Monitoring report form for CDM programme of activities
(version 01.0)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form for CDM programme of activities" at the end of this form.

MONITORING REPORT		
Title of the programme of activities (PoA)	Caixa Econômica Federal Solid Waste Management and Carbon Finance Project CPAs running in this Monitoring Period: CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa CPA-2: CTR São Gonçalo	
UNFCCC reference number of the PoA	6573	
Version number(s) of the PoA-DD(s) applicable to this monitoring report	7.1	
Coordinating/managing entity (CME)	Caixa Econômica Federal, Brazil	
Version number of this monitoring report	1	
Completion date of this monitoring report	21/09/2016	
Monitoring period number and dates covered by this monitoring report	4th Monitoring Period from 01/01/2016 until 30/06/2016 (both days included)	
Monitoring report number for this monitoring period	1	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no)
	Brazil: Caixa Econômica Federal;	No
	Spain: International Bank for Reconstruction and Development acting as the Trustee of the Carbon Partnership Facility; Kingdom of Spain - Ministry of Agriculture, Food and Environment; ; Endesa Generacion S.A.	Yes Yes
	Norway: Norwegian Ministry of Climate and Environment	Yes

	Sweden: Swedish Energy Agency Germany , E.ON Climate & Renewables GmbH	No
Sectoral scope(s)	Sectorial Scope 13 - Waste handling and disposal	
Selected methodology(ies)	*ACM0001 – "Consolidated baseline methodology for landfill gas project activities – Version 11"* of 28/05/2009	
Selected standardized baseline(s)	N/A	
Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case-case CPAs in the PoA covered in this monitoring report	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0 tCO2e	Total: 307,119 tCO2e CPA-1: 296,696 tCO2e CPA-2: 10,423 tCO2e

PART I - Programme of activities

SECTION A. Description of PoA

A.1. Brief description of the PoA

>>

According to the first National GHG Emissions inventory conducted by the Brazilian Ministry of Science and Technology[1], Brazil has over 6,000 waste depositing sites, receiving over 60,000 tons of waste per day. Of this amount, 76% of the total waste was deposed in dumpsites with no management, gas collection or water treatment and usually without any license or under no control by the environmental agencies concerned.

Brazil's National Energy Plan 2030[2], states that solid urban wastes are an important source of renewable energy generation and therefore Brazil's solid waste policy should target its use as a source for energy. In this sense the Brazilian Government has worked to design a program that promotes sustainable energy recovery from Municipal Solid Waste (MSW), bringing together the actions of various governmental entities involved. This program shall be in line with the established National Sanitation Policy[3], the guidelines for the management of municipal solid waste and will take into account the opportunities arising from the Law of Public Consortia.

Since current practice of uncontrolled GHG emissions in landfills is largely prevalent today, the PoA contribute to achieve the goals outlined in both the National Sanitation Policy and Brazil's National Energy Plan. Furthermore, the PoA will help to promote the implementation of LFG capture and combustion/energy generation/distribution systems through the CDM to mitigate the GHG emissions that would have otherwise been completely vented to the atmosphere.

This PoA generates emission reductions by avoiding methane emissions through the destruction of the methane generated by the landfill, and through generation of renewable energy and upgrade of biogas. As of today, the PoA includes 2 CPAs: CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa and the CPA-2: CTR São Gonçalo, which both has implemented the first component of the project, gas flare.The conception, specifications and design for the other components (electricity generation and LFG distribution) are in process and the new components are expected to be implemented in the future. Therefore, during this monitoring period, emission reductions are only generated by the flaring system.

[1] Ministry of Science and Technology, First Brazilian Inventory of Anthropogenic Greenhouse Gas emissions, "Methane Emissions from waste treatment and disposal", 2002, page 15. Available at: http://www.bvsde.paho.org/bvsacd/cd25/methane.pdf

[2] Information on the National Energy Plan, PNE3,0 is available at the following site: http://www.epe.gov.br/PNE/Forms/Empreendimento.aspx

3 http://www.cidades.gov.br/index.php/apresentacao-plansab.html

A.1.1. Generic CPA(s)

Title, identification/reference number and/or version number of the generic CPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
CPA-XX [Landfill name]	Sectorial Scope 13 - Waste handling and disposal.	*ACM0001 – "Consolidated baseline methodology for landfill gas project activities – Version 11"* *"Tool for determining methane emissions avoided from disposal of waste at a solid waste disposal site" – Version 05.1.0* *"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" – Version 02* *"Tool to determine project emissions from flaring gases containing methane" – EB28, Annex 13* *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" Version 01* *"Tool to calculate the emission factor for an electricity system" Version 02.2.1*

A.1.2. Specific-case CPA(s) covered in this monitoring report

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period	Title, identification/ reference number and version number of the generic CPA to which the specific-case CPA applies	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
6573 – 0001	CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa	05/10/2012 – 04/10/2019	Yes
6573 – 0002	CPA-02: CTR São Gonçalo	01/07/2015 – 31/03/2023	Yes

A.2. Contact information of the coordinating/managing entity (CME) and/or responsible persons(s)/entity(ies)

>>

Caixa Econômica Federal
Diretoria Executiva de Infraestrutura e Saneamento
Setor Bancário Sul Quadra 4 lotes 3/ 4 - 12º Andar
Edifício Matriz
Brasília DF 70092-900 Brazil
Email: gesan@caixa.gov.br
Denise Maria Lara de Souza Seabra
Manager

SECTION B. Implementation of PoA

B.1. Implementation of the management system of the PoA

>>
The management system of the PoA has been implemented by CAIXA, the CME of the PoA, as described in the PoA-DD.

CAIXA Economica Federal has followed the topics bellow for the management system:
- screened and validated the projects for inclusion in the PoA;
- carried out the inclusion process;
- trained the CPA Implementers;
- managed the records of CPA including data required to calculate emission reductions;
- ensured rigorous reporting of the CPA Entity;
- verified information sent by the CPA Entity;
- prepared the monitoring report at PoA level.

B.2. Implementation of single sampling plan(s)

>>
Not Applicable.

SECTION C. Post-registration changes to the PoA (including the generic CPA(s))

C.1. Corrections

>>
Not Applicable.

C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), if a monitoring plan was not included at the time of registration

>>
Not Applicable.

C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

>>
Permanent changes from registered monitoring plan have been approved prior to this verification.

Please refer to: PRC-6573-001 (Effective approval date March 4, 2014).

C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA

>>
Not applicable

C.5. Types of changes specific to afforestation and reforestation activities

>>
Not applicable

PART II - Specific-case component project activity(ies)

SECTION D. Description of specific-case CPA(s)

>>

D.1. Brief description of implemented specific-case CPA(s)

>>
CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa

The privately operated landfill of Waste Treatment Center (Central de Tratamento de Resíduos - CTR) Santa Rosa is located in Rio de Janeiro state, in Seropédica municipality, close to Rio de Janeiro city, the second most populous Brazilian city. CTR Santa Rosa covers an area of 1,699,512.97 m² and started receiving waste in March 2011, having received all necessary environmental licenses for operation. The landfill receives domestic solid waste from Rio de Janeiro, Seropédica and Itaguaí municipalities.

As per the registered CPA, the LFG collected in CTR Santa Rosa can be used to generate electricity, upgraded and distributed via a natural gas distribution network, or flared, to avoid any methane emissions going into the atmosphere. At the time of this monitoring report, only the flaring component has been implemented.

The LFG collection and flaring system has a total capacity of 12,500 Nm³/h (2,500 Nm³/h Flare#1, 5,000 Nm³/h Flare#2, and 5,000 Nm³/h Flare#3). The CPA-1 CTR contains the following components:

Landfill gas pre-treatment station

The state-of-the-art gas collection technology in this CPA includes the items listed below.

•Vertical wells used to extract gas and leachate.
•Horizontal wells used to extract gas.
•Optimal well spacing for maximum gas collection while minimizing costs.
•Wellheads designed for gas measurements.
•Condensate extraction and storage systems designed at strategic low points throughout the gas system.

All LFG collected is pre-treated to remove moisture and other impurities in order to prevent the corrosion of the subsequent systems.

Landfill gas flaring system

CPA-1 CTR Santa Rosa has a flaring system in place. The LFG flare system includes the items provided below:

•Three enclosed flares with controlled combustion systems.
•A blower system used to cause negative pressure in the pipeline (before blower) and positive pressure (after blower) to direct gas for flare.
•Monitoring equipment for continuous monitoring of gas composition, flow and burn temperature.
•Security restart system, in the case of a system shut down.

The current project process is shown in the following simplified monitoring diagram:

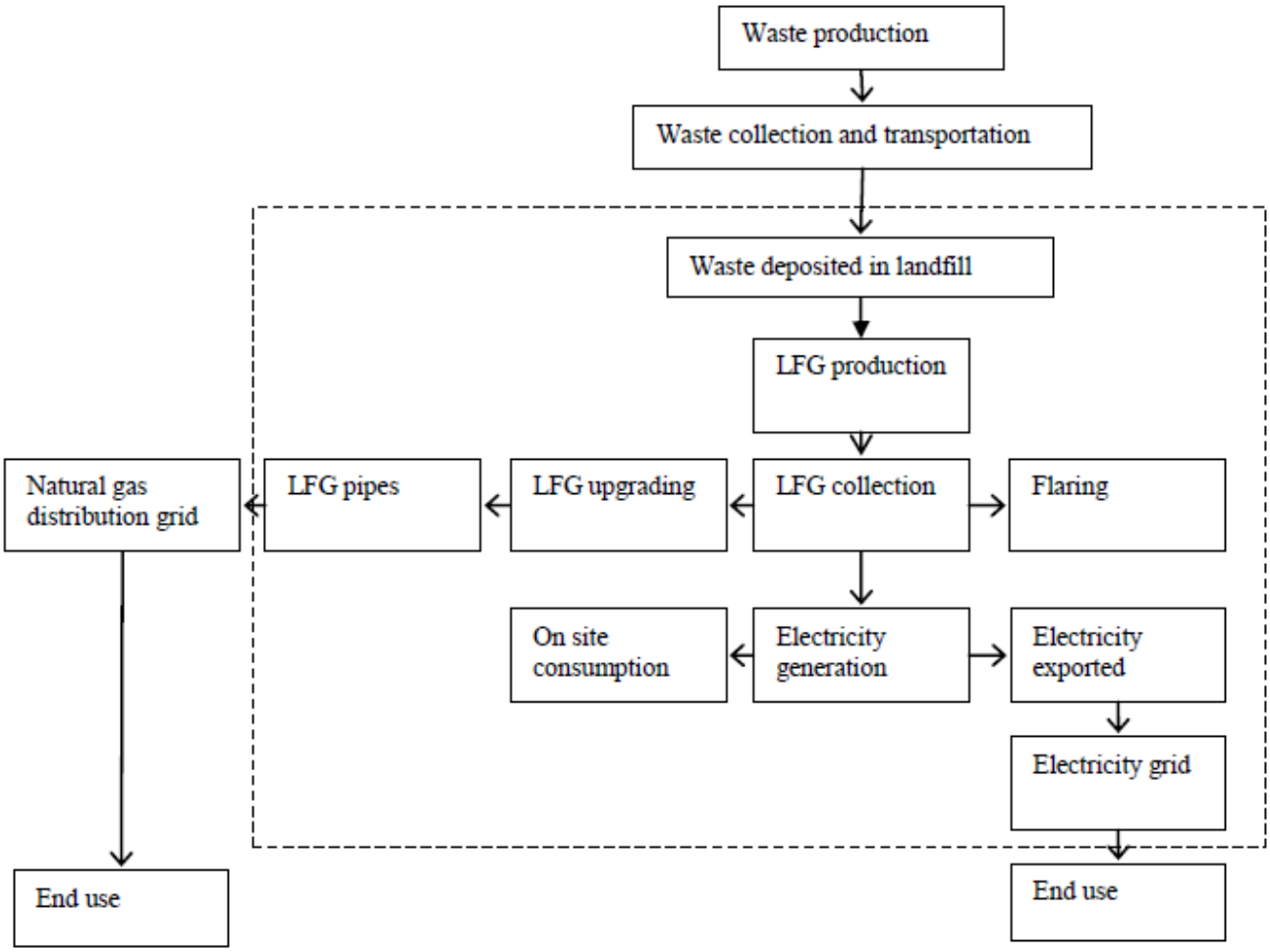


Figure 1 – Simplified schematic representation of the CPA project boundary

The project design considerers the implementation of an electricity generation component and/or a LFG upgrading system for selling the gas. As of this monitoring period only the flaring system has been implemented.

The following list summarizes the relevant dates for CPA-1:

- 19/04/2011: Start date of the landfill operations.
- 16/10/2012: Start date, construction of the LFG collection and flaring system.
- 13/11/2012: Start of operations of the LFG collection and flaring system (Flare#1).
- 23/08/2013: Start of operations of Flare #2.
- 22/02/2016: Start of operations of Flare #3.

The total volume of emission reductions achieved in this monitoring period was 296,696 tCO_2e.

During the period, the main incidents that occurred are listed in the table below. The table includes incidents that resulted in a non Emission Reductions for more than 24 hours. No ERs have been claimed for any of these periods.

