalization of KOPn°2 installation.
12-11-2009	Isokinetic measurement is performed (flare 1)
16-11-2009	Flow restriction for Flare 2, for exhaust gas measurement of the flare 1 by AIRON
18-11-2009	Flare stop due to maintenance of condensate traps.
13-12-2009	Flare stop due to ULTRAMAT gas analyzer stop.
16-12-2009	Flare stop due to energy failure. Flare stop due to unstable flow (liquid in pipelines).
24-12-2009	Flare stop due to SIEMENS analyzer verification
25-12-2009	Flare stop due to energy failure. Flare stop due to failure in the flame monitoring system.
29-12-2009	Flare stop due to energy failure Flare stop due to general maintenance
15-01-2010	Flare stop due to flame arrestor maintenance
21-01-2010	Flare stop due to general maintenance
11-02-2010	Flare stop due to general maintenance
22-02-2010	Flare stop due to energy failure, comes into work emergency generation unit. South gas pipeline is closed du the maintenance
27-02-2010	Flare stop due to heavy seismic event (earthquake), system is re-started with the emergency generation unit.
28-02-2010	Flare stop due to failure in the flame monitoring system
02-03-2010	Flare stop due to energy failure
04-03-2010	Flare stop due to energy failure
23-03-2010	Flare stop due to general maintenance of the system Flowmeter serial number 268935 was changed by the Flowmeter serial number 278712 Flowmeter serial number 300542 was changed by the Flowmeter serial number 285359 A verification of the gas analyzer was performed
30-03-2010	Flow restriction for Flare 1, for exhaust gas measurement of the flare 2 by AIRON
04-04-2010	Compressor problems
07-04-2010	Flow restriction for Flare 2, for exhaust gas measurement of the flare 1 by AIRON
14-04-2010	Isokinetic measurement is performed (flare 1)
22-04-2010	System stops due to UPS installation.
06-05-2010	SIEMENS gas analyzer presents problems, a troubleshooting procedure is applied, in which every 5 minutes a measurement is acquired with a portable gas analyzer device.
11-05-2010	SIEMENS staff left running the gas analyzer
15-05-2010	Flare stop due to maintenance
24-05-2010	Isokinetic measurement is performed (flare 2)
13-06-2010	Flare stop due to energy failure
14-06-2010	Flow restriction for Flare 2, for exhaust gas measurement of the flare 1 by AIRON
15-06-2010	Flow restriction for Flare 1, for exhaust gas measurement of the flare 2 by AIRON
18-06-2010	Flare stop due to unstable flow
21-06-2010	Flare stop due to general maintenance
05-07-2010	Isokinetic measurement is performed (flare 1)
06-07-2010	Flare stop due to unstable flow
09-07-2010	Isokinetic measurement is performed (flare 2)
13-07-2010	Flare stop due to ULTRAMAT gas analyzer stop.

19-07-2010	Flare stop due to maintenance works in the UPS
27-07-2010	Flare stop due to maintenance works in the 315 pipeline
15-08-2010	Flare stop due to energy failure Restriction of flow due to high oxygen content
Generation	
01-01-2010	Reconnector 3 installation
10-01-2010	Ignition system failure of the generator1
21-01-2010	Maintenance work on reconnector 3
30-01-2010	Abnormal voltages in generator 1
26-02-2010	Maintenance work in reconnector 2and 3
02-03-2010	Operation test
30-03-2010	Maintenance in generator 2
10-04-2010	maintenance in the generator 1
24-05-2010	Biogas supply failure in the fuel admision devices
11-06-2010	Maintenance in generator 2
14-06-2010	Maintenance in generator 2
04-07-2010	Maintenance in generator 1
21-08-2010	Maintenance in generator 2

3. **A brief description of: (i) events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and (ii) how the issues resulting from these events or situations are being addressed.**
   During the malfunctioning of the gas Analyser mentioned on the previous point (paragraph 2), due to a fault of the installed gas analyser (ULTRAMAT 23 S/N: N1-W2-678). The procedure to solve this situation is described in the respective troubleshooting procedure I-RSL-013. During this short period of time, the procedure indicates the need to collect data by direct readings from the portable Gas analyser GEM 2000(S/N GM11160) (field analyser) every 5 minutes from the beginning of the event as shown on the Control templates for this case (documents available for the audit team). As the event taked place, the Siemens technician determined the fault and corrected it. After checking the device, the technician put it on work again, certifying the proper functioning of it, and this was held on 11/05/2010.

B.2. Revision of the monitoring plan

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A revision of the monitoring plan was submitted to the DOE on March 26th, 2010. The DOE provides to the EB the validation opinion and upload the revised Monitoring Plan into the UNFCCC web interface. The parameter requested (quantity and CO_2 emission intensity of fuel oil or any other fuel that could be used to fulfil the energy requirements) was included on the improved Monitoring Plan. The Revised Monitoring Plan was approved on 16/08/10 (see following link: http://cdm.unfccc.int/UserManagement/FileStorage/I7PZFDYQLKJCXG1630BHW2N84SVUAO)

B.3. Request for deviation applied to this monitoring period

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No deviations occurred during this monitoring period.

B.4. Notification or request of approval of changes

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In the context of the periodic verification for the monitoring period from 1 September 2009 to 31 August 2010, a notification of changes will be assessed and submitted to UNFCCC by the audit team of the DOE in charge of the verification. The changes are mainly related to a new power generation scheme, and correction of other minor errors in the registered PDD.

SECTION C. Description of the monitoring system

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The data collection begins with the methane content analyzer and the metering of biogas to each Flare and generation units[2] using thermal mass flowmeters, information handled by a PLC which is connected to the main data base collection system, WinCC. Then, data acquired every 15 seconds are archived on the WinCC, and are transferred automatically upon user request to a master spreadsheet, in which the data is discriminated based on the following criteria:

For Flares

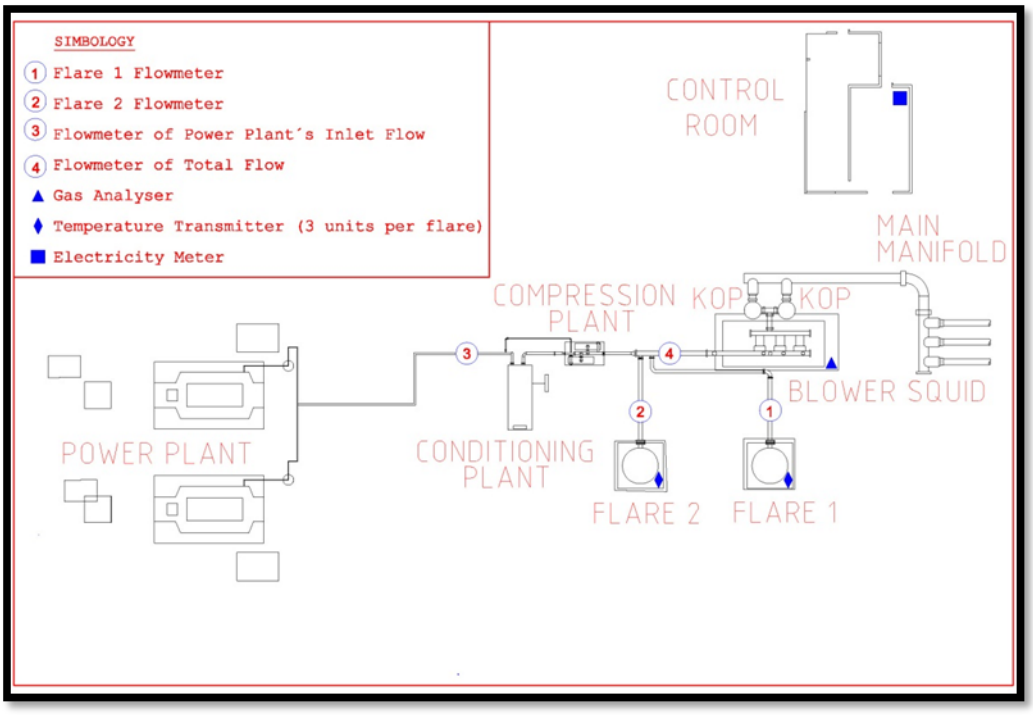
800 m^3/h < Flow biogas < 5,097 m^3/h 500°C < Temperature < 1,095 °C 30% < Methane < 70%

