Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT		
Title of the project activity	Huaycoloro landfill gas capture and combustion	
UNFCCC reference number of the project activity	0708	
Version number of the PDD applicable to this monitoring report	4.4	
Version number of this monitoring report	1	
Completion date of this monitoring report	26/07/2018	
Monitoring period number	6th Monitoring period	
Duration of this monitoring period	05/03/2014 to 31/12/2016 (both days included)	
Monitoring report number for this monitoring report	Not applicable	
Project participants	• PETRAMAS S.A.; • ICECAP Carbon Portfolio Ltd.; • Statkraft Markets GmbH.	
Host Party	Peru	
Sectoral scopes	• 1: Energy industries (renewable - / non-renewable sources) • 13: Waste handling and disposal	
Applied methodologies and standardized baselines	ACM0001: Flaring or use of landfill gas, Version 15.0.0	
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	1,024,214 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	793,476 tCO2e	

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 project's purpose is to reduce greenhouse gases ("GHG") emissions, in particular reduce methane (CH4) emissions through combusting Huaycoloro's landfill gas (LFG) to generate electricity up to a generation capacity of 5.74 MW[1] and flaring the remaining LFG that is not fed into the electricity generation system; and reduce carbon dioxide ("CO2") emissions through supplying renewable electricity to the SEIN-National Interconnected Electricity System (thus displacing fossil fuel-based electricity generation that would have emitted CO2).

b) Brief description of the installed technology and equipment;

Huaycoloro landfill opened in 1994 and is anticipated to remain open until about 2040, with a total capacity of approximately 40 million tons of solid waste. Huaycoloro landfill is currently filling at a rate of approximately 2,200 tons per day, and presently has about 12.6 million tons of waste in place. Huaycoloro landfill is in compliance with all Peruvian regulations for Solid Waste Management (SWM) activities[2].

Prior to the start of the implementation of the project activity, there was no destruction of CH_4 neither through LFG combustion nor energy generation. Therefore, the scenario existing prior to the implementation of the project activity was no methane collection or destruction leading to CH_4 release into the atmosphere. The situation before the project implementation coincides with the baseline scenario.

The installed equipment of the project activity is composed by a LFG Collection System, LFG Combustion System (Flare), LFG Pre-treatment System and an Electricity generation System.

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 and electricity generation which is not common practice in Peru.

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

05/03/2007: Project registration date with Executive Board of United Nation Framework for Climate Change Convention (UNFCCC)
14/03/2007: Commissioning of the LFG Combustion System (Flare);
12/11/2011: Commissioning of the Electricity generation System (4.8 MW)

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

The total emission reductions achieved during the sixth monitoring period from 05/03/2014 to 31/12/2016 (both days included) are 1,024,214 tCO_2e.

[1] The generation capacity of 5.74 MW was considered as the maximum capacity of the project. However, from 12/11/2011, the project has installed 4.8 MW of generation capacity.

[2] Huaycoloro'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 is located over the Huaycoloro Landfill; in the Km 7 the Huaycoloro Valley, in the San Antonio District, in the City of Chaclla, in the Huarochiri Province, in the Department of Lima (capital of Peru). The coordinates are Latitude: -11.931761 and Longitude: -76.872065.

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.	No
United Kingdom of Great Britain and Northern Ireland	ICECAP Carbon Portfolio Ltd	No
Germany	Statkraft Markets GmbH	No

A.4. Reference to applied methodologies and standardized baselines

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The approved baseline and monitoring methodology used for the project activity is ACM0001, "Flaring or use of landfill gas"(version 15.0.0)[3]. In accordance with the methodology, the project makes use of the latest versions of the following tools:

- "Emissions from solid waste disposal sites" (version 06.0.1)[4]
- “Project emissions from flaring”(version 02.0.0)[5]
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 1)[6]
- "Tool to calculate the emission factor for an electricity system" (version 4.0)[7]
- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0)[8]
- “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” (version 02)[9]

A.5. Crediting period type and duration

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The second crediting period corresponding to this monitoring period commence from 05/03/2014 and last till 04/03/2021 (Renewable).

[3] http://cdm.unfccc.int/methodologies/DB/RIV3EXJQG8UUTER1ZYGCLIF7BP4YNT

[4] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v6.0.0.pdf/history_view

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf/history_view

[6] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf/history_view

[7] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf/history_view

[8] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v1.pdf/history_view

[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.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. 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 was designed in two phases:

- Phase 1: The first phase 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.
- Phase 2: Once the LFG flow has been proven to be steady (in terms of volume and quality) for the electricity generation, a second project phase has been carried out and a reciprocating engine facility has been installed. This phase implies the installation of generating equipment that combust the methane of the LFG in order to produce electricity.

The "Huaycoloro landfill gas capture and combustion" project began continuous operations on 16/03/2007 under Phase 1. On 12/11/2011, the project entered into the Phase 2 with a generation capacity of 4.8 MW. From 12/11/2011, the LFG which is captured with the wells is transported through a network of high density polyethylene pipes to both the LFG Combustion System and Electricity Generation System. The following diagram represents the technology applied in the "Huaycoloro landfill gas capture and combustion" project:

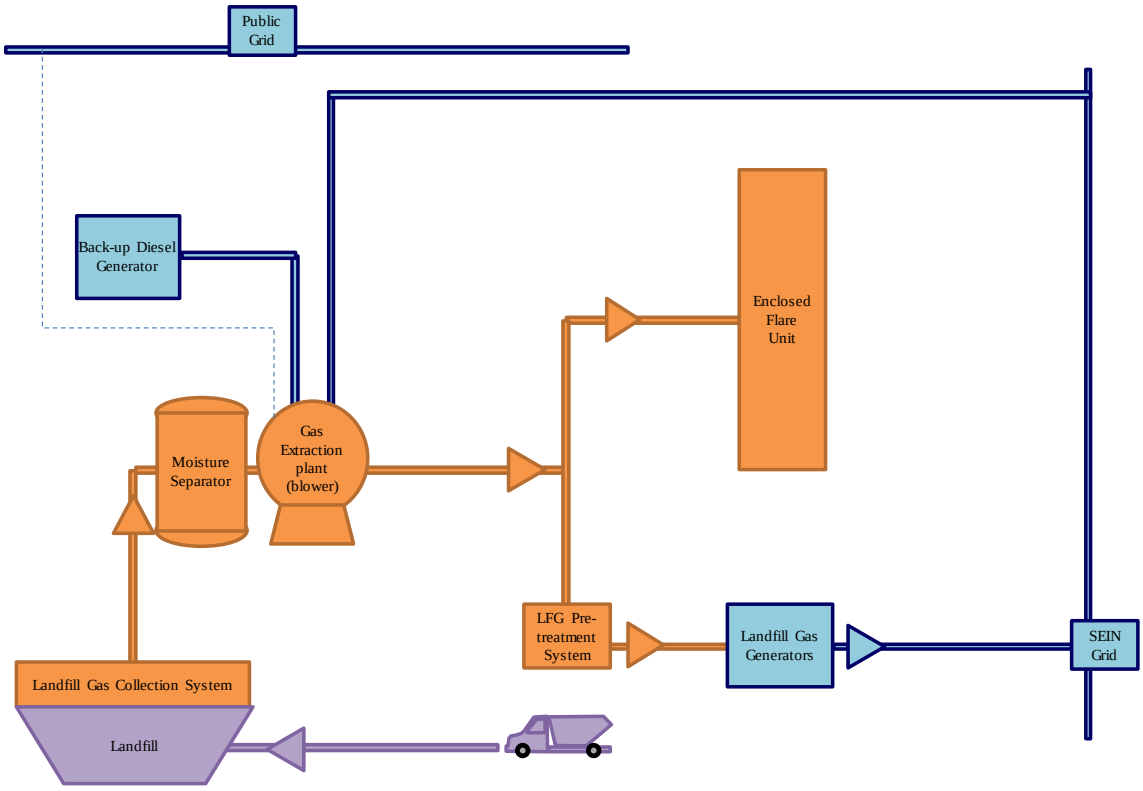

Figure 1. Diagram of the technology applied in the project activity.

