Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT		
Title of the project activity	Modelo del Callao Landfill Gas Capture and Flaring System	
UNFCCC reference number of the project activity	5619	
Version number of the PDD applicable to this monitoring report	6	
Version number of this monitoring report	1	
Completion date of this monitoring report	26/07/2018	
Monitoring period number	2nd Monitoring period	
Duration of this monitoring period	20/08/2014 to 31/12/2016 (both days included)	
Monitoring report number for this monitoring report	Not applicable	
Project participants	PETRAMAS S.A.C.	
Host Party	Peru	
Sectoral scopes	13: Waste handling and disposal	
Applied methodologies and standardized baselines	ACM0001 ver. 11 - Consolidated baseline and monitoring methodology for landfill gas project activities	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0	137,624
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	142,382	

SECTION A. Description of project activity

A.1. General description of project activity

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a) Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks;

The objective of the "Modelo del Callao Landfill Gas Capture and Flaring System" project is to capture the landfill gas (LFG) and to flare it leading to GHG emissions reductions. The principal components of landfill gas are methane (CH_4) and carbon dioxide (CO_2), both of which are greenhouse gases (GHG) listed as such in the Kyoto Protocol.

b) Brief description of the installed technology and equipment;

Modelo del Callao landfill has an area of 54 hectares (ha) and receives around 1,250 tonnes (t) of municipal solid waste (MSW) daily from Callao and the district of San Martin de Porras. It is expected that the amount of MSW could be incremented according to markets conditions of the MSW management sector. Modelo del Callao landfill is anticipated to remain open at least until 2030 reaching an accumulated amount of municipal solid waste of 13,115,618 tones by year 2030. The landfill used to be an open dump managed by Callao's municipal company, ESLIMP. After 26 years of operations, on 10 November 2003, it was awarded as a concession to PETRAMAS S.A.C. The concession was regarded as a solution for converting the open dump into a landfill, and encompasses the management and final disposal of the MSW. The 30-year concession clearly establishes that the rights to the LFG belong to PETRAMAS. Modelo del Callao landfill is in compliance with all Peruvian regulations for Solid Waste Management (SWM) activities[1].

Prior to the start of the implementation of the project activity, there was no destruction of CH_4 through LFG combustion.

The installed equipment of the project activity is composed by a LFG Collection System and a LFG Combustion System (Flare). During the monitoring period, the LFG has been flared reducing methane (CH_4) emissions.

The project activity contributes to sustainable development by significantly improving local and global air quality by addressing greenhouse gas emission by reducing LFG exhaust from landfill activity which was previously vented to the atmosphere. Moreover, there is a technology transfer with the installation of state of the art enclosed flaring equipment which is not common practice in Peru.

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

13/08/2012: Commissioning of the LFG Combustion System (Flare);
20/08/2012: Project registration date with Executive Board of United Nation Framework for Climate Change Convention (UNFCCC)
20/08/2014: Start date (day included) of the 2nd Monitoring period;
31/12/2016: End date (day included) of the 2nd Monitoring period.

d) Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period.

The total emission reductions achieved during the second monitoring period f20/08/2014 to 31/12/2016 (both days included) are 137,624 tCO_2e.

[1] Modelo del Callao's landfill activity is particularly regulated by the General Law of Solid Residues of 2002 (Law 27314).

A.2. Location of project activity

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The project activity is located close to the right bank of the Chillon River at km 19 on the highway to the district of Ventanilla, province of Callao, Peru. The landfill has an area of 55 ha. The coordinates of the Project are Latitude -11.933383 South and Longitude -77.123583 West.

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Peru	PETRAMAS S.A.C. (Private entity)	No

A.4. Reference to applied methodologies and standardized baselines

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The baseline and monitoring methodology applied for the proposed project activity is:

- ACM0001 ver. 11: "Consolidated baseline and monitoring methodology for landfill gas project activities"[2]. This methodology is used for estimation of emission reductions achieved from destruction of methane by the project.

Moreover, the methodology also refers to the latest versions of each of the following tools:

- Tool for the Demonstration and Assessment of Additionality (Version 5.2.1)[3];
- Tool to Determine Project Emissions from Flaring Gases Containing Methane (Version 1)[4];
- Tool to Calculate Baseline, Project and/or Leakage Emissions from Electricity Consumption (Version 1)[5];
- Tool to Calculate Project or Leakage CO_2 Emissions from Fossil Fuel Combustion (Version 2)[6];
- Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality (Version 4.0.0)[7];
- Tool to Determine Methane Emissions Avoided from Disposal of Waste at a Solid Waste Disposal Site (Version 5.1.0)[8]; and,
- Tool to Calculate the Emission Factor for an Electricity System (Version 02.2.1)[9].

A.5. Crediting period type and duration

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The first crediting period corresponding to this monitoring period commence from the date of registration that is from 20/08/2012 and last till 19/08/2019 (Renewable).

[2] https://cdm.unfccc.int/filestorage/U/J/B/UJBDVFYLQKSEWCM73XG14Z692TRHO0/EB47_repan06_ACM0001_ver11.pdf?t=blh8bmh2Y3BhfDAQ3mPWuZR93UDEnteo2PYl

[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.1.pdf

[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v4.0.0.pdf

[8] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v5.1.0.pdf

[9] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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a) **Description of the installed technology, technical processes and equipments;**

PETRAMAS S.A.C. is a Peruvian private company that has provided since 1996 services of collection, transport and final waste disposal to several municipalities and businesses within the city of Lima. The company owns a large fleet of garbage trucks and two landfills; namely, Huaycoloro and Modelo del Callao.

The project activity includes the construction and operation of a landfill gas (LFG) collection and flare system. The purpose of LFG flaring is to safely dispose of the flammable constituents, particularly methane, and to control odour nuisance, health risks and adverse environmental impacts. The installed equipment of the project activity is composed by a LFG Collection System and a LFG Combustion System (Flare) with the following characteristics:

- The LFG Collection System has been installed comprehensively over the closed areas of the landfill with approximately 30 [10] vertical extraction wells of high density polyethylene pipes (HDPE). The wells have been coupled to a high-density polyethylene pipe grid to transport the LFG to the flare station and LFG control plant.
- The LFG Combustion System is an automated station for the capture and combustion of LFG provided by John Zink Company. The combustion of LFG is in an enclosed flare (ZTOF Type). The maximum flow of LFG of the flare is 1500 SCFM (equivalent to 2411 Nm3/h). The LFG Combustion System includes an automatic flare station composed by blowers, moisture separator and enclosed flaring station, including the LFG measuring and recording equipment. The flaring station has destruction efficiency between 98% and 100%. The system is installed with a set of thermocouples that allows to control the temperature of the flame to guarantee the destruction efficiency of the system

A standard operation and maintenance (O&M) program for LFG collection and flaring equipment has been implemented according to equipment manufacturer. The following diagram represents the technology applied in the “Modelo del Callao Landfill Gas Capture and Flaring System” project:

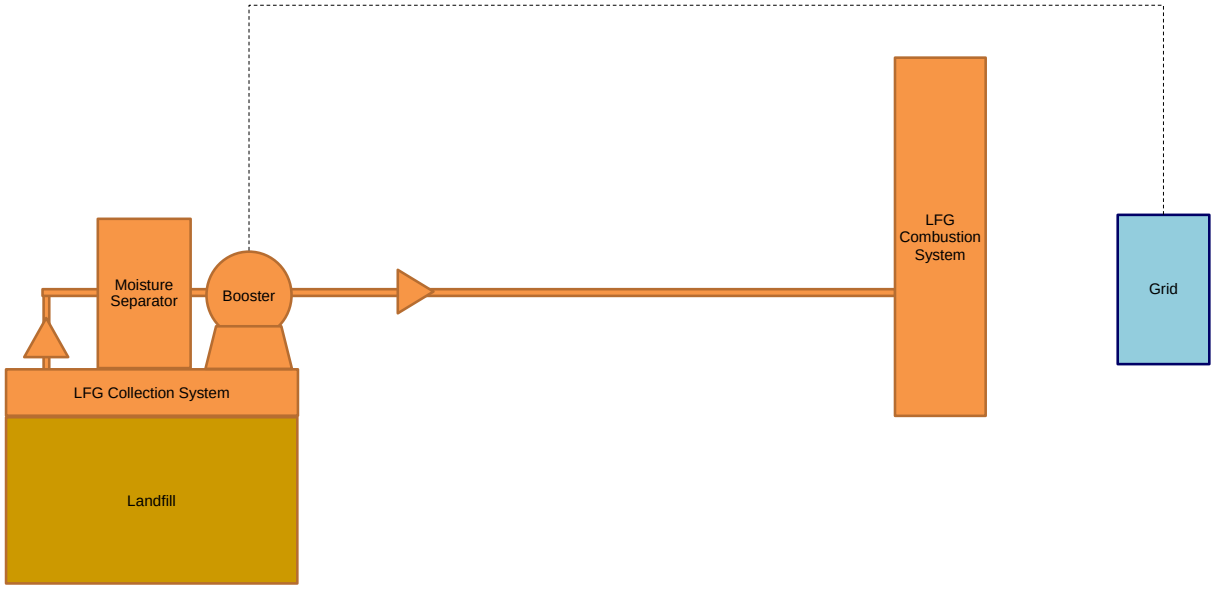

Figure 1. Diagram of the technology applied in the project activity.

[10] The PDD estimated that, during the whole project activity, 50 wells are to be installed whereas at the moment, only 30 wells are installed due to the fact that the current LFG Collection System only covers a part of the LFS area. As the area of the LFS increases, more wells will be installed.

b) **Information on the implementation and actual operation of the project activity, including relevant dates (e.g. construction, commissioning, continued operation periods, etc.).**

During the monitoring period, the LFG was commissioned on 13/08/2012 and was operating by the date of CDM registration on 20/08/2012. The LFG has been flared during the monitoring period from 20/08/2014 to 31/12/2016 (both days included). Since its registration date, the project activity has been implemented and monitored as per the monitoring plan of the PDD, with continuous operation.

The LFG Combustion System of the “Modelo del Callao Landfill Gas Capture and Flaring System” project has been operational 96% of the monitoring period.

c) **Description of events or situations that occurred during the monitoring period that 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.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

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Not applicable. The section is left blank intentionally.

B.2.2. Corrections

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Not applicable. The section is left blank intentionally.

B.2.3. Changes to the start date of the crediting period

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Not applicable. The section is left blank intentionally.

B.2.4. Inclusion of monitoring plan

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Not applicable. The section is left blank intentionally.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

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The Post Registration Change PRC-5619-001 [11] was approved on 19/08/2015. The Permanent change from registered Monitoring Plan replaces the approach for monitoring the methane destruction efficiency from continuously to the use of the default value (90%) in accordance with the "Tool to Determine Project Emissions from Flaring Gases Containing Methane" (Version 1)[12].

B.2.6. Changes to project design

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Not applicable. The section is left blank intentionally.

[11] https://cdm.unfccc.int/PRCContainer/DB/prcp327282513/view

[12] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf

SECTION C. Description of monitoring system

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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 “Modelo del Callao Landfill Gas Capture and Flaring System” project:

a) Line diagram showing all relevant monitoring points: The following line diagram shows the monitoring points applied in the project activity during the monitoring period:

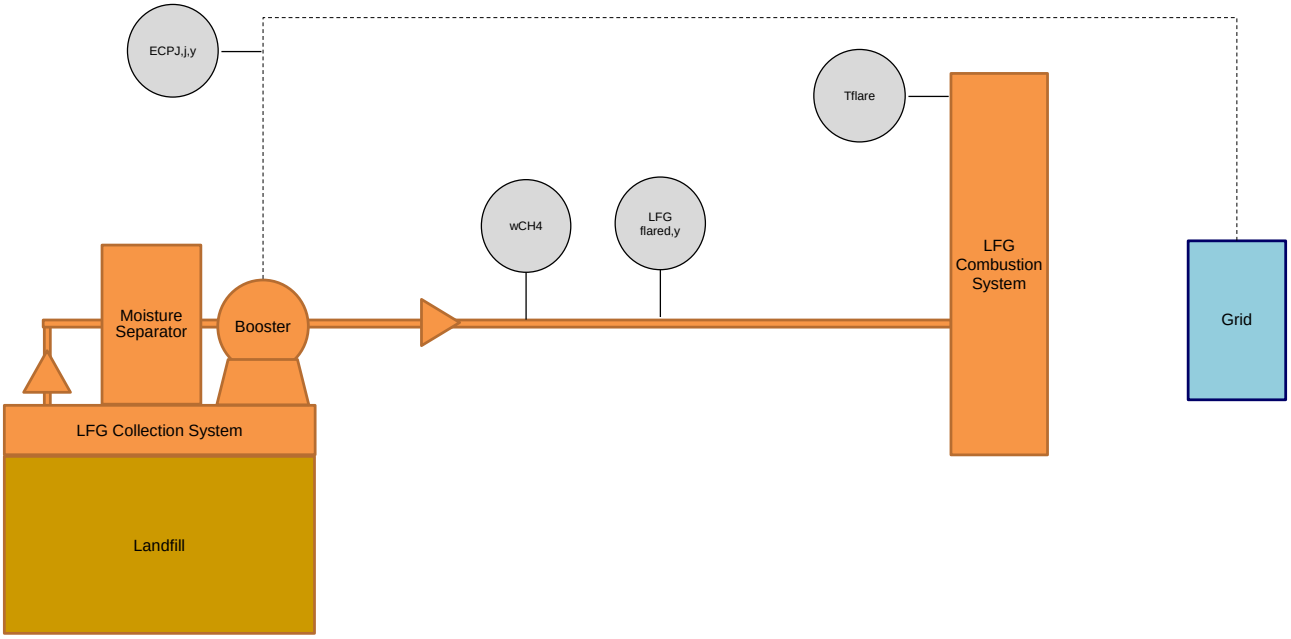

Figure 2. Line diagram showing all relevant monitoring points

b) Data collection procedures: The following points provide a description of the data collection procedures followed by the “Modelo del Callao Landfill Gas Capture and Flaring System” project during the monitoring period:

a) Data generation: The data generation for the project activity is using both Automatic Continuous and Manual Periodic Data Gathering System as follows:

i. Manual Periodic Data Gathering System: The Manual Periodic Data Gathering System corresponds to the data which is recorded periodically (i.e monthly or greater frequency) and is gathered from external sources manually (i.e third party studies or webpages) as specified in Section D.2. The following parameters are gathered manually in daily log sheets:

Table 1. Parameter gathered manually

Parameter	Data unit	Description of the parameter
$EC_{PJ,j,y}$	MWh	Quantity of electricity consumed by the project electricity consumption source j in year y

ii. Automatic Continuous Data Gathering System: In normal operating conditions, data has been recorded every minute electronically and it will be kept during the crediting period and two years after. The Automatic Continuous Data Gathering

System aggregates monthly the raw data and transmits these through Excel file to PETRAMAS S.A.C. The following parameters are gathered automatically under such procedure:

Table 2. Parameters gathered automatically

Parameter	Data unit	Description of the parameter
$\mathbf{LFG_{flared,y}}$	Nm^3	Amount of LFG flared at normal temperature and pressure
$\mathbf{W_{CH4}}$	m^3 CH_4/m^3 LFG	Methane fraction in the LFG
$\mathbf{T_{flare}}$	^oC	Temperature in the exhaust gas of the flare.

b) Data aggregation: The data is aggregated monthly in a Monthly Report which is presented to the Board of PETRAMAS S.A.C. 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. PETRAMAS S.A.C. 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 methodology and the registered PDD and these are reported in the CDM-MR. Previous to this process, a QA/QC procedure is used with the aim of disregard any raw data in the same time interval which do not accomplish the operational condition that the T_{flare} should be above 500ºC.

The following scheme simplifies the Data collection procedures followed in “Modelo del Callao Landfill Gas Capture and Flaring System” project during the monitoring period:

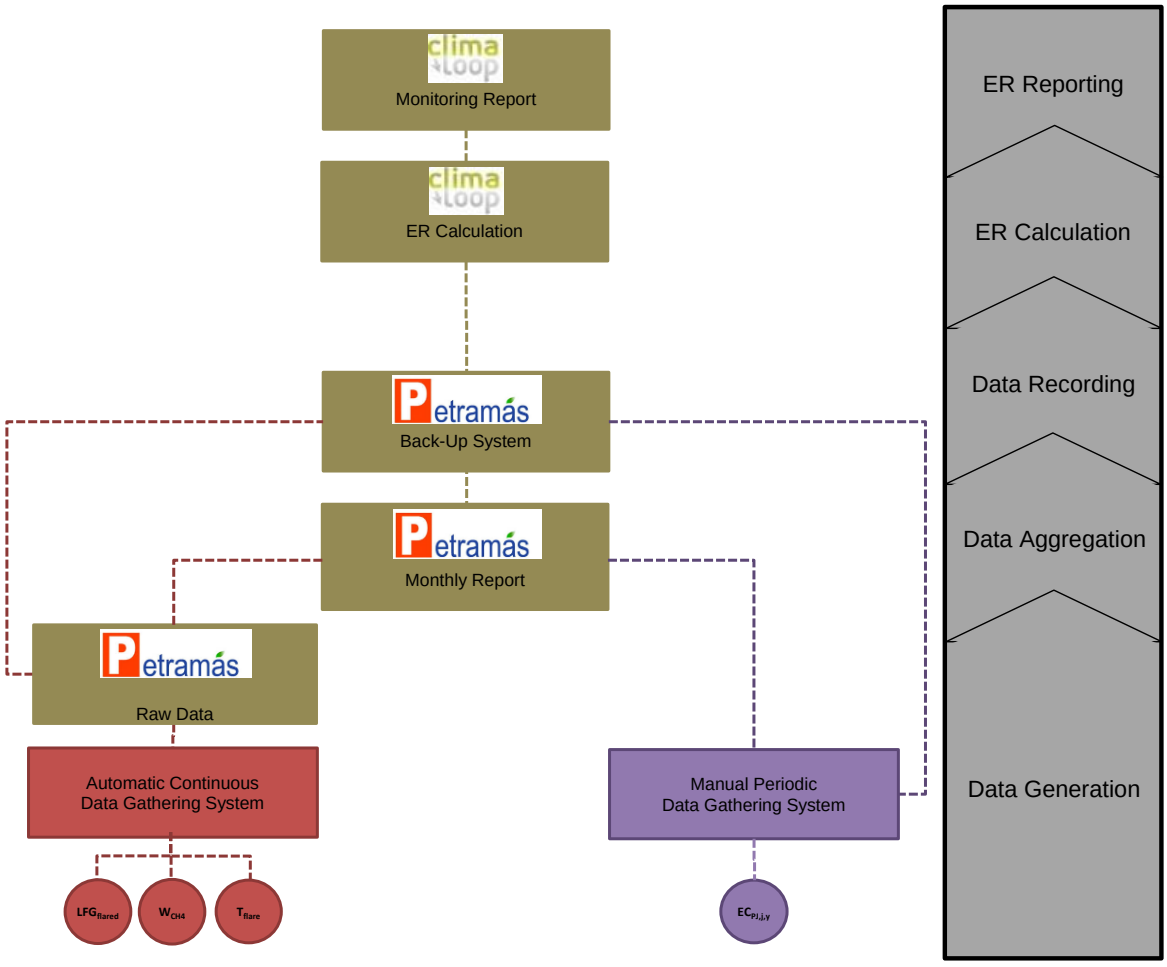

Figure 3. Scheme of the data collection procedures

As shown in the scheme above, the Data collection procedures in the “Modelo del Callao Landfill Gas Capture and Flaring System” project are divided in an Automatic Continuous Data Gathering System (which gathers the parameters $LFG_{flared,y}$, W_{CH4} and T_{flare}) and a Manual Periodic Data Gathering System (which gathers the parameter $EC_{PJ,j,y}$). Once the data is collected, it is aggregated in a monthly basis to report the expected CER generation to PETRAMAS S.A.C ´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).

c) Organizational structure, roles and responsibilities: The following list simplifies the responsibilities allocated of each role during the monitoring period:

Table 3. Roles and responsibilities in the project activity

Name	Role	Organization	Process Involvement
Ivan Garcilazo	Data Technician	PETRAMAS	Data Collection and Recording
Ádamo Melendez	Senior Manager	PETRAMAS	Data Aggregation
Sergi Cuadrat	CDM Consultant	ClimaLoop	ER Calculation and Reporting
Jorge Zegarra	General Manager	PETRAMAS	Final Approval