For Generators

180 m^3/h < Flow biogas < 1,800 m^3/h 30% < Methane < 70%

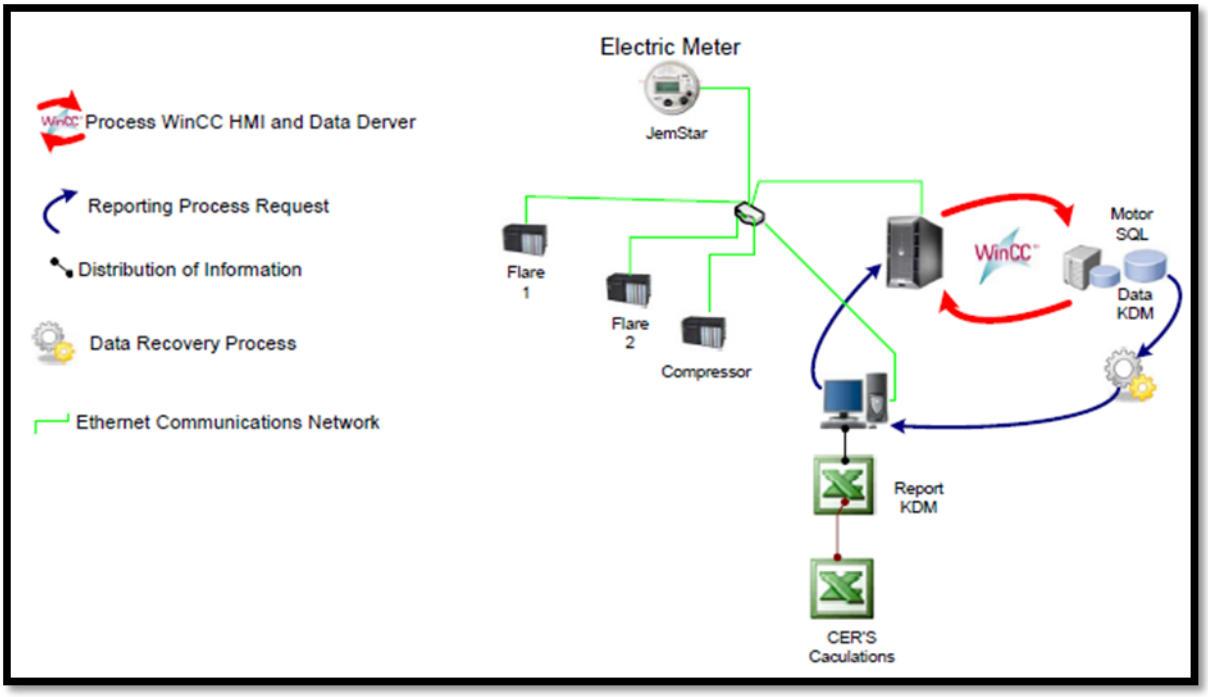
Note: For LFG monitoring purposes, the used data correspond to the information collected by the Flare1, Flare2 and Energy generation measurement devices. Data collected by the total flowmeter (located on the supply pipeline before the Flares and generation units) is used to contrast the monitored information of each device.

Monitoring Points



[2] From January 2010

Also the data collection architecture is presented:



After this discrimination and for reporting procedures, data is transferred manually (copy-paste activity included on the data management procedure named I-RSL-021), to a spreadsheet for CER calculation process.

SECTION D. Data and parameters

This section shall include parameters used to calculate baseline, project, and leakage emissions as well as other relevant parameters required by the approved methodology and the monitoring plan; and specific information on how data and parameters have been monitored during the monitoring period. Data that is determined only once for the crediting period but are used after registration of the project activity should be included here under section D.1.

Provide for each parameter the following information, using the tables provided below:

1. Value of monitored parameter in the period for the purpose of calculating emission reductions. To report multiple values, a table may be used and included in this monitoring report or include references to spreadsheet. For default value (such as an IPCC value), where it is ex-post confirmed, the most recent value shall be applied.
2. Description of the equipment used to monitor each parameter, including details on accuracy class, and calibration information (frequency, date of calibration and validity), if applicable as per monitoring plan.
3. Measuring and recording method: how the parameters are measured/calculated, specifying the measurement and recording frequency.
4. Source of data: logbooks, daily records, surveys, etc.
5. Where relevant, the calculation method of the parameter.
6. The QA/QC procedures applied (if applicable per monitoring plan).
7. Include information about appropriate emission factors, IPCC default values and any other reference values that have been used in the calculation of emission reductions.

Since every parameter is verified and eventually updated at least on each monitoring report, no data is included under section D.1.

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors	
(Copy this table for each data and parameter. To report multiple values, a table may be used)	
Data / Parameter:	**GWP_{CH4}**
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of methane
Source of data used:	ACM0001 methodology (version 4) and registered PDD.
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Value used in the baseline emission calculations
Additional comment:	

Data / Parameter:	**DCH_4**
Data unit:	$t\ CH_4/m_3CH_4$
Description:	Density of methane
Source of data used:	ACM0001 methodology (version 4) and registered PDD.
Value(s) :	0.0007168
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Value used in the baseline emission calculations
Additional comment:	

Data / Parameter:	**$TDL_{j,y}$**
Data unit:	**%**
Description:	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data used:	Defauly value (Scenario A) as per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".
Value(s) :	20%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Value used for project emission calculations
Additional comment:	

Data / Parameter:	**MDreg**
Data unit:	**tCH_4**
Description:	Amount of methane that would have been destroyed during the year in the absence of the project activity
Source of data used:	Fixed number (estimate calculation)
Value(s) :	245 tCH_4
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Value used in the Baseline emission
Additional comment:	

Data / Parameter:	**$CEF_y=EF_{CM}$**
Data unit:	**tCO_2/MWh**
Description:	CO_2 emission factor of the grid
Source of data used:	Calculated as per ACM0002 version 6 and data provided by the CDEC-SIC in an *ex-ante* basis as indicated in the registered PDD.
Value(s) :	0.408 tCO_2e/MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Value used in the baseline and project emission calculations
Additional comment:	

D.2. Data and parameters monitored	
Data / Parameter:	**$LFG_{total,y}$**
Data unit:	**Nm^3**
Description:	Total amount of landfill gas captured
Measured /Calculated /Default:	Measured
Source of data:	Measured by a thermal mass flowmeter.
Value(s) of monitored parameter:	Recorded values are reported in the emission reduction calculation spreadsheet which is enclosed to the Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Thermal mass flowmeter, FCI Model ST-98, calibration every 18 months, according to provider specifications. Descriptions of each device please refer to Table 1 below.
Measuring/ Reading/ Recording frequency:	Continuous measurement (device register every 15 seconds), weekly recording
Calculation method (if applicable):	By spreadsheet
QA/QC procedures applied:	Calibrated flow meters are used from the equipment supplier. This calibration has a validity of 18 months. However for internal operational control, the company (project proponent) will withdraw each flow meter after a period not exceeding 12 months, to send it to the supplier for a re-calibration. On each replacement, factory re-calibrated flow meters will be installed.

