MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	ESTRE'S Paulínia Landfill Gas Project (EPLGP)
Reference number of the project activity	0165
Version number of the monitoring report	1
Completion date of the monitoring report	25/06/2012
Registration date of the project activity	03/03/2006
Monitoring period number and duration of this monitoring period	13th Monitoring Period. From 01/12/2011 until 31/05/2012 (183 days)
Project participant(s)	Private entity ESTRE Ambiental S/A. (Brazil); NATIXIS Environment & Infrastructures (UK); European Carbon Fund (UK); European Carbon Fund (Switzerland); European Carbon Fund (France).
Host Party(ies)	Brazil
Sectoral scope(s) and applied methodology(ies)	13 : Waste handling and disposal AM0003 ver.3 – Simplified financial analysis for landfill gas capture projects.
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	559,236 tCO_2
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	279,392 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

EPLGP is a landfill gas collection and flare project in Brazil. The project's core idea is to avoid methane emissions from the landfill managed by ESTRE in Paulínia municipality.

The project activity comprises the installation of a new active LFG extraction system and flare. The main equipments currently installed in this project activity are:

- 4 blowers;
- 5 flares;
- 2 backup diesel generators;
- Several collection wells, manifolds and transmission pipelines;

See section A.4. for further details on the technology employed.

The project activity construction started in March 2006 and the commissioning date is 14/09/2006. The commissioning date of flare 3 is 18/02/2008 and for flares 4 and 5 is 01/03/2010.

ESTRE's landfill in Paulínia counts on the best management practices for such business. Besides counting on a sorting system for recyclables, where the "dry matter" – recyclable – is sorted by the members of a cooperative, modern engineering has been applied during design, leachate is collected and sent for treatment, and all the pertinent environmental variables are continuously monitored.

The landfill gas was collected only through a passive system, with no systematic and monitored flare. Therefore, an extra-incentive was needed for ESTRE to make additional investments and enhance its landfill gas collection rate and install appropriate facilities to properly flare the methane produced at the site.

Landfill gas generation will be guaranteed throughout EPLGP's lifetime from various strategic aspects CGR Paulínia enjoys:

- CGR Paulínia is located in the metropolitan region of Campinas, which is formed by 18 municipalities, which, in most cases, do not have feasible areas where landfills could be developed. In fact, most of such municipalities are either facing problems regarding their rubbish dumps/landfills capacity or environmental demands by the environmental agency in state of São Paulo (CETESB), requiring the dumps' areas to be recovered and obliging the authorities to find proper destination to the waste generated.
- ESTRE has several municipalities in the region under contract to dispose waste in CGR Paulínia. Considering these clients, as well as the private ones, CGR Paulínia has a capacity to receive up to 1,825,000 tonnes of waste per year (based on the operational license which establishes the daily capacity up to 5,000 tonnes of waste per day). Initially designed to receive 6.5 million tonnes, CGR Paulínia is now under expansion, with neighbour areas already under ESTRE's ownership. In the end, CGR Paulínia will have received about 16 millions of tonnes.
- CGR Paulínia is strategically located in the metropolitan region of Campinas. Its location favours the landfill as the adequate destination for the municipalities and private clients nearby, as transportation costs are low and therefore make it more feasible to have ESTRE disposing the waste than opening and managing their own landfills. Studies conducted by ESTRE show that landfill development and operation is only feasible for waste disposition rates of at least 500 tonnes of waste per day. And moreover, there are no potential feasible areas for landfill development in the region, as it is highly urbanized and fragile environmental systems are protected by legislation.

EPLGP has a major positive impact towards sustainable development. Firstly, while it is reducing methane emissions that would enhance climate change, it is also minimizing the risk that any explosions happen in the site – even though ESTRE's landfills count on the best engineering and design to avoid accidents. Second, this sort of initiative is still new in Brazil, which means technology transfer will need to be in place for project's implementation and operation. Third, specialized operators will be needed for project operation, which means a positive impact in employment and capacity-building. For all of these facts, it can be clearly seen the project contributes towards sustainable development.

The total emission reductions achieved in this period is 279,392 tCO_2e.

A.2. Location of project activity

The project activity takes place in *Centro de Gerenciamento de Resíduos (CGR) Paulínia*, ESTRE's landfill in municipality of Paulínia, around 130 km north of São Paulo city, as shown in figure 7.

The EPLGP is located at Estrada Municipal PLN 190, s/no., Parque da Represa, Paulínia – SP, Brazil (Latitude -22.773506°, Longitude -47.196161°)