The following scheme simplifies the Organizational Structure followed by the "Modelo del Callao Landfill Gas Capture and Flaring System" project:

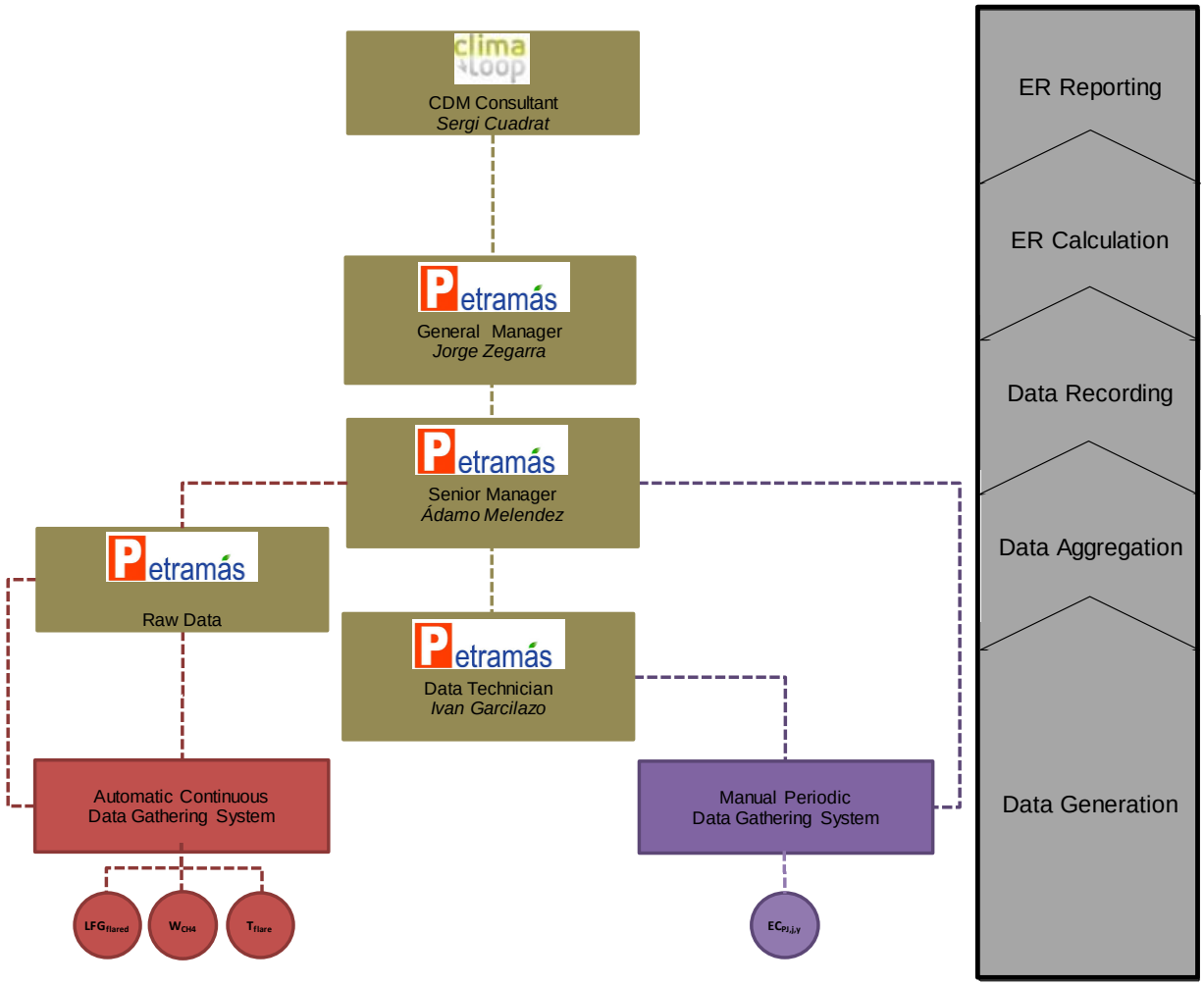

Figure 4. Organizational Structure

The Data 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 Technician supervises all CDM activities such as data collection, aggregation and recording and reports to the Senior Manager who supervises the project activity. Finally, the CDM Consultant is responsible for the CERs calculations and elaborates the Monitoring Report.

d) The responsibilities and authorities for monitoring and reporting: The following list simplifies the responsibilities allocated of each role during the monitoring period:

- Data Technician
  - ✓ Checks day-to-day operation of equipment.
  - ✓ Oversees the required maintenance as per predefined schedule.
  - ✓ Collects data under the Manual Periodic Data Gathering System in paper registries and transfers to electronic registries.
- Automatic Continuous Data Gathering System provider:
  - ✓ Aggregates the raw data gathered by the Automatic Continuous Data Gathering System.
  - ✓ Transmits raw data gathered in a monthly basis through Excel file to PETRAMAS.
  - ✓ Provides support to back-up the automatic raw data.
- Senior Manager
  - ✓ Supervises the general operations.
  - ✓ Supervises all CDM activities such as data collection, aggregation and recording.

- ✓ Executes the calibration of equipment with procedures and frequency established.
- ✓ 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.

- General Manager
  - ✓ Supervises the project activity.
  - ✓ Takes major decisions when required (equipment repair/replacement, improvements, etc).

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

e) Emergency procedures for the monitoring system:

The emergency procedures for the monitoring system in the “Modelo del Callao Landfill Gas Capture and Flaring System” 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.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	Regulatory requirements relating to landfill gas projects
Unit	N/A
Description	Regulatory requirements relating to landfill gas
Source of data	Publicly available information of the Host Country's regulatory requirements relating to landfill gas.
Value(s) applied	0
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Baseline emission calculations.
Additional comments	Callao landfill is in compliance with all Peruvian regulations for Solid Waste Management ("SWM") activities. There have been no new developments in the regulatory requirements since registration. The information though recorded annually, is used for changes to the adjustment factor (AF) or directly $MD_{reg,y}$ at renewal of the credit period.