The installed equipment of the project activity is composed by a LFG Collection System, LFG Combustion System (Flare), LFG Pre-treatment System and an Electricity Generation System with the following characteristics:

- The LFG Collection System is composed by vertical extraction wells drilled in the surface of the landfill and connected by pipe made of high density polyethylene (HDPE) to transport the LFG through the system, which was initially composed by 142 wells and, nowadays, the project has 172 wells in operation.
- 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 4000 SCFM (equivalent to 6430 Nm3/h).
- The LFG Pre-treatment System is composed by a chiller (to reduce humidity of LFG) and a cleaning system (to reduce particulates and compounds which can damage the engines).
- The Electricity Generation System is composed by three LFG Engines provided by Caterpillar (model G3520C) with capacity of 1.6 MW each, providing a total capacity of 4.8 MW.

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 has been used for electricity generation with a generation capacity of 4.8 MW. LFG has been used to generate electricity and only send the excess LFG to the flare. 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 “Huaycoloro landfill gas capture and combustion” project has been operational 95.9% of the monitoring period while the Electricity Generation System has been operational 97.6% 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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Not applicable. The section is left blank intentionally.

B.2.6. Changes to project design

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Not applicable. The section is left blank intentionally.

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 "Huaycoloro landfill gas capture and combustion" 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:

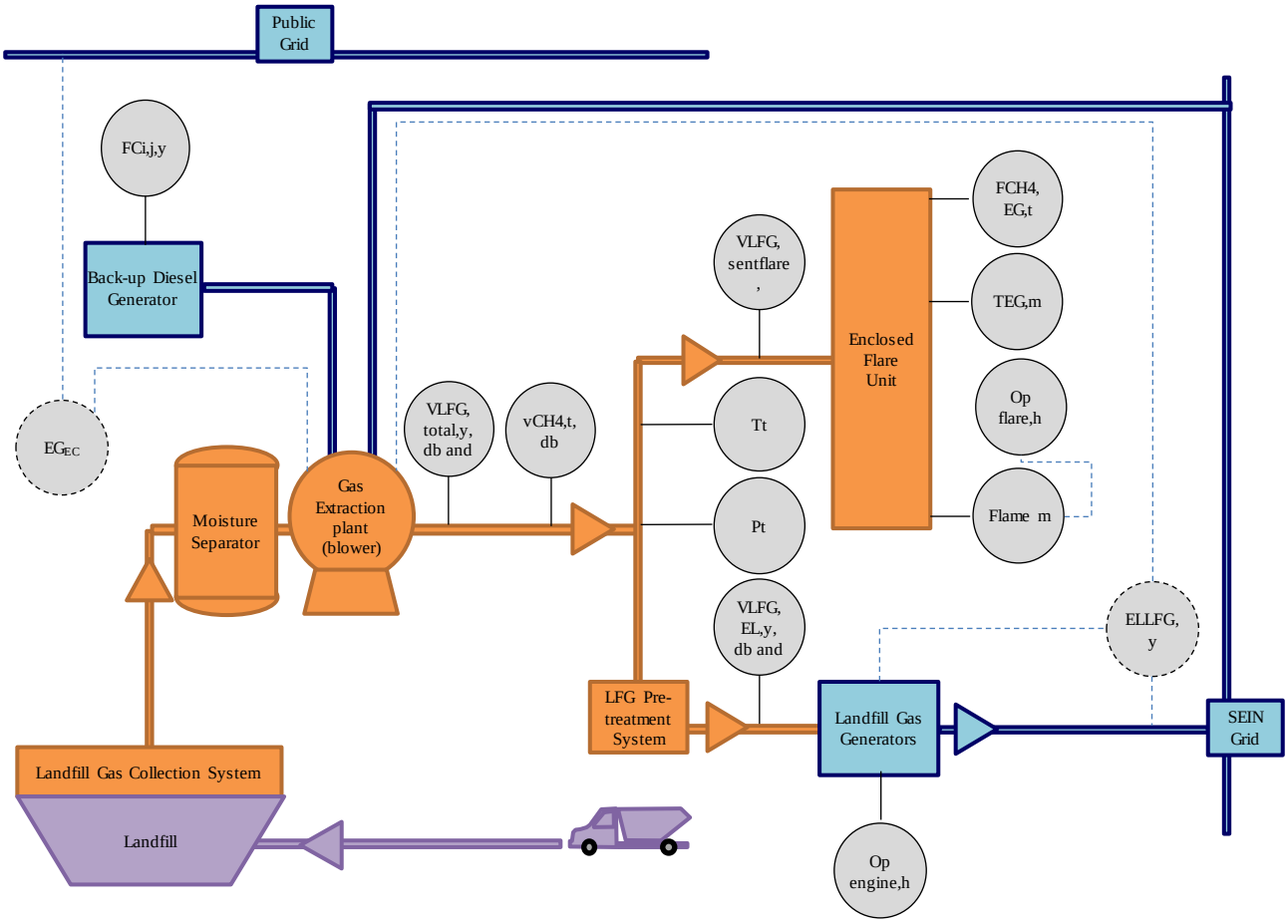

Figure 2. Line diagram showing all relevant monitoring points

b) Data collection procedures: The following points provide a description of the data collection procedures followed by the "Huaycoloro landfill gas capture and combustion" project during the monitoring period:

i. 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 following parameters are gathered manually in daily log sheets:

Table 1. Parameters gathered manually

Parameter	Data unit	Description of the parameter
Management of SWDS	-	Management of SWDS
$\rho_{reg,y}$	Dimensionless	Fraction of LFG that is required to be flared due to a requirement in year y
Maintenance$_y$	Calendar dates	Maintenance events completed in year y
$F_{CH4,EG,t}$	kg	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions
$EL_{LFG,y}$	MWh	Net quantity of electricity generated using LFG
$EG_{EC,y}$	MWh	Amount of electricity consumed by the project activity in year y
$PE_{EC,y}$	tCO2	Project emissions from electricity consumption by the project activity during the year y
$FC_{i,j,y}$	m3/yr	Quantity of fuel type i combusted in process j during the year y

The parameter $F_{CH4,EG,t}$ is monitored yearly using external laboratories which measured simultaneously in the exhaust of the flare, the volume flow of gases and the methane concentration. With these results, the "Tool to determine project emissions from flaring gases containing methane (EB 28. Annex 13)" is applied to determine the value of the flare efficiency.

(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. The following parameters are gathered automatically under such procedure:

Table 2. Parameters gathered automatically

Parameter	Data unit	Description of the parameter
$V_{LFG,total,y,db}$	m³ dry gas/h	Volumetric flow of total landfill gas which is sent to flare and used for electricity generation in year y on a dry basis
$V_{LFG,sent\_flare,y,db}$	m³ dry gas/h	Volumetric flow of landfill gas which is sent to flare in year y on a dry basis
$V_{LFG,EL,y,db}$	m³ dry gas/h	Volumetric flow of landfill gas which is used for electricity generation in year y on a dry basis
T_t	K	Temperature of the gaseous stream in time interval t
P_t	Pa	Pressure of the gaseous stream in time interval t
$v_{CH4,t,db}$	m³ CH4/m³ dry gas	Volumetric fraction of CH4 in a time interval t on a dry basis
$Op_{engine,h}$	-	Operation of the engine that consumes the LFG
$Op_{flare,h}$	-	Operation of the flare that consumes the LFG
$Flame_m$	Flame on or Flame off	Flame detection of flare in the minute m
$T_{EG,m}$	ºC	Temperature in the exhaust gas of the enclosed flare in minute m

ii. **Data aggregation:** The data is aggregated monthly in a Monthly Report which is presented to the Board of Petramas S.A. as per internal procedures.

iii. **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. has an in-house back-up system to record the data during the crediting period.

iv. **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 "Huaycoloro landfill gas capture and combustion" project during the monitoring period:

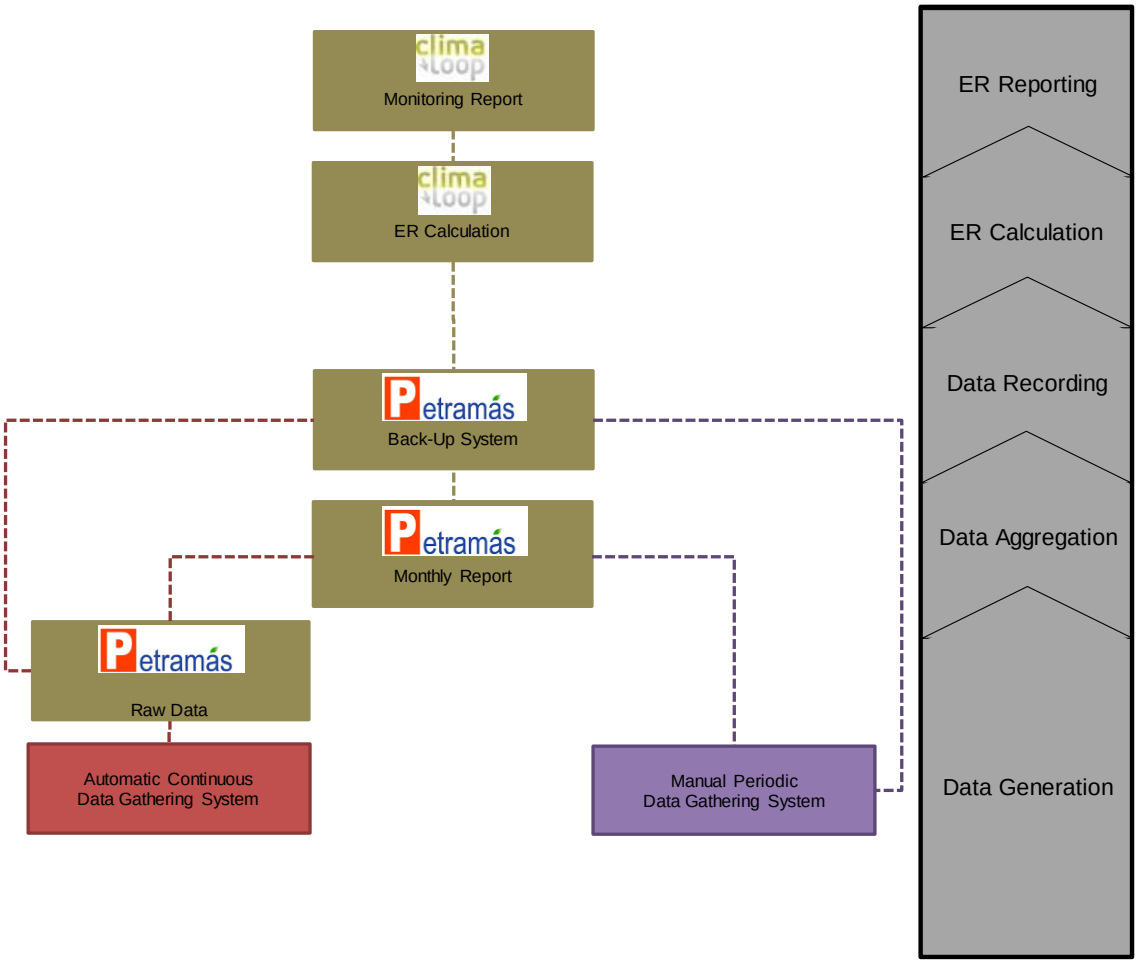

Figure 3. Scheme of the data collection procedures

As shown in the scheme above, the Data collection procedures in the "Huaycoloro landfill gas capture and combustion" project are divided in an Automatic Continuous Data Gathering System and a Manual Periodic Data Gathering System. Once the data is collected, it is aggregated in a monthly basis to report the expected CER generation to Petramas S.A´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 S.A	Data Collection and Recording
Ádamo Meléndez	Senior Manager	Petramas S.A	Data Aggregation
Sergi Cuadrat	CDM Consultant	ClimaLoop	ER Calculation and Reporting
Jorge Zegarra	General Manager	Petramas S.A	Final Approval

The following scheme simplifies the Organizational Structure followed by the "Huaycoloro landfill gas capture and combustion" project:

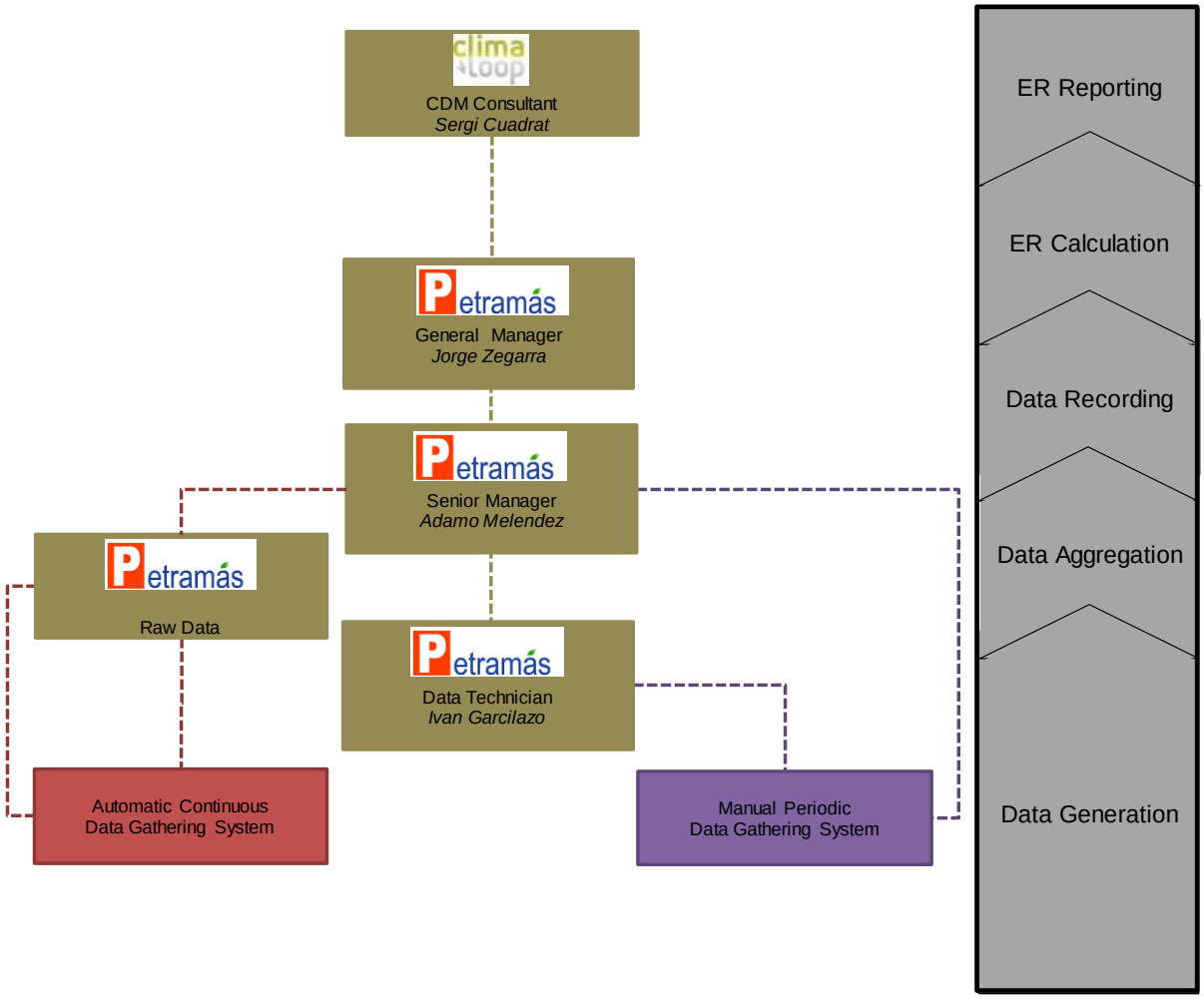

Figure 4. Organizational Structure

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 (which gathers the parameter $CONS_{ELEC,PJ}$) 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 S.A.
  - ✓ 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 “Huaycoloro landfill gas capture and combustion” 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	OX_{top_layer}
Unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites"
Value(s) applied	0.1
Choice of data or measurement methods and procedures	According to the "Emissions from solid waste disposal sites" –Version 6.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Applicable to Step A.