Data / Parameter:	**$LFG_{flare,y}$**
Data unit:	**Nm^3**
Description:	Amount of landfill gas flared
Measured /Calculated /Default:	Measured
Source of data:	Measured by a thermal mass flowmeter
Value(s) of monitored parameter:	Recorded values are reported in the emission reduction calculation spreadsheet which is enclosed to the Monitoring Report.
Indicate what the data are	Data used for baseline emission calculations

used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Thermal mass flowmeter, FCI Model ST-98, calibration every 18 months, according to provider specifications. Descriptions of each device please refer to Table 1 below.
Measuring/ Reading/ Recording frequency:	Continuous measurement (device register every 15 seconds), weekly recording
Calculation method (if applicable):	By spreadsheet
QA/QC procedures applied:	Calibrated flow meters are used from the equipment supplier. This calibration has a validity of 18 months. However for internal operational control, the company (project proponent) will withdraw each flow meter after a period not exceeding 12 months, to send it to the supplier for a re-calibration. On each replacement, factory re-calibrated flow meters will be installed.

Data / Parameter:	**$LFG_{electricity,y}$**
Data unit:	**Nm^3**
Description:	Amount of landfill gas combusted in power plant
Measured /Calculated /Default:	Measured
Source of data:	Measured by a thermal mass flowmeter
Value(s) of monitored parameter:	Recorded values are reported in the emission reduction calculation spreadsheet which is enclosed to the Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Thermal mass flowmeter, FCI Model ST-98, calibration every 18 months, according to provider specifications. Descriptions of each device please refer to Table 1 below.
Measuring/ Reading/ Recording frequency:	Continuous measurement (device register every 15 seconds), weekly recording
Calculation method (if applicable):	By spreadsheet
QA/QC procedures applied:	Calibrated flow meters are used from the equipment supplier. This calibration has a validity of 18 months. However for internal operational control, the company (project proponent) will withdraw each flow meter after a period not exceeding 12 months, to send it to the supplier for a re-calibration. On each replacement, factory re-calibrated flow meters will be installed.

Data / Parameter:	**FE**
Data unit:	**%**

Description:	Flare/combustion efficiency Determined by the operation hours and the methane content in the exhaust gas[3]
Measured /Calculated /Default:	Measured
Source of data:	External Data (see excel file: System Flare Efficiency Calculation.xls)
Value(s) of monitored parameter:	For the Flare 1, the efficiency of the flare applied is as follow: From 04/08/2009 until 15/11/2009 the efficiency used was 99.9968% From 16/11/2009 until 06/04/2010 the efficiency used was 99.9907% From 07/04/2010 until 13/06/2010 the efficiency used was 99.9975% From 14/06/2010 until 21/09/2010 the efficiency used was 99.9933 For the Flare 2, the efficiency of the flare applied is as follow: From 15/07/2009 until 07/10/2009 the efficiency used was 99.9966% From 08/10/2009 until 29/03/2010 the efficiency used was 99.9954% From 30/03/2010 until 14/06/2010 the efficiency used was 99.9986% From 15/06/2010 until 22/09/2010 the efficiency used was 99.9937%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	An accredited external Laboratory performs the CH_4 measurement in the exhaust gases of the enclosed flare.
Measuring/ Reading/ Recording frequency:	Continuous, enclosed flare shall be monitored yearly, with the first year measurement to be made at the time of installation.
Calculation method (if applicable):	According to methodology
QA/QC procedures applied:	Accreditation of the Laboratory for CH_4 measurements, standard gas tracking documents, equipment calibration by an accredited entity, should be scrutinized on each audit.

Data / Parameter:	$\mathcal{W}_{CH4,y}$
Data unit:	**m^3 CH_4/m^3 LFG**
Description:	Methane fraction in the landfill gas
Measured /Calculated /Default:	Measured
Source of data:	Gas analyzer
Value(s) of monitored parameter:	Recorded values are reported in the emission reduction calculation spreadsheet which is enclosed to the Monitoring Report
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration	SIEMENS Ultramat 23, series number U6-477. SIEMENS Ultramat 23, series number N1-W2-678. Descriptions of each device please refer to Table 1 below.

[3] The operating hours are calculated with data valid for one day, but as the Measurement instrument are connected to the PLC, it records the data every 15 seconds, and is considered all valid data in one day obtaining thereby the operating flare hours, and the methane content is monitored by an external Laboratory with certified standard gases.

frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Continuous measurement (device register every 15 seconds), weekly recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Calibration procedures and schedules are described on the Integrated Management System document PGEN-009, and manual equipment

Data / Parameter:	**Regulatory Requirements**
Data unit:	**Text**
Description:	**Regulatory requirements relating to landfill gas projects**
Measured /Calculated /Default:	n/a
Source of data:	According to the procedure P-GEN-AMB-003 regulatory requirements must be analysed once a year, and the persons which take part of such revision are the Environmental engineer of the specific area, with collaboration of the quality department of the company, and on specific cases a request of revision of such regulatory requirements should be asked to an external staff of advocates. For this specific monitoring period, the applicable revision was performed on May 27, 2009. For this period the mentioned report shows no new incidents/changes on the Project activities or in the local environmental regulations. The mentioned procedure and document are available for the audit team.
Value(s) of monitored parameter:	n/a
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	n/a
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	n/a
Measuring/ Reading/ Recording frequency:	At the renewable of crediting period
Calculation method (if applicable):	n/a
QA/QC procedures applied:	n/a

Data / Parameter:	**$EL_{EXP\ LFG,y}$**
Data unit:	**MWh**
Description:	Total amount of electricity exported out of the project
Measured /Calculated /Default:	Measured
Source of data:	Electricity meter
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration	JEMSTAR model Js-09R50110CO Descriptions of each device please refer to Table 1 below.

frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Continuous measurement, weekly recording[4]
Calculation method (if applicable):	n/a
QA/QC procedures applied:	

Data / Parameter:	**$EL_{IMP,y}=EC_{PJ,j,y}$**
Data unit:	**MWh**
Description:	Total amount of electricity imported to meet project requirement
Measured /Calculated /Default:	Measured
Source of data:	Electricity meter
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Power logic PM 710, Calibration frequency twice a year.[5] Descriptions of each device please refer to Table 1 below.
Measuring/ Reading/ Recording frequency:	Continuous measurement, weekly recording[6]
Calculation method (if applicable):	n/a
QA/QC procedures applied:	