Start	End	Incidence	Corrective action	Remarks
14/01/2016 18:14	21/01/2016 19:18	Flare 1 was off due to the low flow of LGF to the plant	N/A	No ERs have been claimed for this period for Flare 1

17/02/2016 14:13	19/02/2016 20:17	System shutdown due to new equipment installation	N/A	No ERs have been claimed for this period
19/02/2016 20:40	07/03/2016 09:26	Installation and Integration of Flare 1 to the new plant system	N/A	No ERs have been claimed for this period for Flare 1
21/02/2016 05:58	02/03/2016 19:20	Installation and Integration of Flare 2 to the new plant system	N/A	No ERs have been claimed for this period for Flare 2
21/02/2016 07:26:00	22/02/2016 15:24	System shutdown due to new plant installation/adequacy	N/A	No ERs have been claimed for this period
25/02/2016 19:31:00	26/02/2016 19:04:00	Preventive shutdown for roof corrective maintenance	N/A	No ERs have been claimed for this period
02/03/2016 19:21	04/03/2016 00:54	Flare 2 Gas Exhaust Temperature below 500°C due to flaps automation set up	N/A	No ERs have been claimed for this period for Flare 2
29/03/2016 19:28	31/03/2016 11:16	Lack of compressed air for actuators and pumps due to compressors failure.	Compressor temporary replacement.	No ERs have been claimed for this period
30/04/2016 22:29	11/05/2016 11:51	Flare 1 was off due to the low flow of LGF to the plant	N/A	No ERs have been claimed for this period for Flare 1

The system was also turned off in some occasions for preventive maintenance, inspection, cleaning or to replace a part.

CPA-2: Landfill gas recovery, energy generation and biogas distribution from Central de Tratamento de Resíduos (CTR) São Gonçalo.

The privately operated landfill of CTR São Gonçalo is located in Rio de Janeiro state, in São Gonçalo municipality. This CPA currently covers an area of 78,000 m² and is expected to cover an area of 439,280m² when closed in 2036. The landfill started receiving waste in 03 Feb 2012, having received all necessary environmental licenses for operation. The landfill receives domestic solid waste from São Gonçalo and Niteroi municipalities.

As per the registered CPA, the LFG collected in CTR São Gonçalo can be used to generate electricity, upgraded and distributed via a natural gas distribution network, or flared, to avoid any methane emissions going into the atmosphere. At the time of this monitoring report, only the flaring component has been implemented.

The LFG collection and flaring system has a total capacity of 2,500 Nm³/h. The CPA-2 CTR São Gonçalo contains the following components:

Landfill gas pre-treatment station

The state-of-the-art gas collection technology in this CPA includes the items listed below.

•Vertical wells used to extract gas and leachate.
•Horizontal wells used to extract gas.

•Optimal well spacing for maximum gas collection while minimizing costs.
•Wellheads designed for gas measurements.
•Condensate extraction and storage systems designed at strategic low points throughout the gas system.

All LFG collected is pre-treated to remove moisture and other impurities in order to prevent the corrosion of the subsequent systems.

Landfill gas flaring system

CPA-2 CTR São Gonçalo has a flaring system in place. The LFG flare system includes the items provided below:

•One enclosed flare with controlled combustion systems.
•A blower system used to cause negative pressure in the pipeline (before blower) and positive pressure (after blower) to direct gas for flare.
•Monitoring equipment for continuous monitoring of gas composition, flow and burn temperature.
•Security restart system, in the case of a system shut down.

The current project process is shown in the following simplified monitoring diagram:

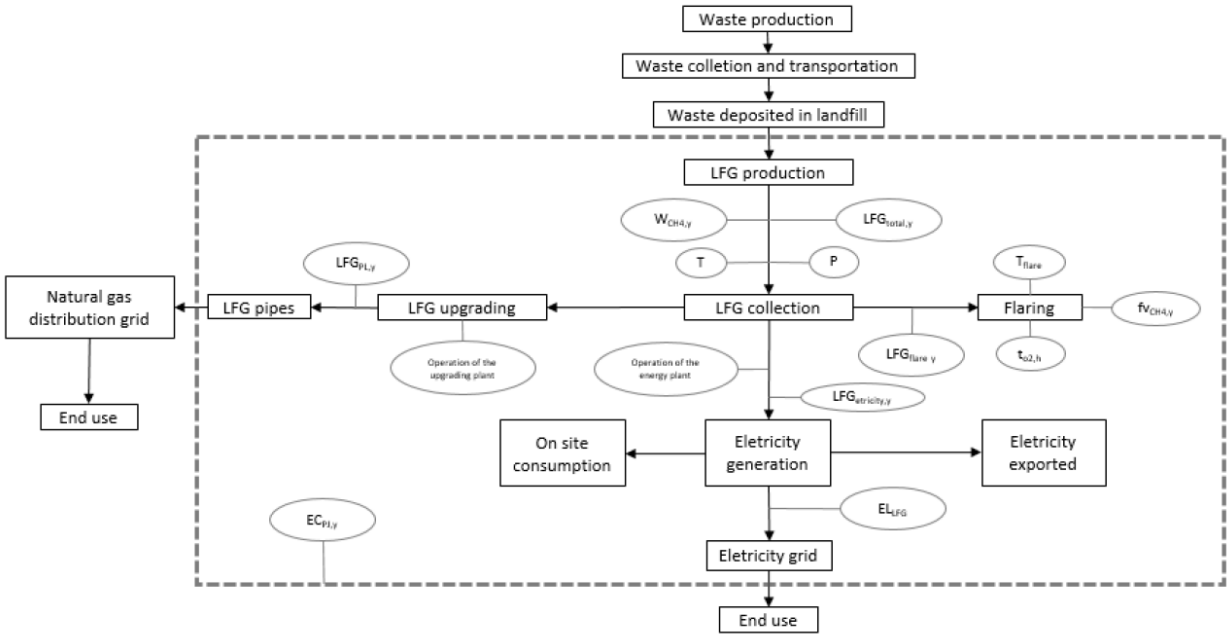


Figure 1 – Simplified schematic representation of the CPA project boundary

The project design considerers the implementation of an electricity generation component and/or a LFG upgrading system for selling the gas. As of this monitoring period only the flaring system has been implemented.

The following list summarizes the relevant dates for CPA-2:

- 03/02/2012: Start date of the landfill operations.
- 25/06/2015: Start date, construction of the LFG collection and flaring system.
- 18/05/2016: Start of operations of the LFG collection and flaring system (Flare#1).

The total volume of emission reductions achieved in this monitoring period was 10,423 tCO_2e.

During the period, the main incidents that occurred are listed in the table below. The table includes incidents that resulted in a non Emission Reductions for more than 24 hours. No ERs have been claimed for any of these periods.

Start	End	Incidence	Corrective action	Remarks
16/06/2016 06:23	30/06/2016 17:04	General alarm. There was a problem in the reset configuration software that wasn't allowing the facility to start	The facility supplier reconfigurated the system	No ERs have been claimed for this period for Flare 1

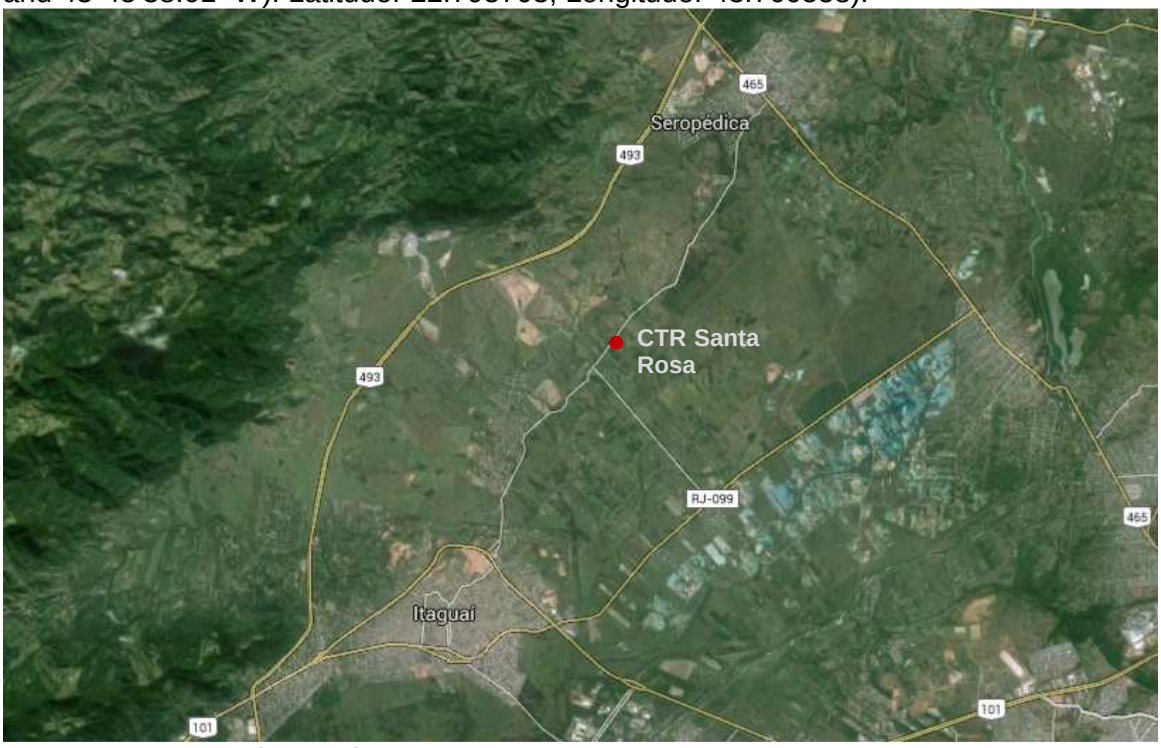
The system was turned off in some occasions for preventive maintenance, inspection, cleaning or to replace a part.

D.2. Geographical references or other means of identification of the location of the specific-case CPA(s)

>>

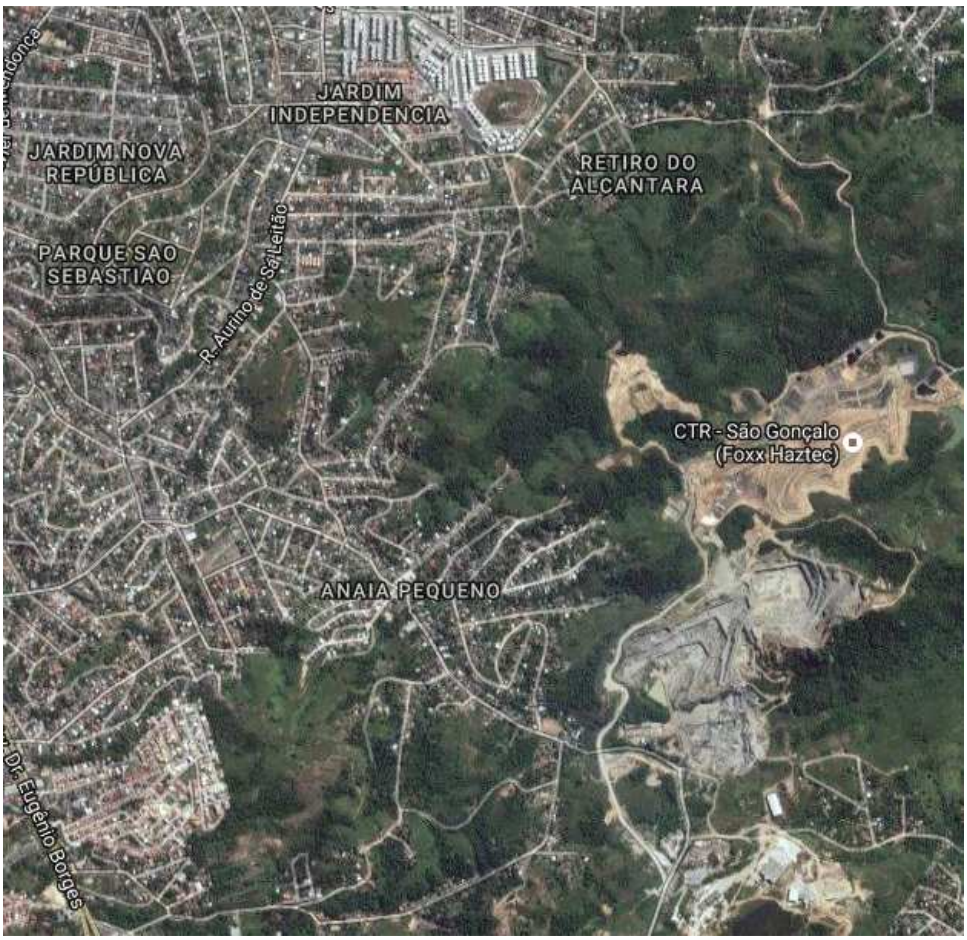
The project boundary of the PoA, and consequentely the CPA-DD, is the country of Brazil.

CPA-1 is located in Rio de Janeiro state, between Seropédica and Itaguaí municipality (22º47'44.53"S and 43º45'38.01" W). Latitude:-22.795703, Longitude:-43.760558).



Source: maps.google.com.br

CPA-2 is located in Rio de Janeiro state, in São Gonçalo municipality (22º51'29.79"S and 42º59'20.71" W). Latitude: -22.858275, Longitude: -42.989086).