Data/Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential of CH_4
Source of data	IPCC
Value(s) applied	25
Choice of data or measurement methods and procedures	25 for the second commitment period in accordance with Table 2.14 of the Fourth Assessment Report of the IPCCC. Shall be updated according to any future COP/MOP decisions.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	As per COP Decision 4/CMP.7, *"for the second commitment period of the Kyoto Protocol, the global warming potentials used by Parties to calculate the carbon dioxide equivalence of anthropogenic emissions by sources and removals by sinks of the greenhouse gases listed in Annex A to the Kyoto Protocol shall be those listed in the column entitled "Global Warming Potential for Given Time Horizon" in table 2.14 of the errata to the contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, based on the effects of greenhouse gases over a 100-year time horizon, taking into account the inherent and complicated uncertainties involved in global warming potential estimates".* Therefore, GWP of methane has been updated from 21 (1st crediting period) to 25 (100-year time horizon) as per Table 2.14 of the Fourth Assessment Report of the IPCCC which can be found at: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14

Data/Parameter	D_{CH4}
Unit	tCH_4/m^3CH_4
Description	Methane density
Source of data	IPCC
Value(s) applied	0.0007168
Choice of data or measurement methods and procedures	At standard T and P (0 degrees C and 1,013 bar)

Purpose of data/parameter	Calculation of baseline emissions
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	Calculated as per the "*Emissions from solid waste disposal sites" –Version 6*
Value(s) applied	**Start year** / **$BE_{CH4,SWDS,y}$ (t CO_2e)** 2013 / 556,527 2014 / 574,287 2015 / 591,586 2016 / 608,490 2017 / 625,057 2018 / 641,337 2019 / 657,374 **Total** / **4,254,657**
Choice of data or measurement methods and procedures	As per the *"Emissions from solid waste disposal sites" –Version 6*
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Used for ex-ante estimation of the amount of methane that would have been destroyed/combusted during the year

Data/Parameter	φ
Unit	-
Description	Model correction factor to account for model uncertainties
Source of data	As per the "Emissions from solid waste disposal sites" –Version 6
Value(s) applied	0.75
Choice of data or measurement methods and procedures	Humid/wet conditions / Dry conditions Application A / 0.75 / 0.75 Application B / 0.85 / 0.80
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	**F**
Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for N/AtioN/Al Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or measurement methods and procedures	According to the "Emissions from solid waste disposal sites" –Version 6
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.

Data/Parameter	f
Unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data	According to the “Emissions from solid waste disposal sites” –Version 6
Value(s) applied	0
Choice of data or measurement methods and procedures	All the methane generated was directly vented to the atmosphere prior to the project activity. Upon the implementation of the project activity, methane captured will be flared and/or used for electricity.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	η_{PJ}
Unit	-
Description	The efficiency of the degassing system which will be installed in the project activity, in year y
Source of data	As per ACM0001 / Version 15.0.0 "Flaring or use of landfill gas"
Value(s) applied	50%
Choice of data or measurement methods and procedures	The efficiency of the planned LFG collection, flaring, and utilization system is estimated based on site conditions and the proposed system design by applying the default value proposed as per page 10/23 of ACM0001 / Version 15.0.0 "Flaring or use of landfill gas"
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	The efficiency of the planned LFG collection, flaring, and utilization system is taken into account for the ex ante estimation of emission reductions.

Data/Parameter	OX
Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	As per the “*Emissions from solid waste disposal sites".V6.*
Value(s) applied	0.1
Choice of data or measurement methods and procedures	According to the “Emissions from solid waste disposal sites” –Version 6.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	MCF
Unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	1
Choice of data or measurement methods and procedures	According to the “Emissions from solid waste disposal sites” –Version 6 for managed solid waste disposal sites” this value is to be applied to the landfill as it is “for unmanaged solid waste disposal sites - deep and/or with high water table. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level.

Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	**DOC_j**
Unit	-
Description	Fraction of degradable organic carbon (by weight) in the waste type *j*.
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)
Value(s) applied	**Waste type j** / **DOC_j (%wet waste)** Wood and wood products: 43 Pulp, paper and cardboard (other than sludge): 40 Food, food waste, bevarages and tobacco (other thansludge): 15 Textiles: 24 Garden, yard and park waste: 20 Glass, plastic, metal, other inert waste: 0
Choice of data or measurement methods and procedures	In accordance with *"Emissions from solid waste disposal sites" –Version 6*
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	The values applied are for wet waste.

Data/Parameter	**DOC_f**
Unit	-
Description	Fraction of degradable organic carbon (DOC) that can decompose
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or measurement methods and procedures	According to the "Emissions from solid waste disposal sites" –Version 6
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	N/A

Data/Parameter	**k_j**
Unit	-
Description	Decay rate for the waste type *j*.
Source of data	IPCC 2006 Guidelines for Nationall Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)

Value(s) applied	<table><tr><th colspan="2" rowspan="2">Waste type *j*</th><th colspan="2">Boreal and Temperate (MAT≤20°C)</th><th colspan="2">Tropical (MAT>20°C)</th></tr><tr><th>Dry (MAP/PET <1)</th><th>Wet (MAP/PET >1)</th><th>Dry (MAP< 1000mm)</th><th>Wet (MAP> 1000mm)</th></tr><tr><td rowspan="2">Slowly degrading</td><td>Pulp, paper, cardboard (other than sludge), textiles</td><td>0.04</td><td>0.06</td><td>0.045</td><td>0.07</td></tr><tr><td>Wood, wood products and straw</td><td>0.02</td><td>0.03</td><td>0.025</td><td>0.035</td></tr><tr><td>Moderately degrading</td><td>Other (non-food) organic putrescible garden and park waste</td><td>0.05</td><td>0.10</td><td>0.065</td><td>0.17</td></tr><tr><td>Rapidly degrading</td><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>0.06</td><td>0.185</td><td>0.085</td><td>0.40</td></tr></table>
Choice of data or measurement methods and procedures	The Huaycoloro Landfill is located in Peru (Lima), which has a mean annual temperature (MAT) of 19.4ºC and mean annual precipitation (MAP) of 13 mm. Data on potential evapotranspiration (PET) is 1. Therefore, the site is based in a Tropical/Temperate climatic conditions (MAT>20C) and dry precipitations (MAP<1000 mm)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	http://www.worldweather.org/029/c00108.htm

Data/Parameter	**$EF_{grid,y}$**
Unit	tCO2/MWh
Description	Emission factor for electricity generation
Source of data	Calculated as per the ”Tool to calculate the emission factor for an electricity system” Version 4.0. See detailed calculation in sheets provided to DOE
Value(s) applied	0.45338
Choice of data or measurement methods and procedures	Calculated as per the ”Tool to calculate the emission factor for an electricity system” Version 4.0
Purpose of data/parameter	Calculation of baseline emissions and Calculation of project emissions
Additional comments	The value will be kept fixed for the entire crediting period.

Data/Parameter	**$\eta_{flare,m}$**
Unit	%
Description	Flare Efficiency in the minute m
Source of data	As per “Project emissions from flaring” (Version 02.0.0)
Value(s) applied	0.9
Choice of data or measurement methods and procedures	Measured flare efficiency will be used to calculate the amount of methane destroyed by flaring ex post as per Option B.1 of “Project emissions from flaring” version 02.0.0. Under Option B, the project participant has chosen to determine flare efficiency using Option B.1. Under Option B.1 the measurement is conducted by an accredited entity on a biannual basis.

Purpose of data/parameter	Calculation of Baseline emissions
Additional comments	The default value flare efficiency will be used to calculate the amount of methane destroyed by flaring ex ante as per Option A (1) of "Project emissions from flaring" version 02.0.0. For ex ante estimation of FCH4,PJ,y, the estimate baseline emission of methane from the SWDS (according to equation 2) in order to estimate the emission reductions of the proposed project activity in the CDM-PDD are conducted following the "Emissions from solid waste disposal sites" (Version 06.0.1). The flare height installed in the project activity is more than 10 times the diameter. This makes it a high height flare. As per the tool "Project emissions from flaring" version 02.0.0, a low height flare is an enclosed flare for which the flame enclosure has a height between 10 and two times de diameter of the enclosure. Given that the project is not using a low height flare, the flare efficiency in the minute m shall not be adjusted by subtracting 0.1 from the default value of 90% for the efficiency of the flare. Therefore, a value of 90% will be used ex-ante for the project activity.

Data/Parameter	**TDL_y**
Unit	%
Description	Average technical transmission and distribution losses in the grid in year y.
Source of data	Default value of average technical transmission and distribution losses will be used.
Value(s) applied	20.0%
Choice of data or measurement methods and procedures	Not applicable
Purpose of data/parameter	Calculation of baseline emissions and Calculation of project emissions
Additional comments	Determined ex ante for the second monitoring period.