Data/Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential of CH_4
Source of data	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories for the first commitment period and 25 for the second commitment period in accordance with Table 2.14 of the Fourth Assessment Report of the IPCC.
Value(s) applied	21 and 25
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Baseline emission calculation
Additional comments	GWP_{CH4} of methane has been updated from 21 (used to calculate ERs up to 31/12/2012) to 25 (used to calculate ERs from 01/01/2013)

Data/Parameter	D_{CH4}
Unit	tCH_4/m^3CH_4
Description	Methane Density
Source of data	ACM0001 version 11, adopted at EB 47, "Consolidated baseline and monitoring methodology for landfill gas project activities", page 14
Value(s) applied	0.0007168
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Baseline emission calculations
Additional comments	N/A

Data/Parameter	$BE_{CH4, SWDS,y}$
Unit	tCO_2e

Description	Methane generation from the landfill in the absence of the project activity at year y
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**MD_{Hist}**
Unit	tCH_4
Description	Amount of methane destroyed historically for the previous year before the start of project activity
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	φ
Unit	-
Description	Model correction factor to account for model uncertainties
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**OX**
Unit	Number
Description	Oxidation factor (reflecting the amount of methane from solid waste disposal site (SWDS) that is oxidized in the soil or other material covering the waste)
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**MCF**
Unit	-
Description	Methane correction factor
Source of data	Not applied

Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**DOC_j**
Unit	-
Description	Fraction of degradable organic carbon (by weight) in the waste type *j*.
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**K_j**
Unit	-
Description	Decay rate for the waste type *j*.
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**F**
Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**DOC_f**
Unit	-
Description	Fraction of degradable organic carbon (DOC) that can decompose
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD

Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**$EF_{EL,j,y}$**
Unit	tCO2/MWh
Description	Emission factor of the grid
Source of data	*Tool to Calculate Baseline, Project and/or Leakage Emissions from Electricity Consumption*
Value(s) applied	Default Value: 1.3 tCO2/MWh
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not applied
Additional comments	There is no captive power plant installed at the site and no on-site captive power plant exists. Therefore the electricity is purchased from the grid only.

Data/Parameter	**W_{total}**
Unit	Tons
Description	The amount of waste disposed in the landfill sites in year x
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**CE**
Unit	%
Description	LFG collection efficiency
Source of data	Not applied
Value(s) applied	Not applied
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Not used
Additional comments	Used for ex-ante estimation in the CDM-PDD.

Data/Parameter	**$\eta_{flare,h}$**
Unit	%
Description	Flare efficiency in hour h
Source of data	As per the "Tool to Determine Project Emissions from Flaring Gases Containing Methane" Version 1

Value(s) applied	In case of enclosed flares and use of the default value for the flare efficiency, the flare efficiency in the hour h (ηflare,h) is: • 0% if the temperature in the exhaust gas of the flare (Tflare) is below 500 °C for more than 20 minutes during the hour h . • 50%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour h, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h. 90%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h.
Choice of data or measurement methods and procedures	As per registered CDM-PDD
Purpose of data/parameter	Project emissions
Additional comments	Application of default value as per the "Tool to Determine Project Emissions from Flaring Gases Containing Methane" Version 1

D.2. Data and parameters monitored

Data/Parameter	**$LFG_{total,y}$**
Unit	Nm^3
Description	Total amount of landfill gas captured at normal temperature and pressure
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	18,474,394

Monitoring equipment	***Equipment 1***	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2006174
	Calibration Frequency	18 months
	Date of last calibration	18/04/2012
	Validity of last calibration	13/02/2014
	Installation date	14/08/2012
	Validity of calibration runs from	Installation date
	Equipment 2	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2012436
	Calibration Frequency	18 months
	Date of last calibration	15/11/2012
	Validity of last calibration	03/10/2014
	Installation date	04/04/2013
	Validity of calibration runs from	Installation date
	Equipment 3	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2012113
	Calibration Frequency	18 months
	Date of last calibration	22/04/2014
	Validity of last calibration	14/11/2015
	Installation date	15/05/2014
	Validity of calibration runs from	Installation date
Measuring/reading/recording frequency	Measured continuously each minute.	

Calculation method (if applicable)	The Automatic Continuous Data Gathering System measures the maximum and minimum value of the parameter each minute so the value considered is the simple average between the two. As established by the manufacturer, the mass flow meter registers the volume in m3/h at 21.1°C and 1.013 bar. Therefore, the LFG flow should be converted at normal conditions (0°C and 1.013bar). In accordance with ACM0001 ver 11, the normalized density is 0.0007168 tCH_4/m^3 (which is the density of methane at 0 °C and 1.013 bar). In order to do so, since pressure is a constant in both conditions, Charles´s Law of ideal gasses is used to convert the volume registered by the meter to a volume in normal conditions, as follows: **Charles´s Law:** V1/T1 = V2/T2 Where V1: Flow measured V2: Flow Normalized T1: Temperature measured = 21.1°C (294.25K) T2 : Temperature Normalized= 0°C (273.15K) **Normalization equation:** V2 = (273.15 / 294.25) x V1 The value of the monitored value shown in this table represents the total value monitored during the period by adding the instantaneous readings taken each minute.
QA/QC procedures	Flow meters are subject to a regular maintenance and testing regime to ensure accuracy.
Purpose of data/parameter	Baseline emission calculation.
Additional comments	Data will be kept for 2 years after end of crediting period or last issuance of CERs, whichever is later. The amount of landfill gas flared equals to the amount of landfill gas sent to the flare. Furthermore, $LFG_{flare,y}$ is equal to $LFG_{total,y,}$ therefore, the same flow meter has been used. Methane fraction of the landfill gas and LFG flow has been measured on the same basis (dry).

Data/Parameter	**$LFG_{flared,y}$**
Unit	Nm^3
Description	Amount of LFG flared at normal temperature and pressure
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	18,474,394

Monitoring equipment	***Equipment 1***	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2006174
	Calibration Frequency	18 months
	Date of last calibration	18/04/2012
	Validity of last calibration	13/02/2014
	Installation date	14/08/2012
	Validity of calibration runs from	Installation date
	Equipment 2	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2012436
	Calibration Frequency	18 months
	Date of last calibration	15/11/2012
	Validity of last calibration	03/10/2014
	Installation date	04/04/2013
	Validity of calibration runs from	Installation date
	Equipment 3	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2012113
	Calibration Frequency	18 months
	Date of last calibration	22/04/2014
	Validity of last calibration	14/11/2015
	Installation date	15/05/2014
	Validity of calibration runs from	Installation date
Measuring/reading/recording frequency	Measured continuously each minute.	

Calculation method (if applicable)	The Automatic Continuous Data Gathering System measures the maximum and minimum value of the parameter each minute so the value considered is the simple average between the two. As established by the manufacturer, the mass flow meter registers the volume in m3/h at 21.1°C and 1.013 bar. Therefore, the LFG flow should be converted at normal conditions (0°C and 1.013bar). In accordance with ACM0001 ver 11, the normalized density is 0.0007168 tCH_4/m^3 (which is the density of methane at 0 °C and 1.013 bar). In order to do so, since pressure is a constant in both conditions, Charles´s Law of ideal gasses is used to convert the volume registered by the meter to a volume in normal conditions, as follows: **Charles´s Law:** V1/T1 = V2/T2 Where V1: Flow measured V2: Flow Normalized T1: Temperature measured = 21.1°C (294.25K) T2 : Temperature Normalized= 0°C (273.15K) **Normalization equation:** V2 = (273.15 / 294.25) x V1 The value of the monitored value shown in this table represents the total value monitored during the period by adding the instantaneous readings taken each minute.
QA/QC procedures	Flow meters are subject to a regular maintenance and testing regime to ensure accuracy.
Purpose of data/parameter	Baseline emission calculation.
Additional comments	Data will be kept for 2 years after end of crediting period or last issuance of CERs, whichever is later. The amount of landfill gas flared equals to the amount of landfill gas sent to the flare. Furthermore, $LFG_{flare,y}$ is equal to $LFG_{total,y,}$ therefore, the same flow meter has been used. Methane fraction of the landfill gas and LFG flow has been measured on the same basis (dry).

