MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

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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, date 06/09/2011

Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León.
Project 3378
27/10/2010 - 30/06/2011 (first and last days included)

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

The following section provides a description of the project activity as brief summary of the detailed description given in the section "B.1 Implementation status of the project activity" below and includes:

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

   The objective of El Verde Landfill Gas Project is to capture the landfill gas (LFG) and to flare and/or utilize it leading to GHG emissions reductions. The principal components of landfill gas are methane (CH4) and carbon dioxide (CO2), both of which are greenhouse gases (GHG) listed as such in the Kyoto Protocol.

2. Brief description of the installed technology and equipment;

   The installed equipment of the project activity is composed by a LFG Collection System, LFG Flare System and a Leachate Evaporator System. The LFG Collection System is composed by deep and shallow vertical wells installed in intermediate or closed areas of the El Verde Landfill site and interconnected by a piping network for serving the blower station with a specific diameter piping, suitable for the anticipated flow rates. A leachate pumping system and a condensate management system has also been installed. The LFG Flare System is composed by an enclosed ZTOF Biogas Flare which is equipped with all the monitoring equipment as per the methodology requirements including continuous exhaust gas monitoring. The Leachate Evaporator System includes a EvapoDry Model ED 500 utilizing a submerged burner tube fire which can be fed either by LFG and by LPG (Liquefied Petroleum Gas) below the leachate level which achieves high rates of energy efficiency.

   The LFG has been mainly flared during the monitoring period and only a small amount has been used to evaporate leachate due to operational difficulties with the equipment. Eventually, it is expected to install LFG Power Generation equipment. From then on and when operational difficulties with the Leachate Evaporator System have been solved, LFG would be used to evaporate leachate, generate electricity, and only send the excess LFG to the flare. Thus all LFG will be combusted in one of these three ways, and methane contained in LFG would be destroyed.

3. Relevant dates for the project activity;

   The LFG Flare System of el Verde Landfill Gas Project was commissioned on 11th January 2010 and has been operating since then. The construction works for the LFG Collection System and the Leachate Evaporator System were completed on 27th of February 2010. The project activity was registered on 27th October 2010.

4. Total emission reductions achieved in this monitoring period.

   The total emission reductions achieved during the first monitoring period from 27th October 2010 to 30th June 2011 (first and last days included) are 40,884 tCO2e.

A.2. Project Participants

The project participant is Promotora Ambiental S.A.B. de C.V, a Mexican private entity.

A.3. Location of the project activity:

El Verde landfill is located in León de Los Aldamas (also called León), about 15 kilometres northwest of the centre of the city. The address is Carretera León, Lagos de Morenos km 18.5, León City, Guanajuato State, Mexico. The geographic coordinates are N 21°10'14"; W 101°46'30".

A.4. Technical description of the project

The El Verde Landfill was designed for municipal waste treatment with a total area of 60 ha. The landfill is divided in two macro cells, with a total area of approximatly 51 ha planned for waste disposal. The remaining 9 ha include roads, buffer zone, and the administrative area. The proposed project activity covers the entire 60 ha, i.e. including future expansion as more waste is received. The landfill started to receive waste in June 2001 and since then is receiving an average of 442,000 tonnes per year. Before the project implementation, the most likely scenario was the atmospheric release of landfill gas generated at the landfill site with no landfill gas capture and destruction.

The installed equipment of El Verde Landfill Gas Project is composed by a LFG Collection System, LFG Flare System and a Leachate Evaporator System. In order to maximize LFG recovery rates, and thus GHG emission reductions, an active LFG Collection System has been installed. The system consists of a series of vertical extraction wells interconnected by header piping. The LFG is extracted from the landfill by a set of blowers to be initially flared in the LFG Flare System while a certain amount is used for leachate evaporation in the Leachate Evaporator System. Once LFG gas recovery is considered to be stationary and proper dimensioning can be conducted, project proponent would install a LFG power generation equipment. During the current monitored period, LFG has mainly been flared and only small amount has been used for leachate evaporation. However, it is expected that in future monitoring periods LFG would be used both for leachate evaporation and for power generation, with any excess LFG flared.

The essential characteristics of the technology applied during the monitoring period for the LFG collection, flaring and leachate evaporation systems are:

LFG Collection System: The LFG collection system is composed by:

- Deep and shallow vertical wells in intermediate or closed areas have been installed, trying not to interfere with landfill operation. Depending on future development plans, some horizontal wells might be installed to capture the gas in areas that continue to be filled;

- A piping network has been installed to include connection to extraction wells for serving the blower station with a specific diameter piping, suitable for the anticipated flow rates. Connection has been made to those extraction wells that have been constructed to final or intermediate grade, and to which the piping connection have a minimal impact on current filling operations.

- A leachate pumping system and a condensate management system has also been installed. The LFG collection system has been designed to include self draining condensate traps and condensate manholes with pumps where necessary.

LFG Flare System: The John Zink Biogas Flare System has been installed in the project activity and consists of:

- An Enclosed ZTOF Biogas Flare which offers automated operation and is designed to destroy safely, with automatic temperature control, typical organic compounds generated by solid waste and other biogas processes. The flare system is controlled with a processor, or programmable logic controller (PLC), which receives and transmits signals with respect to operating conditions. If an unacceptable operating condition occurs, the control system discontinues flow of biogas or adjusts the operating parameters to correct the problem. Control of the Enclosed ZTOF Biogas Flare includes an initial purge cycle, automatic ignition sequence, and fail-safe controls. A self-checking flame scanner monitors the pilot flame and main flame and safety shutdown features prevent equipment damage. The Enclosed ZTOF Biogas Flare is equipped with all the monitoring equipment as per the methodology requirements including continuous exhaust gas monitoring.

- A skid assembly containing a panel rack with flare control panel, a moisture separator, and a blower station. The blower station has been installed to provide the necessary suction pressure for the flare and leachate evaporator systems, considering future electricity generator flow demands.

Leachate Evaporator System: The leachate evaporation has been installed in the project activity as a solution to the disposal problem and consists of:

- The Leachate Evaporator System includes a EvapoDry Model ED 500 utilizing a submerged burner tube fire which can be fed either by LFG and by LPG (Liquefied Petroleum Gas) below the leachate level which achieves high rates of energy efficiency removing the moisture and greatly reducing the disposal leachate volumes. The direct hot gas contact with the liquid creates almost instantaneous vapour while the combustion gases rapidly mix the leachate for an even heat distribution allowing the tube to be continuously self-purging. The uniqueness of the EvapoDry lies in the cylindrical design of the solution tank, with a cone bottom which is connected to a drain which allows for easy removal of any solids build up settling in the cone.