Data/Parameter	**$SPEC_{flare}$**
Unit	Temperature - °C Flow rate - Nm3/h Maintenance schedule - number of days
Description	Manufacturer's flare specifications for temperature, flow rate and maintenance schedule
Source of data	Flare manufacturer
Value(s) applied	Temperature - From 760 to 982°C (1400 °F to 1800 °F)[10] Flow rate - From 643 to 6,430 Nm3/h (400[11] SCFM to 4,000 SCFM[12]) Maintenance schedule – Weekly (7 days)[13]

[10] Operating temperature as per manufacturer's flare specifications set in page 12 of the document provided to the DOE under the name "Manual John Zink_ ZTOF"

[11] Considering a 50% methane concentration, all flares designed for flow rates of 1500 SCFM (2411 Nm3/h) or greater must achieve a 10:1 instantaneous turndown minimum as set in point 1.03.A.2 of the manufacturer's flare specifications provided to the DOE under the name "ZTOF_Landfill Gas Enclosed Flare System". Therefore, the minimum inlet flow rate of the flare would be 400 SCFM (643 Nm3/h).

[12] The maximum inlet flow rate is 4,000 SCFM as per manufacturer's flare specifications set in page 12 of the document provided to the DOE under the name "Manual John Zink_ ZTOF"

[13] The maintenance program should be developed by the user of the flare as per manufacturer's flare specifications set in page 29 of the document provided to the DOE under the name "Manual John Zink_ ZTOF", and that is why a maximum of 7 days between maintenance events are considered appropriate by the project developer.

Choice of data or measurement methods and procedures	The flare specifications set by the manufacturer for the correct operation of the flare are: (a) From 643 to 6,430 Nm3/h inlet flow rate; and (b) From 760 to 982°C operating temperature (c) Maximum of 7 days between maintenance events.
Purpose of data/parameter	Not used in emission reductions calculations.
Additional comments	Only applicable in case of enclosed flares. The maintenance schedule is not required if Option A is selected to determine flare efficiency of an enclosed flare

D.2. Data and parameters monitored

Data/Parameter	**Management of SWDS**
Unit	-
Description	Management of SWDS
Measured/calculated/ default	Not applicable
Source of data	Use different sources of data: (a) Original design of the landfill; (b) Technical specifications for the management of the SWDS; (c) Local or national regulations
Value(s) of monitored parameter	Not applicable
Monitoring equipment	Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications.
Measuring/reading/recording frequency	Annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	This section has been left in blank on purpose.
Purpose of data/parameter	Not required for calculations.
Additional comments	This section has been left in blank on purpose.

Data/Parameter	$\rho_{reg,y}$
Unit	Dimensionless
Description	Fraction of LFG that is required to be flared due to a requirement in year y
Measured/calculated/ default	Default
Source of data	ACM0001 / Version 15.0.0, Step A2, Case 2 c), eq. 9
Value(s) of monitored parameter	0

Monitoring equipment	For the project activity, the Case 2 “Requirement to destroy methane exists and no existing LFG capture system” under situation c) “the requirement does not specify the amount or percentage of LFG that should be destroyed but requires the installation of a capture system, without requiring the captured LFG to be flared” is applicable because the legislation applicable at the submission for validation of the project activity does not specify the amount or percentage of LFG that should be destroyed but requires the installation of a capture system, without requiring the captured LFG and without existing LFG capture system. ACM0001 / Version 15.0.0, Step A2, Case 2 c), eq. 9 is applied.
Measuring/reading/recording frequency	Annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	This section has been left in blank on purpose.
Purpose of data/parameter	Calculation of Baseline emissions.
Additional comments	Applicable to Case 2 of section-5.4.1.3. Used to calculate $F_{CH4,BL,y}$, which is part of the calculation of $BE_{CH4,y}$.

Data/Parameter	**$V_{LFG,total,y,db}$**
Unit	m^3 dry gas/h
Description	Volumetric flow of total landfill gas which is sent to flare and used for electricity generation in year y on a dry basis
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	117,926,939

Monitoring equipment	***Equipment 1***	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2011196
	Calibration Frequency	18 months
	Date of last calibration	12/07/2011
	Validity of last calibration	12/07/2012
	Installation date	27/10/2011
	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	2012024
	Calibration Frequency	18 months
	Date of last calibration	16/02/2012
	Validity of last calibration	16/10/2013
	Installation date	14/03/2012
	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	2011196
	Calibration Frequency	18 months
	Date of last calibration	04/03/2013
	Validity of last calibration	04/09/2014
	Installation date	03/06/2013
	Validity of calibration runs from	Installation date
	Equipment 4	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2014112
	Calibration Frequency	18 months
	Date of last calibration	22/04/2014
	Validity of last calibration	21/10/2015
	Installation date	24/05/2014
	Validity of calibration runs from	Installation date
Measuring/reading/recording frequency	Continuous.	

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 SCFM at 21.1°C and 1.013 bar. Therefore, the LFG flow should be firstly converted from SCFM to m3/h multiplying the measurement by 60 and 0.028317. Secondly, it should be converted at normal conditions (0°C and 1.013bar) using Charles´s Law of ideal gasses 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 / 294.15) 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	Periodic calibration against a primary device will be conducted. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This parameter will be monitored in Options A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 2.0.0. No separate monitoring of temperature and pressure is necessary since flowmeters that automatically express LFG volumes in normalized cubic meters will be used.

Data/Parameter	$V_{LFG,sent\_flare,y,db}$
Unit	m^3 dry gas/h
Description	Volumetric flow of landfill gas which is sent to flare in year y on a dry basis
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	45,226,397

Monitoring equipment	***Equipment 1***	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2011196
	Calibration Frequency	18 months
	Date of last calibration	12/07/2011
	Validity of last calibration	12/07/2012
	Installation date	27/10/2011
	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	2012024
	Calibration Frequency	18 months
	Date of last calibration	16/02/2012
	Validity of last calibration	16/10/2013
	Installation date	14/03/2012
	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	2011196
	Calibration Frequency	18 months
	Date of last calibration	04/03/2013
	Validity of last calibration	04/09/2014
	Installation date	03/06/2013
	Validity of calibration runs from	Installation date
	Equipment 4	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2014112
	Calibration Frequency	18 months
	Date of last calibration	22/04/2014
	Validity of last calibration	21/10/2015
	Installation date	24/05/2014
	Validity of calibration runs from	Installation date
Measuring/reading/recording frequency	Continuous	

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 SCFM at 21.1°C and 1.013 bar. Therefore, the LFG flow should be firstly converted from SCFM to m3/h multiplying the measurement by 60 and 0.028317. Secondly, it should be converted at normal conditions (0°C and 1.013bar) using Charles´s Law of ideal gasses 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 / 294.15) 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	Periodic calibration against a primary device will be conducted. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This parameter will be monitored in Options A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 2.0.0. No separate monitoring of temperature and pressure is necessary since flowmeters that automatically express LFG volumes in normalized cubic meters will be used.

Data/Parameter	$V_{LFG,EL,y,db}$
Unit	m^3 dry gas/h
Description	Volumetric flow of landfill gas which is used for electricity generation in year y on a dry basis
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	72,700,541

Monitoring equipment	***Equipment 1***	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2011196
	Calibration Frequency	18 months
	Date of last calibration	12/07/2011
	Validity of last calibration	12/07/2012
	Installation date	27/10/2011
	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	2012024
	Calibration Frequency	18 months
	Date of last calibration	16/02/2012
	Validity of last calibration	16/10/2013
	Installation date	14/03/2012
	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	2011196
	Calibration Frequency	18 months
	Date of last calibration	04/03/2013
	Validity of last calibration	04/09/2014
	Installation date	03/06/2013
	Validity of calibration runs from	Installation date
	Equipment 4	
	Type	Thermo-mass Flowmeter
	Accuracy class	± 1% Full Scale
	Manufacturer	Thermal Instruments
	Model	62-9/9500
	Serial Number	2014112
	Calibration Frequency	18 months
	Date of last calibration	22/04/2014
	Validity of last calibration	21/10/2015
	Installation date	24/05/2014
	Validity of calibration runs from	Installation date
Measuring/reading/recording frequency	Continuous	

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 SCFM at 21.1°C and 1.013 bar. Therefore, the LFG flow should be firstly converted from SCFM to m3/h multiplying the measurement by 60 and 0.028317. Secondly, it should be converted at normal conditions (0°C and 1.013bar) using Charles´s Law of ideal gasses 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 / 294.15) 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	Periodic calibration against a primary device will be conducted. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This parameter will be monitored in Options A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 2.0.0. No separate monitoring of temperature and pressure is necessary since flowmeters that automatically express LFG volumes in normalized cubic meters will be used.