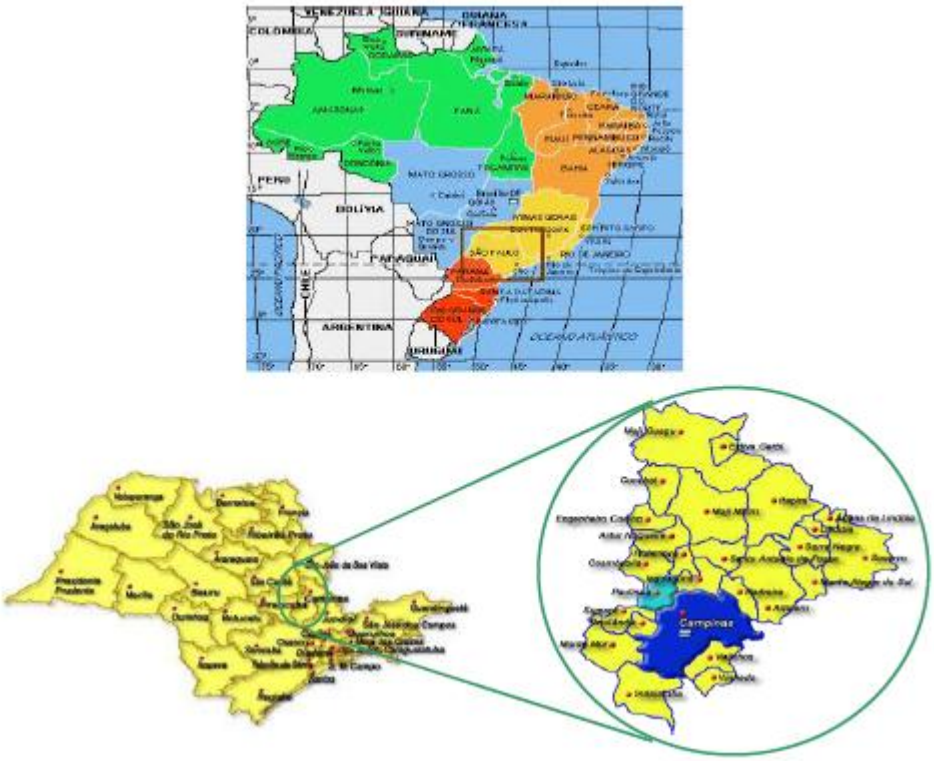


Figure 1 – Paulínia's location

Note: Paulínia is the region appearing in light blue.
Source: SEBRAE-SP[1]

[1] www.sebraesp.sp.gov.br

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	• Private entity ESTRE Ambiental S/A.	No
United Kingdom of Great Britain and Northern Ireland	• NATIXIS Environment & Infrastructures • European Carbon Fund	No
Switzerland	• European Carbon Fund	No
France	• European Carbon Fund	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Reference of applied methodology

AM0003 ver.3 – Simplified financial analysis for landfill gas capture projects.

A.5. Crediting period of project activity

The renewable crediting period is from 14/09/2006 to 13/09/2013 (changed from previously 01/05/2006 to 30/04/2013).

SECTION B. Implementation of project activity
B.1. Description of implemented registered project activity

EPLGP started its operation in 14 September 2006. During this monitoring period, the project has operated with five flares and four blowers, destroying the LFG collected in only one landfill (ESTRE Paulinia) site.

Flare 1	Manufacturer	Biotecnogás (BTG)
	Commissioning date	14/09/2006
	Model	2000 HT
	Serial number	133/05A
	Year of manufacturing	2006
	Nominal gas flow	2000 Nm^3/h
	Minimum retention time	greater than 0.3 sec
	Oxygen in the exhaust gas	greater than 3%
	Minimum methane content	30% of CH_4
	Minimum efficiency	97%
	Lowest operation temperature	850ºC
Flare 2	Manufacturer	Biotecnogás (BTG)
	Commissioning date	14/09/2006
	Model	2000 HT
	Serial number	133/05B

	Year of manufacturing	2006
	Nominal gas flow	2000 Nm³/h
	Minimum retention time	greater than 0.3 sec
	Oxygen in the exhaust gas	greater than 3%
	Minimum methane content	30% of CH_4
	Minimum efficiency	97%
	Lowest operation temperature	850 °C
Flare 3	Manufacturer	Biotecnogás (BTG)
	Commissioning date	18/02/2008
	Model	2500 HT
	Serial number	110/07-C
	Year of manufacturing	2007
	Nominal gas flow	2500 Nm³/h
	Minimum retention time	greater than 0.3 sec
	Oxygen in the exhaust gas	greater than 3%
	Minimum methane content	30% of CH_4
	Minimum efficiency	97%
	Lowest operation temperature	850 °C
Flare 4	Manufacturer	Biotecnogás (BTG)
	Commissioning date	01/03/2010
	Model	2500 HT
	Serial number	076/09-D
	Year of manufacturing	2009
	Nominal gas flow	2500 Nm³/h
	Minimum retention time	greater than 0.3 sec
	Oxygen in the exhaust gas	greater than 3%
	Minimum methane content	30% of CH_4
	Minimum efficiency	97%
	Lowest operation temperature	850 °C
Flare 5	Manufacturer	Biotecnogás (BTG)
	Commissioning date	01/03/2010
	Model	2500 HT
	Serial number	076/09-E
	Year of manufacturing	2009
	Nominal gas flow	2500 Nm³/h
	Minimum retention time	greater than 0.3 sec
	Oxygen in the exhaust gas	greater than 3%
	Minimum methane content	30% of CH_4
	Minimum efficiency	97%
	Lowest operation temperature	850 °C
Blower 1	Year	2006
	Commissioning date	14/09/2006
	Model	77A1.03
	Serial number	0677A051