Data / Parameter:	**Operational Hours**
Data unit:	**Hours**
Description:	Operation of the power plant
Measured /Calculated /Default:	Measured
Source of data:	Hour meter
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	n/a

[4] According to the methodology, the parameter should be measured continuously /periodically. On the PDD, we define, based on the design of the project a weekly basis, nonetheless, information is taken daily, being conservative and more accurate

[5] There has not been performed the calibration of the electric meters consumption power logic PM710 series number 02B 0629 and power logic PM710 series number 02B 0637, at the biogas plant in accordance with the established in section D.4, page 37 number 10 of the PDD, which mentions that the calibrations will be performed twice a year. According to the letter delivered by the manufacturer Schneider Electric with date of April 23, 2007, the meters installed and used since February 2007 to register the consumption of the plant, doesn't need any calibration, because they are digital and not possess any internal mechanical system to realize the functions of measure and control. However, KDM requested an external calibration which was performed on October 3th 2008, where was used an electrical analysis equipment (brand Electrochile model RT8C series number: RT2806), demonstrating that the electrical meters used at the plant are perfectly operative not affecting the measurements of electrical consumption in the period. This request is performed in order to give transparency to the measurement process of the electricity consumption. The following calibration for both meters was performed on June 1st 2009.

[6] According to the methodology, the parameter should be measured continuously /periodically. On the PDD, we define, based on the design of the project a weekly basis, nonetheless, information is taken daily, being conservative and more accurate

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Hour meter included in the system
Measuring/ Reading/ Recording frequency:	Collected annually
Calculation method (if applicable):	n/a
QA/QC procedures applied:	

Data / Parameter:	**T_{Flare}**
Data unit:	**°C**
Description:	Flare Temperature
Measured /Calculated /Default:	Measured
Source of data:	Thermocouples
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	n/a
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Thermocouples Pyromation Type D
Measuring/ Reading/ Recording frequency:	Continuous measurements
Calculation method (if applicable):	n/a
QA/QC procedures applied:	In case of failure, a new thermocouple is installed; new devices are calibrated by provider.

Data / Parameter:	**$FC_{i,j,y}$**
Data unit:	mass or volume unit/yr
Description:	Quantity of fuel type i combusted in process j during the year y
Measured /Calculated /Default:	Measured
Source of data:	According to operative instructive IRSL-013 which describes and require procedures to record fuel consumption from each source.
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Continuous measurements
Calculation method (if	n/a

applicable):	
QA/QC procedures applied:	

Data / Parameter:	**$NCV_{i,j}$**
Data unit:	TJ/Kg or TJ/m3 (in the case of natural gas)
Description:	Weighted average net calorific value of the fuel type i in year y
Measured /Calculated /Default:	Measured
Source of data:	(a) Values provided by the fuel supplier of the power plants in invoices (b) Regional or national average defaults (c) IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	n/a
Measuring/ Reading/ Recording frequency:	n/a
Calculation method (if applicable):	n/a
QA/QC procedures applied:	

Data / Parameter:	**$EFCO_{2,i,y}$**
Data unit:	tCO_2/TJ
Description:	Weighted average CO_2 emission factor of fuel type i in year y
Measured /Calculated /Default:	Measured
Source of data:	IPCC 2006 default emission factors (Volume 2, Chapter 3, page 50, Table 3.5.2.) will be used for each of the fuels consumed.
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data used for project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	n/a
Calculation method (if applicable):	n/a
QA/QC procedures applied:	

TABLE 1 Calibration Table from all Monitoring devices									
Instruments	**Model**	**Parameter**	**Calibration Frequency**	**Serial Number**	**Calibration Date**	**Calibration Expiration Date**	**Dates Used**		**Comment**
							From	**To**	
Gas analyzer SIEMENS	Ultramat 23	$w_{CH_4,y}$	Only when the accuracy is without the established range of both the analyzer and the standard gas . Annual calibration as per the manual	U6-477	03-03-2008	03-03-2009	13-03-2007	24-09-2009	On September 24th, the gas analyzer SIEMENS is changed from the S/N U6-477 device to the S/NN1-W2-678 device
					09-03-2009	09-03-2010			
					02-09-2009	02-09-2010			
					17-09-2009	17-09-2010			
				N1-W2-678	01-10-2009	01-10-2010	24-09-2009	Present	From May 6th the biogas concentration were made by the biogas field analyzer GEM Serial number GM11160 as a contingency measure. On May 11th, the SIEMENS technical staff performs maintenance and leaves operational the gas analyzer
					24-12-2009	24-12-2010			
					23-03-2010	23-03-2011			
					11-05-2010	11-05-2011			
					18-08-2010	18-08-2011			
Thermal Mass Flow Meter Flare n°1	*ST-98*	$LFG_{total,y}$	Every 2 years.	278712	16-05-2007	16-11-2008	11-01-2008	11-11-2008	Replaced for thermal mass flow meter, serial number: 268935 on November 11, 2008 in the flare N°1.
				268935	21-10-2008	21-04-2010	11-11-2008	23-03-2010	Installed November 11, 2008 in the flare N°1, in replacement of thermal mass flow meter serial number: 278712.
				278712	20-10-2009	20-04-2011	23-03-2010	06-01-2011	Replaced for thermal mass flow meter, serial number: 268935 on March 23, 2010 in the flare N°1.
				300542	22-11-2010	22-05-2012	06-01-2011	Present	Installed January 6, 2008 in the flare N°1, in replacement of thermal mass flow meter serial number: 278712.
Thermal Mass Flow Meter Flare n°2	*ST-98*	$LFG_{total,y}$	Every 2 years.	285359	28-11-2007	28-05-2009	03-03-2008	15-05-2009	Replaced for thermal mass flow meter, serial number: 300542 on May 15, 2009 in the flare N°2.
				300542	23-01-2009	23-07-2010	15-05-2009	23-03-2010	Installed May 15, 2009 in the flare N°2, in replacement of thermal mass flow meter serial number: 285359
				285359	20-10-2009	20-04-2011	23-03-2010	06-01-2011	Replaced for thermal mass flow meter, serial number: 300542 on January 6, 2011

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

TABLE 1 Calibration Table from all Monitoring devices									
Instruments	**Model**	**Parameter**	**Calibration Frequency**	**Serial Number**	**Calibration Date**	**Calibration Expiration Date**	**Dates Used**		**Comment**
							From	**To**	
									in the flare N°2.
				268935	19-11-2010	19-05-2012	06-01-2011	Present	Installed January 6, 2011 in the flare N°2, in replacement of thermal mass flow meter serial number: 285359
Thermal Mass Flow Meter Total	*ST-98*	$LFG_{total,y}$	Every 2 years.	303215	17-04-2009	17-10-2010	19-08-2009	19-07-2010	
				325925	17-05-2010	17-11-2011	19-07-2010	06-01-2011	
				303215	22-11-2010	22-05-2012	06-01-2011	Present	
Thermal Mass Flow Meter Electricity	*ST-98*	$LFG_{total,y}$	Every 2 years.	300541	02-07-2009	02-01-2011	01-09-2009	19-07-2010	
				325926	18-05-2010	18-11-2011	19-07-2010	06-01-2011	
				300541	18-11-2010	18-05-2012	06-01-2011	Present	
Electricity meter 1	*Power Logic PM 710*	$EL_{IMP,y}$	Twice a year	02B0629	03-10-2008	03-04-2009	13-03-2007	Present	
					01-06-2009	01-12-2009			
					29-12-2009	29-06-2010			
					22-06-2010	22-12-2010			
Electricity meter 2	*Power Logic PM 710*	$EL_{IMP,y}$	Twice a year	02B0637	03-10-2008	03-04-2009	13-03-2007	Present	
					01-06-2009	01-12-2009			
					29-12-2009	29-06-2010			
					22-06-2010	22-12-2010			
Electricity meter	*Js-09R50110CO*	$EL_{EXP\ LFG,y}$		092312090	22-06-2010	22-12-2010	24-08-2009	Present	