Source: maps.google.com.br

SECTION E. Post-registration changes to specific-case CPA(s)

E.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

>>
CPA-1
A temporary deviation is requested for the period of this monitoring report. From 22/02/2016 to 02/05/2016 and from 01/06/2016 to 06/06/2016 the $\mathbf{EC_{PJ,y}}$ parameter could not be calculated due to an energy meter installation problem. Project emissions from electricity consumption from 22/02/2016 to 02/05/2016 and 01/06/2016 to 06/06/2016 were calculated using a conservative approach, considering the maximum electricity consumption of each equipment and continuous operation during the whole period.

CPA-2
A temporary deviation is requested for the period of this monitoring report. As of the date of this report, the project could not connect to the electricity grid. Moreover, the electricity meter at the biogas plant is not yet connected to all the equipments. As a temporary measure, the project has used a diesel generator to provide electricity. The connection to the electricity grid and the correct installation of the electricity meter is expected by the end of 2016. Because of these deviations $\mathbf{EC_{PJ,y}}$ is considered as zero and project emissions from the generator are accounted in a conservative manner under the Project Emissions from fossil fuel combustion, $\mathbf{PE_{FC,j,y}}$. Please refer to section G.2 for further details.

E.2. Corrections

>>
Not Applicable

E.3. Changes to the start date of the crediting period of the specific-case CPA(s)

>>
Not Applicable

E.4. Inclusion of a monitoring plan into the specific-case CPA(s) that was not included at registration

>>
Not Applicable

E.5. Permanent changes to the monitoring plan as described in the registered specific-case CPA-DD(s), applied methodology or standardized baseline

>>
CPA-1: CTR Santa Rosa
Permanent changes from registered monitoring plan have been approved prior to this verification. Please refer to: PRC-6573- 001 (Effective approval date March 4, 2014).

E.6. Changes to project design of the specific-case CPA(s)

>>
Not Applicable

E.7. Types of changes specific to afforestation and reforestation specific-case CPA(s)

>>
Not Applicable

SECTION F. Description of the monitoring system of specific-case CPA(s)

>>
The following equipment is used to monitor the operation of the projects and the emission reductions.

The control of maintenance and inspection schedules was defined considering the equipment manufacture´s specifications and orientations.

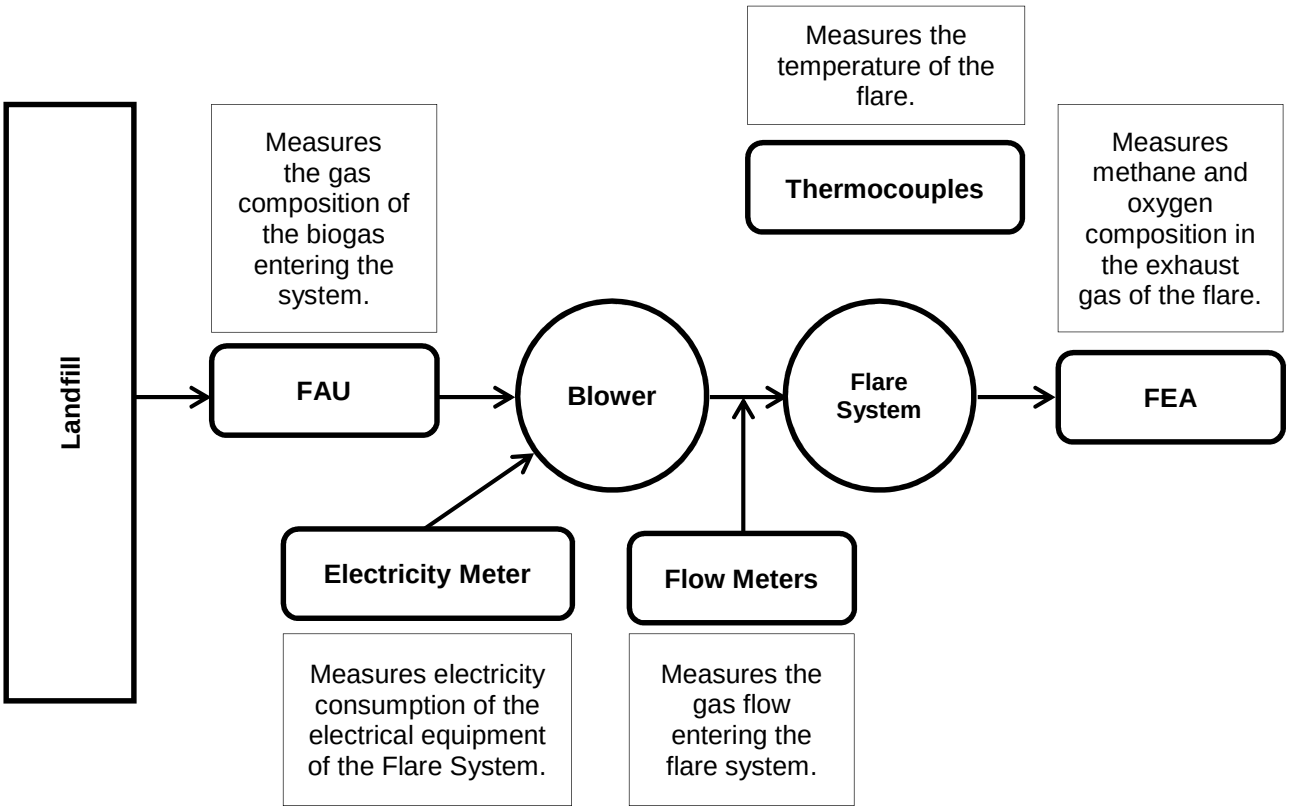


Diagram of the monitoring equipment

CPA-1: CTR SANTA ROSA

Field Analytical Unit (FAU)
The Field Analytical Unit (FAU), or gas analyser, is used to measure the biogas composition before the gas enters the flaring system.

Flow Meter
The flow meter is used to measure the gas flow entering the flare system. The Project uses differential pressure flow meters, that operate with a measurement control system of the biogas temperature and pressure in the pipeline to calculate the flow in normal conditions (Nm3/h – normal cubic meter per hour).

Thermocouples
High performance equipment to control the flare temperature is installed in the flare tower.

Flare Emissions Analyser (FEA)
The Flare Emissions Analyser (FEA) provides continuous monitoring of methane and oxygen in the exhaust gas of the flare to calculate the biogas flaring efficiency.

Energy Meter
The Energy Meter of the Project Site operates in order to measure electricity consumption of the Flare System.

Emergency procedures for data monitoring.

The CPA-1 implementer had in place a number of procedures to handle problems with data transfer and/or storage, until 22/02/2016:

- Continuously, the data was transfered from monitoring equipment to the data logging and storage system (Memograph).

- Once a day, the data was automatically transfered from the Memograph to the local server.
- In case of data transfer failure from the Memograph to the local server, the system could re-schedule a data transfer at a later time.

If automatic data transfer was not possible from the plant to the server, the equipment allowed manual downloads to an external memory (the monitoring equipment has an internal memory that could store more than 12 months of continuous monitoring data).

From 22/02/2016, after the beggining of the operation of the Biotecnogas - Supervisorio system:

- PLC continuously receives data from monitoring equipament installed at degassing plant.
- Data is stored by Manufacturer's Supervisorio Software, which is installed in 2 computers (PC1 and PC2), located at Control Room. PC2 is only used for controlling and/or storing data in case PC1 is unavailable.
- Once a day, the data is transfered to the local server as a back-up copy.

To mitigate the risk of data losses on the local server and/or Supervisorio System, the CPA-1 implementer has a daily automatic backup procedure using an external server.

CAIXA also receives copies of the monthly generation that can be used as a backup in case of need.

Project management responsibility.

SERB – Saneamento e Energia Renovável do Brasil S.A./Ciclus Ambiental staff has operational and data collection obligations to fulfil, in order to maximize the GHG emissions reductions, ensuring that sufficient information is available to calculate ERs in a transparent and verifiable manner, allowing a fast and successful verification of these ERs.

CAIXA has the responsibility for the collection of monitored data in CPA-1, the emission reduction estimates, producing the monitoring reports and reporting to the DOE. CAIXA also maintain all necessary data to undertake the PoA monitoring plan, such as a list of all projects under review for inclusion in the PoA and the performing data and parameters for each registered CPA.

All provided data by CPA-1 implementer are checked for completeness and quality.

Data Storage

Both CAIXA and the CPA-1 implementer have in place procedures to archive all relevant documents, and all data recording of the monitored data that include paper and electronic versions, backup systems and periodic checking for data entry mistakes.

All records are kept for at least 2 years after the end of the crediting period.

Operation related documents are stored by the CPA-1 implementer in both hard and soft versions. All commercial documents as well as those related to PoA requirements defined by the CME are stored by CAIXA in both hard and soft versions. All these documents can be accessed and traced for CDM auditing purposes.

CPA-2: CTR SÃO GONÇALO

Field Analytical Unit (FAU)
The Field Analytical Unit (FAU), or gas analyser, is used to measure the biogas composition before the gas enters the flaring system.

Flow Meter
The flow meter is used to measure the gas flow entering the flare system. The Project uses a differential pressure flow meter that operates with a measurement control system of the biogas

temperature and pressure in the pipeline to calculate the flow in normal conditions (Nm3/h – normal cubic meter per hour).

Thermocouples
High performance equipment to control the flare temperature is installed in the flare tower.

Flare Emissions Analyser (FEA)
The Flare Emissions Analyser (FEA) provides continuous monitoring of methane and oxygen in the exhaust gas of the flare to calculate the biogas flaring efficiency.

Energy Meter
The Energy Meter of the Project Site operates in order to measure electricity consumption of the Flare System.

Emergency procedures for data monitoring.

The CPA-2 implementer has in place a number of procedures to handle problems with data transfer and/or storage:

- Continuously, the data is transfered from the monitoring equipment to local drives .
- Once a day, the data is transfered from the local drives to to the local server.
- To mitigate the risk of data losses on the local server, the CPA-2 implementer had applied a daily backup procedure using acorporate server.
- CAIXA receives copies of the monthly generation that can be used as a backup in case of need.

Project management responsibility.

Central de Tratamento de Resíduos Alcântara S.A. (CTR Alcântara) staff has operational and data collection obligations to fulfil, in order to maximize the GHG emissions reductions, ensuring that sufficient information is available to calculate ERs in a transparent and verifiable manner, allowing a fast and successful verification of these ERs.

CAIXA has the responsibility for the collection of monitored data in CPA-2 the emission reduction estimates, producing the monitoring reports and reporting to the DOE.

All provided data by CPA-2 implementer are checked for completeness and quality by CAIXA.

Data Storage

Both CAIXA and the CPA-2 implementer have in place procedures to archive all relevant documents, and all data recording of the monitored data that include paper and electronic versions, backup systems and periodic checking for data entry mistakes.

All records will be kept for at least 2 years after the end of the crediting period.

Operation related documents are stored by the CPA-2 implementer in both hard and soft versions. All commercial documents as well as those related to PoA requirements defined by the CME are stored by CAIXA in both hard and soft versions. All these documents can be accessed and traced for CDM auditing purposes.

SECTION G. Data and parameters

G.1. Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period

Parameters fixed for both CPAs

The following parameters, listed in the registereds CPA-DD, have been determined ex-ante and/or will not be used during the current monitoring period: Regulatory requirements relating to landfill gas; $BE_{CH4,SWDS,y}$; φ ; OX ; F; DOC_f ; MCF ; DOC_j; k_j ; E_{DS} ; $P_{n,j,x}$; η_{ugf}.

Data/parameter	**GWP_{CH4}**
Unit	t CO_2 / t CH_4
Description	Global Warming Potential of CH_4
Source of data	IPCC Fourth Assessment Report: Climate Change 2007
Value(s) applied	25
Choice of data or measurement methods and procedures	21 for the first commitment period. 25 for the second and third commitment period. Shall be updated according to any future COP/MOP decisions.
Purpose of data	Calculation of baseline emissions.
Additional comments	Shall be updated according to any future COP/MOP decisions.

Data/parameter	**D_{CH4}**
Unit	t CH_4 / m^3 CH_4
Description	Methane density
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.0007168
Choice of data or measurement methods and procedures	At standard T and P (0° C and 1.013 bar) the density of methane is 0.0007168 tCH_4 / m_3CH_4
Purpose of data	Calculation of baseline emissions.
Additional comments	At standard T and P (0° C and 1.013 bar) the density of methane is 0.0007168 tCH_4 / m_3CH_4

Data/parameter	**TDL_y**
Data Unit	%
Description	Average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site.
Source of data	Default value according to the "*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*" version 01
Value(s) applied	20%
Purpose of data	Calculation of project emissions.
Additional comments	

G.2. Data and parameters monitored

Parameters for both CPAs

Data / Parameter:	**T**
Unit:	^{o}C
Description:	Temperature of the landfill gas
Measured/Calculated / Default:	Measured
Source of data:	Project implementer
Value(s) of monitored parameter:	N/A
Monitoring equipment:	No separate monitoring is necessary when using flow meters that automatically measure the temperature and pressure, expressing LFG volumes in normalized cubic meters
Measuring/ Reading/ Recording frequency:	Monitored continuously
Calculation method (if applicable):	N/A
QA/QC procedures:	Measuring instruments shall be subject to a regular maintenance and testing regime, based on the manufacturer's recommendations
Purpose of data:	Calculation of baseline emissions.
Additional comment:	Data will be kept for 2 years after end of crediting period

Data / Parameter:	**P**
Unit:	Pa
Description:	Pressure of the landfill gas
Measured/ Calculated / Default:	Measured
Source of data:	Project implementer
Value(s) of monitored parameter:	N/A
Monitoring equipment:	Measured continuously to determine the density of methane DCH4. No separate monitoring is necessary when using flow meters that automatically measure the temperature and pressure, expressing LFG volumes in normalized cubic meters
Measuring/Reading/ Recording frequency:	Monitored continuously
Calculation method (if applicable):	N/A
QA/QC procedures:	Measuring instruments shall be subject to a regular maintenance and testing regime, based on the manufacturer's recommendations
Purpose of data:	Calculation of baseline emissions.
Additional comment:	Data will be kept for 2 years after end of crediting period

The following parameters, listed in the registered CPA, are not be used during the current monitoring period and/or refer to a component not yet implemented, such as the electricity generation and the purification of LFG and distribution through a natural gas pipeline: ELLFG ; Operation of the energy plant ; $FC_{i,j,y}$; ; $EF_{CO2,i,y}$; W_x ; Z ; $LFG_{PL,y}$; Operation of the upgrading gas plant; $MG_{PR,y}$; $LFG_{electricity,y}$.