	Maximum capacity	5000 Nm³/h
	Manufacturer	Continental Industrie
	Motor Capacity	75kW
Blower 2	Year	2006
	Commissioning date	14/09/2006
	Model	77A1.03
	Serial number	0677A050
	Maximum capacity	5000 Nm³/h
	Manufacturer	Continental Industrie
	Motor Capacity	75kW
Blower 3	Year	2009
	Commissioning date	01/03/2010
	Model	77A1.03
	Serial number	0977A084
	Maximum capacity	5000 Nm³/h
	Manufacturer	Continental Industrie
	Motor Capacity	75kW
Blower 4	Year	2009
	Commissioning date	01/03/2010
	Model	77A1.03
	Serial number	0977A083
	Maximum capacity	5000 Nm³/h
	Manufacturer	Continental Industrie
	Motor Capacity	75kW

Table 1 –Technical details of equipments installed at EPLGP

The system has installed backup diesel generators, to supply electricity for the project in case of power shortage. The specification of these equipments is presented in the table below:

Generator Manufacturer: STEMAC (WEG) Generator Model: GTA Engine Manufacturer: STEMAC (Cummins) Engine Model: NTA63 Serial Number: 0450533001 Capacity: 450 kVA Frequency: 60 Hz Tension: 380 V Current: 614 A Year: 10/2001 Commissioning date: 14/09/2006	Generator Manufacturer: Heimer Generator Model: 40/41 Serial Number: 9P0263 Capacity: 512 kVA Frequency: 60 Hz Tension: 220V / 380V / 440V Current: 1344 Year: 10/2009 Commissioning date: 19/02/2010

Table 2 - Diesel generators specifications

Most of this monitoring period the system has been in normal operation. There were a few days with relevant down period, as listed below:

05/12/2011 The flares operation stopped due to BIOAGRI inspection regarding flare exhaust gas

06/12/2011	The flares operation stopped due to BIOAGRI inspection regarding flare exhaust gas
26/01/2012	The plant operation stopped due to collection system maintenance
09/02/2012	The plant operation stopped due to compressed air system maintenance
09/02/2012	The system was down due to power shortage
25/02/2012	Start of daylight saving time, thus one hour less in the day
28/02/2012	The plant operation stopped due to flaring system maintenance
05/03/2012	The flares operation stopped due to BIOAGRI inspection regarding flare exhaust gas
06/03/2012	The flares operation stopped due to BIOAGRI inspection regarding flare exhaust gas
28/03/2012	The plant operation stopped due to flaring system maintenance
02/04/2012	The plant operation stopped due to control room system maintenance
15/04/2012	The system was down due to power shortage

No other significant system shutdown happened in this period, and the ones that happened (listed above) have no impact on the methodology applicability.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

Not applicable.

B.2.2. Corrections

Not applicable.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

A revised monitoring plan was submitted to the UNFCCC, mainly modifying and including the following parameters:

- The version of the monitoring methodology, changed from version 2 to version 3;
- Inclusion of the monitoring of the temperature and pressure of the LFG. Those parameters has been monitored since the project operation started, but were not listed in the monitoring plan;
- Inclusion of the parameter "Total amount electricity used for gas pumping from the diesel fuelled generator" and the emission factor for diesel generation;
- The change of the recording frequency of flare efficiency (exhaust gas analyses) to quarterly instead of semi-annual before;

This revised Monitoring Plan is dated of 09 February 2009 and was approved on 25 April 2009.

A second revision of the monitoring plan, dated of 26/08/2010 was submitted to UNFCCC, requesting the modification of the following parameters:

- Change the flow measurement from m^3 to Nm^3. This means that the new flow meter automatically converts the flow to Nm^3. Consequently it is not needed to monitor the LFG Temperature or Pressure separately;
- Change the electricity data unit from kWh to MWh.

This revision of the monitoring plan was approved on 11/12/2010.

As a consequence of a Request for Review received during issuance request of the 8th verification, a new monitoring plan has been developed requesting the inclusion of the following monitoring parameters:

- Working hours of the flare;
- Flare temperature;

The revision of the monitoring plan submitted together with a notification was approved on 16/03/2012

B.2.4. Changes to project design of registered project activity

A Notification of changes has been conducted and approved on 16/03/2012.