Data/Parameter	**T**
Unit	ºC
Description	Temperature of the landfill gas
Measured/calculated/ default	Not measured
Source of data	Not installed
Value(s) of monitored parameter	Not monitored
Monitoring equipment	Not installed
Measuring/reading/recording frequency	Not measured. The flow meters automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm^3).
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Not applicable.
Purpose of data/parameter	Not used. The flow meters automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm^3).
Additional 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 (Nm^3).

Data/Parameter	P
Unit	Pa
Description	Pressure of the landfill gas
Measured/calculated/ default	Not measured
Source of data	Not installed
Value(s) of monitored parameter	Not monitored
Monitoring equipment	Not installed
Measuring/reading/recording frequency	Not measured. The flow meters automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm^3).
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Not applicable.
Purpose of data/parameter	Not used. The flow meters automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm^3).
Additional 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 (Nm^3).

Data/Parameter	T_{flare}
Unit	^0C
Description	Temperature in the exhaust gas of the flare.
Measured/calculated/ default	Measured
Source of data	Thermocouples
Value(s) of monitored parameter	821.87

Monitoring equipment	***Equipment 1***
	Type: Thermocouple
	Accuracy class: ± 2.2° C or 0.75% of reading, whichever is greater
	Manufacturer: Thermo Sensors Corporation
	Model: 494-92716-8-K-I600
	Serial Number: 121826-1,2,3 and 4
	Calibration Frequency: 18 months
	Date of last calibration: 09/03/2010
	Validity of last calibration: 13/02/2014
	Installation date: 14/08/2012
	Validity of calibration runs from: Installation date
	Equipment 2
	Type: Thermocouple
	Accuracy class: ± 2.2° C or 0.75% of reading, whichever is greater
	Manufacturer: Thermo Sensors Corporation
	Model: 494-92716-8-K-I600
	Serial Number: 128042-2,3,4 and 5
	Calibration Frequency: 18 months
	Date of last calibration: 28/09/2012
	Validity of last calibration: 19/08/2014
	Installation date: 20/02/2013
	Validity of calibration runs from: Installation date
	Equipment 3
	Type: Thermocouple
	Accuracy class: ± 2.2° C or 0.75% of reading, whichever is greater
	Manufacturer: Thermo Sensors Corporation
	Model: 494-92716-8-K-I600
	Serial Number: 124264-1,2,3 and 4
	Calibration Frequency: 18 months
	Date of last calibration: 18/03/2011
	Validity of last calibration: 01/03/2015
	Installation date: 02/09/2013
	Validity of calibration runs from: Installation date
Measuring/reading/recording frequency	Measured continuously each minute.
Calculation method (if applicable)	The flare is considered to be operational if the T_{flare} is above 500 ºC. The Automatic Continuous Data Gathering System measures the maximum and minimum value of the parameter each minute so the value considered is the simple average between the two. The value of the monitored value shown in this table represents the weighted average value monitored during the period using the instantaneous readings taken each minute.
QA/QC procedures	Temperature in the exhaust gas has been measured every minute using four thermocouples distributed along the flare stack.
Purpose of data/parameter	Baseline emission calculation.
Additional comments	Data will be kept for 2 years after end of crediting period or last issuance of CERs, whichever is later.

Data/Parameter	**$MD_{BL,y}$ or AF**
Unit	% or tons
Description	Methane destroyed due to regulatory or other requirements
Measured/calculated/ default	Measured
Source of data	Local and/or national authorities

Value(s) of monitored parameter	0
Monitoring equipment	Changes in regulatory requirements, relating to the baseline landfill(s) need to be monitored in order to update the adjustment factor (AF), or directly MD_{reg}.
Measuring/reading/recording frequency	At the beginning of each crediting period.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Not applicable.
Purpose of data/parameter	Project emission calculation.
Additional comments	The AF was set at 0%. This value is justified based on the fact that the regulatory requirements do not indicate any specific amount of gas collection and destruction or utilization and that in practice, no amounts of LFG were flared before project implementation.

Data/Parameter	**$PE_{flare,y}$**
Unit	tCO_2
Description	Project emissions from flaring of the residual gas stream in year y
Measured/calculated/ default	Calculated
Source of data	Calculated based on monitored values as per the "Tool to determine project emissions from flaring gases containing methane" (Version 1).
Value(s) of monitored parameter	15,330
Monitoring equipment	Calculated, based on monitored energy consumed by the project activity.
Measuring/reading/recording frequency	Calculated continuously each minute.
Calculation method (if applicable)	The parameters used for determining the project emissions from flaring of the residual gas stream in year y will be monitored as per the "Tool to determine project emissions from flaring gases containing methane" (Version 1). When no records for monitoring exist, the default value for enclosed flare are selected and the flare efficiency in the hour *h* as: • 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour *h* . • 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour *h,* but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h*. • 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour *h* and the manufacturer's specifications on proper operation of the flare are met continuously during the hour *h*.
QA/QC procedures	As per the "Tool to determine project emissions from flaring gases containing methane" (Version 1) and regular maintenance and testing regime in line with the manufacturer`s recommendations will ensure optimal operation of the flare.
Purpose of data/parameter	Project emission calculation.
Additional comments	Data will be kept for 2 years after end of crediting period or last issuance of CERs, whichever is later.

Data/Parameter	**w_{CH4}**
Unit	m^3 CH_4/m^3 LFG
Description	Methane fraction in the landfill gas