Data/Parameter	**$V_{LFG,total,y,wb}$**
Unit	m^3 wet gas/h
Description	Volumetric flow of total landfill gas which is sent to flare and used for electricity generation in year y on a wet basis
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	0
Monitoring equipment	See table of parameter **$V_{LFG,total,y,db}$**
Measuring/reading/recording frequency	Continuous
Calculation method (if applicable)	See table of parameter **$V_{LFG,total,y,db}$**
QA/QC procedures	Periodic calibration against a primary device will be conducted. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data/parameter	The values applied ex ante for this parameter have been considered to be in dry basis so values in wet basis have not been used in the calculation.

Additional comments	This parameter will be monitored in Options B of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 2.0.0. No separate monitoring of temperature and pressure is necessary since flowmeters that automatically express LFG volumes in normalized cubic meters will be used.

Data/Parameter	$\mathbf{V_{LFG,sent\_flare,y,wb}}$
Unit	m^3 wet gas/h
Description	Volumetric flow of landfill gas which is sent to flare in year y on a wet basis
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	0
Monitoring equipment	See table of parameter $\mathbf{V_{LFG,sent\_flare,y,db}}$
Measuring/reading/recording frequency	Continuous
Calculation method (if applicable)	See table of parameter $\mathbf{V_{LFG,sent\_flare,y,db}}$
QA/QC procedures	Periodic calibration against a primary device will be conducted. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data/parameter	The values applied ex ante for this parameter have been considered to be in dry basis so values in wet basis have not been used in the calculation.
Additional comments	This parameter will be monitored in Options B of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 2.0.0. No separate monitoring of temperature and pressure is necessary since flowmeters that automatically express LFG volumes in normalized cubic meters will be used. The parameter $V_{LFG,sent\_flare,y,wb}$ equates to the parameter $V_{RG,m}$ in the application of the "Project emissions from flaring" version 02.0.0.

Data/Parameter	$\mathbf{V_{LFG,EL,y,wb}}$
Unit	m^3 wet gas/h
Description	Volumetric flow of landfill gas which is used for electricity generation in year y on a wet basis
Measured/calculated/ default	Measured with a thermal mass flow meter
Source of data	Monitoring equipment
Value(s) of monitored parameter	0
Monitoring equipment	See table of parameter $\mathbf{V_{LFG,EL,y,db}}$
Measuring/reading/recording frequency	Continuous
Calculation method (if applicable)	See table of parameter $\mathbf{V_{LFG,EL,y,db}}$
QA/QC procedures	Periodic calibration against a primary device will be conducted. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data/parameter	The values applied ex ante for this parameter have been considered to be in dry basis so values in wet basis have not been used in the calculation.
Additional comments	This parameter will be monitored in Options B of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 2.0.0. No separate monitoring of temperature and pressure is necessary since flowmeters that automatically express LFG volumes in normalized cubic meters will be used.

Data/Parameter	$F_{CH4,EG,t}$
Unit	kg
Description	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t
Measured/calculated/ default	Measured by third party company.
Source of data	Reports from third party company.
Value(s) of monitored parameter	See ER Calculations Spreadsheets
Monitoring equipment	Measure the mass flow of methane in the exhaust gas according to an appropriate national or international standard e.g. UKs Technical Guidance LFTGN05. The time period t over which the mass flow is measured must be at least one hour. The average flow rate to the flare during the time period t must be greater than the average flow rate observed for the previous six months
Measuring/reading/recording frequency	Biannual
Calculation method (if applicable)	Not applicable
QA/QC procedures	According to the standard applied.
Purpose of data/parameter	Calculation of project emissions
Additional comments	Monitoring of this parameter is required because the project activity uses the case of enclosed flares and selects Option B.1 to determine flare efficiency

Data/Parameter	$Maintenance_y$
Unit	Calendar dates
Description	Maintenance events completed in year y
Measured/calculated/ default	Measured
Source of data	Maintenance logs
Value(s) of monitored parameter	Not applicable
Monitoring equipment	Record the date that maintenance events were completed in year y. Records of maintenance logs must include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or needing to be replaced, source of replacement parts, serial numbers and calibration certificates
Measuring/reading/recording frequency	Annual
Calculation method (if applicable)	Not applicable
QA/QC procedures	Records must be kept in a maintenance log for two years beyond the life of the flare
Purpose of data/parameter	Calculation of project emissions
Additional comments	Monitoring of this parameter is required for the case of enclosed flares and the project participant selects Option B to determine flare efficiency. These dates are required so that they can be compared to the maintenance schedule to check that maintenance events were completed within the minimum time between maintenance events specified by the manufacturer (SPEC,flare)

Data/Parameter	T_t
Unit	K
Description	Temperature of the gaseous stream in time interval t
Measured/calculated/ default	Not measured
Source of data	Not installed
Value(s) of monitored parameter	Not installed
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_t
Unit	Pa
Description	Pressure of the gaseous stream in time interval t
Measured/calculated/ default	Not measured
Source of data	Not installed
Value(s) of monitored parameter	Not installed
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 pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm^3).

Data/Parameter	$v_{CH4,t,db}$
Unit	m^3 CH4/m^3 dry gas
Description	Volumetric fraction of CH4 in a time interval t on a dry basis
Measured/calculated/ default	Measured
Source of data	Data Gathering System
Value(s) of monitored parameter	52.25%

<table>
<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>7830</td></tr>
<tr><td>Calibration Frequency</td><td>12 months</td></tr>
<tr><td>Date of last calibration</td><td>03/05/2011</td></tr>
<tr><td>Validity of last calibration</td><td>03/05/2012</td></tr>
<tr><td>Installation date</td><td>23/05/2011</td></tr>
<tr><td>Validity of calibration runs from</td><td>Installation 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>NOVA</td></tr>
<tr><td>Model</td><td>910</td></tr>
<tr><td>Serial Number</td><td>9218</td></tr>
<tr><td>Calibration Frequency</td><td>12 months</td></tr>
<tr><td>Date of last calibration</td><td>08/12/2011</td></tr>
<tr><td>Validity of last calibration</td><td>08/12/2012</td></tr>
<tr><td>Installation date</td><td>03/05/2012</td></tr>
<tr><td>Validity of calibration runs from</td><td>Installation 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>09/11/2012</td></tr>
<tr><td>Validity of last calibration</td><td>09/11/2013</td></tr>
<tr><td>Installation date</td><td>05/12/2012</td></tr>
<tr><td>Validity of calibration runs from</td><td>Installation date</td></tr>
<tr><td colspan="2">Equipment 4</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>9218</td></tr>
<tr><td>Calibration Frequency</td><td>12 months</td></tr>
<tr><td>Date of last calibration</td><td>19/03/2013</td></tr>
<tr><td>Validity of last calibration</td><td>19/03/2014</td></tr>
<tr><td>Installation date</td><td>05/08/2013</td></tr>
<tr><td>Validity of calibration runs from</td><td>Installation date</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Continuous</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>
<tr><td>QA/QC procedures</td><td>Calibration should include zero verification with an inert gas (e.g. N2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of baseline emissions</td></tr>
</table>

Additional comments	This parameter will be monitored in Options A and B of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 2.0.0. Its calibration frequency would be as per manufacturer instructions. The meter has been installed in this first phase of the project activity in the main line between the flare and the booster.