B.2.5. Changes to start date of crediting period

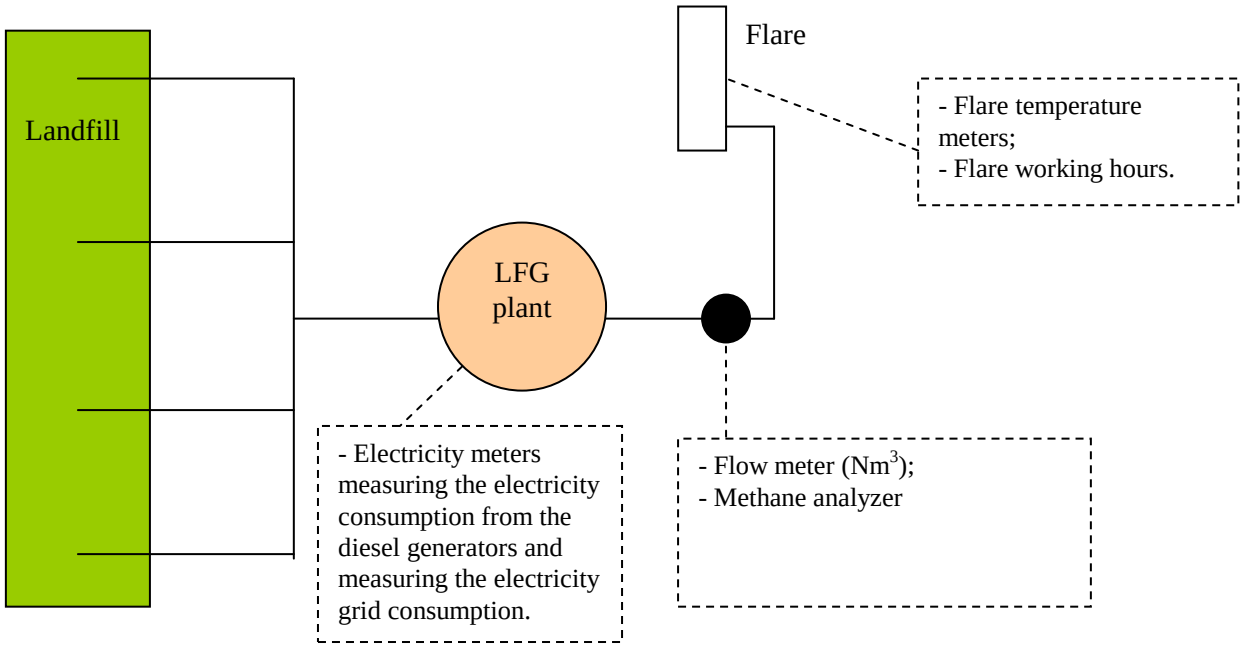
The renewable crediting period is from 14/09/2006 to 13/09/2013 (changed from previously 01/05/2006 to 30/04/2013).

B.2.6. Types of changes specific to afforestation or reforestation project activity

Not applicable.

SECTION C. Description of monitoring system

The monitoring equipments of the EPLGP and their location are presented in below.



All monitoring instruments were running properly and calibrated during this monitoring period.

The electricity consumption data, flow data, methane (CH_4) content data and flare operational parameter data are measured on-line and hourly compiled in an Excel data sheet. All the data transmission and compilation is made electronically to the calculation spreadsheet.

The methane content of the flare exhaust gas is measured at least quarterly by an independent company specialized in gas analysis. Then the flare efficiency is calculated and this value will be used until the next methane content analysis is conducted.

The Table 3 provides technical information regarding instruments used in the project and also, the errors and uncertainties of the instruments are presented just below Table 3.

All data (except the parameters "flare efficiency" and "regulatory requirements") are continuously monitored and every 2 minutes recorded. Besides, once per hour the "hourly report sheet" is generated and once a day the "daily report sheet" is generated.

Type	Manufacturer	Model	Location	Range
Flow Meter[2]	ABB	S-4000	Main pipeline	0 – 20,000 m³/h
Pressure Transmitter	ABB	2600T	Main Pipeline	0.07 kPA – 160 kPA
Temperature Sensor	ABB	TSP321	Main Pipeline	-200°C to 600°C
Electricity meter from the grid	CIBER	UPD200 2480M	Electricity cabin	300V 5A
Electricity meter from the Diesel generation	CIBER	UPD200 2480M	Electricity cabin	300V 5A
Methane content analyzer in the residual gas	SIEMENS	ULTRAMAT 23	Container – analysis room	O_2 0-25% CH_4 0-100%
Temperature of Flare 1	ELSI	Type S	Flare 1	0°C to 1600°C
Temperature of Flare 2	ELSI	Type S	Flare 2	0°C to 1600°C
Temperature of Flare 3	ELSI	Type S	Flare 3	0°C to 1600°C
Temperature of Flare 4	ELSI	Type S	Flare 4	0°C to 1600°C
Temperature of Flare 5	ELSI	Type S	Flare 5	0°C to 1600°C

Table 3 – Monitoring instruments

[2] Using data from temperature sensor and pressure transmitter the flow computer (FCU400G) converts the flow to Nm3.

The errors and uncertainties applied in the relevant monitoring period are presented below:

Measurement equipment of operation data						*From 01/12/2011 to 09/01/2012*		*From 10/01/2012 to 13/01/2012*		*From 14/01/2012 to 29/01/2012*		*From 30/01/2012 to 09/02/2012*		*From 10/02/2012 to 31/05/2012*	
Data	**Equipment**	**Manufacturer**	**Model**	**Serial Number**	**Last calibration**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**
Total Flow	Flow Meter	ABB	S-4000	240297184/X001	08/02/2012	0.057	0.0091	0.057	0.0091	0.057	0.0091	0.057	0.0091	0.057	0.0091
Temperature	Temperature Sensor	ABB	TSP 321	210000516854001	07/02/2011	0.0770	0.0720	0.0770	0.0720	0.0770	0.0720	0.0770	0.0720	0.0770	0.0720
Pressure	Pressure transmitter	ABB	2600T	6410001002	07/02/2011	0.0000	0.2000	0.0000	0.2000	0.0000	0.2000	0.0000	0.2000	0.0000	0.2000
Methane content	Methane analyzer	Siemens	Ultramat 23	N1-U4-0790	10/01/2012	0.4478	0.2478	0.2090	0.1424	0.2090	0.1424	0.2090	0.1424	0.2090	0.1424
Methane collected	Flow Computer	ABB	FCU 400-G	31635618	-	0.5000	0.0000	0.5000	0.0000	0.5000	0.0000	0.5000	0.0000	0.5000	0.0000
			Total error + uncertainty			0.8947		0.6634		0.6634		0.6634		0.6634	