<table>
<tr><td>Measured/calculated/ default</td><td>Measured continuously</td></tr>
<tr><td>Source of data</td><td>Continuous Gas Analyzer</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>46.51%</td></tr>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td colspan="2">Equipment 1</td></tr>
<tr><td>Type</td><td>Continuous Analyzer</td></tr>
<tr><td>Accuracy class</td><td>± 1% Full Scale</td></tr>
<tr><td>Manufacturer</td><td>NOVA</td></tr>
<tr><td>Model</td><td>910</td></tr>
<tr><td>Serial Number</td><td>8456</td></tr>
<tr><td>Calibration Frequency</td><td>12 months</td></tr>
<tr><td>Date of last calibration</td><td>18/11/2009</td></tr>
<tr><td>Validity of last calibration</td><td>17/11/2010</td></tr>
<tr><td>Installation date</td><td>14/08/2012</td></tr>
<tr><td>Validity of calibration runs from</td><td>Calibration date</td></tr>
<tr><td colspan="2">Equipment 2</td></tr>
<tr><td>Type</td><td>Continuous Analyzer</td></tr>
<tr><td>Accuracy class</td><td>± 1% Full Scale</td></tr>
<tr><td>Manufacturer</td><td>Landtec</td></tr>
<tr><td>Model</td><td>FAU</td></tr>
<tr><td>Serial Number</td><td>1061</td></tr>
<tr><td>Calibration Frequency</td><td>12 months</td></tr>
<tr><td>Date of last calibration</td><td>09/11/2012</td></tr>
<tr><td>Validity of last calibration</td><td>08/11/2013</td></tr>
<tr><td>Installation date</td><td>02/09/2013</td></tr>
<tr><td>Validity of calibration runs from</td><td>Calibration date</td></tr>
<tr><td colspan="2">Equipment 3</td></tr>
<tr><td>Type</td><td>Continuous Analyzer</td></tr>
<tr><td>Accuracy class</td><td>± 1% Full Scale</td></tr>
<tr><td>Manufacturer</td><td>Landtec</td></tr>
<tr><td>Model</td><td>FAU</td></tr>
<tr><td>Serial Number</td><td>1061</td></tr>
<tr><td>Calibration Frequency</td><td>12 months</td></tr>
<tr><td>Date of last calibration</td><td>12/09/2013</td></tr>
<tr><td>Validity of last calibration</td><td>11/09/2014</td></tr>
<tr><td>Installation date</td><td>19/11/2013</td></tr>
<tr><td>Validity of calibration runs from</td><td>Calibration date</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Measured continuously each minute.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>The Automatic Continuous Data Gathering System measures the maximum and minimum value of the parameter each minute so the value considered is the simple average between the two.
The value of the monitored value shown in this table represents the weighted average value monitored during the period using the instantaneous readings taken each minute.</td></tr>
</table>

QA/QC procedures	The gas analyzer is subject to quarterly maintenance and testing to ensure accuracy, to be performed by the project developer according to the supplier's manual, to ensure the optimal conditions of the instrument. Since the date of calibration of the NOVA with serial number 8456 (Equipment 1) was valid up to 17/11/2010, the PP has applied the maximum permissible error of the gas analyzer (- 1%) to the measured values of the parameter $w_{CH4,y}$ taken during the period between the start of the monitoring period (20/08/2012) and the installation of the calibrated gas analyzer (Equipment 2) with serial number 1061 (02/09/2013), as per paragraph 283 (a) of the "Clean development mechanism validation and verification standard (Version 07.0)". Moreover, since the date of calibration of the FAU with serial number 1061 (Equipment 2) was valid up to 08/11/2013, the PP has applied the maximum permissible error of the gas analyzer (- 1%) to the measured values of the parameter $w_{CH4,y}$ taken during the period between the end of the validity of the calibration of the equipment (09/11/2013) and the installation of the calibrated gas analyzer (Equipment 3) with serial number 1072 (19/11/2013), as per paragraph 283 (a) of the "Clean development mechanism validation and verification standard (Version 07.0)".
Purpose of data/parameter	Baseline emission calculation.
Additional comments	Methane fraction of the landfill gas and LFG flow has been measured on the same basis (dry). Data will be kept for 2 years after end of crediting period or last issuance of CERs, whichever is later.

Data/Parameter	**$fv_{i,h}$**
Unit	-
Description	Volumetric fraction of component i in the residual gas in the hour h where i = CH_4, CO, CO_2, O_2,H_2, N_2
Measured/calculated/ default	Measured continuously
Source of data	Continuous Gas Analyzer
Value(s) of monitored parameter	46.51%
Monitoring equipment	The methane concentration in the residual gas in the hour h ($\mathbf{fv_{CH4,h}}$) is measured as per the equipment set out for the parameter $\mathbf{w_{CH4}}$
Measuring/reading/recording frequency	Measured continuously each minute.
Calculation method (if applicable)	The Automatic Continuous Data Gathering System measures the maximum and minimum value of the parameter each minute, so the value considered is the simple average between the two. The value of the monitored value shown in this table represents the weighted average value monitored during the period using the instantaneous readings taken each minute.
QA/QC procedures	The gas analyzer is subject to quarterly maintenance and testing to ensure accuracy, to be performed by the project developer according to the supplier's manual, to ensure the optimal conditions of the instrument.
Purpose of data/parameter	Baseline emission calculation.
Additional comments	Methane fraction of the landfill gas and LFG flow has been measured on the same basis (dry). Data will be kept for 2 years after end of crediting period or last issuance of CERs, whichever is later. As a simplified approach, project participants have only measured the methane content of the residual gas and consider the remaining part as N_2.

Data/Parameter	$EC_{PJ,j,y}$
Unit	MWh
Description	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
Measured/calculated/ default	Measured
Source of data	Electricity Meter
Value(s) of monitored parameter	330.719
Monitoring equipment	***Equipment 1*** Type: Electricity Meter Accuracy class: 0.2S Manufacturer: SATEC Model: PM175 Serial Number: 13539113 Calibration Frequency: Not applicable Date of last calibration: Not applicable Validity of last calibration: Not applicable Installation date: Not applicable Validity of calibration runs from: Not applicable
Measuring/reading/recording frequency	Measured continuously. The data used for the monitored parameter is sourced from the monthly invoices provided by the electricity company.
Calculation method (if applicable)	The value of the monitored value shown in this table represents the total value monitored during the period by adding the monthly readings.
QA/QC procedures	0.2 Precision as required by National Law when a power plant is connected to the national grid. Will be maintained and calibrated regularly by the project developer, following the supplier's manual.
Purpose of data/parameter	Project emission calculation.
Additional comments	Data will be kept for 2 years after end of crediting period or last issuance of CERs, whichever is later.

Data/Parameter	TDL_y
Unit	-
Description	Average technical transmission and distribution losses for providing electricity from the grid.
Measured/calculated/ default	Default
Source of data	"Tool to calculate baseline, project and/or leakage emissions from electricity consumptions"
Value(s) of monitored parameter	20%
Monitoring equipment	Not monitored.
Measuring/reading/recording frequency	Not applicable
Calculation method (if applicable)	Not applicable
QA/QC procedures	Not applicable
Purpose of data/parameter	Project emission calculation
Additional comments	There is no captive power plant installed at the site and no on-site captive power plant exists. Therefore the electricity is purchased from the grid only. As such, the default value of Scenario A is applied.

Data/Parameter	$PE_{EC,y}$
Unit	tCO_2
Description	Project emissions from electricity consumption by the project activity during the year y
Measured/calculated/ default	Calculated as per the Option A2 of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Source of data	Calculated based on monitored values.
Value(s) of monitored parameter	516
Monitoring equipment	Calculated, based on monitored energy consumed by the project activity.
Measuring/reading/recording frequency	Calculated continuously each minute.
Calculation method (if applicable)	The $EC_{PJ,j,y}$ as quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr) is multiplied by Emission factor for the grid (1.3 tCO_2/MWh) and by the factor (1+ TDL_y)
QA/QC procedures	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Purpose of data/parameter	Project emission calculation.
Additional comments	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"

Data/Parameter	$FV_{RG,h}$
Unit	Nm^3
Description	Total amount of landfill gas captured at normal temperature and pressure
Measured/calculated/ default	See corresponding section for parameter $LFG_{flare,y}$
Source of data	See corresponding section for parameter $LFG_{flare,y}$
Value(s) of monitored parameter	See corresponding section for parameter $LFG_{flare,y}$
Monitoring equipment	$FV_{RG,h}$ is equal to $LFG_{flare,y}$, therefore, no separate flow meter has been installed.
Measuring/reading/recording frequency	See corresponding section for parameter $LFG_{flare,y}$
Calculation method (if applicable)	See corresponding section for parameter $LFG_{flare,y}$
QA/QC procedures	See corresponding section for parameter $LFG_{flare,y}$
Purpose of data/parameter	See corresponding section for parameter $LFG_{flare,y}$
Additional comments	See corresponding section for parameter $LFG_{flare,y}$

D.3. Implementation of sampling plan

>>

Not applicable. The section is left blank intentionally.