The following diagram represents the technology applied in the El Verde Landfill Gas Project:

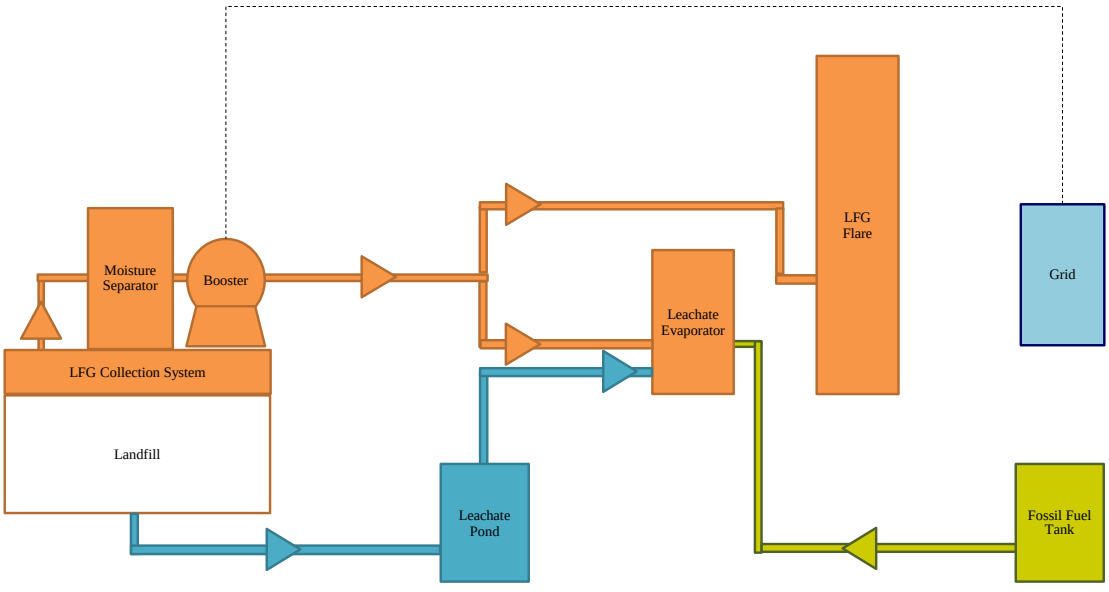

Figure 1. Diagram of the technology applied in the El Verde Landfill Gas Project.

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

The baseline and monitoring methodology applied for the proposed project activity is the approved consolidated baseline methodology ACM0001, version 10: "Consolidated baseline and monitoring methodology for landfill gas project activities". Moreover, the following tools have been applied to the project activity for the monitoring period:

- In order to determine the flare efficiency and/or to monitor the flare exhaust gases the version 1 of the "Tool to determine project emissions from flaring gases containing methane" is applied. References to this tool in the formulae are marked as T.

- In order to determine emissions associated with electricity consumption in the project scenario, the version 1 of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" is applied. References to this tool in the formulae are marked as TE.

- The version 2 of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" is applied in case any fossil fuels are used on site. References to this tool in the formulae are marked as TF.

A.6. Registration date of the project activity:

The project was registered on 27th October 2010.

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

The crediting period of the project activity is from 27th October 2010 to 26th October 2017 (Renewable).

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

The entity responsible for completing the monitoring report form (CDM-MR) is ClimaLoop. The responsible person is Sergi Cuadrat, Climate Change Mitigation Consultant of ClimaLoop. His contact details are:

Address: Carrer del Vidre, 14. Post Code 43201, Reus. Spain.
Tel: +34 636 075 989
Website: www.climaloop.com
Email: sergi.cuadrat@climaloop.com

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

This section includes 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 as follows:

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

1. Starting date of operation of the project activity:

   The LFG Flare System of el Verde Landfill Gas Project was commissioned on 11th January 2010 and has been operating since then. The construction works for the LFG Collection System and the Leachate Evaporator System were completed on 27th of February 2010. The project was fully operational by the date of registration on 27th October 2010.

2. Information regarding the actual operation of the project activity during this monitoring period:

   The LFG has been mainly flared during the monitoring period and only a small amount on 2nd December 2010 has been used to evaporate leachate due to operational difficulties with the equipment. Moreover, during the monitoring period, abnormal peaks of LFGflare readings were observed in the LFG Flare System from 11th December 2010 to 12th February 2011 due to high leachate levels creating intermittent downtimes. Once LFG gas recovery is considered to be stationary, project proponent would install a LFG power generation equipment. Other than these remarkable events, the project activity has been operated as planned. The following table summarizes the actual operation of the Verde Landfill Gas Project during the monitoring period:

Table 1. Information regarding the actual operation of the Verde Landfill Gas Project.

Event of actual operation of the project activity	Type of Event
On 2-12-10, installation of LFGthermal_Flowmeter (S.N 2010168) (Evaporador) and the LFGflare_Flowmeter (S.N 2010167) with a downtime of less than 2h. From 27-10-10 up to 2-12-10, only LFGtotal_Flowmeter was installed.	Downtime period on 2-12-10 (less than 2h)
The Leachate Evaporator System has mainly been fed with LPG during the monitoring period due to operational difficulties. Only the date of 2-12-10, the Leachate Evaporator System was fed with LFG.	Abnormal operation of the Leachate Evaporator System (except 2-12-10)
Peaks of LFGflare in the LFG Flare System were observed from 11-Dec-10 to 12-Feb-11 due to high leachate levels in the process pipework.	Intermitent downtimes

3. Brief description of events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and how the issues resulting from these events or situations are being addressed:

   During the monitoring period, there were not major events or situations that affected the applicability of the methodology. Only the consequences of the mentioned events summarized above are reported in the following table:

Table 2. Events and the application of methodologies in the Verde Landfill Gas Project.

Event which may impact application of methodology	Action taken
On 2-12-10, installation of LFGthermal_Flowmeter (S.N 2010168) (Evaporador) and the LFGflare_Flowmeter (S.N 2010167) with a downtime of less than 2h. From 27-10-10 up to 2-12-10, only LFGtotal_Flowmeter was installed.	Up to 2-12-10, calculation of MDflared in BE is using readings from LFGtotal_Flowmeter since the Leachate Evaporator System was not operational.
The Leachate Evaporator System has mainly been fed with LPG during the monitoring period due to operational difficulties. Only the date of 2-12-10, the Leachate Evaporator System was fed with LFG.	Calculation of BE is considered 0 when Leachate Evaporator System was not fed with LFG , although PE for electricity and fuel consumption are accounted to calculate ERs conservatively.
Peaks of LFGflare in the LFG Flare System were observed from 11-Dec-10 to 12-Feb-11 due to high leachate levels in the process pipework.	Calculation of BE is considered 0 for flows exceeding flare capacity, although PE for electricity and fuel consumption are accounted to calculate ERs conservatively.

B.2. Revision of the monitoring plan

The monitoring plan has not been revised.

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

No deviation has been applied to this monitoring period.

B.4. Notification or request of approval of changes

No notification or request of approval of changes from the project activity as described in the registered CDM-PDD has been applied.

SECTION C. Description of the monitoring system

The following section provides a description of the monitoring system including data collection procedures (information flow including data generation, aggregation, recording, calculation and reporting), organizational structure, roles and responsibilities of personnel, and emergency procedures for the monitoring system for the El Verde Landfill Project:

1. **Data collection procedures:** The following points provide a description of the data collection procedures followed by the El Verde Landfill Project during the monitoring period:

    a) Data generation: The data generation for the El Verde Landfill Gas Project is using both Automatic Continuous and Manual Periodic (Daily) Data Gathering System as follows:

    - Automatic Continuous Data Gathering System: In normal operating conditions, data has been recorded every two minutes electronically and it will be kept during the crediting period and two years after. Data has also been aggregated monthly. The following parameters are gathered automatically under such procedure:

Table 3. Parameters gathered automatically in Leon LFS.