CPA-1 data and parameters

<table>
<tr><td>Data / Parameter:</td><td>$LFG_{total,y}$</td></tr>
<tr><td>Unit:</td><td>Nm^3</td></tr>
<tr><td>Description:</td><td>Total amount of landfill gas captured at normal temperature and pressure</td></tr>
<tr><td>Measured/ Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>From project implementer, measured on site</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Please refer to Table 1 and 2 in section H, and ER calculation spreadsheet</td></tr>
<tr><td>Monitoring equipment:</td><td>There are two Deltabar S PMD70 Endress+Hauser flow meter available on site, one for Flare 1 and the other for Flare 2:
<table>
<tr><th colspan="2">Type: Differential pressure Flow Meter</th></tr>
<tr><td>Accuracy:</td><td>± 0.696%</td></tr>
<tr><td>Serial number:</td><td>H901DB0109D</td></tr>
<tr><td>Calibration frequency:</td><td>12 months after the start of operation</td></tr>
<tr><td>Last Calibration Date:</td><td>19/08/2015</td></tr>
<tr><td>Validity</td><td>18/08/2016</td></tr>
<tr><td>Operation Period:</td><td>01/01/2016 to 30/06/2016 for Fare #1</td></tr>
</table>
<table>
<tr><th colspan="2">Type: Differential pressure Flow Meter</th></tr>
<tr><td>Accuracy:</td><td>± 0.696%</td></tr>
<tr><td>Serial number:</td><td>F804240109D</td></tr>
<tr><td>Calibration frequency:</td><td>12 months after the start of operation</td></tr>
<tr><td>Last Calibration Date:</td><td>19/08/2015</td></tr>
<tr><td>Validity</td><td>18/08/2016</td></tr>
<tr><td>Operation Period:</td><td>01/01/2016 to 30/06/2016 for Fare #2</td></tr>
</table>
And one 266DSH ABB flow meter available on site for Flare 3:
<table>
<tr><th colspan="2">Type: Differential pressure Flow Meter</th></tr>
<tr><td>Accuracy:</td><td>+/-0.075%</td></tr>
<tr><td>Serial number:</td><td>3K646615009427</td></tr>
<tr><td>Calibration frequency:</td><td>4 years and one month after the start of operation</td></tr>
<tr><td>Previous Calibration Date:</td><td>31/03/2015</td></tr>
<tr><td>Validity</td><td>30/04/2019</td></tr>
<tr><td>Operation Period:</td><td>21/02/2016 to 30/06/2016 for Flare #3</td></tr>
</table></td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measured continuously (average value in a time interval not greater than an hour) by flow meter continuously; data to be aggregated monthly and yearly.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures:</td><td>Flow meters shall be subject to a regular maintenance and testing regime, based on the manufacturer’s recommended schedule and procedures, to ensure accuracy</td></tr>
</table>

Purpose of data:	Calculation of baseline emissions.
Additional comment:	Data will be kept for 2 years after end of crediting period.

Data/parameter:	**$LFG_{Flare,y}$**
Unit	Nm^3
Description	Flow of LFG to the flare. Amount of landfill gas flared at normal temperature and pressure.
Measured/ calculated/ default	Measured
Source of data	From project implementer, measured on site
Value(s) of monitored parameter	Please refer to Table 1 in section H, and ER calculation spreadsheet
Monitoring equipment	There are two Deltabar S PMD70 Endress+Hauser flow meter available on site, one for Flare 1 and the other for Flare 2:

	Type: Differential pressure Flow Meter
Accuracy:	± 0.696%
Serial number:	H901DB0109D
Calibration frequency:	12 months after the start of operation
Previous Calibration Date:	19/08/2015
Validity	18/08/2016
Operation Period:	01/01/2016 to 30/06/2016 for Fare #1

	Type: Differential pressure Flow Meter
Accuracy:	± 0.696%
Serial number:	F804240109D
Calibration frequency:	12 months after the start of operation
Previous Calibration Date:	19/08/2015
Validity	18/08/2016
Operation Period:	01/01/2016 to 30/06/2016 for Fare #2

And one 266DSH ABB flow meter available on site for Flare 3:

	Type: Differential pressure Flow Meter
Accuracy:	± 0,075%
Serial number:	3K646615009427
Calibration frequency:	4 years and one month after the start of operation
Previous Calibration Date:	31/03/2015
Validity	30/04/2019
Operation Period:	21/02/2016 to 30/06/2016 for Fare #3

Measuring/ reading/ recording frequency:	Measured continuously (average value in a time interval not greater than an hour) by flow meter continuously; data to be aggregated monthly and yearly.

Calculation method (if applicable):	NA
QA/QC procedures:	Flow meters shall be subject to a regular maintenance and testing regime, based on the manufacturer's recommended schedule and procedures, to ensure accuracy
Purpose of data:	Calculation of baseline emissions.
Additional comments:	$LFG_{flare,y}$ is considered to be equivalent to the variable $FV_{RG,h}$ (volumetric flow rate of the residual gas) as described in the "Tool to determine Project emissions from flaring gases containing methane" used to determine project emissions from flaring. Data will be kept for 2 years after end of crediting period.

Data / Parameter:	**$w_{CH4,y}$**
Unit:	m^3 CH_4 / m^3 LFG
Description:	Methane fraction in the landfill gas
Measured/Calculated / Default:	Measured
Source of data:	Measured by continuous gas quality analyzer.
Value(s) of monitored parameter:	Please refer to the Table 1 in section H, and ER calculation spreadsheet
Monitoring equipment:	From 01/01/2016 to 21/02/2016, there was a Raw Gas Analyzer (GAE CH_4) NUK on site.

	Type: NUK GAE CH_4 Raw Gas analyzer
Accuracy:	± 2%
Serial number:	A1815
Calibration frequency:	No external calibration required, according to manufacturer. Weekly calibrations performed on site by the plant operators
Operation Period:	01/01/2016 to 21/02/2016

From 21/0202016 to 30/06/2016 there was a Raw Gas Analyzer (Ultramat 23) Siemens available on site.

	Type: Siemens Ultramat 23 Raw Gas analyzer
Accuracy:	± 1%
Serial number:	N1F3920
Calibration frequency:	No external calibration required, according to manufacturer. Monthly calibrations performed on site by the plant operators
Operation Period:	21/02/2016 to 30/06/2016

Measuring/Reading/ Recording frequency:	Monitored continuously
Calculation method (if applicable):	NA
QA/QC procedures:	The gas analyzer shall be subjected to regular maintenance and calibration, based on the manufacturer's recommended schedule and procedures, to ensure accuracy
Purpose of data:	Calculation of baseline emissions.
Additional comment:	$w_{CH4,y}$ is considered to be equivalent to the variable $fv_{CH4,h}$ (volumetric fraction of the component CH_4 in the landfill gas in the hour h) as described in the "Tool to determine Project emissions from flaring gases containing methane". Data will be kept for 2 years after end of crediting period.

Data / Parameter:	$EF_{grid, CM,y}$
Unit:	tCO_2/MWh
Description:	Combined Margin CO_2 emission factor for the project electricity system in year y
Measured/Calculated / Default:	Calculated as per the "Tool to calculate the emission factor for an electricity system" version 02.2.1.
Source of data:	Published data by the Brazilian Ministry of Science and Technology for values for OM_{grid} and BM_{grid}
Value(s) of monitored parameter:	0.4067 for 2015
Monitoring equipment:	Monitored yearly using published data from the Brazilian Ministry of Science and Technology (Brazil DNA)
Measuring/Reading/ Recording frequency:	Monitored yearly
Calculation method (if applicable):	Calculated as per the "Tool to calculate the emission factor for an electricity system" version 02.2.1.
QA/QC procedures:	This value will be updated yearly as per the monitored data EFgrid,BM,y and EFgrid,OM,y using the latest published data from Brazil's DNA
Purpose of data:	Calculation of project emissions.
Additional comment:	$EF_{grid, CM,y} = CEF_{elecy,BL,y} = EF_{EL,j,y}$ This value will be reported within each CPA, and will be monitored ex-post. Data will be kept for two years after end of crediting period

Data / Parameter:	$EF_{grid, BM,y}$
Unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor for the project electricity system in year y
Measured/Calculated / Default:	Calculated as per the "Tool to calculate the emission factor for an electricity system" version 02.2.1.
Source of data:	Based on yearly published data from the Brazilian Ministry of Science and Technology (Brazilian DNA)
Value(s) of monitored parameter:	0.2553 for 2015
Monitoring equipment:	Monitored yearly using published data from the Brazilian Ministry of Science and Technology (Brazil DNA)
Measuring/Reading/ Recording frequency:	Monitored yearly.
Calculation method (if applicable):	Calculated as per the "Tool to calculate the emission factor for an electricity system" version 02.2.1.
QA/QC procedures:	This value will be updated and monitored as per the latest published data from Brazil's DNA.
Purpose of data:	Calculation of project emissions.
Additional comment:	This value will be reported within each CPA, and will be monitored ex-post. Data will be kept for two years after end of crediting period.

Data / Parameter:	$EF_{grid,OM,y}$
Unit:	tCO_2/MWh
Description:	Operating margin CO_2 emission factor for the project electricity system in year y
Measured/ Calculated / Default:	Calculated as per the "Tool to calculate the emission factor for an electricity system" version 02.2.1.

Source of data:	Based on yearly published data from the Brazilian Ministry of Science and Technology (Brazilian DNA)
Value(s) of monitored parameter:	0.5580 for 2015
Monitoring equipment:	Monitored yearly using published data from the Brazilian Ministry of Science and Technology (Brazil DNA)
Measuring/Reading/ Recording frequency:	Monitored yearly.
Calculation method (if applicable):	Monitored yearly using published data from the Brazilian Ministry of Science and Technology (Brazil DNA). The dispatch data analysis is used, option (C) of the "Tool to calculate the emission factor for an electricity system". Version 02.2.1
QA/QC procedures:	This value will be updated and monitored as per the latest published data from Brazil's DNA.
Purpose of data:	Calculation of project emissions.
Additional comment:	This value will be reported within each CPA, and will be monitored ex-post. Data will be kept for two years after end of crediting period.

Data / Parameter:	T_{flare}
Unit:	°C
Description:	Temperature in the exhaust gas of the flare
Measured/Calculated / Default:	Measured
Source of data:	Project implementer
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet

<table>
<tr><td>Monitoring equipment:</td><td>

Flare #1 thermocouple:

	Model	Replaced by:
	ECIL Type S	ECIL Type S
Accuracy:	±0.25%	±0.25%
Reference:	TES-20	TES-23
Calibration frequency:	Annual, from the time of installation	Annual, from the time of installation
Installation date:	06/04/2015	30/03/2016
Validity:	05/04/2016	29/03/2017
Operation Period:	01/01/2016 – 30/03/2016	30/03/2016 – 30/06/2016

Flare #2 thermocouple:

	Model	Replaced by:
	ECIL Type S	ECIL Type S
Accuracy:	±0.25%	±0.25%
Reference:	TES-21	TES-24
Calibration frequency:	Annual, from the time of installation	Annual, from the time of installation
Installation date:	06/04/2015	30/03/2016
Validity:	05/04/2016	29/03/2017
Operation Period:	01/01/2016 – 30/03/2016	30/03/2016 – 30/06/2016

Flare #3 thermocouple:

	Model	Replaced by:
	ELSI Type S	ELSI Type S
Accuracy:	±0.04%	±0.04%
Reference:	E15TS0340	E15TS0339
Calibration frequency:	Annual, from the time of installation	Annual, from the time of installation
Installation date:	21/02/2016	03/05/2016
Validity:	20/02/2017	02/05/2017
Operation Period:	21/02/2016 – 03/05/2016	03/05/2016 – 30/06/2016

</td></tr>
<tr><td>Measuring/Reading/ Recording frequency:</td><td>Data is measured continuously.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures:</td><td>Measuring instruments are subject to regular maintenance and testing regime, based on the manufacturer’s recommended schedule and procedures</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment:</td><td>Required to determine adequate operation and operating hours of the flare. Data will be kept for at least two years after the end of the crediting period with an annual frequency of calibration or replacement as per the “Tool to determine project emissions from flaring gases containing methane” – EB28, Annex 13</td></tr>
</table>

Data / Parameter:	$t_{O2,h}$
Unit:	--
Description:	Volumetric fraction of O_2 in the exhaust gas of the flare in the hour *h*
Measured/Calculated / Default:	Measured

<table>
<tr><td>Source of data:</td><td>Project Implementer</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Please refer to ER calculation spreadsheet</td></tr>
<tr><td>Monitoring equipment:</td><td>The gas analyzer is used to measure the exhaust gas composition. The manufacturer of the gas analyzer is NUK.