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

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Methane

The GHG emission reduction associated with methane destruction achieved by the project activity during a given year "y" (ERM_y) is the difference between the amount of methane actually destroyed during the year ($MD_{project,y}$) and the amount of methane that would have been destroyed during the year in the absence of the project activity ($MD_{reg,y}$)[7], times the approved GWP Global Warming Potential value for methane (GWP_{CH_4}).

$$ERM_y = (MD_{project,y} - MD_{reg,y}) \cdot GWP_{CH_4}$$

Where:

ERM_y is expressed in tonnes of CO_2 equivalent (tCO_{2e})

$MD_{project,y}$ and $MD_{reg,y}$ are expressed in tonnes of methane (tCH_4)

GWP_{CH_4} = 21 tCO_2e/tCH_4

Even though $MD_{reg,y}$, is not specified in regulatory or contractual requirements, since there are no legal requirements to capture and flare landfill gas in Chile, prior to the implementation to the project activity a small amount of landfill gas has been collected and flared at this project site. In order to be conservative, we have considered the three-year average (2002-04) mass of methane captured (245 tonnes methane per year) and flared (assuming 100% flare efficiency) to be the baseline. If any such requirements are introduced during the first crediting period, an appropriate absolute value of $MD_{reg,y}$, shall be used and justified in the baseline for the second crediting period, taking into account the project context.

$MD_{project,y}$ will be determined *ex post* by metering the actual quantity of methane captured and destroyed once project activity is operational. The methane destroyed by the project activity ($MD_{project,y}$) during a year is determined by monitoring the quantity of methane actually flared or otherwise combusted for electricity generation.

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

$$MD_{flared,y} = LFG_{flare,y} \cdot w_{CH_4,y} \cdot D_{CH_4} \cdot FE$$

Where:

$MD_{flared,y}$ is the quantity of methane destroyed by flaring during the year expressed in cubic meters (m^3)

$LFG_{flared,y}$ is the quantity of landfill gas flared or during the year measured in cubic meters (m^3)

$w_{CH_4,y}$ is the methane fraction of the landfill gas as measured and expressed as a fraction (in m^3CH_4/m^3LFG)

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[7] Reg = regulatory and contractual requirements.

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

FE is the flare efficiency (the fraction of the methane destroyed)

D_{CH_4} is the methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4).

$$MD_{electricity,y} = LFG_{electricity,y} \cdot w_{CH_4,y} \cdot D_{CH_4}$$

Where:

$MD_{electricity,y}$ is the quantity of methane destroyed by generation of electricity during the year measured in cubic meters (m^3)

$LFG_{electricity,y}$ is the quantity of landfill gas fed into electricity generator during the year measured in cubic meters (m^3)

$w_{CH_4,y}$ is the methane fraction of the landfill gas as measured and expressed as a fraction (in m^3CH_4/m^3LFG)

D_{CH_4} is the methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4).

For calculate the flare efficiency we propose the next formula based in a mass balance between methane inlet and methane in the exhaust gases.

$$FE = 1 - \frac{M_{nd,kg/h}}{MD_{flared,kg/h}}$$ This formula is according to EB 28 Annex13.

Where:

$MD_{flared,kg/h}$ is quantity of methane sent to flare in kg/hour

$M_{nd,kg/h}$ is the quantity of methane non destroyed in kg/hour

$$M_{nd,kg/h} = \frac{CH_4 \text{mg/m}^3\text{n} \cdot Flow \text{m}^3\text{n/hr}}{1{,}000{,}000 Kg/gr}$$

$$MD_{flared,kg/h} = LFG_{flared,m^3/h} \cdot w_{CH4,day\_average} \cdot D_{CH_4} \cdot 1000 \frac{kg}{ton}$$

Carbon dioxide

Carbon dioxide emissions reductions during a given year y (ERC_y) are given by:

$$ERC_y = EL_y \bullet CEF_y$$

where

ERC_y is measured in tonnes of CO_2 (tCO_{2e})

EL_y is the net quantity of electricity exported during the year *y*, MWh, given by:

$$EL_y = EL_{EXPLFG,y}$$

where

$EL_{EXPLFG,y}$ is the quantity of electricity exported during year *y*, produced using landfill gas, MWh

CEF_y is the emission factor for electricity generation, tCO_2/MWh, given by:

$$CEF_y = \frac{CEF_{OM,y} + CEF_{BM,y}}{2}$$

where

$CEF_{OM,y}$ is the Operating Margin emission factor, tCO_2/MWh, and

$CEF_{BM,y}$ is the Build Margin emission factor, tCO_2/MWh.

The emissions factor is determined using the approved consolidated methodology ACM0002 (version 6), requiring a determination of the Build Margin, the Operating Margin and a Combined Margin.

Data of vintage year 2003, 2004 and 2005 were used to determine the *ex-ante* determined Operating Margin and Build Margin.

On the following tables a summary of calculations are included for baseline emission on the calculation spreadsheet (see spreadsheet: CERcalculationsMR4_2009_2010.xlsx)

Flare 1

Period		Methane destroyed and sent to flare [m3]	Methane sent to flare [tons]	Total tCO2e
01-09-2009	30-09-2009	1,170,018.8002	837.7334	17,592.4014
01-10-2009	31-10-2009	1,284,798.0735	919.9154	19,318.2234
01-11-2009	30-11-2009	1,159,259.0225	830.0294	17,430.6174
01-12-2009	31-12-2009	1,006,221.4076	720.4545	15,129.5445
01-01-2010	31-01-2010	1,103,199.4516	789.8908	16,587.7068
01-02-2010	28-01-2010	1,029,863.7323	737.3824	15,485.0304
01-03-2010	31-03-2010	1,177,947.1266	843.4101	17,711.6121
01-04-2010	30-04-2010	1,313,032.8077	940.1314	19,742.7594
01-05-2010	05-05-2010	259,704.5488	185.9484	3,904.9164
06-05-2010	11-05-2010	246,804.0567	176.7117	3,710.9457
12-05-2010	31-05-2010	995,802.3973	712.9945	14,972.8845
01-06-2010	30-06-2010	1,382,031.7525	989.5347	20,780.2287
01-07-2010	31-07-2010	1,414,268.1221	1,012.6159	21,264.9339
01-08-2010	31-08-2010	1,401,135.0619	1,003.2127	21,067.4667
Total of period		**14,944,086.3611**	**10,699.9658**	**224,699.2818**