Data/Parameter	**$EL_{LFG,y}$**
Unit	MWh
Description	Net quantity of electricity generated using LFG
Measured/calculated/ default	Measured
Source of data	Data Gathering System
Value(s) of monitored parameter	104,978
Monitoring equipment	Electricity meter will be used to measure $EL_{LFG,y}$. The measurement method will be based in the principle that the electricity reading is the power accumulated over a period divided by the duration of such period. The readings will be gathered automatically by an electricity meter and the project participant will be receiving the corresponding bills, which will be used as the monitoring data source.. The accuracy of the measurement equipment will be 1% of maximum reading. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the electricity company.
Measuring/reading/recording frequency	It will be calculated from continuous measurement using electricity meters.
Calculation method (if applicable)	Not applicable
QA/QC procedures	Data will be measured continuously, recorded electronically, and data will be kept during the crediting period and two years after. Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Required to estimate the emission reductions from electricity generation from LFG.

Data/Parameter	**$EG_{EC,y}$**
Unit	MWh
Description	Amount of electricity consumed by the project activity in year y
Measured/calculated/ default	Measured
Source of data	Data Gathering System
Value(s) of monitored parameter	0

Monitoring equipment	Electricity meter will be used to measure $EG_{EC,y}$. The measurement method will be based in the principle that the electricity reading is the power accumulated over a period divided by the duration of such period. The readings will be gathered automatically by an electricity meter and the project participant will be receiving the corresponding bills, which will be used as the monitoring data source.. The accuracy of the measurement equipment will be 1% of maximum reading. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the electricity company.
Measuring/reading/recording frequency	It will be calculated from continuous measurement using electricity meters.
Calculation method (if applicable)	Not applicable
QA/QC procedures	Data will be measured continuously, recorded electronically, and data will be kept during the crediting period and two years after. Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Purpose of data/parameter	Calculation of project emissions
Additional comments	Required to estimate the emission reductions from electricity generation from LFG.

Data/Parameter	**$Op_{engine,h}$**
Unit	-
Description	Operation of the engine that consumes the LFG
Measured/calculated/ default	Measured
Source of data	Data Gathering System
Value(s) of monitored parameter	24,207.15 hours
Monitoring equipment	For the engine using the LFG, the plant is operating in hour h by monitoring the product generated by the engine (i.e Net quantity of electricity generated using LFG). The method to determine the operation of the engine that consumes the LFG would be: • $Op_{engine,h}$=0 when no net quantity of electricity is generated using LFG in the hour h. • $Op_{engine,h}$=1 when net quantity of electricity is generated using LFG in the hour h.
Measuring/reading/recording frequency	Hourly
Calculation method (if applicable)	Not applicable
QA/QC procedures	Not applicable
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Data will be kept for at least two years after the end of the crediting period.

Data/Parameter	**$Op_{flare,h}$**
Unit	-
Description	Operation of the flare that consumes the LFG
Measured/calculated/ default	Measured

Source of data	Data Gathering System
Value(s) of monitored parameter	23,770.65 hours
Monitoring equipment	For the enclosed flare using the LFG, the plant is operating in hour h by monitoring, at least, the flame detection system. The flame detection system is used to ensure that the equipment is in operation since the control system of the equipment ensures that the enclosed flare will stop if no flame is detected. The method to determine the operation of the enclosed flare using the LFG would be: • $Op_{flare,h}$ =0 when flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); • $Op_{flaree,h}$=1 when flame is detected continuously in hour h (instantaneous measurements are made at least every minute).
Measuring/reading/recording frequency	Hourly
Calculation method (if applicable)	Not applicable
QA/QC procedures	Not applicable
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Data will be kept for at least two years after the end of the crediting period.

Data/Parameter	**$Flame_m$**
Unit	Flame on or Flame off
Description	Flame detection of flare in the minute m
Measured/calculated/ default	Measured
Source of data	Data Gathering System
Value(s) of monitored parameter	24,207.15 hours
Monitoring equipment	Measured using a Ultra Violet detector or Infra-Red or both. The flame detection system is used to ensure that the equipment is in operation since the control system of the equipment ensures that the enclosed flare will stop if no flame is detected. The method to determine wether the flame is on or off would be: • Flame off: when flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); • Flame on: when flame is detected continuously in hour h (instantaneous measurements are made at least every minute).
Measuring/reading/recording frequency	Once per minute. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off.
Calculation method (if applicable)	
QA/QC procedures	Equipment shall be maintained and calibrated in accordance with manufacturer's recommendations
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Data will be kept for at least two years after the end of the crediting period.

Data/Parameter	**$PE_{EC,y}$**
Unit	tCO2
Description	Project emissions from electricity consumption by the project activity during the year *y*
Measured/calculated/ default	0

Source of data	Measured
Value(s) of monitored parameter	Data Gathering System
Monitoring equipment	The calculation procedures and methods will be defined according to the case presented during the crediting period for the project activity, according to one of the following possible scenarios: a) Electricity consumption from the grid; or b) Electricity consumption from (an) off-grid captive power plant(s); or c) Electricity consumption from the grid and (a) captive power plant(s).
Measuring/reading/recording frequency	It will be measured at continuously.
Calculation method (if applicable)	Not applicable
QA/QC procedures	As per the latest version of the "Tool to calculate baseline, project and or leakage emissions from electricity consumption".
Purpose of data/parameter	Calculation of project emissions
Additional comments	For ex-ante purposes, it was followed case a) in order to estimate project emissions from electricity consumption from the grid.

Data/Parameter	**$FC_{i,j,y}$**
Unit	Mass or volume unit per year (e.g. ton/yr or m3/yr)
Description	Quantity of fuel type i combusted in process j during the year y*y*
Measured/calculated/ default	Not applicable for this monitoring period
Source of data	Not applicable for this monitoring period
Value(s) of monitored parameter	Not applicable for this monitoring period, hence 0
Monitoring equipment	• Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
Measuring/reading/recording frequency	It will be measured at continuously.
Calculation method (if applicable)	Not applicable
QA/QC procedures	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Purpose of data/parameter	Calculation of project emissions
Additional comments	For ex-ante purposes, since the fuel will be used mainly for the diesel backup generator, the value applied for the parameter is 0 because the consumption of fossil fuel is not considered as the normal operational conditions of the project activity.

Data/Parameter	$NCV_{i,y}$
Unit	GJ/m3
Description	Weighted average net calorific value of fuel type i in year y
Measured/calculated/ default	Not applicable for this monitoring period
Source of data	Not applicable for this monitoring period
Value(s) of monitored parameter	Not applicable for this monitoring period
Monitoring equipment	For a) Measurements should be undertaken in line with national or international fuel standards
Measuring/reading/recording frequency	For a) : The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated. For d): Any future revision of the IPCC Guidelines should be taken into account
Calculation method (if applicable)	Not applicable
QA/QC procedures	Verify if the values under a) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data/parameter	Calculation of project emissions
Additional comments	Applicable where Option B is used

Data/Parameter	$EF_{CO2,i,y}$
Unit	tCO2/GJ
Description	Weighted average CO2 emission factor of fuel type i in year y
Measured/calculated/ default	Not applicable for this monitoring period
Source of data	Not applicable for this monitoring period
Value(s) of monitored parameter	Not applicable for this monitoring period
Monitoring equipment	For a) Measurements should be undertaken in line with national or international fuel standards
Measuring/reading/recording frequency	For a) : The $EF_{CO2,i,y}$ should be obtained for each fuel delivery, from which weighted average annual values should be calculated. For d): Any future revision of the IPCC Guidelines should be taken into account
Calculation method (if applicable)	
QA/QC procedures	Applicable where option B is used. For a): If the fuel supplier does provide the NCV value and the CO2 emission factor on the invoice and these two values are based on measurements for this specific fuel, this CO2 factor should be used. If another source for the CO2 emission factor is used or no CO2 emission factor is provided, Option d) should be used.
Purpose of data/parameter	Calculation of project emissions
Additional comments	Applicable where Option B is used

Data/Parameter	$T_{EG,m}$
Unit	°C
Description	Temperature in the exhaust gas of the enclosed flare in minute m

Measured/calculated/ default	Measured
Source of data	Data Gathering System
Value(s) of monitored parameter	See ER Calculation Spreadseets
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	12 months
Date of last calibration	09/03/2010
Validity of last calibration	17/03/2011
Installation date	17/03/2010
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	124264-1,2,3 and 4
Calibration Frequency	12 months
Date of last calibration	18/03/2011
Validity of last calibration	16/11/2012
Installation date	09/03/2011
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	128042-1,7,6 and 8
Calibration Frequency	12 months
Date of last calibration	28/09/2012
Validity of last calibration	28/09/2013
Installation date	16/11/2012
Validity of calibration runs from	Installation date

Equipment 4	
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	132587-3, 5, 7 and 9
Calibration Frequency	12 months
Date of last calibration	28/07/2014
Validity of last calibration	28/07/2015
Installation date	19/09/2014
Validity of calibration runs from	Installation date

Measuring/reading/recording frequency	Once per 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 measurement equipment should be replaced or calibrated in accordance with their maintenance schedule
Purpose of data/parameter	Not used in the calculations
Additional comments	Unexpected changes such as a sudden increase/drop in temperature can occur for different reasons. These events should be noted in the site records along with any corrective action that was implemented to correct the issue. Monitoring of this parameter is applicable in case of enclosed flares. Measurements are required to determine if manufacturer's flare specifications for operating temperature are met.