Parameter	Data unit	Description of the parameter
LFGtotal	Nm3	Total amount of landfill gas captured at normal temperature and pressure
LFGflare	Nm3	Amount of landfill gas flared at normal temperature and pressure
LFGthermal	Nm3	Amount of landfill gas combusted in leachate evaporator at normal temperature and pressure
wCH4	m3 CH4 / m3	Methane fraction in the landfill gas.
tO2	%	Volumetric fraction of O2 in the exhaust gas of the flare.
fvCH4,FG	mg/m3	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions
Tflare	ºC	Temperature in the exhaust gas of the flare.

    - Manual Periodic (Daily) Data Gathering System: The following parameters are gathered manually in daily log sheets:

Table 4. Parameters gathered manually in Leon LFS

Parameter	Data unit	Description of the parameter
ECPJ	MWh	On-site consumption of electricity provided by the grid attributable to the project activity
FCi,j	m3	Quantity of fuel type i combusted in process j

b) Data aggregation: The data is aggregated monthly in a Monthly Report which is presented to the Board of Promotora Ambiental S.A. de C.V (PASA) as per internal procedures.

c) Data recording: The data which is gathered automatically is recorded in monthly spreadsheets while the data gathered manually is recorded both in paper forms and in spreadsheets. Promotora Ambiental S.A. de C.V (PASA) has an in-house back-up system to record the data during the crediting period.

d) ER calculation and reporting: The gathered data is used to calculate the Emission Reductions (ER) as per the applicable methodologies and the registered PDD and these are reported in the CDM-MR.

The following scheme simplifies the Data collection procedures followed in the El Verde Landfill Gas Project during the monitoring period:

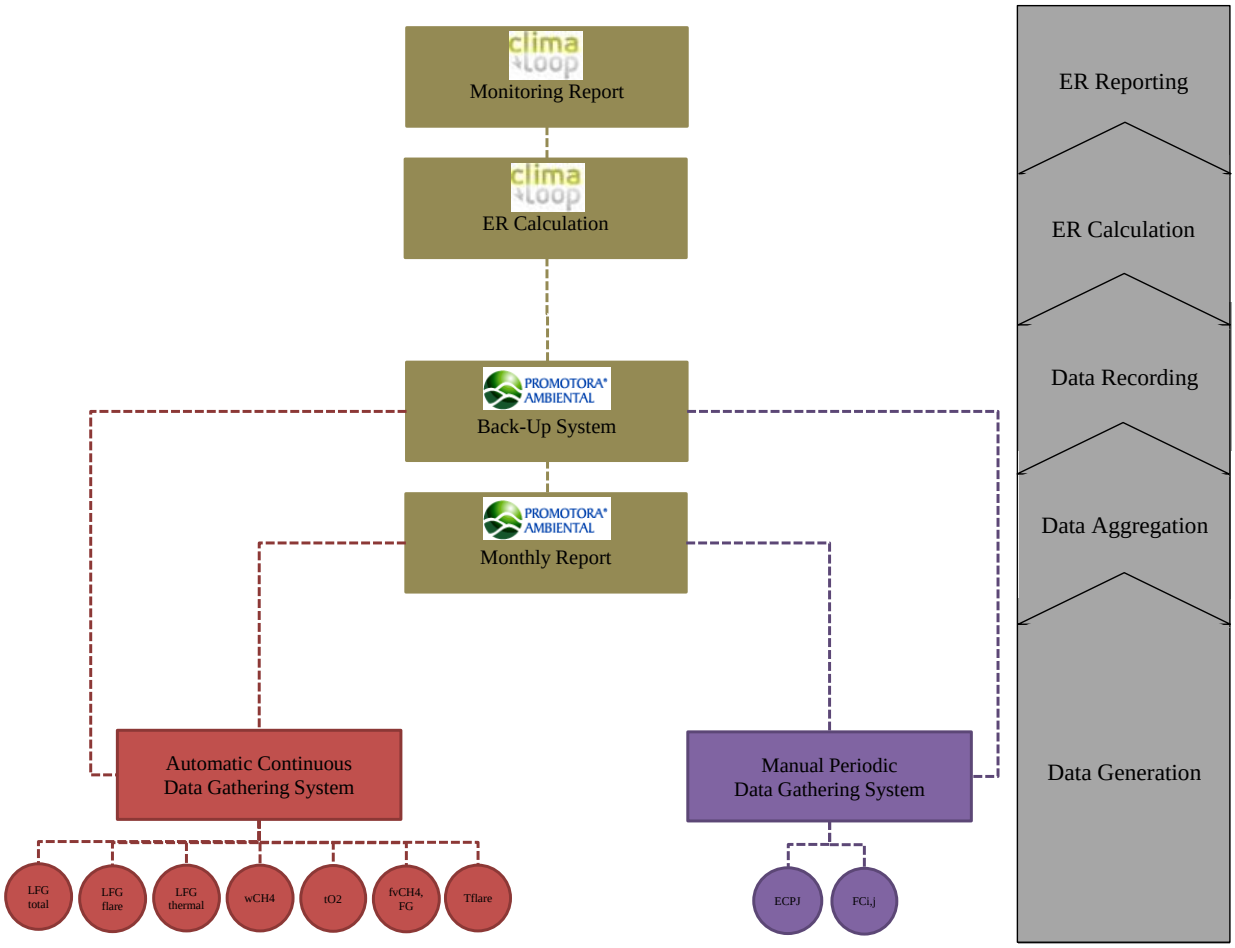

Figure 2. Scheme of the data collection procedures for El Verde Landfill Gas Project.

As shown in the scheme above, the Data collection procedures in the El Verde Landfill Gas Project are divided in an Automatic Continuous Data Gathering System (which gathers the parameters LFGtotal, LFGflare, LFGthermal, wCH4, tO2, fvCH4FG and Tflare) and a Manual Periodic Data Gathering System (which gathers the parameters ECPJ and FCi,j).

Once the data is collected, it is aggregated in a monthly basis to report the expected CER generation to PASA´s Board. Once data is archived in back-up system of the facility, all data is sent to the CDM Consultant to conduct the ER calculations and the preparation of the Monitoring Report (CDM-MR).

2. **Organizational structure, roles and responsibilities:** The following table simplifies responsibilities allocated in the project activity by specifying the process involvement of each role:

Table 5. Roles and responsibilities in the El Verde Landfill Gas Project.