SECTION E. Calculation of emission reductions or net anthropogenic removals

The file "ER Summary_2ndMP_Callao" provides the summary of the emission reductions calculation for the current monitoring period. The file can only be reviewed together with the monthly files, which incorporate the detailed calculation using the raw data monitored.

E.1. Calculation of baseline emissions or baseline net removals

>>

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

Table 4. Results and parameters used to calculate the Baseline Emissions

Data / Parameter:	Description	Source	Value	Unit
BE_y	Baseline Emissions			
$BE_y = (MD_{project,y} - MD_{reg,y}) \times GWP_{CH4}$		Eq 1 (page 19 PDD)	**138,140**	tCO_2e
$MD_{project,y}$	Amount of methane that would have been destroyed in project scenario			
$MD_{project,y} = MD_{flared,y}$		Eq 2 (page 19 PDD)	**5,526**	tCH_4
$MD_{flared,y}$	Methane destroyed by flaring			
$MD_{flared,y} = LFG_{flared,y} \times W_{CH4} \times D_{CH4} - (PE_{flare,y} / GWP_{CH4})$		Eq 3 (page 19 PDD)	**5,526**	tCH_4
$LFG_{flared,y}$	Amount of LFG flared	Monitored	**18,474,394**	Nm^3 LFG
W_{CH4}	Methane fraction in the LFG	Monitored	**46.51%**	m^3CH4/m^3LFG
D_{CH4}	Methane density at normal temperature and pressure	Default	**0.0007168**	tCH_4/Nm^3CH_4
T_{flare}	Temperature of the flare	Monitored	**821.87**	ºC
$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year y			
$PE_{flare,y} = TM_{RG,h} * (1 - \eta_{flare,h}) * GWP_{CH4} / 1000$		Eq (8)	**15,330**	tCO2e
$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour h			
$TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,n}$		Step 5. Eq (T.13)	**6,131,922**	kg
$FV_{RG,h}$	Volumetric flow rate of the residual gas	Monitored	**18,474,394**	Nm^3 LFG
$fv_{CH4,RG,h}$	Volumetric fraction of methane in the residual	Monitored	**46.51%**	m^3CH4/m^3LFG
$\rho_{CH4,n}$	Density of methane at normal conditions	Default	**0.716**	$kgCH_4/Nm^3CH_4$
$\eta_{flare,h}$	Flare efficiency in hour h	Default	**90.0%**	
GWPCH4	Global Warming Potential value of methane	Default	**25**	tCO2e/tCH4
$MD_{reg,y}$	Methane that would have been destroyed in the absence of the project due to regulatory requirement			
$MD_{reg,y} = MD_{project,y} \times AF$		Eq 3 (page 19 PDD)	**-**	tCH_4
$MD_{project,y}$	Amount of methane that would have been destroyed in project scenario	Monitored	**5,526**	tCH_4
AF	Adjustment factor (for methane destruction in the baseline)	Default	**0.0%**	
GWP_{CH4}	Global Warming Potential value for methane	Default	**25**	tCO_2e/tCH_4

E.2. Calculation of project emissions or actual net removals

>>

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

Table 5. Results and parameters used to calculate the Project Emissions

Data / Parameter:	Description	Source	Value	Unit
PE_y	Project Emissions			
$PEy = PE_{EC,y}$		Eq 16 (page 30 PDD)	**516**	tCO_2e
$PE_{EC,y}$	Emissions from consumption of electricity in the project case			
$PE_{EC,y} = EC_{PJ,y} * EF_{EL,j,y} * (1+TDL_y)$		Eq (page 31 PDD)	**516**	tCO_2e
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project activity	Monitored	**330.719**	MWh
$EF_{EL,j,y}$	Emission factor for the grid in year	Calculated	**1.3**	tCO2/MWh
TDL_y	Average technical transmission and distribution losses in the grid	Default	**20%**	

E.3. Calculation of leakage emissions

>>

The calculation does not need to consider leakage emissions, so LEy=0

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals ($t CO_2e$)	Project GHG emissions or actual net GHG removals ($t CO_2e$)	Leakage GHG emissions ($t CO_2e$)	GHG emission reductions or net anthropogenic GHG removals ($t CO_2e$)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	138,140	516	0	0	137,624	137,624

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period ($t CO_2e$)	Amount estimated ex ante ($t CO_2e$)
137,624	142,382

The emission reductions derived from the yearly values stated in the registered CDM-PDD are shown in the following table and compared against the yearly values obtained in the monitoring report:

Table 6. Comparison of actual emission reductions with estimates in registered PDD

Item		Actual values achieved during this monitoring period	Values estimated in ex-ante calculation of registered PDD
Year 2014	*From*	20/08/2014	01/01/2014
	To	31/12/2014	31/12/2014
	Days	134	365
	Emission reductions or GHG removals by sinks (t CO_2e)	16,465	51,793
	tCO2e/day	**123**	**142**
Year 2015	*From*	01/01/2015	01/01/2015
	To	31/12/2015	31/12/2015
	Days	365	365
	Emission reductions or GHG removals by sinks (t CO_2e)	52,807	58,408
	tCO2e/day	**145**	**160**
Year 2016	*From*	01/01/2016	01/01/2016
	To	31/12/2016	31/12/2016
	Days	366	366
	Emission reductions or GHG removals by sinks (t CO_2e)	68,352	64,960
	tCO2e/day	**187**	**177**

The values in the ex-ante calculation of the CDM-PDD are 51,793 tCO2e for 2014 (365 days), 58,408 tCO2e for 2015 (365 days), and 64,960 tCO2e for 2016 (365 days). The daily average for 2014, 2015 and 2016 equate to 142, 160 and 177 tCO2e/day, respectively. The ex-ante estimation is calculated by multiplying each of the daily average for 2014, 2015 and 2016 by the days of the current monitored period (134, 365 and 366 days, respectively).

E.6. Remarks on increase in achieved emission reductions

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The actual emission reductions achieved during the current monitoring period are 3% lower than the emission reductions derived from the yearly values stated in the registered CDM-PDD. Therefore, there is no need to provide explanation of any increase.

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Document information

Version	*Date*	*Description*
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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