D.3. Implementation of sampling plan

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Not applicable. The section is left blank intentionally.

SECTION E. Calculation of emission reductions or net anthropogenic removals

The file "ER Summary_6thMP_Huaycoloro" 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

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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
BEy	Baseline emissions (tCO2e)			
BEy = BECH4,y + BEEC,y		Eq. (1) page 18 PDD	**1,024,214**	tCO2e
BECH4,y	Baseline emissions of LFG from the SWDS (tCO2e/yr)			
BECH4 = ((1 − OXtop _layer) × FCH4,PJ,y − FCH4,BL,y) × GWPCH4		Eq. (2) page 18 PDD	**986,138**	tCO2e
OXtop _layer	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)	Default	**0.1**	-
FCH4,PJ,y = FCH4,flared,y + FCH4,EL,y	Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH4/yr)	Eq. (3) page 19 PDD	**43,828**	tCH4
FCH4flared, y = FCH4,sent_flare,y - (PEflare / GWPCH4)	Amount of methane in the LFG which is destroyed by flaring in year y (t CH4/yr)	Eq (4) Page 20 PDD	**16,935**	tCH4
FCH4,sent_flare,y = VLFG,sent_flare,y,db * vCH4,t,db * DCH4	Amount of methane in the LFG which is sent to the flare in year y (t CH4/yr)	Page 21 PDD	**16,935**	tCH4
VLFG,sent_flare,y,db	Quantity of landfill gas fed to the flare (m3)	Measured	**45,226,397**	m3 LFG
vCH4,t,db	Average methane fraction of the landfill gas as measured and expressed as a fraction (m³ CH4 / m³ LFG)	Measured	**52.25%**	m³ CH4/m³ LFG
DCH4	Methane density at normal temperature and pressure (0°C and 1.013 bar) (tCH4/m3CH4)	Default	**0.0007168**	tCH4/m3CH4
PEflare = GWPCH4 * FCH4,RG * (1 - ηflare) / 1000	Project emissions from flaring of the residual gas stream in year y (t CO2e/yr)	Eq (15) Page 23 PDD	**0**	tCO2e
GWPCH4	Global warming potential of CH4 (t CO2e/t CH4)	Default	**25**	tCO2e/tCH4
FCH4,RG = FVRG * fv CH4, RG * ρ CH4,n	Mass flow rate of methane in the residual gas (kg)	Eq (5) Page 25 PDD	**16,916,549**	kgCH4
FVRG	Quantity of landfill gas fed to the flare (m3)	Measured	**45,226,397**	m3 LFG
fv CH4, RG	Volumetric fraction of methane in the residual gas on dry basis	Measured	**52.25%**	m³ CH4/m³ LFG
ρ CH4,n	Density of methane at normal conditions (kg/m3)	Default	**0.7160000**	kgCH4/m3CH4
ηflare	Flare combustion efficiency (%)	Measured	**100.00%**	%
GWPCH4	Global Warming Potential value of methane	Default	**25**	tCO2e/tCH4
FCH4,EL,y =VLFG,EL,y,db * vCH4,t,db * DCH4	Amount of methane in the LFG which is used for electricity generation in year y (t CH4/yr)	Page 23 PDD	**26,893**	tCH4
VLFG,EL,y,db	Volumetric flow of landfill gas which is used for electricity generation in year y on a dry basis (m³ dry gas/h)	Measured	**72,700,541**	m³ LFG
vCH4,t,db	Average methane fraction of the landfill gas as measured and expressed as a fraction (m³ CH4 / m³ LFG)	Measured	**51.59%**	m³ CH4/m³ LFG
DCH4	Methane density at normal temperature and pressure (0°C and 1.013 bar) (tCH4/m3CH4)	Default	**0.0007168**	tCH4/m3CH4
FCH4,BL,y	Amount of methane in the LFG that would be flared in the baseline in year y (t CH4/yr)	Default	**0**	tCH4
GWPCH4	Global Warming Potential value of methane	Default	**25**	tCO2e/tCH4
BEEC,y	Baseline emissions of LFG from the SWDS in year y (tCO2e/yr)			
BEEC,y=ECBL,k,y * EFEL,k,y * (1-TDLk,y)		Eq. (2) page 18 PDD	**38,076**	tCO2e
ECBL,k,y	Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y (MWh/yr)	Monitored	**104,978**	MWh
EFEL,k,y	Emission factor for electricity generation for source k in year y (tCO2/MWh)	Default	**0.45338**	tCO2/MWh
TDLk,y	Average technical transmission and distribution losses in the grid	Default	**20%**	%

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

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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	Unit
PEy	Project emissions in year y (tCO2e)		
PEy = PEEC,y + PEFC,j,y		Eq. (17) Page 33 PDI	**0** tCO2
PEEC,y	Emissions from consumption of electricity in the project case.		
PEEC,y = ECPJ,j,y * EFEL,j,y * (1 + TDLj,y)	Project emissions from electricity consumption by the project activity during the year y (tCO2 / yr)	Eq. (1) Page 33 PDD	**0** tCO2
ECPJ,j,y	Quantity of electricity consumed by the project activity during the year y (MWh)	Monitored	**0** MWh
EFEL,j,y	Emission factor for the grid in year y (tCO2/MWh)	Default	**0.45338** tCO2/MWh
TDLj,y	Average technical transmission and distribution losses in the grid	Default	**20.0%** %
PEFC,j,y	Project emissions from fossil fuel combustion in process j		
PEFC,j,y = FCi,j,y* COEFi,y	CO2 emissions from fossil fuel combustion in process j during the year y (tCO2/yr)	Eq. (1) Page 34 PDD	**0** tCO2
FCi,j,y	Quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)	Monitored	**0** m3
COEFi,y = NCVi,y *EF CO2,i,y	CO2 emission coefficient of fuel type i in year y (tCO2 / mass or volume unit)	Page 34 PDD	**2.027** tCO2/TJ
NCVi,y	Weighted average net calorific value of the fuel type i in year y	Default	**30.90** GJ/m3
EF CO2,i,y	Weighted average CO2 emission factor of fuel type i in year y	Default	**0.0656** tCO2/GJ

E.3. Calculation of leakage emissions

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The calculation does not need to consider leakage emissions, so LE_y=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	1,024,214	0	0	0	1,024,214	1,024,214

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)
1,024,214	793,476

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*	05/03/2014	15/03/2014
	To	31/12/2014	14/03/2015
	Days	302	365
	Emission reductions or GHG removals by sinks (t CO_2e)	258,971	271,755
	tCO2e/day	**858**	**745**
Year 2015	*From*	01/01/2015	15/03/2015
	To	31/12/2015	13/03/2016
	Days	365	365
	Emission reductions or GHG removals by sinks (t CO_2e)	354,288	280,418
	tCO2e/day	**971**	**768**
Year 2016	*From*	01/01/2016	14/03/2016
	To	31/12/2016	13/03/2017
	Days	366	365
	Emission reductions or GHG removals by sinks (t CO_2e)	410,955	287,421
	tCO2e/day	**1,123**	**787**

The values in the ex-ante calculation of the CDM-PDD are 271,755 tCO2e for 2014 (365 days), 280,418 tCO2e for 2015 (365 days), and 287,421 tCO2e for 2016 (365 days). The daily average for 2014, 2015 and 2016 equate to 745, 768 and 787 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 (302, 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 29% higher than the emission reductions derived from the yearly values stated in the registered CDM-PDD due to higher recovery rates in the landfill site achieved.

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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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