Flare #1:
<table><tr><th colspan="2">Type: NUK GAE O_2 Exhaust Gas Analyzer</th></tr><tr><td>Serial number:</td><td>A1847</td></tr><tr><td>Accuracy:</td><td>± 1.0%</td></tr><tr><td>Operation Period:</td><td>01/01/2016 to 30/06/2016</td></tr><tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer.
Weekly calibrations performed on site by the plant operators</td></tr></table>
Flare #2:
<table><tr><th colspan="2">Type: NUK GAE O_2 Exhaust Gas Analyzer</th></tr><tr><td>Serial number:</td><td>A1848</td></tr><tr><td>Accuracy:</td><td>± 1.0%</td></tr><tr><td>Operation Period:</td><td>01/01/2016 to 30/06/2016</td></tr><tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer.
Weekly calibrations performed on site by the plant operators</td></tr></table>
Flare #3:
<table><tr><th colspan="2">Type: SIEMENS Utramat 23 O_2 Exhaust Gas Analyzer</th></tr><tr><td>Serial number:</td><td>N1F3921</td></tr><tr><td>Accuracy:</td><td>± 1.0%</td></tr><tr><td>Operation Period:</td><td>21/02/2015 to 30/06/2016</td></tr><tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer.
Monthy calibrations performed on site by the plant operators</td></tr></table></td></tr>
<tr><td>Measuring/Reading/ Recording frequency:</td><td>Data is measured continuously and aggregated monthly and yearly</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures:</td><td>Analyzers are calibrated according to the manufacturer’s recommendation and in accordance with appropriate national/international standards to ensure its accuracy. A zero check and a typical value check is performed by comparison with a standard certified gas.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment:</td><td>Monitoring of this parameter is due to continuous monitoring of the flare efficiency. Data will be kept for 2 years after end of crediting period or last issuance of CERs for the project activity.</td></tr>
</table>

Data / Parameter:	$fv_{CH4,h}$
Unit:	-
Description:	Volumetric fraction of methane in the residual gas
Measured/Calculated / Default:	Measured
Source of data:	Project Implementer
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet

<table>
<tr><td>Monitoring equipment:</td><td>From 01/01/2016 to 21/02/2016, there was a Raw Gas Analyzer (GAE CH_4) NUK on site.
<table>
<tr><th colspan="2">Type: NUK GAE CH_4 Raw Gas analyzer</th></tr>
<tr><td>Accuracy:</td><td>± 2%</td></tr>
<tr><td>Serial number:</td><td>A1815</td></tr>
<tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer. Weekly calibrations performed on site by the plant operators</td></tr>
<tr><td>Operation Period:</td><td>01/01/2016 to 21/02/2016</td></tr>
</table>
From 21/0202016 to 30/06/2016 there was a Raw Gas Analyzer (Ultramat 23) Siemens available on site.
<table>
<tr><th colspan="2">Type: Ultramat 23 Raw Gas analyzer</th></tr>
<tr><td>Accuracy:</td><td>± 1%</td></tr>
<tr><td>Serial number:</td><td>N1F3920</td></tr>
<tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer. Monthly calibrations performed on site by the plant operators</td></tr>
<tr><td>Operation Period:</td><td>21/02/2016 to 30/06/2016</td></tr>
</table></td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Monitored continuously</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures:</td><td>The gas analyzer shall be subjected to regular maintenance and calibration, based on the manufacturer’s recommended schedule and procedures, to ensure accuracy</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions.</td></tr>
<tr><td>Additional comment:</td><td></td></tr>
</table>

Data / Parameter:	**$FV_{RG,h}$**
Unit:	m^3/h
Description:	Volumetric flow rate of the residual gas in wet basis at normal (NTP) conditions in the hour h
Measured/ Calculated / Default:	Measured
Source of data:	From project implementer, measured on site
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet

<table>
<tr><td>Monitoring equipment:</td><td>There are two Deltabar S PMD70 Endress+Hauser flow meter available on site, one for Flare 1 and the other for Flare 2:

<table>
<tr><th colspan="2">Type: Differential pressure Flow Meter</th></tr>
<tr><td>Accuracy:</td><td>± 0.696%</td></tr>
<tr><td>Serial number:</td><td>H901DB0109D</td></tr>
<tr><td>Calibration frequency:</td><td>12 months after the start of operation</td></tr>
<tr><td>Previous Calibration Date:</td><td>19/08/2015</td></tr>
<tr><td>Validity</td><td>18/08/2016</td></tr>
<tr><td>Operation Period:</td><td>01/01/2016 to 30/06/2016 for Fare #1</td></tr>
</table>

<table>
<tr><th colspan="2">Type: Differential pressure Flow Meter</th></tr>
<tr><td>Accuracy:</td><td>± 0.696%</td></tr>
<tr><td>Serial number:</td><td>F804240109D</td></tr>
<tr><td>Calibration frequency:</td><td>12 months after the start of operation</td></tr>
<tr><td>Previous Calibration Date:</td><td>19/08/2015</td></tr>
<tr><td>Validity</td><td>18/08/2016</td></tr>
<tr><td>Operation Period:</td><td>01/01/2016 to 30/06/2016 for Fare #2</td></tr>
</table>

And one 266DSH ABB flow meter available on site for Flare 3:

<table>
<tr><th colspan="2">Type: Differential pressure Flow Meter</th></tr>
<tr><td>Accuracy:</td><td>± 0.075%</td></tr>
<tr><td>Serial number:</td><td>3K646615009427</td></tr>
<tr><td>Calibration frequency:</td><td>4 years and one month after the start of operation</td></tr>
<tr><td>Previous Calibration Date:</td><td>31/03/2015</td></tr>
<tr><td>Validity</td><td>30/04/2019</td></tr>
<tr><td>Operation Period:</td><td>21/02/2016 to 30/06/2016 for Fare #3</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measured continuously (average value in a time interval not greater than an hour) by flow meter continuously; data to be aggregated monthly and yearly.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures:</td><td>Flow meters shall be subject to a regular maintenance and testing regime, based on the manufacturer’s recommended schedule and procedures, to ensure accuracy</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions.</td></tr>
<tr><td>Additional comment:</td><td>Data will be kept for 2 years after end of crediting period</td></tr>
</table>

Data / Parameter:	$fv_{CH4,FG,h}$
Unit:	mg/m3
Description:	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h

<table>
<tr><td>Measured/Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Project Implementer</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Please refer to ER calculation spreadsheet</td></tr>
<tr><td>Monitoring equipment:</td><td>The gas analyzer is used to measure the exhaust gas composition. The manufacturer of the gas analyzer for Flare 1 and Flare 2 is NUK.

Flare #1:
<table><tr><th colspan="2">Type: NUK GAE CH_4 Exhaust Gas Analyzer</th></tr><tr><td>Serial number:</td><td>A1887</td></tr><tr><td>Accuracy:</td><td>± 2.0%</td></tr><tr><td>Operation Period:</td><td>01/01/2016 to 19/03/2016</td></tr><tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer. Weekly calibrations performed on site by the plant operators</td></tr></table>
<table><tr><th colspan="2">Type: NUK GAE CH_4 Exhaust Gas Analyzer</th></tr><tr><td>Serial number:</td><td>A1838</td></tr><tr><td>Accuracy:</td><td>± 2.0%</td></tr><tr><td>Operation Period:</td><td>19/03/2016 to 19/03/2016</td></tr><tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer. Weekly calibrations performed on site by the plant operators</td></tr></table>
Flare #2:
<table><tr><th colspan="2">Type: NUK GAE CH_4 Exhaust Gas Analyzer</th></tr><tr><td>Serial number:</td><td>A2055</td></tr><tr><td>Accuracy:</td><td>± 2.0%</td></tr><tr><td>Operation Period:</td><td>01/01/2016 to 30/06/2016</td></tr><tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer. Weekly calibrations performed on site by the plant operators</td></tr></table>
The manufacturer of the gas analyzer for Flare 3 is Siemens.

Flare #3:
<table><tr><th colspan="2">Type: SIEMENS Ultramat 23 CH_4 Exhaust Gas Analyzer</th></tr><tr><td>Serial number:</td><td>N1F3921</td></tr><tr><td>Accuracy:</td><td>± 1.0%</td></tr><tr><td>Operation Period:</td><td>21/02/2016 to 30/06/2016</td></tr><tr><td>Calibration frequency:</td><td>No external calibration required, according to manufacturer. Monthly calibrations performed on site by the plant operators</td></tr></table></td></tr>
<tr><td>Measuring/Reading/ Recording frequency:</td><td>Data is measured continuously and aggregated monthly and yearly</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures:</td><td>Analyzers will be calibrated according to the manufacturer’s recommendation and in accordance with appropriate national/international standards to ensure its accuracy. A zero check and a typical value check will be performed by comparison with a standard certified gas.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment:</td><td>Monitoring of this parameter is due to continuous monitoring of the flare efficiency. Data will be kept for 2 years after end of crediting period or last issuance of CERs for the project activity</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>$EC_{PJ,y}$</td></tr>
<tr><td>Unit:</td><td>MWh</td></tr>
<tr><td>Description:</td><td>Quantity of electricity consumed by the project activity during the year y</td></tr>
<tr><td>Measured/Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Project developer</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Please refer to Table 3 in section H, at Project Emissions from electricity consumption</td></tr>
<tr><td>Monitoring equipment:</td><td>There was one electricity meter EMU available on the project site from 13/11/12 to 21/02/2016:
<table>
<tr><th colspan="2">Type: EMU Electricity Meter</th></tr>
<tr><td>Serial number:</td><td>22858</td></tr>
<tr><td>Models:</td><td>EMU32.x4</td></tr>
<tr><td>Accuracy:</td><td>Active energy class 1</td></tr>
<tr><td>Calibration frequency:</td><td>5 years as per Brazilian standard[4]</td></tr>
<tr><td>Manufacturer calibration</td><td>13/07/2012</td></tr>
<tr><td>Operation Period</td><td>13/11/2012 to 21/02/2016</td></tr>
</table>
And one electricity meter SCHNEIDER available on the project site from 02/05/2016 to 31/05/2016 and from 06/06/2016 to 30/06/2016:
<table>
<tr><th colspan="2">Type: SCHNEIDER Electricity Meter</th></tr>
<tr><td>Serial number:</td><td>C034151170401</td></tr>
<tr><td>Models:</td><td>PM1200</td></tr>
<tr><td>Accuracy:</td><td>Active energy class ; as per IEC 62052-11 & IEC 62053-22</td></tr>
<tr><td>Calibration frequency:</td><td>5 years as per Brazilian standard[5]</td></tr>
<tr><td>Manufacturer calibration</td><td>16/03/2015</td></tr>
<tr><td>Operation Period</td><td>02/05/2016 to 31/05/2016 & 06/06/2016 to 30/06/2016</td></tr>
</table></td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Electricity will be measured continuously using an electricity meter. Data will be aggregated at least annually as stated in the “Tool to calculate Project emissions from electricity consumption” version 01.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures:</td><td>Electricity meter will be subject to regular maintenance and testing in accordance with stipulation of the meter supplier and in accordance with appropriate national/international standards to ensure accuracy</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of project emissions.</td></tr>
<tr><td>Additional comment:</td><td>Project emissions from electricity consumption from 22/02/2016 to 02/05/2016 and 01/06/2016 to 30/06/2016 were calculated using a conservative approach, considering the maximum electricity consumption of each equipment and continuous operation.</td></tr>
</table>

[4] http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC001671.pdf

[5] http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC001671.pdf

Data / Parameter:	**Other flare operation parameters: T_{flare} and $LFG_{flare,y}$**
Unit:	-
Description:	The range of operating conditions is defined according to the methodology and the manufacturer's specifications based on the flow of LFG to the flare and the temperature of the exhaust gas.
Measured/ Calculated / Default:	Measured
Source of data:	Project implementer
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet
Monitoring equipment:	Thermocouple and flow meter measurements (please refer to equipment described under T_{flare} and $LFG_{flare,y}$)
Measuring/Reading/ Recording frequency:	Monitored continuously
Calculation method (if applicable):	Data will be continuously measured to ensure that the flare/s operate within the range specified by the methodology and the manufacturer in terms of the temperature of the exhaust gas and the LFG flow rate, as follows: Minimum temperature: 500°C Maximum temperature: 1,200°C Minimum flow rate: 500 Nm^3/h 1,000 Nm^3/h for the third flare Maximum flow rate: 2,500 Nm^3/h for the first flare 5,000 Nm^3/h for the second and third flare The thermocouple and the flow meter will also follow the measurement methods and procedures described for T_{flare} and $LFG_{flare,y}$
QA/QC procedures:	As previously defined for T_{flare} and $LFG_{flare,y}$
Purpose of data:	Calculation of baseline emissions
Additional comment:	Only applicable in case of use of a default value.