Name	Role	Organisation	Process Involvement
Federico Silva	Field Technician	PASA	Data Collection
Reynaldo A. Hernández	Monitoring and Biogas Manager	PASA	
Carola M. Rodriguez	Project Engineer	PASA	
Ricardo López Loredo	Landfill Sites, Biogas and Energy Manager	PASA	Data Aggregation
Reynaldo A. Hernández	Monitoring and Biogas Manager	PASA	Data Recording
Sergi Cuadrat	CDM Consultant	ClimaLoop	ER Calculation and Reporting

The following scheme simplifies the Organizational Structure followed by the El Verde Landfill Gas Project:

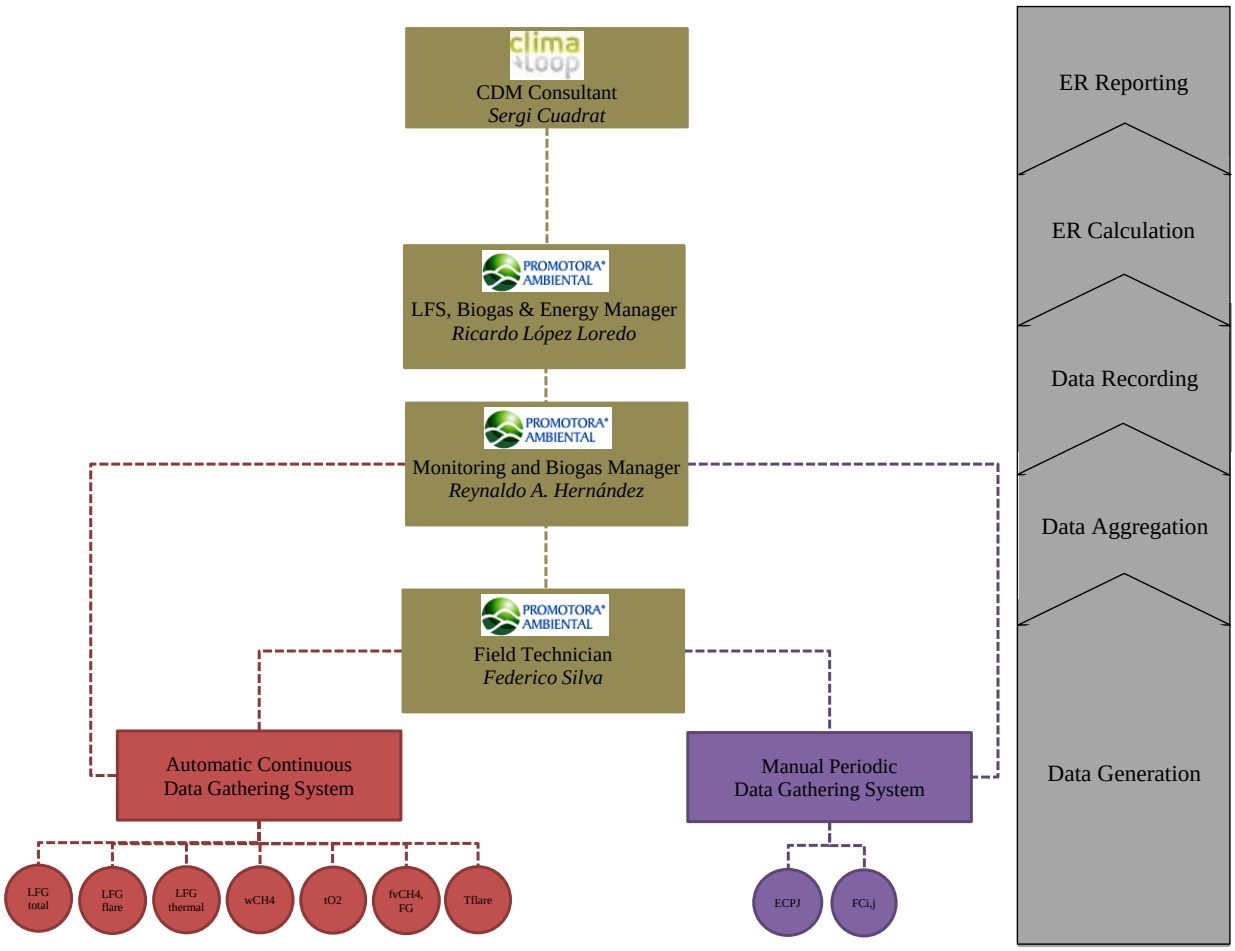

Figure 3. Organizational Structure followed in El Verde Landfill Gas Project.

The Field Technician is the responsible to conduct the day-to-day operation of equipment and collects data under the Manual Periodic Data Gathering System. The Monitoring and Biogas Manager supervises all CDM activities such as data collection, aggregation and recording and reports to the Landfill Sites, Biogas and Energy Manager who supervises the project activity. Finally, the CDM Consultant is responsible for the CERs calculations and elaborates the Monitoring Report.

3. **The responsibilities and authorities for monitoring and reporting:** The following list simplifies the responsibilities allocated of each role during the monitoring period:

a) Field Technician
- Checks day-to-day operation of equipment.
- Conduct the required maintenance as per predefined schedule.
- Executes the calibration of equipment with procedures and frequency established.
- Collects data under the Manual Periodic Data Gathering System (which gathers the parameters ECPJ and FCi,j) in paper registries and transfers to electronic registries.

b) Monitoring and Biogas Manager
- Supervises the general operations.
- Supervises all CDM activities such as data collection, aggregation and recording.
- Supervision of Automatic Continuous Data Gathering System.
- Ensures that data is collected as per the registered PDD.
- Manages the calibration of equipment with procedures and frequency established.
- Ensures proper Back-Up of the Raw Data and CDM Documentation.
- Sends Raw Data to CDM Consultant.

c) Landfill Sites, Biogas and Energy Manager
- Supervises the project activity.
- Takes major decisions when required (equipment repair/replacement, improvements, etc).

d) CDM Consultant
- Performs the CERs calculations;
- Performs internal audits of the project;
- Elaborates the Monitoring Report;
- Supports the project during the verification site visits.

4. **Emergency procedures for the monitoring system:**

The emergency procedures for the monitoring system in the El Verde Landfill Gas Project consist in daily checks of the project activity equipment and meters. If any problem occurs, the responsible personnel take the required action to solve the problem. If a malfunction on meters or equipment occurs, no CERs are claimed for the corresponding period.

5. **Line diagram showing all relevant monitoring points:**

The following line diagram shows the monitoring points applied in the El Verde Landfill Gas Project during the monitoring period:

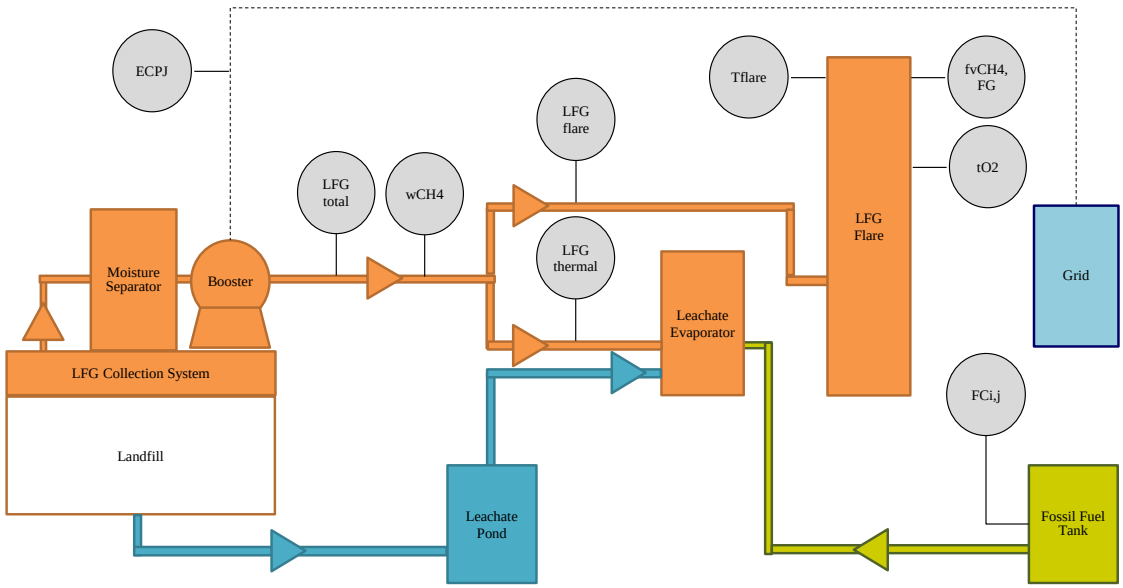

Figure 4. Line diagram showing all monitoring points applied in the El Verde Landfill Gas Project.