Electricity meters						*From 01/12/2011 to 09/01/2012*		*From 10/01/2012 to 13/01/2012*		*From 14/01/2012 to 29/01/2012*		*From 30/01/2012 to 09/02/2012*		*From 10/02/2012 to 31/05/2012*	
Data	**Equipment**	**Manufacturer**	**Model**	**Serial Number**	**Last calibration**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**
Electricity consumption from the grid	Grid meter	CIBER	UPD200-2480M	40964200869	08/02/2012	0.4667	0.0467	0.4667	0.0467	0.4667	0.0467	0.4667	0.0467	0.4460	0.0460
			Total error + uncertainty			0.5134		0.5134		0.5134		0.5134		0.4920	

Data	**Equipment**	**Manufacturer**	**Model**	**Serial Number**	**Last calibration**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**	**Error (+/-%)**	**Uncertainty**
Electricity consumption in the Diesel generators	Medidor-Diesel	CIBER	UPD200-2480M	40962200082	08/02/2012	0.6670	0.0800	0.6670	0.0800	0.6670	0.0800	0.6670	0.0800	0.5330	0.0000
			Total error + uncertainty			0.7470		0.7470		0.7470		0.7470		0.5330	

Responsibilities and roles:

ESTRE and Econergy are the companies responsible for monitoring and reporting the emissions reductions from EPLGP. The personnel involved with monitoring will be responsible for carrying out the following tasks:

- Supervise and verify metering and recording (ESTRE responsibility): The staff will coordinate internally with other departments to ensure and verify adequate metering and recording of data.

- Collection of additional data (ESTRE responsibility): The staff will collect any data deemed necessary to calculate and report the emission reductions for each monitoring period, such as daily operational reports of project.

- Calibration (ESTRE responsibility): The staff will coordinate internally to ensure that calibration of the metering instruments is carried out in accordance with the equipment manufacturers' specifications. Third parties might be hired to conduct the calibration procedures.

- Preparation of monitoring report (Econergy): The staff will prepare the monitoring report for verification.

- Data Archives (ESTRE / Econergy): The staff will be responsible for keeping all monitoring data, and making it available to the DOE for the verification of the emission reductions.

ESTRE's organizational structure is presented in the figure below:

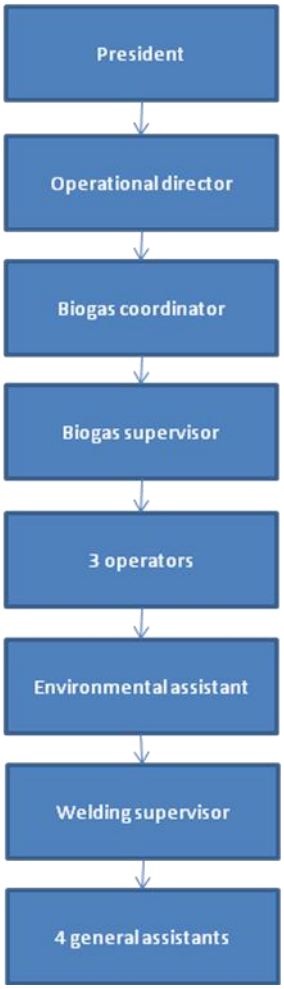


Figure 2. ESTRE's organizational structure

All data (besides the regulatory requirements and flare efficiency) is electronically collected (PLC - Programmable Logic Controller) and archived. A daily back-up of daily and hourly reports occurs to a second, independent server. Besides, daily two hard-disc copies of the reports and daily printouts of the hourly reports and monthly printouts of the daily reports are made.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	**EF** (ID 4.1)
Unit	tCO_2e/MWh
Description	CO_2 emission factor of the grid
Source of data	ONS
Value(s) applied	0.2677
Purpose of data	Project emissions
Additional comment	This emission factor is calculated *ex-ante.*

Data/Parameter	EF_{BM}
Unit	tCO_2e/MWh
Description	Build Margin
Source of data	ONS
Value(s) applied	0.1045
Purpose of data	Project Emissions
Additional comment	-

Data/Parameter	EF_{OM}
Unit	tCO_2e/MWh
Description	Operating Margin
Source of data	ONS
Value(s) applied	0.4310
Purpose of data	Project emissions
Additional comment	-

Data/Parameter	EF_{diesel} (ID 4.2)
Unit	tCO_2e/MWh
Description	CO_2 emission factor of the diesel
Source of data	AMS I – D version 13
Value(s) applied	0.8
Purpose of data	Project emissions
Additional comment	This value is used based on the capacity of the diesel generators currently installed 450kVA and 512 kVA (360 kW and 409.6 kW). Required to determine CO_2 emissions from use of electricity from diesel generators to operate the project activity.