CPA-2 data and parameters

Data / Parameter:	**$LFG_{total,y}$ = $LFG_{Flare,y}$**
Unit:	Nm^3
Description:	Total amount of landfill gas captured at normal temperature and pressure
Measured/ Calculated / Default:	Measured
Source of data:	From project implementer, measured on site
Value(s) of monitored parameter:	Please refer to Table 2 in section H, and ER calculation spreadsheet

<table>
<tr><td>Monitoring equipment:</td><td>There is one fixed Annubar flow meter from Simer installed before the flare. This equipment uses the differential pressure, that is read by a pressure sensor model 2600T developed by ABB to calculate the biogas flow.

<table>
<tr><th colspan="2">Type: Diferential Pressure flow meter</th></tr>
<tr><td>Accuracy:</td><td>0.075%</td></tr>
<tr><td>Serial number:</td><td>3K646615024645</td></tr>
<tr><td>Calibration frequency:</td><td>49 months</td></tr>
<tr><td>Manufacturer Calibration Date:</td><td>25/08/2015</td></tr>
<tr><td>Validity</td><td>24/09/2019</td></tr>
<tr><td>Operation Period for this Monitoring Report:</td><td>13/05/2016 to 30/07/2016</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measured continuously (average value in a time interval not greater than an hour) by the Annubar flow meter (pressure sensor and temperature sensor); data to be aggregated monthly.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures:</td><td>To ensure the correct reading, the sensor shall be subject to a regular maintenance and calibration regime based to the manufacture’s recommended schedule.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions.</td></tr>
<tr><td>Additional comment:</td><td>Data will be kept for 2 years after end of crediting period.</td></tr>
</table>

Data / Parameter:	$w_{CH4,y}$
Unit:	m^3 CH_4 / m^3 LFG
Description:	Methane fraction in the landfill gas
Measured/Calculated / Default:	Measured
Source of data:	Measured by continuous gas quality analyzer.
Value(s) of monitored parameter:	Please refer to the Table 2 in section H, and ER calculation spreadsheet

Monitoring equipment:	Onegas analizer model Ultramat 23, developed bySIEMENS is available on site. **Type: gas analyser** Accuracy: ±1% Serial number: N1F6765 Calibration frequency: 12 months Manufacturer Calibration Date: 28/07/2015 Validity 27/07/2016 Operation Period: 13/05/2016 to 30/07/2016
Measuring/Reading/ Recording frequency:	Measured continuously
Calculation method (if applicable):	NA
QA/QC procedures:	To ensure accuracy, the gas analyzer shall be subjected to regular maintenance and calibration based on the manufacturer's recommended schedule and procedures.
Purpose of data:	Calculation of baseline emissions.
Additional comment:	$w_{CH4,y}$ is considered to be equivalent to the variable $fv_{CH4,h}$ (volumetric fraction of the component CH_4 in the landfill gas in the hour h) as described in the "Tool to determine Project emissions from flaring gases containing methane". Data will be kept for 2 years after end of crediting period.

Data / Parameter:	**$EF_{CO2,i,y}$**
Unit:	tCO2/GJ
Description:	Weighted average CO2 emission factor of fuel type i in year y
Source of data:	If available, values provided by fuel supplier, but if not available then IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of chapter 1 of Vol 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	0.0843 was used considering the table 1.4 of IPCC Guidelines
Measurement methods and procedures	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 2.
Monitoring frequency	Monitored annually
QA/QC procedures	Will be checked against any future revision of IPCC Guidelines
Purpose of data	Calculation of project emissions.
Additional comment:	For this monitoring period was used the IPCC default value.

Data / Parameter:	**T_{flare}**
Unit:	°C
Description:	Temperature in the exhaust gas of the flare
Measured/Calculated / Default:	Measured
Source of data:	Measured by continuous by thermocouple
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet

<table>
<tr><td>Monitoring equipment:</td><td>There is one thermocouple type S M1.U07-S00-M0040.1-S20 developed by Elsi in the top of the flare #1

<table><tr><th colspan="2">Type: thermocouple type S</th></tr><tr><td>Accuracy:</td><td>±0.01% Full Range Input ± 0.05% Reading</td></tr><tr><td>Serial number:</td><td>E15TS0734</td></tr><tr><td>Calibration frequency:</td><td>365 days</td></tr><tr><td>Calibration Date:</td><td>04/08/2015</td></tr><tr><td>Validity</td><td>04/08/2016</td></tr><tr><td>Calibration Date:</td><td>03/08/2016</td></tr><tr><td>Operation Period:</td><td>13/05/2016 to 30/07/2016</td></tr></table></td></tr>
<tr><td>Measuring/Reading/ Recording frequency:</td><td>Data is measured continuously.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures:</td><td>To ensure accuracy, the thermocouple shall be subjected to regular maintenance and calibration, based on the manufacturer’s recommended schedule and procedures.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment:</td><td>Parameter required to ensure adequate operation of the flare. Data will be kept for 2 years after end of crediting period.</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>$t_{O2,h}$</td></tr>
<tr><td>Unit:</td><td>--</td></tr>
<tr><td>Description:</td><td>Volumetric fraction of O_2 in the exhaust gas of the flare in the hour h</td></tr>
<tr><td>Measured/Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Measured by gas analyzer.</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Please refer to ER calculation spreadsheet</td></tr>
<tr><td>Monitoring equipment:</td><td>One gas analyzer, model Ultramat 23 developed by SIEMENS, is available on the project site.

<table><tr><th colspan="2">Type: gas analyser</th></tr><tr><td>Accuracy:</td><td>±1%</td></tr><tr><td>Serial number:</td><td>N1F6766</td></tr><tr><td>Calibration frequency:</td><td>12 months</td></tr><tr><td>Calibration Date:</td><td>28/07/2015</td></tr><tr><td>Validity</td><td>27/07/2016</td></tr><tr><td>Operation Period:</td><td>13/05/2016 to 30/07/2016</td></tr></table></td></tr>
<tr><td>Measuring/Reading/ Recording frequency:</td><td>Measured continuously.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures:</td><td>To ensure accuracy, the gas analyzer shall be subjected to regular maintenance and calibration, based on the manufacturer’s recommended schedule and procedures.</td></tr>
</table>

Purpose of data:	Calculation of baseline emissions
Additional comment:	Monitoring of this parameter is due to continuous monitoring of the flare efficiency. Data will be kept for 2 years after end of crediting period

Data / Parameter:	**$fv_{CH4,h}$**
Unit:	--
Description:	Volumetric fraction of methane in the exhausted gas of the flare in the hour h
Measured/Calculated / Default:	Measured
Source of data:	Measured by continuous gas analyzer.
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet
Monitoring equipment:	One gas analyzer, model Ultramat 23 developed by SIEMENS, is available on the project site.

	Type: Gas analyzer
Accuracy:	±1 %
Serial number:	N1F6766
Calibration frequency:	12 months
Calibration Date:	28/07/2015
Validity	27/07/2016
Operation Period:	13/05/2016 to 30/07/2016

Measuring/ Reading/ Recording frequency:	Measured continuously
Calculation method (if applicable):	NA
QA/QC procedures:	To ensure accuracy, the gas analyzer shall be subjected to regular maintenance and calibration, based on the manufacturer's recommended schedule and procedures.
Purpose of data:	Calculation of baseline emissions.
Additional comment:	Monitoring of this parameter is due to continuous monitoring of the flare efficiency. Data will be kept for 2 years after end of crediting period

Data / Parameter:	**$FV_{RG,h}$**
Unit:	Nm^3/h
Description:	Volumetric flow rate of the residual gas in wet basis at normal (NTP) conditions in the hour h.
Measured/ Calculated / Default:	Measured
Source of data:	From project implementer, measured on site and aggregated hourly
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet

<table>
<tr><td>Monitoring equipment:</td><td>There is one fixed Annubar flow meter from Simer installed before the flare. This equipment uses the differential pressure, that is read by a pressure sensor model 2600T developed by ABB to calculate the biogas flow.

<table>
<tr><th colspan="2">Type: Diferential Pressure flow meter</th></tr>
<tr><td>Accuracy:</td><td>0.075%</td></tr>
<tr><td>Serial number:</td><td>3K646615024645</td></tr>
<tr><td>Calibration frequency:</td><td>49 months</td></tr>
<tr><td>Manufacturer Calibration Date:</td><td>25/08/2015</td></tr>
<tr><td>Validity</td><td>24/09/2019</td></tr>
<tr><td>Operation Period for this Monitoring Report:</td><td>13/05/2016 to 30/07/2016</td></tr>
</table></td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measured continuously (average value in a time interval not greater than an hour) by the Annubar flow meter (pressure sensor and temperature sensor); data to be aggregated monthly.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures:</td><td>To ensure the correct reading, the sensor shall be subject to a regular maintenance and calibration regime based to the manufacture’s recommended schedule.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions.</td></tr>
<tr><td>Additional comment:</td><td>Data will be kept for 2 years after end of crediting period.</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>$fv_{CH4,FG,h}$</td></tr>
<tr><td>Unit:</td><td>mg/m3</td></tr>
<tr><td>Description:</td><td>Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h</td></tr>
<tr><td>Measured/Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Project Implementer</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Please refer to ER calculation spreadsheet</td></tr>
<tr><td>Monitoring equipment:</td><td>One gas analyzer, model Ultramat 23 developed by SIEMENS, is available on the project site.

<table>
<tr><th colspan="2">Type: Gas analyzer</th></tr>
<tr><td>Accuracy:</td><td>±1 %</td></tr>
<tr><td>Serial number:</td><td>N1F6766</td></tr>
<tr><td>Calibration frequency:</td><td>12 months</td></tr>
<tr><td>Manufacturer Calibration Date:</td><td>28/07/2015</td></tr>
<tr><td>Validity</td><td>27/07/2016</td></tr>
<tr><td>Operation Period:</td><td>13/05/2016 to 30/07/2016</td></tr>
</table></td></tr>
<tr><td>Measuring/Reading/ Recording frequency:</td><td>Data is measured continuously and aggregated monthly and yearly</td></tr>
</table>

Calculation method (if applicable):	N/A
QA/QC procedures:	Analyzers will be calibrated according to the manufacturer's recommendation and in accordance with appropriate national/international standards to ensure its accuracy. A zero check and a typical value check will be performed by comparison with a standard certified gas.
Purpose of data:	Calculation of baseline emissions
Additional comment:	Monitoring of this parameter is due to continuous monitoring of the flare efficiency. Data will be kept for 2 years after end of crediting period or last issuance of CERs for the project activity

Data / Parameter:	**$EC_{PJ,y}$**
Unit:	MWh
Description:	Quantity of electricity consumed by the project activity during the year y
Measured/Calculated / Default:	Measured
Source of data:	Project developer
Value(s) of monitored parameter:	Please see additional comments below
Monitoring equipment:	**Type: IME Electricity Meter** Serial number: MF96001 Models: Nemo 96HD Accuracy: Active energy class 0.5 Calibration frequency: 5 years from the date of the last calibration, as per Brazilian standard[6] Calibration Date 25/08/2015 Valid up to: 24/09/2020 Operation Period 13/05/2016 up to now
Measuring/ Reading/ Recording frequency:	Electricity will be measured continuously using an electricity meter. Data will be aggregated at least annually as stated in the "*Tool to calculate Project emissions from electricity consumption" version 01.*
QA/QC procedures:	Electricity meter will be subject to regular maintenance and testing in accordance with stipulation of the meter supplier and in accordance with appropriate national/international standards to ensure accuracy
Purpose of data:	N/A
Additional comment:	As mentioned in section E during this period the project did not register all the electricity consumptions from the biogas plant. Project Emissions from electricity consumption are accounted under project emission from fossil fuel consumption (under **$PE_{FC,j,y}$**) as a diesel generator was used in this period

Data/parameter	**NCVi,y**
Data Unit	GJ/m^3
Description	Weighted average net calorific value of fuel type i in year y
Source of data	IPCC Guidelines (Table 1.2, Vol. 2)
Value(s) applied	46.44 GJ/m^3
Purpose of data	Required to calculate project emissions from fossil fuel combustion.

[6] http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC001931.pdf

Measurement methods and procedures	The value refers to IPCC Guidelines (Table 1.2, vol.2) considering that the values was not provided by the fuel supplier. For this reason were applied the more conservative value, the maximum value of the range.
Monitoring frequency	Monitored at each fuel delivery, from which weighted average annual values should be calculated.
QA/QC procedures	Values will be verified to check that they 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
Purpose of data	Required to calculate project emissions from fossil fuel combustion.
Additional comments	Following a conservative approach, it has been considered the maximum value of the IPCC Table 1.2, Vol.2, page 18 of the 2006 IPCC Guidelines for biodiesel as the diesel used contains a blend of diesel and biodiesel..