SECTION D. Data and parameters

This section includes 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 for the El Verde Landfill Gas Project. For each parameter, the following information is provided using the tables provided below:

1. Value of monitored parameter in the period for the purpose of calculating emission reductions. Average and total values are reported for the monitoring period, although the specific values for the calculation of emission reductions are shown in the spreadsheets.
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: Automatic or Manual Data Gathering System.
5. The QA/QC procedures applied (if applicable per monitoring plan).
6. Information about appropriate emission factors, IPCC default values and any other reference values that have been used in the calculation of emission reductions are also included.

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	**$\rho_{CH4,n}$**
Data unit:	**kg/m3**
Description:	Density of methane gas at normal conditions
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	0.7168
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**D_{CH4}**
Data unit:	**tCH4/m3CH4**
Description:	Methane density at normal temperature and pressure (0°C and 1.013 bar)
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	0.0007168
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**AM_C**
Data unit:	**kg/kmol**
Description:	Atomic mass of carbon
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	12
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**AM_H**
Data unit:	**kg/kmol**
Description:	Atomic mass of hydrogen
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	1.01
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**AM_O**
Data unit:	**kg/kmol**
Description:	Atomic mass of oxygen
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	16
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**AM_N**
Data unit:	**kg/kmol**
Description:	Atomic mass of nitrogen
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	14.01
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**$NA_{C,CH4}$**
Data unit:	**Atoms**
Description:	Number of atoms of carbon in CH4
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**$NA_{N,N2}$**
Data unit:	**Atoms**
Description:	Number of atoms of nitrogen in N2
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**MM_{CH4}**
Data unit:	**kg/kmol**
Description:	Molecular mass of methane
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	16.04
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**MM_{N2}**
Data unit:	**kg/kmol**
Description:	Molecular mass of nitrogen
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	28.02
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**MVn**
Data unit:	**m3/Kmol**
Description:	Volume of one mole of any ideal gas at normal temperature and pressure
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	22.414
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**MF_{O2}**
Data unit:	**m3/Kmol**
Description:	O2 volumetric fraction of air
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	0.21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**Pn**
Data unit:	**Pa**
Description:	Atmospheric pressure at normal conditions
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	101,325
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**Ru**
Data unit:	**Pa m3/kmol K**
Description:	Universal ideal gas constant
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	8,314.472
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**Tn**
Data unit:	**K**
Description:	Temperature at normal conditions
Source of data used:	"Tool to determine project emissions from flaring gases containing methane" (ver. 1)
Value(s) :	273.15
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline

Data / Parameter:	**GWP_{CH4}**
Data unit:	**tCO2e/tCH4**
Description:	Global Warming Potential of CH4
Source of data used:	IPCC
Value(s) :	21.00
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Any comment	Shall be updated according to any future COP/MOP decisions.

Data / Parameter:	**CEFelec,BL,y = EFgrid,CM,y**
Data unit:	**tCO2e/MWh**
Description:	CO2 emissions intensity of the grid connected to the project site. It is used to determine emissions due to project electricity consumption (EFgrid,CM,y).
Source of data used:	As shown in the PDD, the emissions factor was calculated using the version 1.1 of the "Tool to calculate the emission factor for an electricity system", recommended by ACM0001 Ver.10.
Value(s) :	0.51
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project
Any comment	A single, fixed value is used for each crediting period.

Data / Parameter:	**Regulatory requirements relating to landfill gas projects**
Data unit:	**Dimensionless**
Description:	Regulatory requirements relating to landfill gas projects
Source of data used:	Publicly available information of the host country's regulatory requirements relating to landfill gas.
Value(s) :	0%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Any comment	The information though recorded annually, is used for changes to the adjustment factor (AF) or directly MDBL,y at renewal of the credit period.

Data / Parameter:	**TDL**
Data unit:	**-**
Description:	Average technical transmission and distribution losses in the grid for the voltage level at which electricity is obtained from the grid.
Source of data used:	As per "Tool to calculate project, baseline and leakage emissions from electricity consumption" (version 1)
Value(s) :	20%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project
Any comment	Project electricity consumption is the sum of electricity consumption by the LFG blower and by the leachate evaporation plant. Each component has the same emissions factor for electricity generation and the same transmission and distribution losses.

D.2. Data and parameters monitored

Data / Parameter:	**LFGtotal**	
Data unit:	**Nm3**	
Description:	Total amount of landfill gas captured at normal temperature and pressure	
Measured /Calculated /Default:	Measured by a mass flow meter	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		6,328,528
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	LFGtotal_Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2011024
	Calibration Frequency	18 months
	Date of last calibration	09/02/2011
	Validity	07/09/2012
Measuring/ Reading/ Recording frequency:	Continuous mass flow meters have been used to measure flow rates. In normal operating conditions, data has been recorded every two minutes electronically and it will be kept during the crediting period and two years after. Data has been also aggregated monthly.	
QA/QC procedures applied:	Flow meters have been subject to regular maintenance and testing regime to ensure accuracy. The same basis (dry or wet) as CH4 concentration is considered for this measurement when the residual gas temperature exceeds 60ºC.	
Comments	No separate monitoring of temperature and pressure have been necessary because the project activity is using flow meters that automatically compensate for temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm3).	

Data / Parameter:	**LFGflare**	
Data unit:	**Nm3**	
Description:	Amount of landfill gas flared at normal temperature and pressure	
Measured /Calculated /Default:	Measured by a mass flow meter	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		6,205,131
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	LFGflare_Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2011025
	Calibration Frequency	18 months
	Date of last calibration	09/02/2011
	Validity	07/09/2012
Measuring/ Reading/ Recording frequency:	Continuous mass flow meters have been used to measure flow rates. In normal operating conditions, data has been recorded every two minutes electronically and it will be kept during the crediting period and two years after. Data has been also aggregated monthly.	
QA/QC procedures applied:	Flow meters have been subject to regular maintenance and testing regime to ensure accuracy. The same basis (dry or wet) as CH4 concentration is considered for this measurement when the residual gas temperature exceeds 60ºC.	
Comments	No separate monitoring of temperature and pressure have been necessary because the project activity is using flow meters that automatically compensate for temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm3).	

Data / Parameter:	**LFGelectricity**	
Data unit:	**Nm3**	
Description:	Amount of landfill gas combusted in power plant at normal temperature and pressure	
Measured /Calculated /Default:	It will be measured by a mass flow meter when installed	
Source of data:	Not installed	
Value of monitored parameter:	Not installed	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not used	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Not installed
	Accuracy class	Not installed
	Manufacturer	Not installed
	Model	Not installed
	Serial Number	Not installed
	Calibration Frequency	Not installed
	Date of last calibration	Not installed
	Validity	Not installed
Measuring/ Reading/ Recording frequency:	Continuous mass flow meters will be used to measure flow rates combusted in power plant at normal temperature and pressure when installed. In normal operating conditions, data will be recorded every two minutes electronically and it will be kept during the crediting period and two years after. Data will also be aggregated monthly.	
QA/QC procedures applied:	Flow meters will be subject to regular maintenance and testing regime to ensure accuracy. The same basis (dry or wet) as CH4 concentration will be considered for this measurement when the residual gas temperature exceeds 60ºC.	
Comments	No separate monitoring of temperature and pressure will be necessary because the project activity will be using flow meters that automatically compensate for temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm3).	