System error calculation

Flare 1						
Period		hours	Flow m3/h	Q mean	error %	deviation
01-09-2009	30-09-2009	707.2750	2,419,423.8708	3,420.77	1.75	59.693
01-10-2009	31-10-2009	735.9250	2,630,538.2625	3,574.47	1.71	61.230
01-11-2009	30-11-2009	679.5125	2,356,787.0000	3,468.35	1.73	60.168
01-12-2009	31-12-2009	723.1833	2,137,673.1958	2,955.92	1.86	55.044
01-01-2010	31-01-2010	731.3375	2,298,818.3167	3,143.31	1.81	56.918
01-02-2010	28-02-2010	644.9500	2,133,135.4542	3,307.44	1.77	58.559
01-03-2010	31-03-2010	705.0708	2,434,934.8125	3,453.46	1.74	60.020
01-04-2010	30-04-2010	705.4917	2,631,419.8208	3,729.91	1.68	62.784
01-05-2010	05-05-2010	118.8875	513,259.3208	4,317.18	1.59	68.657
06-05-2010	11-05-2010	143.5125	479,484.0000	3,341.06	1.76	58.896
12-05-2010	31-05-2010	469.7458	1,973,134.8125	4,200.43	1.61	67.489
01-06-2010	30-06-2010	708.1958	2,757,686.0583	3,893.96	1.65	64.425
01-07-2010	31-07-2010	726.3917	2,867,380.0542	3,947.43	1.65	64.959
01-08-2010	31-08-2010	737.9500	2,842,266.1583	3,851.57	1.66	64.001
	Total	8,537.43	30,475,941.14			

Q Average of the period	3569.685973
deviation of the average	61.18185973
Error	1.71
Total	29953605.343813

System error	0.01984	0.000393755
	1.990	3.93755037321584

Flare 2				
Period		Methane sent to flare [m3]	Methane sent to flare [tons]	Total tCO2e
01-09-2009	30-09-2009	1,309,175.3499	937.3695	19,684.7595
01-10-2009	31-10-2009	1,404,015.5785	1,005.2751	21,110.7771
01-11-2009	30-11-2009	1,196,200.6286	856.4796	17,986.0716
01-12-2009	31-12-2009	1,187,366.9015	850.1547	17,853.2487
01-01-2010	31-01-2010	1,093,190.5410	782.7244	16,437.2124
01-02-2010	28-02-2010	979,844.2732	701.5684	14,732.9364
01-03-2010	31-03-2010	1,066,443.9086	763.5738	16,035.0498
01-04-2010	30-04-2010	1,253,884.1814	897.7810	18,853.4010
01-05-2010	05-05-2010	247,865.9672	177.4720	3,726.9120
06-05-2010	11-05-2010	271,014.6897	194.0465	4,074.9765
12-05-2010	31-05-2010	1,012,796.3908	725.1622	15,228.4062
01-06-2010	30-06-2010	1,469,156.7596	1,051.9162	22,090.2402
01-07-2010	31-07-2010	1,472,192.0494	1,054.0895	22,135.8795
01-08-2010	31-08-2010	1,527,197.7081	1,093.4735	22,962.9435
Total of period		**15,490,344.9274**	**11,091.0869**	**232,912.8249**

System error calculation

Flare 2						
Period		hours	Flow m3/h	Q mean	error %	deviation
01-09-2009	30-09-2009	704.1125	2,707,565.4625	3,845.36	1.66	63.939
01-10-2009	31-10-2009	733.5791	2,874,959.5042	3,919.09	1.65	64.676
01-11-2009	30-11-2009	674.9000	2,431,893.8458	3,603.34	1.71	61.518
01-12-2009	31-12-2009	718.7000	2,522,604.3792	3,509.95	1.73	60.585
01-01-2010	31-01-2010	725.7250	2,278,163.1125	3,139.15	1.81	56.877
01-02-2010	28-02-2010	637.0125	2,029,483.8708	3,185.94	1.80	57.344
01-03-2010	31-03-2010	697.4125	2,206,677.8375	3,164.09	1.81	57.126
01-04-2010	30-04-2010	701.9417	2,514,635.2292	3,582.40	1.71	61.309
01-05-2010	05-05-2010	119.0875	489,845.8875	4,113.33	1.62	66.618
06-05-2010	11-05-2010	143.5000	526,274.0000	3,667.41	1.69	62.159
12-05-2010	31-05-2010	468.0500	2,006,755.5458	4,287.48	1.59	68.360
01-06-2010	30-06-2010	705.3458	2,931,870.5500	4,156.64	1.61	67.051
01-07-2010	31-07-2010	724.4375	2,985,477.4167	4,121.10	1.62	66.696
01-08-2010	31-08-2010	737.3292	3,098,387.8458	4,202.18	1.61	67.507
	Total	8,491.13	31,604,594.49			

Q Average of the period	3722.070246
deviation of the average	62.70570246
Error	1.68
Total	31072152.011324

System error	0.01959	0.000383821
	1.960	3.83821273438789

Electricity Flow

Period		Methane sent to Electricity [m3]	Methane sent to flare [tons]	Total tCO2e
01-09-2009	30-09-2009	0.0000	0.0000	0.0000
01-10-2009	31-10-2009	0.0000	0.0000	0.0000
01-11-2009	30-11-2009	0.0000	0.0000	0.0000
01-12-2009	31-12-2009	0.0000	0.0000	0.0000
01-01-2010	31-01-2010	55,428.8984	39.6870	833.4270
01-02-2010	28-02-2010	133,261.2985	95.4150	2,003.7150
01-03-2010	31-03-2010	111,592.7210	79.9003	1,677.9063
01-04-2010	30-04-2010	343,756.8303	246.1298	5,168.7258
01-05-2010	05-05-2010	45,326.5029	32.4537	681.5277
06-05-2010	11-05-2010	82,462.1030	59.0428	1,239.8988
12-05-2010	31-05-2010	153,183.7798	109.6795	2,303.2695
01-06-2010	30-06-2010	334,245.9254	239.3200	5,025.7200
01-07-2010	31-07-2010	274,146.5863	196.2889	4,122.0669
01-08-2010	31-08-2010	304,683.0288	218.1530	4,581.2130
Total of period		**1,838,087.6743**	**1,316.0707**	**27,637.4847**

System error calculation

Electricity						
Period		hours	Flow m3/h	Q mean	error %	deviation
01-09-2009	30-09-2009	0.0000	0.0000	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!
01-10-2009	31-10-2009	0.0000	0.0000	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!
01-11-2009	30-11-2009	0.0000	0.0000	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!
01-12-2009	31-12-2009	0.0000	0.0000	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!
01-01-2010	31-01-2010	239.2500	115,838.7375	484.17	6.26	30.327
01-02-2010	28-02-2010	464.5708	277,747.2250	597.86	5.26	31.464
01-03-2010	31-03-2010	315.8083	229,884.7542	727.92	4.50	32.764
01-04-2010	30-04-2010	679.1833	687,177.2833	1,011.77	3.52	35.603
01-05-2010	05-05-2010	117.6083	89,406.3042	760.20	4.35	33.087
06-05-2010	11-05-2010	143.5500	160,131.0000	1,115.51	3.28	36.640
12-05-2010	31-05-2010	353.3125	302,602.6875	856.47	3.98	34.050
01-06-2010	30-06-2010	684.1375	666,002.6750	973.49	3.62	35.220
01-07-2010	31-07-2010	707.9417	556,148.9000	785.59	4.24	33.341
01-08-2010	31-08-2010	724.6500	616,464.2167	850.71	4.00	33.992
	Total	4,430.01	3,701,403.78			