Data / Parameter:	**Other flare operation parameters: T_{flare} and $LFG_{flare,y}$**
Unit:	-
Description:	The range of operating conditions is defined according to the methodology and the manufacturer's specifications based on the flow of LFG to the flare and the temperature of the exhaust gas.
Measured/ Calculated / Default:	Measured
Source of data:	Project implementer
Value(s) of monitored parameter:	Please refer to ER calculation spreadsheet
Monitoring equipment:	Thermocouple and flow meter measurements (please refer to equipment described under T_{flare} and $LFG_{flare,y}$)
Measuring/Reading/ Recording frequency:	Monitored continuously
Calculation method (if applicable):	Data will be continuously measured to ensure that the flare/s operate within the range specified by the methodology and the manufacturer in terms of the temperature of the exhaust gas and the LFG flow rate, as follows: Minimum temperature: 500ºC Maximum temperature: 1,200ºC Minimum flow rate: 500 Nm^3/h Maximum flow rate: 2,500 Nm^3/h for the first flare The thermocouple and the flow meter will also follow the measurement methods and procedures described for T_{flare} and $LFG_{flare,y}$
QA/QC procedures:	As previously defined for T_{flare} and $LFG_{flare,y}$
Purpose of data:	Calculation of baseline emissions
Additional comment:	Only applicable in case of use of a default value.

G.3. Implementation of specific-case CPA level sampling plan

>>
Not Applicable

SECTION H. Calculation of GHG emission reductions or net GHG removals by sinks

H.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

According to the baseline methodology ACM0001 - Version 11, Emissions Reductions are calculated as follows:

$$BE_y = (MD_{project,y} - MD_{BL,y}) \times GWP_{CH_4} + EL_{LFG,y} \cdot CEF_{elec,BL,y} + ET_{LFG,y} \times CEF_{ther,BL,y}$$

Where:

BE_y = Baseline Emissions in year y (t CO_2e).
$MD_{project,y}$ = The amount of Methane that would have been Destroyed/combusted during the year, n tons of methane (t CH_4) in project scenario.
$MD_{BL,y}$ = The amount of Methane that would have been Destroyed/combusted during the year in the absence of the project due to regulatory and/or contractual requirement, in tons of methane (t CH_4)
GWP_{CH4} = Global Warming Potential value for methane, 25 tCO_2e/tCH_4
$EL_{LFG,y}$ = Net quantity of Electricity produced using LFG, which in the absence of the project activity would have been produced by power plants connected to the grid or by an on-site/off-site fossil fuel based captive power generation, during year y, in megawatt hours (MWh).
$CEF_{elecy,BL,y}$ = CO_2 emissions intensity of the baseline source of Electricity displaced, in tCO_2e/MWh.
$ET_{LFG,y}$ = The quantity of Thermal Energy produced utilizing the landfill gas, which in the absence of the project activity would have been produced from onsite/offsite fossil fuel fired boiler/air heater, during the year y, in TJ.
$CEF_{ther,BL,y}$ = CO_2 emissions intensity of the fuel used by boiler/air heater to generate thermal Energy which is displaced by LFG based thermal energy generation, in tCO_2e/TJ.

The baseline emissions for each CPA in a given year "y" (BE_y) is the difference between the amount of methane actually destroyed/combusted during the year ($MD_{project,y}$) and the amount of methane that would have been destroyed/combusted during the year in the absence of the project activity ($MD_{BL,y}$), times the approved Global Warming Potential value for methane (GWP_{CH4}), plus the net quantity of electricity displaced during the year (EG_y) multiplied by the CO_2 emissions intensity of the electricity displaced ($CEF_{electricity,y}$).

The term $MD_{BL,y}$ is equal to zero due to absence of any regulation and contractual requirements relating to landfill gas projects as registered under this PoA. The last term of the equation $ET_{LFG,y}$ x $CEF_{ther,BL,y}$ is equal to zero since there is no thermal energy produced by CPAs. In addition the CPAs has not had any energy generation, therefore parameters $EL_{LFG,y}$ and $CEF_{elec,y}$ will not be considered further in the Baseline Emission Reduction calculation.

The methane destroyed by CPAs ($MD_{project,y}$) during a year is determined by monitoring the quantity of methane actually flared, sent to the natural as distribution grid, and used to generate electricity.

The sum of the quantities fed to de flare(s), to the power plant(s), to the boiler(s)/air heater(s)/heat generating equipment(s) and to the natural gas distribution network must be compared annually with the total quantity of methane generated. The lowest value of the two must be adopted as MDproject,y.

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

Where:
•$MD_{flared,y}$ = Quantity of methane destroyed by flaring (tCH_4).
•$MD_{electricity,y}$ = Quantity of methane destroyed by generation of electricity (tCH_4).
•$MD_{thermal,y}$ = Quantity of methane destroyed for generation of thermal energy (tCH_4).
•$MD_{PL,y}$ = Quantity of methane sent to the pipeline for feeding to the natural gas distribution network (tCH_4).

As CPAs did not use the methane to generate thermal energy, nor generate energy during this monitored period, and no gas has been sent to the natural gas distribution network, then $MD_{electricity,y} = 0$, $MD_{thermal,y} = 0$, and $MD_{PL,y} = 0$.

The quantity of methane destroyed by flaring (t CH_4) is calculated using the following equation:

$$MD_{flared,y} = (LFG_{flare,y} \times w_{CH_4,y} \times D_{CH4,y}) - (PE_{flared,y} / GWP_{CH4})$$

Where:

- $LFG_{flare,y}$ = Quantity of landfill gas fed to the flare(s) during the year measured in cubic meters (m^3).
- $w_{CH4,y}$ = Average methane fraction of the landfill gas as measured during the year and expressed as a fraction (in m^3 CH_4/m^3 LFG)
- D_{CH4} = Methane density expressed in tons of methane per cubic meter of methane (tCH_4/m^3CH_4).
- $PE_{flare,y}$ = Project emissions from flaring of the residual gas stream in year y (tCO_2e) determined following the procedure described in the "Tool to determine project emissions from flaring gases Containing Methane". If methane is flared through more than one flare on a CPA, the $PE_{flare,y}$ shall be determined for each flare.

The CPAs under this PoA will implement enclosed flares. For enclosed flares, either of the following two options can be used to determine the flare efficiency:

(a) To use a 90% default value. Continuous monitoring of compliance with manufacturer's specification of flare (temperature, flow rate of residual gas at the inlet of the flare) must be performed. If in a specific hour any of the parameters are out of the limit of manufacturer's specifications, a 50% default value for the flare efficiency should be used for the calculations for this specific hour.

b) Continuous monitoring of the methane destruction efficiency of the flare (flare efficiency).

In case of the continuous monitoring system is unavailable for maintenance, or failure, the following methods are used:

- 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.

In both cases for all CPAs, if there is no record of the temperature of the exhaust gas of the flare or if the recorded temperature is less than 500 °C for any particular hour, it shall be assumed that during that hour the flare efficiency is zero.

For both CPAs the flare efficiency is continuously monitored, following Option (b) of B.6.3 under the PoA. The data used to calculate the quantity of methane flared are uploaded every minute to a management program. The results of the amount of methane flared are aggregated on a monthly basis.

As there is no electricity generation, nor gas sent to the natural gas distribution network, in CPAs during this Monitored Period the amount of aggregated monthly data of methane flared is adopted as MDproject.

The final formula used to calculate the Baseline Emission for both CPAs is:

$BE_y = MD_{project,y} * GWP_{CH4}$

The following table shows the collected data, from the period 01/jan/2016 to 30/jun/2016.

Description / Date	Total amount of landfill gas captured	Amount of landfill gas flared	Methane fraction in the landfill gas	Quantity of methane captured	Quantities of methane fed to the flare	Quantity of methane destroyed by flaring	Amount of methane destroyed / combusted	Project Emissions from Flaring	Project Emissions from Electricity Imported from the grid	Emission reductions from destroyed methane	Baseline Emissions	Emission Reductions
Parameter	$LFG_{total,y}$	$LFG_{flare,y}$	$W_{CH4,y}$	MD_{total}	MD_{flared}	$MD_{flared,y}$	$MD_{project,y}$	$PE_{flare,y}$	$PE_{EC,y}$	$MD_{project,y} * GWP_{CH4}$	BE_y	ER_y
Unit	Nm^3	Nm^3	% Vol.	tCH_4	tCH_4	tCH_4	tCH_4	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2016_01	4,345,918.8	4,345,918.8	54.1	1,683.1	1,683.1	1,595.1	1,595.1	2,198.9	34.0	39,878.4	39,878	39,844
2016_02	2,906,329.0	2,906,329.0	53.1	1,119.5	1,119.5	1,020.5	1,020.5	2,474.4	48.0	25,512.6	25,512	25,464
2016_03	5,738,471.8	5,738,471.8	49.7	2,060.5	2,060.5	1,749.4	1,749.4	7,776.3	126.0	43,736.0	43,735	43,609
2016_04	6,547,227.6	6,547,227.6	48.2	2,261.8	2,261.8	2,121.1	2,121.1	3,517.5	122.0	53,028.3	53,028	52,906
2016_05	7,133,100.4	7,133,100.4	50.6	2,587.0	2,587.0	2,433.4	2,433.4	3,839.1	63.0	60,835.0	60,835	60,772
2016_06	8,579,730.6	8,579,730.6	51.6	3,172.6	3,172.6	2,967.1	2,967.1	5,138.0	77.0	74,178.2	74,178	74,101
TOTAL	**35,250,778.2**	**35,250,778.2**	**51.2**	**12,884.5**	**12,884.5**	**11,886.7**	**11,886.7**	**24,944.2**	**470.0**	**297,168.5**	**297,166**	**296,696**

Table 1: CPA-1 Data Monitored (01/Jan/2016 to 30/Jun/2016)

Description / Date	Total amount of landfill gas captured	Amount of landfill gas flared	Methane fraction in the landfill gas	Quantity of methane captured	Quantities of methane fed to the flare	Quantity of methane destroyed by flaring	Amount of methane destroyed / combusted	Project Emissions from Flaring	Project Emission from fossil fuel combustion	Emission reductions from destroyed methane	Baseline Emissions	Emission Reductions
Parameter	$LFG_{total,y}$	$LFG_{flare,y}$	$W_{CH4,y}$	MD_{total}	MD_{flared}	$MD_{flared,y}$	$MD_{project,y}$	$PE_{flare,y}$	$PEFC_{j,i,y}$ (tCO2)	$MD_{project,y} * GWP_{CH4}$	BE_y	ER_y
Unit	Nm^3	Nm^3	% Vol.	tCH_4	tCH_4	tCH_4	tCH_4	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2016_01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2016_02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2016_03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2016_04	-	-	-	-	-	-	-	-	-	-	-	-
2016_05	470.951,9	470.951,9	51,6	175,0	175,0	172,4	172,4	4.347,5	20,0	4.310,6	4.310	4.290
2016_06	667.170,8	667.170,8	52,1	249,6	249,6	246,3	246,3	5.532,2	24,0	6.157,3	6.157	6.133
TOTAL	**1.138.122,8**	**1.138.122,8**	**51,8**	**424,5**	**424,5**	**418,7**	**418,7**	**9.879,7**	**44,0**	**10.467,9**	**10.467**	**10.423**

Table 2: CPA-2 Data Monitored (18/may/2016 to 30/Jun/2016)

Determination of $PE_{flare,y}$

When applying the tool to the CPAs, the continuous monitoring of the efficiency is selected for the enclosed flare (option b). According to the tool , $PE_{flare,y}$ is determined as follows:

This tool involves the following seven steps:
STEP 1: Determination of the mass flow rate of the residual gas that is flared
STEP 2: Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas
STEP 3: Determination of the volumetric flow rate of the exhaust gas on a dry basis
STEP 4: Determination of methane mass flow rate of the exhaust gas on a dry basis
STEP 5: Determination of methane mass flow rate of the residual gas on a dry basis
STEP 6: Determination of the hourly flare efficiency
STEP 7: Calculation of annual project emissions from flaring based on measured hourly values or based on default flare efficiencies.

1. **STEP 1. Determination of the mass flow rate of the residual gas that is flared**

As per the tool, using the simplified approach, the project developer measures the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N2).

$$FM_{RG,h} = \rho_{RG,n,h} \times FV_{RG,h}$$

Where:
•$FM_{RG,h}$= Mass flow rate of the residual gas in hour h, kg/h.
•$\rho_{RG,n,h}$ = Density of the residual gas at normal conditions in hour h, kg/m3.
•$FV_{RG,h}$= Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h, m3/h.

$$\rho_{RG,n,h} = \frac{P_n}{\frac{R_u}{MM_{RG,h}} \times T_n}$$

Where:
•P_n = Atmospheric pressure at normal conditions (101,325), Pa
•R_u = Universal ideal gas constant (8.314), Pa.m3/kmol.K
•$MM_{RG,h}$= Molecular mass of the residual gas in hour h, kg/kmol
•T_n = Temperature at normal conditions (273.15), K

$$MM_{RG,h} = \sum_i (fv_{i,h} \times MM_i)$$

Where:
•$fv_{i,h}$ = Volumetric fraction of component i in the residual gas in the hour h
•MM_i = Molecular mass of residual gas component i, kg/kmol
•i = Limited to the two main components CH4 and N2.

As per the tool, the project participant only measures the volumetric fraction of methane and considers the difference as 100% nitrogen (N_2). Therefore, only elements C, H, N are included in the calculation of STEP 2.

2. STEP 2. Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas

Not applicable (refer to step 1), the simplified approach was slected, thus only the volumetric fraction of methane is to be measured and the difference to 100% is to be considered as being nitrogen (N_2).

3. STEP 3. Determination of the volumetric flow rate of the exhaust gas on a dry basis

This step is applicable to the project activity because the methane combustion efficiency of the flare will be continuously monitored.