Data / Parameter:	**LFGthermal**	
Data unit:	**Nm3**	
Description:	Amount of landfill gas combusted in leachate evaporator at normal temperature and pressure	
Measured /Calculated /Default:	Measured by a mass flow meter	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		6,043
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	LFGthermal_Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2010168
	Calibration Frequency	18 months
	Date of last calibration	25/05/2010
	Validity	02/05/2012
Measuring/ Reading/ Recording frequency:	Continuous mass flow meters have been used to measure flow rates. In normal operating conditions, data has been recorded every two minutes electronically and it will be kept during the crediting period and two years after. Data has been also been aggregated monthly.	
QA/QC procedures applied:	Flow meters have been subject to regular maintenance and testing regime to ensure accuracy. The same basis (dry or wet) as CH4 concentration is considered for this measurement when the residual gas temperature exceeds 60ºC.	
Comments	No separate monitoring of temperature and pressure have been necessary because the project activity is using flow meters that automatically compensate for temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm3).	

Data / Parameter:	**wCH4**	
Data unit:	**m3 CH4 / m3 LFG**	
Description:	Methane fraction in the landfill gas.	
Measured /Calculated /Default:	Measured by a gas analyzer	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		48%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Field Analyser Unit (FAU)
	Accuracy class	± 0.2% to ± 1% (0 to full scale)
	Manufacturer	Landtec
	Model	FAU
	Serial Number	GA08772/do
	Calibration Frequency	6 months
	Date of last calibration	14/02/2011
	Validity	28/09/2011
Measuring/ Reading/ Recording frequency:	Methane content has been measured using a continuous gas analyzer. Data has been measured at least once per hour and recorded electronically. Data will be kept during the crediting period and two years after. Data has been aggregated monthly.	
QA/QC procedures applied:	Gas analyzer has been subject to a regular calibration, maintenance and testing regime to ensure accuracy.	
Comments	Paired values of the methane fraction of the landfill gas and LFG flow which are averaged for the same time interval have been used in the calculation of emission reductions.	

Data / Parameter:	**T**	
Data unit:	**°C**	
Description:	Temperature of the landfill gas	
Measured /Calculated /Default:	Measured by thermal flow meter	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		48.23
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not used. The flow meters automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm3).	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	LFGflare_Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2011025
	Calibration Frequency	18 months
	Date of last calibration	09/02/2011
	Validity	07/09/2012
Measuring/ Reading/ Recording frequency:	Data has been measured at least once per hour, recorded electronically. Data has been aggregated monthly/yearly. Records will be kept during the crediting period and two years after.	
QA/QC procedures applied:	Measuring instruments should be subject to a regular maintenance and testing regime to ensure accuracy.	
Comments	No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm3). However, the temperature of the landfill gas has been used to compensate for humidity.	

The following parameters are used to determine the project emissions from flaring of the residual gas stream (PEflare,y) and have been monitored as per the "Tool to determine project emissions from flaring gases containing methane":

Data / Parameter:	**PEflare**
Data unit:	**tCO2e**
Description:	Project emissions from flaring of the residual gas stream
Measured /Calculated /Default:	Calculated
Source of data:	Manual Data Gathering System
Value of monitored parameter:	3,721
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project
Measuring/ Reading/ Recording frequency:	In normal operating conditions, data has been recorded every two minutes electronically and it will be kept during the crediting period and two years after. Data has also been aggregated monthly.
QA/QC procedures applied:	Regular maintenance will ensure optimal operation of the flare. Analysers will be calibrated according to manufacturer's recommendations.
Comments	The parameters used for determining the project emissions from flaring of the residual gas stream (PEflare,y) have been monitored as per the "Tool to determine project emissions from flaring gases containing methane". The parameters used for the determination of PEflare are LFGflare, wCH4, fvi, fvCH4,FG, tO2 and Tflare.

Data / Parameter:	**FV_{RG}**	
Data unit:	**Nm3**	
Description:	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h.	
Measured /Calculated /Default:	Measured by a mass flow meter	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		6,205,131
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	LFGflare_Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2011025
	Calibration Frequency	18 months
	Date of last calibration	09/02/2011
	Validity	07/09/2012
Measuring/ Reading/ Recording frequency:	Continuous mass flow meters have been used to measure flow rates. In normal operating conditions, data has been recorded every two minutes electronically and it will be kept during the crediting period and two years after. Data has been also aggregated monthly.	
QA/QC procedures applied:	Flow meters have been subject to regular maintenance and testing regime to ensure accuracy. The same basis (dry or wet) as CH4 concentration is considered for this measurement when the residual gas temperature exceeds 60ºC.	
Comments	As a simplified approach, this parameter is considered to be the same as the amount of landfill gas flared at normal temperature and pressure (LFGflare) as per the "Tool to determine project emissions from flaring gases containing methane". No separate monitoring of temperature and pressure have been necessary because the project activity is using flow meters that automatically compensate for temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm3).	

Data / Parameter:	**fv_{CH4}**	
Data unit:	**m3 CH4 / m3 LFG**	
Description:	Volumetric fraction of methane in the residual gas	
Measured /Calculated /Default:	Measured by a gas analyzer	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		48%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Field Analyser Unit (FAU)
	Accuracy class	± 0.2% to ± 1% (0 to full scale)
	Manufacturer	Landtec
	Model	FAU
	Serial Number	GA08772/do
	Calibration Frequency	6 months
	Date of last calibration	14/02/2011
	Validity	28/09/2011
Measuring/ Reading/ Recording frequency:	Methane content has been measured using a continuous gas analyzer. Data has been measured at least once per hour and recorded electronically. Data will be kept during the crediting period and two years after. Data has been aggregated monthly.	
QA/QC procedures applied:	Gas analyzer has been subject to a regular calibration, maintenance and testing regime to ensure accuracy. The same basis (dry or wet) is considered for this measurement when the residual gas temperature exceeds 60ºC.	
Comments	This parameter is considered to be the same as the methane fraction in the landfill gas (wCH4) as per the "Tool to determine project emissions from flaring gases containing methane". As a simplified approach, only methane content of the residual gas has been measured and the remaining part has been considered as N2.	

Data / Parameter:	t_{O2}	
Data unit:	**%**	
Description:	Volumetric fraction of O2 in the exhaust has of the flare.	
Measured /Calculated /Default:	On-site measurements using a continuous gas analyser.	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		16.1%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Flare Emissions Analyser (FEA)
	Accuracy class	O2 = 0.1% + 1%
	Manufacturer	Landtec
	Model	FEA
	Serial Number	4299
	Calibration Frequency	12 months
	Date of last calibration	15/10/2010
	Validity	15/10/2011
Measuring/ Reading/ Recording frequency:	Oxygen concentration in the exhaust gas has been measured at least once per hour using a continuous gas analyser, and data records will be kept during the crediting period and two years after. Data has also been aggregated daily/monthly/yearly.	
QA/QC procedures applied:	Analyser has been periodically calibrated according to the manufacturer's recommendation. A zero check and typical value check by comparison with a standard certified gas has been conducted.	
Comments	Extractive sampling analysers with water and particulates removal devices have been used. The point of measurement (sampling point) is in the upper section of the flare (80% of total flare height). Sampling is conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes).	