Data/Parameter	AF
Unit	%
Description	Methane Destruction in the Baseline
Source of data	PDD
Value(s) applied	20
Purpose of data	Baseline emissions
Additional comment	-

Data/Parameter	D_{CH4}
Unit	ton/m^3
Description	Methane density at Standard Temperature and Pressure
Source of data	AM0003 version 3
Value(s) applied	0.0007168
Purpose of data	Baseline emissions
Additional comment	STP - 0 degree Celsius and 1.013 bar

Data/Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Methane Global Warming Potential
Source of data	UNFCCC website
Value(s) applied	21
Purpose of data	Baseline emissions
Additional comment	Based on 100 years time horizon. Information available at: http://unfccc.int/ghg_data/items/3825.php, accessed on 17/06/2010.

D.2. Data and parameters monitored

Data/Parameter	**Regulatory requirements relating to landfill gas projects** (ID 11)
Unit	N/A
Description	Legal requirements of methane destruction
Measured/Calculated /Default	-
Source of data	National Legislation (through the Green Solution software)
Value(s) of monitored parameter	N.A.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Required for any changes to the adjustment factor (AF), monitored annually.
Calculation method (if applicable)	NA
QA/QC procedures	NA
Purpose of data	Baseline emissions
Additional comment	-

Data/Parameter	LFG_y (ID 1)
Unit	Nm^3
Description	Amount of landfill gas collected and sent to flares
Measured/Calculated /Default	Measured
Source of data	PLC records
Value(s) of monitored parameter	See excel calculation tool.
Monitoring equipment	From 01/12/2011 to 31/05/2012 Flow meter: Manufacturer: ABB Model: S-4000 Accuracy class: 0.5% Serial Number: 240297184/X001 Calibration frequency: 3 years Date of last calibration: 07 February 2011

<table>
<tr><td></td><td>Validity: 06 February 2014

<u>Pressure transmitter:</u>
Manufacturer: ABB
Model: 2600T
Accuracy class: 0.075%
Serial Number: 6410001002
Calibration frequency: 3 years
Date of last calibration: 07 February 2011
Validity: 06 February 2014

<u>Temperature sensor:</u>
Manufacturer: ABB
Model: TSP321
Accuracy class: 0.35%
Serial Number: 210000516854001
Calibration frequency: 3 years
Date of last calibration: 07 February 2011
Validity: 06 February 2014

<u>Flow computer:</u>
Manufacturer: ABB
Model: FCU 400-G
Accuracy class: variable as per the table below

<table><tr><th>Flow [Nm^3/h]</th><th>Accuracy class</th></tr><tr><td>3,000</td><td>1.000%</td></tr><tr><td>6,000</td><td>0.500% (applicable for this Monitoring Period)[3]</td></tr><tr><td>9,000</td><td>0.333%</td></tr><tr><td>12,000</td><td>0.250%</td></tr><tr><td>15,000</td><td>0.200%</td></tr></table>Serial number: 31635618
Calibration frequency: Not Applicable, as this equipment only calculates the flow to Nm^3.</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Continuous measurement, end every 2 minutes recording</td></tr>
<tr><td>Calculation method (if applicable)</td><td>NA</td></tr>
<tr><td>QA/QC procedures</td><td>The flow meter is subject to regular maintenance (weekly visual inspection and repair, on a need basis) as per PAT 4.4.6-24 procedure which refers to SGA 096 (Programme of preventive maintenance).</td></tr>
<tr><td>Purpose of data</td><td>Baseline emissions</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

Data/Parameter	$w_{CH4,y}$ (ID 5)
Unit	% of volume

[3] Value applicable for this monitoring period, as the flow range was between 6,570 Nm^3/h and 9,570 Nm^3/h (average 9,143 Nm^3/h), and this is the highest, thus more conservative, accuracy value close to this range

Description	Methane fraction in the landfill gas
Measured/Calculated /Default	Measured
Source of data	PLC records
Value(s) of monitored parameter	Variable but available in a separate spreadsheet
Monitoring equipment	From 01/12/2011 to 09/01/2012 Manufacturer: SIEMENS Model: ULTRAMAT 23 Range: CH4 0-100% Serial Number: N1-U4-0790 Accuracy class: 0.5% Calibration frequency: yearly Date of calibration: 10/01/2011 Validity: 09/01/2012 From 10/01/2012 to 31/05/2012 Manufacturer: SIEMENS Model: ULTRAMAT 23 Range: CH4 0-100% Serial Number: N1-U4-0790 Accuracy class: 0.5% Calibration frequency: yearly Date of calibration: 10/01/2012 Validity: 09/01/2013
Measuring/Reading/ Recording frequency	Continuous reading and recorded every two minutes.
Calculation method (if applicable)	NA
QA/QC procedures	This meter is subject to regular maintenance (weekly inspection and repair, on a need basis and semi-annual cross-check with standard gas) and annual calibration as per PAT 4.4.6-24 procedure which refer to SGA 096 (Programme of preventive maintenance).
Purpose of data	Baseline emissions
Additional comment	-

Data/Parameter	**EG_y** (ID 3.1)
Unit	MWh
Description	Amount of electricity imported from the grid
Measured/Calculated /Default	Measured
Source of data	PLC records
Value(s) of monitored parameter	Variable but available in a separate spreadsheet
Monitoring equipment	From 01/12/2011 to 09/02/2012 Manufacturer: CIBER Model: UPD200-2480M Range: maximum 300V and 5 A;