Q Average of the period	835.5289705
deviation of the average	15.3552897
Error	1.84
Total	3633379.658000

System error	0.02092	0.000437748
	2.100	4.37748169097236

Energy Export

Period		Electricity export MWh	Emission factor tCO2 / MWh	Total tCO2e
01-01-2010	31-01-2010	147.1670	0.4080	60.0441
01-02-2010	28-02-2010	335.4973	0.4080	136.8829
01-03-2010	31-03-2010	558.5440	0.4080	227.8860
01-04-2010	30-04-2010	1,004.9890	0.4080	410.0355
01-05-2010	05-05-2010	130.0051	0.4080	53.0421
06-05-2010	11-05-2010	237.4258	0.4080	96.8697
12-05-2010	31-05-2010	471.8237	0.4080	192.5041
01-06-2010	30-06-2010	1,001.5558	0.4080	408.6348
01-07-2010	31-07-2010	979.2664	0.4080	399.5407
01-08-2010	31-08-2010	1,088.2322	0.4080	443.9987
			Total	**2,429.4385**

E.2. Project emissions calculation

>>

Project emissions $PE_{i,y}$ are defined as follows:

$$PE_{i,y} = PE_{EC,y} + PE_{FC,j,y}$$

Fossil fuels consumption:

To determine project emissions from fossil fuel combustion the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" version 2, which refers to the following formula:

$$PE_{FC,j,y} = \sum FC_{i,j,y} * COEF_{i,y}$$

$PE_{FC,j,y}$: Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);

$FC_{i,j,y}$: Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);

$COEF_{i,y}$: Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

i: Are the fuel types combusted in process j during year y

To determine $COEF_{i,j}$ option B was chosen, and is determined as follows:

$$COEF_{i,y} = NVC_{i,j} * EF_{CO2,i,y}$$

$COEF_{i,y}$: Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

$NCV_{i,j}$: Is the weighted average net calorific value of the fuel type i in year y

$EF_{CO2,i,y}$: Is the weighted average CO_2 emission factor of fuel type i in year y

i: Are the fuel types combusted in process j during year y

Fuel consumption

Period		Fuel or Energy	Emission Factor	Quantity liters	Quantity Kg	Calorific power kj/kg	Energy Tj	Tons of CO_{2e}
01-09-2009	30-09-2009	Fuel oil	74,1 tCO_{2e}/TJ	273	232.05	43,000	0.0100	0.7410
01-10-2009	31-10-2009	Fuel oil	74,1 tCO_{2e}/TJ	280	238.00	43,000	0.0103	0.7633
01-11-2009	30-11-2009	Fuel oil	74,1 tCO_{2e}/TJ	213	181.05	43,000	0.0078	0.5780
01-12-2009	31-12-2009	Fuel oil	74,1 tCO_{2e}/TJ	106	90.10	43,000	0.0039	0.2890
01-01-2010	31-01-2010	Fuel oil	74,1 tCO_{2e}/TJ	301	255.85	43,000	0.0111	0.8226
01-02-2010	28-02-2010	Fuel oil	74,1 tCO_{2e}/TJ	1,039	883.15	43,000	0.0380	2.8158
01-03-2010	31-03-2010	Fuel oil	74,1 tCO_{2e}/TJ	1,350	1,147.50	43,000	0.0494	3.6606
01-04-2010	30-04-2010	Fuel oil	74,1 tCO_{2e}/TJ	153	130.05	43,000	0.0056	0.4150
01-05-2010	31-05-2010	Fuel oil	74,1 tCO_{2e}/TJ	345	293.25	43,000	0.0127	0.9411
01-06-2010	30-06-2010	Fuel oil	74,1 tCO_{2e}/TJ	416	353.60	43,000	0.0153	1.1338
01-07-2010	31-07-2010	Fuel oil	74,1 tCO_{2e}/TJ	0	0.00	43,000	0.0000	0.0000
01-08-2010	31-08-2010	Fuel oil	74,1 tCO_{2e}/TJ	256	217.60	43,000	0.0094	0.6966
Total				**4,732**	**4,022.20**		**0.1735**	**12.8568**

Date	Fuel or Energy	Emission Factor	Quantity (Kg)	Calorific power kj/kg	Energy Tj	Tons of CO_{2e}
29-12-2009	Liquefied Petroleum Gases	63.1 tCO_{2e}/TJ	45	47,300	0.0022	0.1389
03-05-2010	Liquefied Petroleum Gases	63.1 tCO_{2e}/TJ	45	47,300	0.0022	0.1389
Total Project emission tCO2e						**0.2778**

Electricity consumption:

"Imported" electricity refers to any electricity taken (from the grid) by the project activity, principally for blowers used in landfill gas extraction. Such imports may be present as project emissions. These CO2 emissions from electricity consumption are calculated using the latest version of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption": The electricity is purchased from the grid only with no captive plants, so scenario A corresponds to the analysis. Such tool states that:

$$PE_{EC,y} = \sum_{j} EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

Where:

$PE_{EC,y}$	Project emissions from electricity consumption in year *y* (tCO_2/yr)
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source *j* in year *y* (MWh/yr)[8].
$EF_{EL,j,y}$	Emission factor for electricity generation for source *j* in year *y* (tCO_2/MWh)[9].
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source *j* in year *y.* As proposed by the tool, scenario *A* gives the alternative of using a default value of 20%, so that alternative was applied.

Therefore, the previous equation turns into:

$$PE_{EC,y} = 1.2 * \sum_{j} EL_{IMP,y} * CEF_{y}$$

In the tables below the information of the CERs calculation is provided. During on site audit, the calculation sheet (CERcalculationsMR4_2009_2010.xlsx) will be provided.

Period		Energy	Emission Factor	Quantity Electricity KW	Tons of CO_{2e}
01-09-2009	30-09-2009	Electricity	0.408 tCO_{2e}/MWh	38,509	18.8541
01-10-2009	31-10-2009	Electricity	0.408 tCO_{2e}/MWh	42,901	21.0044
01-11-2009	30-11-2009	Electricity	0.408 tCO_{2e}/MWh	39,008	19.0984
01-12-2009	31-12-2009	Electricity	0.408 tCO_{2e}/MWh	44,034	21.5591
01-01-2010	31-01-2010	Electricity	0.408 tCO_{2e}/MWh	44,697	21.8837
01-02-2010	28-02-2010	Electricity	0.408 tCO_{2e}/MWh	42,944	21.0254
01-03-2010	31-03-2010	Electricity	0.408 tCO_{2e}/MWh	49,820	24.3919
01-04-2010	30-04-2010	Electricity	0.408 tCO_{2e}/MWh	42,830	20.9696
01-05-2010	31-05-2010	Electricity	0.408 tCO_{2e}/MWh	32,233	15.7813
01-06-2010	30-06-2010	Electricity	0.408 tCO_{2e}/MWh	29,492	14.4393
01-07-2010	31-07-2010	Electricity	0.408 tCO_{2e}/MWh	35,065	17.1679
01-08-2010	31-08-2010	Electricity	0.408 tCO_{2e}/MWh	36,111	17.6800
Total				**477,644**	**233.8551**

[8] This parameter refers to the same monitored variable under $EL_{IMP,y}$

[9] CEF_y in this case replaces $FE_{EL,j,y}$

Summary of used fuels during the period

Fuel or Energy	Emission Factor	Quantity	Calorific power kj/kg	Energy Tj	Tons of CO_{2e}
Fuel oil	74.1 tCO_{2e}/TJ	4,022.20	43,000	0.1735	12.8568
Liquefied Petroleum Gases	63.1 tCO_{2e}/TJ	90 kg	47,300	0.0043	0.2778
Electricity	0.408 tCO2e/MWh	477,644 MWh			233.8551
Total Project emission tCO2e					**246.9897**

E.3. Leakage calculation

>>

According with ACM0001– version 04 and the registered PDD, no leakage needs to be considered.