Data / Parameter:	**$fv_{CH4,FG}$**	
Data unit:	**mg/m3**	
Description:	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions	
Measured /Calculated /Default:	On-site measurements using a continuous gas analyser.	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		37.02
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Flare Emissions Analyser (FEA)
	Accuracy class	CH4 = 5ppm +1%
	Manufacturer	Landtec
	Model	FEA
	Serial Number	4299
	Calibration Frequency	12 months
	Date of last calibration	15/10/2010
	Validity	15/10/2011
Measuring/ Reading/ Recording frequency:	Methane concentration in the exhaust gas has been measured at least once per hour using a continuous gas analyser, and data records will be kept during the crediting period and two years after. Data has also been aggregated daily/monthly/yearly.	
QA/QC procedures applied:	Analyser has been periodically calibrated according to the manufacturer's recommendation. A zero check and typical value check by comparison with a standard certified gas has been conducted.	
Comments	Extractive sampling analysers with water and particulates removal devices have been used. The point of measurement (sampling point) is in the upper section of the flare (80% of total flare height). Sampling is conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes).	

Data / Parameter:	**T_{flare}**	
Data unit:	**°C**	
Description:	Temperature in the exhaust gas of the flare.	
Measured /Calculated /Default:	On-site measurements using a thermocouple.	
Source of data:	Automatic Data Gathering System	
Value of monitored parameter:		825.02
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not used directly in the calculations	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Thermocouple
	Accuracy class	99.98% accurate
	Manufacturer	Thermo Sensors Corporation
	Model	494-92716-8-K-I600
	Serial Number	123781-4,9,11,12
	Calibration Frequency	18 months
	Date of last calibration	23/12/2010
	Validity	23/06/2012
Measuring/ Reading/ Recording frequency:	Temperature in the exhaust gas has been measured at least once per hour using a continuous gas analyser, and data records will be kept during the crediting period and two years after. Data has also been aggregated daily/monthly/yearly.	
QA/QC procedures applied:	Continuous measurement of the temperature of the exhaust gas stream in the flare by a thermocouple. A temperature above 500 ºC indicates that a significant amount of gases are still being burnt and that the flare is operating.	
Comments	An excessively high temperature at the sampling point may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.	

The following variables are required to determine the electricity consumption from the grid using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", version 1:

Data / Parameter:	**PE_{EC}**
Data unit:	**tCO_2**
Description:	Project emissions from electricity consumption by the project activity
Measured /Calculated /Default:	Calculated as per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 1)
Source of data:	Manual Data Gathering System
Value of monitored parameter:	65
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project.
Measuring/ Reading/ Recording frequency:	Measured continuously with electricity meter, aggregated daily.
QA/QC procedures applied:	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 1)
Comments	Project electricity consumption is the sum of electricity consumption by the LFG blower and by the leachate evaporation plant. Each component has the same emissions factor for electricity generation and the same transmission and distribution losses.

Data / Parameter:	**EC_{PJ}**	
Data unit:	**MWh**	
Description:	On-site consumption of electricity provided by the grid and/or LFG-based power plant(s) attributable to the project activity	
Measured /Calculated /Default:	On-site measurements	
Source of data:	Manual Data Gathering System	
Value of monitored parameter:		105
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Electricity Meter
	Accuracy class	±0.5%
	Manufacturer	CFE
	Model	FM 9S (8S)
	Serial Number	2189511
	Calibration Frequency	N/A
	Date of last calibration	N/A
	Validity	N/A
Measuring/ Reading/ Recording frequency:	Measured continuously with electricity meter, aggregated daily.	
QA/QC procedures applied:	According to manufacturer's specifications, the electricty meters does not need to be calibrated . Cross check measurements results with invoices for purchased electricity has been conducted.	
Comments	Project electricity consumption is the sum of electricity consumption by the LFG blower and by the leachate evaporation plant. Each component has the same emissions factor for electricity generation and the same transmission and distribution losses.	

Data / Parameter:	**TDL**
Data unit:	-
Description:	Average technical transmission and distribution losses in the grid for the voltage level at which electricity is obtained from the grid.
Measured /Calculated /Default:	A default value of 20%.
Source of data:	As per "Tool to calculate project, baseline and leakage emissions from electricity consumption" (version 1)
Value of monitored parameter:	20%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project
Measuring/ Reading/ Recording frequency:	Default value of average technical transmission and distribution losses is used so its Measuring/ Reading/ Recording frequency are not relevant for its accuracy.
QA/QC procedures applied:	In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.
Comments	Project electricity consumption is the sum of electricity consumption by the LFG blower and by the leachate evaporation plant. Each component has the same emissions factor for electricity generation and the same transmission and distribution losses.

The following variables are required to determine the CO2 emissions from fossil fuel combustion using the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion":

Data / Parameter:	**$PE_{FC,j}$**
Data unit:	**tCO2e**
Description:	Project emissions from fossil fuel combustion in process j
Measured /Calculated /Default:	Calculated as per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
Source of data:	Manual Data Gathering System
Value of monitored parameter:	91
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project
Measuring/ Reading/ Recording frequency:	Measured continuously with electricity meter, aggregated daily.
QA/QC procedures applied:	
Comments	

Data / Parameter:	**FCi,j**	
Data unit:	**m3**	
Description:	Quantity of fuel type i combusted in process j	
Measured /Calculated /Default:	Onsite measurements	
Source of data:	Manual Data Gathering System	
Value of monitored parameter:		51
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type	Fuel Meter
	Accuracy class	±5%
	Manufacturer	Rochester Gauges, Inc
	Model	6281
	Serial Number	N/A
	Calibration Frequency	N/A
	Date of last calibration	N/A
	Validity	N/A
Measuring/ Reading/ Recording frequency:	Measured continuously with tank level fuel meter, aggregated daily.	
QA/QC procedures applied:	The consistency of metered fuel consumption quantities has been crosschecked by an energy balance that is based on purchased quantities and stock changes. Since the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities have also been crosschecked with available purchase invoices from the financial records.	
Comments		

The following variables have been provided by third parties and no equipment has been used for its measurement:

Data / Parameter:	**NCVi**
Data unit:	**GJ/m3**
Description:	Weighted average net calorific value of fuel type i (LPG)
Source of data:	Value provided by the fuel supplier
Value(s) :	27.30
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project
Any comment	Mixture of LPG at 30% Propane and 70% Butane is used in the leachate evaporator

Data / Parameter:	**EFCO2,i**
Data unit:	**tCO2/GJ**
Description:	Weighted average net calorific value of fuel type i
Source of data:	IPCC default values as provided in Table 1.4 of Chapter 1 Vol. 2 (energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value(s) :	0.0656
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project
Any comment	

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The following table summarizes the actual values used to calculate the baseline emissions (BE) with the corresponding results applying the formulae as per the registered PDD:

Table 6. Results and parameters used to calculate the Baseline Emissions of the El Verde Landfill Project.