	Accuracy class: 0.5%; Serial Number: 40991700175 Calibration frequency: yearly Date of last calibration: 11/02/2011 Validity: 10/02/2012 From 10/02/2012 to 31/05/2012 Manufacturer: CIBER Model: UPD200-2480M Range: maximum 300V and 5 A; Accuracy class: 0.5%; Serial Number: 40964200869 Calibration frequency: yearly Date of last calibration: 08/02/2012 Validity: 07/02/2013
Measuring/Reading/ Recording frequency	Continuous reading and recorded every two minutes.
Calculation method (if applicable)	NA
QA/QC procedures	Calibration is made yearly.
Purpose of data	Leakage
Additional comment	-

Data/Parameter	**EG_{diesel}** (ID 3.2)
Unit	MWh
Description	Electricity consumption from the Diesel generator
Measured/Calculated /Default	Measured
Source of data	PLC records
Value(s) of monitored parameter	Variable but available in a separate spreadsheet
Monitoring equipment	From 01/12/2011 to 09/02/2012 Manufacturer: CIBER Model: UPD200-2480M Range: maximum 300V and 5 A; Accuracy class: 0.5%; Serial Number: 40962200099 Calibration frequency: yearly Date of last calibration: 11/02/2011 Validity: 10/02/2012 From 10/02/2012 to 31/05/2012 Manufacturer: CIBER Model: UPD200-2480M Range: maximum 300V and 5 A; Accuracy class: 0.5%; Serial Number: 40962200082 Calibration frequency: yearly Date of last calibration: 08/02/2012

	Validity: 07/02/2013
Measuring/Reading/ Recording frequency	Continuous reading and recorded every two minutes.
Calculation method (if applicable)	NA
QA/QC procedures	Calibration is made yearly.
Purpose of data	Leakage
Additional comment	-

Data/Parameter	**FE** (ID 4)
Unit	%
Description	Flare efficiency
Measured/Calculated /Default	Measured and calculated
Source of data	Methane exhaust gas analyses and internal data collection sheets
Value(s) of monitored parameter	Values applied in each day of the monitoring period are available in a different spreadsheet. However the lowest values of flare efficiencies measured in this period are presented in the table below:

Item	**Lowest flare efficiency measured per flare [%]**		
	Set/2011	Dez/2011	Mar/2012
Flare 1	99.9983	99.9985	99.9979
Flare 2	99.9991	99.9990	99.9989
Flare 3	99.9986	99.9983	99.9986
Flare 4	99.9991	99.9980	99.9990
Flare 5	99.9991	99.9973	99.9989
Lowest flare efficiency by period	99.9983	99.9973	99.9979

Monitoring equipment	The LFG flow meter, w_{CH4} meter are used in this process (please see description above). The methane content in the exhaust gas is measured by a third party company.
Measuring/Reading/ Recording frequency	Quarterly
Calculation method (if applicable)	Calculated based on the residual gas flow and methane and oxygen content in the exhaust gas and methane and oxygen content in the residual gas.
QA/QC procedures	Flare efficiency will be checked quarterly.
Purpose of data	Baseline emissions
Additional comment	-

Data/Parameter	T_{flare}
Unit	°C
Description	Flare temperature
Measured/Calculated /Default	Measured
Source of data	PLC records
Value(s) of monitored parameter	Variable but available in a separate spreadsheet
Monitoring equipment	**Flare 1** From 01/12/2011 to 13/01/2012 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 05-06/0617 Calibration frequency: yearly Date of last calibration: 14/01/2011 Validity: 13/01/2012 From 14/01/2012 to 29/01/2012 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 05-06/0617 Calibration frequency: yearly Date of last calibration: Not performed for this period From 30/01/2012 to 31/05/2012 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 05-06/0617 Calibration frequency: yearly Date of last calibration: 30/01/2012 Validity: 29/01/2013 **Flare 2** From 01/12/2011 to 09/01/2012 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5207 Calibration frequency: yearly

	Date of last calibration: 10/01/2011 Validity: 09/01/2012 <u>From 10/01/2012 to 29/01/2012</u> Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5207 Calibration frequency: yearly Date of last calibration: Not performed for this period <u>From 30/01/2012 to 31/05/2012</u> Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5207 Calibration frequency: yearly Date of last calibration: 30/01/2012 Validity: 29/01/2013 **Flare 3** <u>From 01/12/2011 to 09/01/2012</u> Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 10-07/741 Calibration frequency: yearly Date of last calibration: 10/01/2011 Validity: 09/01/2012 <u>From 10/01/2012 to 29/01/2012</u> Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 10-07/741 Calibration frequency: yearly Date of last calibration: Not performed for this period <u>From 30/01/2012 to 31/05/2012</u> Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C