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

E.4. Emission reductions calculation / table

>>

Considering both, methane and carbon dioxide emissions, total emissions reductions, ER_y are given by:

$$ER_y = ERM_y + ERC_y - PE_{i,y}$$

On the following table a summary included on the calculation spreadsheet CERcalculationsMR4_2009_2010.xlsx shows the respective emission reductions.

Summary Table

Total tCO_{2e} Flare 1	Total tCO_{2e} Flare 2	Total tCO_{2e} Electricity	Total tCO_{2e} Electricity export	System uncertainty Flare1	System uncertainty Flare 2	System uncertainty Electricity	MD reg,y (tCO2e)	Project emission (tCO_{2e})	Total tCO_{2e} claimed
224,699.2818	232,912.8249	27,637.4847	2,429.4385	1.9900%	1.9600%	2.1000%	5,146.0000	246.9897	472,669.0000

$$Total_{tCO_{2e}claimed} = [[Total_{tCO_{2E}}\ flare1 * (1 - System_{uncertainty}\ flare1)] +$$
$$[Total_{tCO_{2E}}\ flare2 * (1 - System_{uncertainty}\ flare2)] +$$
$$[Total_{tCO_{2E}}\ Electricity * (1 - System_{uncertainty}\ Electricity)]] -$$
$$MD_{reg} - \Pr oject_{emission}$$

This section shall include the formulae used to calculate the emission reductions and the total of the emission reductions achieved during the monitoring period.

Total baseline emissions:	472,915.9897	tCO_{2e}/y
Total project emissions:	246.9897	tCO_{2e}/y
Total leakage:	0	tCO_{2e}/y
Total emission reductions:	472,669.0000	tCO_{2e}/y

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	567,378 (*)	472,669

(*)Value proportional to the estimated stated in the registered PDD (1/9/2009 until 31/8/2010)

On the following section a summary of the above interpolation is included

E.6. Remarks on difference from estimated value in the PDD

>>

Estimation of total emission reduction for 2009 according to PDD: 543,670 tCO_2e
Estimation of total emission reduction for 2010 according to PDD: 579,281 tCO_2e
Since in this monitoring period year 2009 is only covered for a period of 122 days, the proportional estimation of total emission reduction is 181,720 tCO_2e, and for the year 2010 it covers a period of 243 days, then the proportional estimation of total emission reduction is 385,658 tCO_2e. The sum gives an estimation of total emission reduction of 567,378 tCO_2e for the scrutinized period.

During 2009 for the monitoring period which start on September 1st, 2009, the total emission reduction corresponds to 141,390 tCO_2e as shown on the below table.
During 2010 for the monitoring period which finalize on August 31th, 2010, the total emission reduction corresponds to 331,279 tCO_2e as shown on the below table.
According to this the total emission reductions claimed in this report is 472,669 tCO_2e which is lower than the estimated value included on the PDD (extrapolation shows a value of: 567,378 tCO_2e) for the same period of time.
The quantity of CERs is lower than projected because the registered PDD estimation considered the extraction of LFG from all of the landfill surface (100%) which is unpractical since no more than 60% of the landfill surface is available for well drilling and the rest remains for landfill filling operations. Another factor impacting the CERs estimation is the measured methane content of approximately 48,5% in average, which is lower than the 50% considered in the registered PDD estimation.

The inclusion of electricity generation during this period allows an increase of CERs claims, but no so important as the flaring of the LFG. We consider that the project is now in regime, and minor corrections were included to improve the collection of LFG and methane destruction (flaring/energy generation).

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

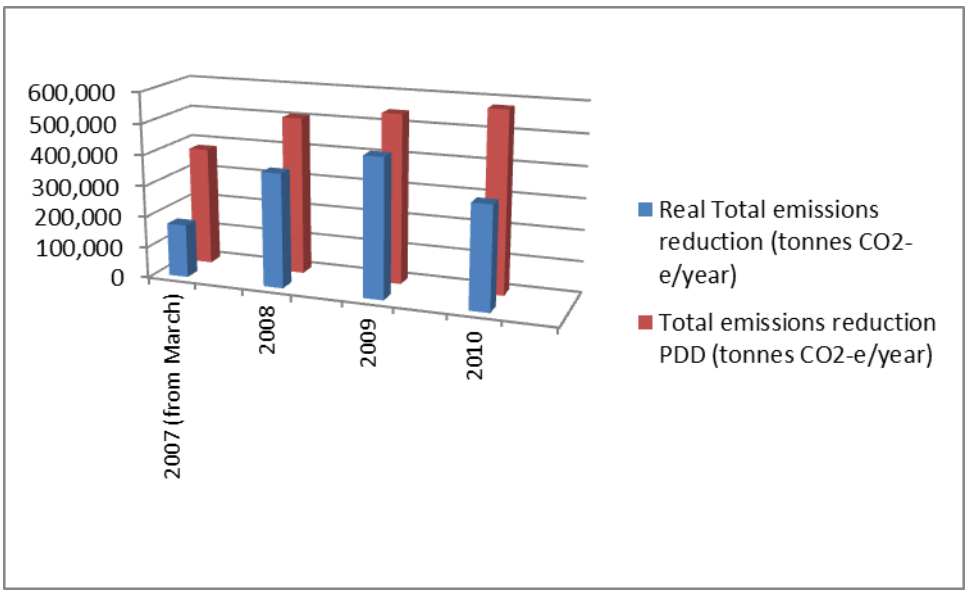
Comparison Table

Year	Total emissions reduction PDD (tonnes CO_2-e/year)	Monitoring Report	Emissions reduction (tonnes CO_2-e)	Real Total emissions reduction (tonnes CO_2-e/year)
2007 (from March)	381,163	MR 1	40,131	171,415
		MR 2	131,284	
2008	507,377	MR 2	49,089	367,600
		MR 3	318,511	
2009	543,670	MR 3	304,652	446,042
		MR 4	141,390	
2010	579,281	MR 4	331,279	331,279
2011	614,303			
2012	648,821			

MR 1	Monitoring Report n°1 Period 17/03/2007 to 17/06/2007
MR 2	Monitoring Report n°2 Period 18/06/2007 to 12/03/2008
MR 3	Monitoring Report n°3 Period 13/03/2008 to 31/08/2009
MR 4	Monitoring Report n°4 Period 01/09/2009 to 31/08/2010

Note: claimed period is remarked in red

Comparison Graph



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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		