Data / Parameter:	Description	Source	Value	Unit
BE	Baseline Emissions			
BE = MDproject * GWPCH4 + ELLFG * CEFelec,BL		Eq. (1a)	41,039	tCO2e
MDproject	Amount of methane that would have been destroyed			
MDproject = MDflared + MDelectricity + MDthermal		Eq (8a)	1,954	tCH4
MDflared	Methane destroyed by flaring			
MDflared = (LFGflare * wCH4 * D CH4) - (PEflare / GWPCH4)		Eq (9)	1,954	tCH4
LFGflare	Quantity of landfill gas fed to the flare	Monitored	6,205,131	m3 LFG
wCH4	Average methane fraction of the landfill gas	Monitored	48%	m³CH4/m³LFG
DCH4	Methane density at normal temperature and pressure	Default	0.0007168	tCH4/m3CH4
PEflare	Project emissions from flaring of the residual gas stream			
PEflare = TMRG * (1 - ηflare) * GWPCH4 / 1000		Eq (8)	3,721	tCO2e
TMRG	Total mass flow rate in the residual gas	Step 5. Eq (T.13)	2,131,372	kg
ηflare	Flare combustion efficiency	Step 6. Eq (T.14)	91%	
GWPCH4	Global Warming Potential value for methane	Default	21	tCO2e/tCH4
MDthermal	Methane destroyed by thermal generation (tCH4)			
MDthermal = LFGthermal * wCH4 * D CH4		Eq (11)	0	tCH4
LFGthermal	Quantity of landfill gas fed into thermal generator (m3)	Monitored	6,043	m3 LFG
wCH4	Average methane fraction of the landfill gas	Monitored	48%	m³CH4/m³LFG
DCH4	Methane density at normal temperature and pressure	Default	0.0007168	tCH4/m3CH4

As shown in the Table 6 and according to ACM0001 (version 10), the greenhouse gas baseline emissions (BE) during the monitoring period are given by the Equation (1a), when the required simplifications have been adopted. The methane destroyed by the project activity (MDproject) during the monitoring period is determined by monitoring the quantity of methane actually flared and gas used to generate electricity and/or produce thermal energy and the total quantity of methane captured applying Equation (8a). Since there is no generation of electricity during the monitoring period, MDelectricty has been considered to be 0. The other values in Equation (8a) are calculated as follows:

- The calculation of MDflared is conducted applying the Equation (9) where the methane sent to the flare is determined by monitoring LFGflare and wCH4 every 2 minutes (under normal operational conditions) with paired values added over the monitoring period. In the Table 6 above, the values of LFGflare and wCH4 are cumulative and average values, respectively. The calculation of PEflare in Equation (9) is conducted as per the seven steps described in the "Tool to determine project emissions from flaring gases containing methane" (ver. 1) using continuous monitoring of the methane destruction efficiency of the flare (flare efficiency) as can be checked in the ER Calculation Spreadsheets (see Monthly ER Spreadsheets) and expressed in Equation (8).

- The calculation of MDthermal is conducted applying the Equation (11) where the methane sent to the leachate evaporator is determined by monitoring LFGthermal and wCH4 every 2 minutes (under normal operational conditions) with paired values added over the monitoring period.

E.2. Project emissions calculation

The following table summarizes the actual values used to calculate the project emissions (PE) with the corresponding results applying the formulae as per the registered PDD:

Table 7. Results and parameters used to calculate the Project Emissions of the El Verde Landfill Project.

Data / Parameter:	Description	Source	Value	Unit
PE	Project Emissions			
PE = PEEC + PEFC,j		Eq. (16)	155	tCO2
PEEC	Emissions from consumption of electricity in the project case			
PEEC = ECPJ * EFgrid * (1 + TDL)		Eq. (TE.1)	65	tCO2
ECPJ	Quantity of electricity consumed by the project activity	Monitored	105	MWh
EFgrid	Emission factor for the grid	Default	0.51	tCO2/MWh
TDL	Average technical transmissions and distribution losses	Default	20.0%	%
PEFC,j	Emissions from the consumption of heat in the project case			
PEFC,j = FCi,j* COEFi		Eq. (TF.1)	91	tCO2
FCi,j	Quantity of fuel type i combusted in process j	Monitored	51	m3
COEFi	CO2 emission coefficient of fuel type i			
COEFi = NCVi *EF CO2,i		Eq. (TF.4)	16.115	tCO2/TJ
NCVi	Weighted average net calorific value of the fuel type i	Provider	27.30	GJ/m3
EF CO2,i	Weighted average CO2 emission factor of fuel type	IPCC	0.0656	tCO2/GJ

As shown in the Table 7 and according to ACM0001 (version 10), the greenhouse gas project emissions (PE) during the monitoring period are given by the Equation (16). The values for PEEC and PEFC,j in Equation (16) are calculated as follows:

- The project emissions from consumption of electricity (PEEC) have been calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (TE) applying Equation (TE.1) using the monitored value of the quantity of electricity consumed by the project activity, a fixed value of the emission factor (EFgrid) and an average technical transmission and destruction losses (TDL).

- The project emissions from the fossil consumption (PEFC,j) have been calculated according to the version 2 of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (TF) and is given by the Equation (TF.1), using the monitored value of the quantity of fuel LPG consumed by the project activity mainly to evaporate the leachate and the CO2 emission coefficient of the LPG calculated as per the Equation (TF.4).

E.3. Leakage calculation

The calculation does not need to consider leakage emissions.

E.4. Emission reductions calculation / table

The following table summarizes the actual values used to calculate the emission reductions (ER) with the corresponding results applying the Equation (17) as per the registered PDD:

Table 8. Results and parameters used to calculate the Emission Reductions of the El Verde Landfill Project.

Data / Parameter:	Description	Source	Value	Unit
ER	Emission Reductions			
ER = BE - PE		Eq. (17)	40,884	tCO2e
BE	Baseline Emissions	Eq. (1a)	41,039	tCO2e
PE	Project Emissions	Eq. (16)	155	tCO2e

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

The following table shows a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD. Since the monitoring period is considered from 27th October 2010 to 30th June 2011 (first and last days included), it comprises 66 days of 2010 and 181 days of 2011 hence relative values (tCO2e/day) for each year have been compared:

Table 9. 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		
	2010	2011	Total	2010	2011	Total
Monitoring Period (days)	365	365	**730**	66	181	**247**
Emission reductions (tCO_2e)	130,993	140,015	**271,008**	15,404	25,480	**40,884**
Daily Emission reductions (tCO_2e/day)	359	384	**371**	233	141	**166**

As can be observed in Table 9, the actual emission reductions achieved during the current monitoring period (40,884 tCO2e) are lower than the emission reductions stated in the registered CDM-PDD (271,008 tCO2e). Moreover, in order to compare them in the same period, the actual relative emission reductions achieved during the current monitoring period (166 tCO2e/day) are lower than the relative emission reductions stated in the registered CDM-PDD (371 tCO2e/day).

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

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The actual emission reductions achieved during the current monitoring period (40,884 tCO2e) are lower than the emission reductions stated in the registered CDM-PDD (271,008 tCO2e), so there is no need to provide an explanation of the cause of any increase.

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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		