	Serial Number: 05-06/0619 Calibration frequency: yearly Date of last calibration: 30/01/2012 Validity: 29/01/2013 **Flare 4** From 01/12/2011 to 09/01/2012 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5208 Calibration frequency: yearly Date of last calibration: 10/01/2011 Validity: 09/01/2012 From 10/01/2012 to 29/01/2012 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5208 Calibration frequency: yearly Date of last calibration: Not performed for this period From 30/01/2012 to 31/05/2012 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5208 Calibration frequency: yearly Date of last calibration: 30/01/2012 Validity: 29/01/2013 **Flare 5** From 01/12/2011 to 09/01/2011 Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5209 Calibration frequency: yearly Date of last calibration: 10/01/2011 Validity: 09/01/2012 From 10/01/2012 to 29/01/2012 Manufacturer: ELSI

	Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5209 Calibration frequency: yearly Date of last calibration: Not performed for this period <u>From 30/01/2012 to 31/05/2012</u> Manufacturer: ELSI Model: Type S Range: 0-1600°C Accuracy class: Accuracy class: [2.704 + (0.0025 x measured temperature)] °C, if measured temperature is equal or higher than 600°C Serial Number: 11-09/5209 Calibration frequency: yearly Date of last calibration: 30/01/2012 Validity: 29/01/2013
Measuring/Reading/ Recording frequency	Continuous reading and recorded every 2 minutes
Calculation method (if applicable)	-
QA/QC procedures	Thermocouples will be calibrated yearly
Purpose of data	The flare temperature does not directly enter into the baseline emission, project emission or leakage emission calculation. However a compliance check against the minimum flare temperature as per the manufacturer has been carried out. All hours in which all 5 flares are operating simultaneously below 867°C, which is referred to 850°C from the manufacturer specification as the lowest operation temperature plus 17°C, which is the maximum error identified in the flares temperature meters calibration, are excluded from the ER calculation.
Additional comment	-

Data/Parameter	**Flare working hours**
Unit	Hours
Description	Flare working hours
Measured/Calculated /Default	Measured
Source of data	PLC records
Value(s) of monitored parameter	Variable but available in a separate spreadsheet
Monitoring equipment	N/A as working hours are measured by the supervisory system and thus calibration is not applicable
Measuring/Reading/ Recording frequency	Continuous reading and recorded every 2 minutes
Calculation method (if applicable)	N/A
QA/QC procedures	N/A

Purpose of data	N/A since flare working hours do not enter into baseline, project and leakage emission calculations
Additional comment	-

D.3. Implementation of sampling plan

Not applicable.

SECTION E. Calculation of emission reductions or GHG removals by sinks

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

The calculation of baseline emission reductions was made using the formulas listed in the following table:

A	Total LFG collected	Nm^3
B	Methane content on LFG	$\%_{methane}$
C = $B \times A$	Methane collected	Nm^3
D =	Flare Efficiency	%
E = C x D	Total methane destroyed	Nm^3
F =	Flow-meter Error	%
G =	Flow-meter Uncertainty	%
H =	Methane analyzer Error	%
I =	Methane analyzer Uncertainty	%
J =	Pressure transmitter Error	%
K =	Pressure transmitter Uncertainty	%
L =	Temperature sensor Error	%
M =	Temperature sensor Uncertainty	%
N = $\sqrt{(F+G)^2+(H+I)^2+(J+K)^2+(L+M)^2}$	Equivalent error of gas measuring equipment	%
O = E . (1-N/100)	Total methane destroyed corrected	Nm^3
P = O . 0.0007168	Total methane destroyed corrected	$t_{methane}$
Q = P . 21	Total CO_2e destroyed	tCO_2e
R =Q . 0.2	Total CO_2e destroyed in the baseline[4]	tCO_2e

All information used in this calculation was made available for the DOE in a separate spreadsheet.

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

According to AM0003 – version 03, no project emissions need to be addressed.

E.3. Calculation of leakage

S	Total electricity imported	MWh
T	Emission factor of the grid which EPLGP is connected	tCO_2e/MWh
U	Grid electricity meter error	%
V	Grid electricity meter uncertainty	%
W = $\sqrt{(U+V)^2}$	Equivalent error of Grid electricity measuring equipment	%
X = S . T . (1+W/100)	Emissions due to the import of electricity	tCO_2e
Y	Electricity produced by the diesel generators	MWh

[4] During the monitoring period, the Adjustment Factor adopted was 20% (according with AM0003 – version 3) as no obligatory requirement (law/regulation) on LFG destruction was identified in São Paulo State or in Brazil.

Z	Emission factor of the diesel electricity generation	tCO_2e/MWh
AA	Diesel electricity meter error	%
AB	Diesel electricity meter uncertainty	%
AC = $\sqrt{(AA+AB)^2}$	Equivalent error of diesel electricity measuring equipment	%
AD = Y . Z . (1+AC/100)	Emissions due to the production of electricity using diesel	tCO_2e

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

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
Total	279,392	0	198	279,392

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	559,236 tCO_2[5]	279,392 tCO_2

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

The CER volume claimed in this report is lower than the estimated in the revised PDD (after notification).

The CER volume claimed is 50% lower than the estimated in the PDD.

$$\frac{559{,}237tCO_2 - 279{,}392tCO_2}{559{,}237tCO_2} \times 100 = 50\%$$

[5] Calculated using the PDD estimation for 2011 (1,028,315) times the number of days in this monitoring period for this year (31 days) divided by the number of days in the year (365 days) plus estimation for 2012 (1,136,286) times the number of days in this monitoring period for this year (152 days) divided by the number of days in the year (366 days).