The average volumetric flow rate of the exhaust gas in each hour *h* is determined based on a stoichiometric calculation of the combustion process, which depends on the chemical composition of the residual gas, the amount of air supplied to combust it and the composition of the exhaust gas, as follows:

$$TV_{n,FG,h} = V_{n,FG,h}\, XFM_{RG,h}$$

Where:

Variable	SI unit	Description
$TV_{n,FG,h}$	m^3/h	Volumetric flow rate of the exhaust gas in dry basis at normal conditions in hour h
$V_{n,FG,h}$	m^3/ kg residual gas	Volume of the exhaust gas of the flare in dry basis at normal conditions per kg of residual gas in hour h
$FM_{RG,h}$	kg residual gas/h	Mass flow rate of the residual gas in the hour h

$$V_{n,FG,h} = V_{n,CO_2,h} + V_{n,O_2,h} + V_{n,N_2,h}$$

Where:

Variable	SI unit	Description
$V_{n,FG,h}$	m^3/ kg residual gas	Volume of the exhaust gas of the flare in dry basis at normal conditions per kg of residual gas in the hour h
$V_{n,CO_2,h}$	m^3/ kg residual gas	Quantity of CO_2 volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
$V_{n,O_2,h}$	m^3/ kg residual gas	Quantity of O_2 volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
$V_{n,N_2,h}$	m^3/ kg residual gas	Quantity of N_2 volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h

$$V_{n,O_2,h} = n_{O_2,h}\, x\, MV_n$$

Where:

Variable	SI unit	Description
$V_{n,O_2,h}$	m^3/ kg residual gas	Quantity of O_2 volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
$n_{O_2,h}$	kmol/kg residual gas	Quantity of moles O_2 in the exhaust gas of the flare per kg residual gas flared in hour h
MV_n	m^3/ kmol	Volume of one mole of any ideal gas at normal temperature and pressure (22.4 L/mol)

$$V_{n,N_2,h} = MV_n * \left\{\frac{fm_{N,h}}{200AM_N} + \left(\frac{1 - MF_{O2}}{MF_{O2}}\right) * \left[F_h + n_{O2,h}\right]\right\}$$

Where:

Variable	SI unit	Description
$V_{n,N_2,h}$	m^3/ kg residual gas	Quantity of N_2 volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
MV_n	m^3/ kmol	Volume of one mole of any ideal gas at normal temperature and pressure (22.4 m^3/Kmol)
$fm_{N,h}$	-	Mass fraction of nitrogen in the residual gas in the hour h
AM_N	kg/ kmol	Atomic mass of nitrogen
MF_{O2}	-	O_2 volumetric fraction of air
F_h	kmol/kg residual gas	Stochiometric quantity of moles of O_2 required for a complete oxidation of one kg residual gas in hour h
$n_{O2,h}$	kmol/kg residual gas	Quantity of moles O_2 in the exhaust gas of the flare per kg residual gas flared in hour h

$$V_{n,CO_2,h} = \frac{fm_{C,h}}{AM_C} * MV_n$$

Where:

Variable	SI unit	Description

$V_{n,CO_2,h}$	m^3/ kg residual gas	Quantity of CO_2 volume free in the exhaust gas of the flare at normal conditions per kg of residual gas in the hour h
MV_n	m^3/ kmol	Volume of one mole of any ideal gas at normal temperature and pressure (22.4 m^3/Kmol)
$fm_{C,h}$	-	Mass fraction of carbon in the residual gas in the hour h
AM_C	kg/ kmol	Atomic mass of carbon

$$n_{O_2,h} = \frac{t_{O_2,h}}{\left[1 - \left({}^{t_{O_2,h}}\!/_{MF_{O_2}}\right)\right]} * \left[\frac{fm_{c,h}}{AM_c} + \frac{fm_{N,h}}{2AM_N} + \left(\frac{1 - MF_{O2}}{MF_{O2}}\right) x\ F_h\right]$$

Where

Variable	SI unit	Description
$n_{O_2,h}$	kmol/kg residual gas	Quantity of moles O_2 in the exhaust gas of the flare per kg residual gas flared in hour h
$t_{O_2,h}$	-	Volumetric fraction of O_2 in the exhaust gas in the hour h
MF_{O_2}	-	Volumetric fraction of O_2 in the air (0.21)
F_h	kmol/kg residual gas	Stochiometric quantity of moles of O_2 required for a complete oxidation of one kg residual gas in hour *h*
$fm_{j,h}$		Mass fraction of element j in the residual gas in hour h
AM_j	kg/kmol	Atomic mass of element j
j	-	The elements carbon (index C) and nitrogen (index N)

$$F_h = \frac{fm_{C,h}}{AM_C} + \frac{fm_{H,h}}{4AM_H} - \frac{fm_{O,h}}{2AM_O}$$

Where

Variable	SI unit	Description
F_h	kmol O_2/kg residual gas	Stochiometric quantity of moles of O_2 required for a complete oxidation of one kg residual gas in hour *h*
$fm_{j,h}$	-	Mass fraction of element j in the residual gas in hour h
AM_j	kg/kmol	Atomic mass of element j
j	-	The elements carbon (index C) , hydrogen (index H) and oxygen (index O)

4. STEP 4. Determination of methane mass flow rate of the exhaust gas on a dry basis

This step is applicable to the CPA because the combustion efficiency of the flare(s) will be continuously monitored.
The mass flow of methane in the exhaust gas is based on the volumetric flow of the exhaust gas and the measured concentration of methane in the exhaust gas, as follows:

$$TM_{FG,h} = \frac{TV_{n,FG,h} * fv_{CH4,FG,h}}{1000000}$$

Where:

Variable	SI unit	Description
$TM_{FG,h}$	kg/h	Mass flow rate of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h
$TV_{n,FG,h}$	m^3/h exhaust gas	Volumetric flow rate of the exhaust gas in dry basis at normal conditions in hour h
$fv_{CH4,FG,h}$	mg/m^3	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in hour h

5. STEP 5. Determination of methane mass flow rate in the residual gas on a dry basis

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n}$$

Where:

- $TM_{RG,h}$ = Mass flow rate of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h, kg/h.
- $fv_{CH4,RG,h}$ = Volumetric fraction of methane in the residual gas on dry basis in hour h.
- $\rho_{CH4,n}$ = Density of methane at normal conditions (0.716), kg/m^3.

6. STEP 6. Determination of the hourly flare efficiency

The approach used in the CPAs is enclosed flare with continuous monitoring.

In this case the flare efficiency in the hour h (ηflare,h) is determined as follows in cases where the temperature of the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour h :

$$n_{flare,h} = 1 - \frac{TM_{FG,h}}{TM_{RG,h}}$$

Where:

Variable	SI unit	Description
$n_{flare,h}$	-	Flare efficiency in the hour h
$TM_{FG,h}$	Kg/h	Methane mass flow rate in exhaust gas averaged in a period of time t (hour, two months or year)
$TM_{RG,h}$	kg/h.	Mass flow rate of methane in the residual gas in the hour h

In case of the continuous monitoring system is unavailable for maintenance, or failure, the following methods will be used:

- 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*.

7. STEP 7. Calculation of annual project emissions from flaring

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1 - \eta_{flare,h}) \times \frac{GWP_{CH4}}{1000}$$

Where:

- $PE_{flare,y}$ = Project emissions from flaring of the residual gas stream in year y, tCO_2e.
- $\eta_{flare,h}$ = Flare efficiency in hour h
- GWP_{CH4} = Global Warming Potential of methane valid for the commitment period, tCO_2e/tCH_4

H.2. Calculation of project emissions or actual net GHG removals by sinks

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According to the baseline methodology ACM0001 - Version 11, Project Emissions for CPA-1 are calculated as follows:

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

Where:

- $PE_{EC,y}$= Emissions from consumption of electricity in the project case.
- $PE_{FC,j,y}$ = Emissions from consumption of heat

Project emissions from electricity consumption ($PE_{EC,y}$) are calculated following the *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption",* version 01.

Scenario A applies to CPA-1 (i.e., electricity from the grid). Furthermore, the option **A1** has been selected, i.e., the combined margin emission factor is calculated, using the procedures of the Tool to calculate the emission factor for an electricity system ($EF_{EL,j/k/l,y} = EF_{grid,CM,y}$).

The generic approach has been selected for CPAs under this PoA:

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

Where:

$EC_{PJ,j,y}$	Quantity of electricity consumed by the project activity during the year y (MWh/y)
$EF_{EL,j,y}$	Emission factor for the electricity grid ($EF_{EL,j/k/l,y} = EF_{grid,CM,y}$) in year y ($tCO_2/MWh$)
$TDL_{j,y}$	Average technical transmission and distribution losses for providing the electricity source j in year y
j	sources of electricity consumption in the project

According to the "Tool to calculate the emission factor for an electricity system" the grid emission factor is calculated as the weighted average of the operating margin emission factor and the build margin emission factor and is expressed in tCO_2/MWh, using the following formula:

$$EF_{EL,j,y} = EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$$

Where: $EF_{EL,j,y}$ = Emission factor for the electricity grid ($EF_{EL,j/k/l,y} = EF_{grid,CM,y}$) in year y ($tCO_2/MWh$)
$EF_{grid,OM,y}$: Operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$: Build margin CO_2 emission factor in year y (tCO_2/MWh)
W_{OM}: Weighting for operating margin emission factor (%)
W_{BM}: Weighting for build margin emission factor (%)

According to the Tool, W_{OM} = 0.5 and W_{BM} = 0.5 for the first crediting period.

The data used for the calculation is $EF_{grid,OM,y}$ = 0.5837 (tCO_2/MWh) / $EF_{grid,BM,y}$ = 0.2963 (tCO_2/MWh) for 2015.

The information was collected from the website of the Brazilian Ministry of Science and Technology[7]. Following this procedure, the calculated value of the $EF_{EL,j,y}$ is 0.4400.

Project emissions from fossil fuel combustion ($PE_{FC,j,y}$) are calculated following version 02 of "*Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*". These emissions are calculated as follows:

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

Where

$FC_{i,j,y}$ is the fossil fuel combusted of type i, in the process j, for the year y

$COEF_{i,y}$ is the CO_2 emission coefficient of the fossil fuel i

Due to data availability, $COEF_{i,y}$ is calculated following Option B of the tool:

$$COEF_{i,y} = NCV_{i,y} * EF_{CO2i,y}$$

Where

$NCV_{i,y}$ Is the weighted average net calorific value of the fuel type *i*

$EF_{CO2i,y}$ Is the weighted average CO_2 emission factor of fuel type *i*

During the period considered in this monitored report, PE for CPA-1 only origined from electricity consumption, while PE for CPA-2 only origined from fossil fuel consumption from the electricity generator. The tables below show the PE for each of the CPAs.

Table 3: Project Emissions from electricity consumption (CPA-1 only)

Period	Electricity Consumption (kW.h)	ECPJ, j, y (MW.h)	EFEL,j,y	TDLj,y	PEEC,y (tCO2)	PEEC,y Rounded up (tCO2)
2016_01	68,772.00	68.77	0.4067	20%	33.56	34
2016_02	97,827.80	97.83	0.4067	20%	47.74	48
2016_03	256,680.00	256.68	0.4067	20%	125.26	126
2016_04	248,400.00	248.40	0.4067	20%	121.22	122
2016_05	127,716.00	127.72	0.4067	20%	62.32	63
2016_06	156,304.00	156.30	0.4067	20%	76.27	77
TOTAL	955,699.80	955.70			466.37	470

To be conservative, the Project Emissions are rounded up for the final calculation of ERs

Table 4: Project Emissions from fossil fuel consumption (CPA-2 only)

Period	FCi,j,y	NCVi,y	$EF_{CO2i,y}$	COEFi,y	PEFC, i, j, y
2016_01	NA	NA	NA	NA	NA
2016_02	NA	NA	NA	NA	NA
2016_03	NA	NA	NA	NA	NA
2016_04	0,00	46,71	0,0843	3,9377	0,00
2016_05	5,005	46,71	0,0843	3,9377	20,00
2016_06	5,969	46,71	0,0843	3,9377	24,00
TOTAL	**10,97**	**-**	**-**	**-**	**44,00**

To be conservative, the Project Emissions are rounded up for the final calculation of ERs

[7] http://www.mct.gov.br/index.php/content/view/74689.html

H.3. Calculation of leakage

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According to the baseline methodology ACM0001 - Version 11, no leakage effects need to be accounted under that methodology.

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

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
6573 - 0001	297,166	470	0	0	296,696	296,696
6573 - 0002	10,467	44	0	0	10,423	10,423
Total	**307,633**	**514**	**0**	**0**	**307,119**	**307,119**

H.5. Comparison of GHG emission reductions or net GHG removals by sinks with estimates in the included CPA-DD(s)

Specific-case CPA reference number	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
6573 - 0001	440,252	296,696
6573 - 0002	36,540	10,423
Total	**464,304**	**307,119**

H.6. Remarks on difference from the estimated value in the included CPA-DD(s)

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The difference between the ex-ante and actual values is mainly due to delays in the expansion of the LFG collection system and in the installation of new components for the biogas plant.

Appendix 1. Contact information of coordinating/managing entity and/or responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Caixa Econômica Federal
Street/P.O. Box	Setor Bancário Sul Quadra 4 lotes 3/ 4 - 12º Andar
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Direct tel.	
Personal e-mail	

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