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

CONTENTS

MONITORING REPORT
version 00 of 25/08/2011

Novagerar Landfill Gas to Energy Project
Reference number: 0008
4th monitoring period (01/01/2010 - 30/06/2011)

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

The purpose of the Brazil NovaGerar Landfill Gas to Energy Project is to capture the landfill gas (LFG) generated at the NovaGerar sites (Marambaia and Adrianópolis) and to use it for power generation and/or flaring. The Project site is located in Nova Iguacu, State of Rio de Janeiro, Brazil.

LFG is being captured and flared at the Marambaia dump site, and at the Adrianópolis sanitary landfill. The Marambaia dumpsite opened in 1986 and closed in February 2003; about 700,000 tons of waste was disposed at the site The Adrianópolis landfill started operations in February 2003, and is currently disposing about 2,700 tons of solid waste per day. The Adrianópolis and Marambaia sites are adjacent to each other located beside a densely populated section of the municipality of Nova Iguaçu, Rio de Janeiro, with more than 800,000 inhabitants. The project consists of two phases:

1. Collection and flaring of LFG, reducing uncontrolled release of methane
2. Generation of electricity from LFG, reducing CO2 emissions associated to the use of grid electricity.

Currently the project has only implemented Phase I. The conception, specifications and design of Phase II was concluded, but the current amount of the captured biogas hinders its viability. The objective is to increase the biogas flow in the following years, expecting to install the power energy plant (Phase II) at the end of 2012.

The low flow and gas quality (Methane percentage) in Marambaia site indicated that operation is not economically viable and satisfactory. The LFG operation for capture gas and flaring in Marambaia site has been closed in December 21, 2010.

The total emission reductions achieved in this monitoring period **was 166.796 tCO2e.**

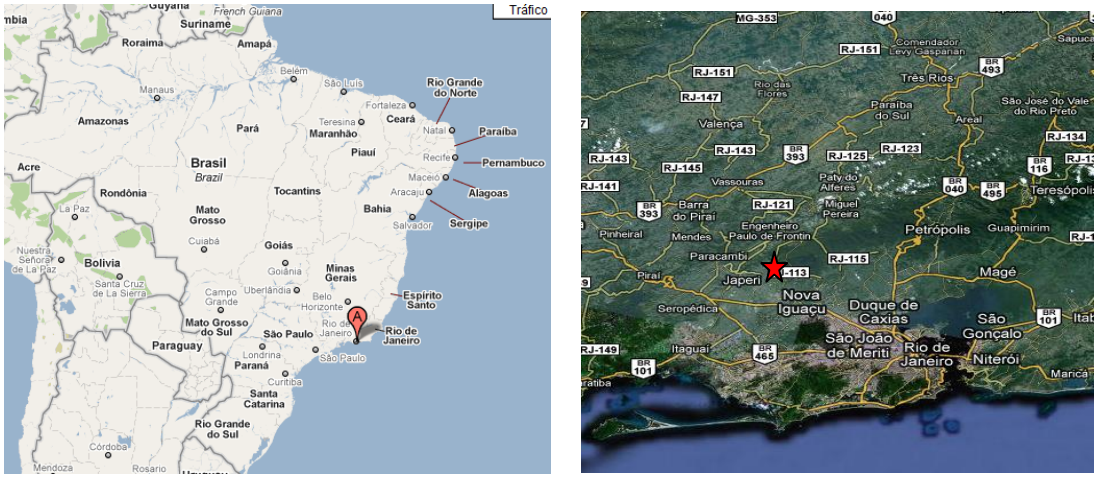
A.2. Project Participants

- NovaGerar EcoEnergia Ltda
- International Bank for Reconstruction and Development (IBRD) as Trustee of the Netherlands Clean Development Mechanism Facility (NCDMF)
- Netherlands' Ministry of Infrastructure and the Environment (IenM).

A.3. Location of the project activity:

The project site is located 10 km from the municipality of Nova Iguaçu in the state of Rio de Janeiro, Brazil. Latitude: -22.672, Longitude: -43.476

Figure 1: Location of the Project Activity



A.4. Technical description of the project

The sanitary landfill is divided into 4 cells for waste disposal, named Sub-Landfill 1, 2, 3 and 4 (Figure 2). Initially, the waste was only disposed in 2 cells (Sub-Landfill 1 and Sub-Landfill 3) and the gas extraction system was operating in the Sub-Landfill 1. In November of 2008, the Sub-Landfill 4 started to receive waste and the gas extraction system was extended to Sub - Landfill 3. Also, In June of 2010 the gas extraction system was extended to Sub - Landfill 4.

Figure 2: Disposition of the 4 cells in the landfill

The LFG collection and flaring system has a capacity for 3,000 m³/h, with the possibility to expand it up to 9,000 m³/h. First, the LFG is collected with the use of blowers, and then through a pipe system, it reaches a pre-treatment system, in which the moisture and impurities are removed. Finally the LFG is transported with the use of a blower, to the enclosed flare for its combustion.

Landfill gas collection System:

The equipment installed by the project activity for the landfill gas collection system includes:

- Vertical wells used to extract gas and leachate;
- Horizontal wells used to extract gas;

- Wellheads designed as a looping system in order to allow for partial or total loss of header function in one direction without losing gas system functionality; and
- Condensate extraction and storage systems designed at strategic low points throughout the gas system.
- Pipeline collection system to connect the LFG collected with the flare system

Figure 3: LFG pipeline collection system

Landfill gas flaring system:

The equipment that installed by the project activity for the landfill gas flaring system includes:

- One enclosed flare with burning controlled system;
- Blower system used to direct the landfill gas for flaring;
- Equipment to continuously monitor the landfill gas methane composition, gas flow, and flare temperature;
- Security restart system in case the system is turned off; and
- Flare efficiency continuous monitoring.

The enclosed flare selected is designed to operate continuously with automatic temperature control to safely destroy the biogas generated by solid waste. Also, the flaring system is controlled by a programmable logic controller (PLC) which will receive and transmit signals associated to the operating conditions of the flare.

The flare efficiency is automatically adjusted by the system by controlling the air inlet in the burner and registering the temperatures of burn. All data is sent every 4 minutes to the management program which refreshes automatically in the website program. All condensation generated inside the grid is collected and sent to the leachate treatment area

Figure 4: LFG pipeline flaring system

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

The baseline applied to this project activity is AM0003: Simplified Financial Analysis for Landfill Gas Capture Projects, version 01, of January 12, 2004.

A.6. Registration date of the project activity:

18 November 2004

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

The 1st crediting period is from 01st July 2004 to 30th June 2011. (3 crediting periods of 7 years)

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

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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

Two landfills sites are part of the projects activity, the LFG collection and flaring systems have been in operation since 15th March 2007 for CTR Nova Iguaçu (Adrianópolis) and 17th May 2007 for Marambaia.

As mentioned before, the project consists of two phases:

1. Collection and flaring of LFG, reducing uncontrolled release of methane
2. Generation of electricity from LFG, reducing CO2 emissions associated to the use of grid electricity.

Currently the project has only implemented Phase I. The conception, specifications and design of Phase II was concluded, but the current the low energy price and amount of the captured biogas hinders its viability. The objective is to increase the biogas flow in the following years, expecting to install the power energy plant (Phase II) at the end of 2012.

In the reference period (01/01/2010 - 30/06/2011), the field monitoring took place without any incidents or problems in the field operations of the biogas extraction.

The next figure demonstrates some downtimes for 2010 and 2011.

Shutdowns System	
Site	**Adrianópolis**
Date	17-March-2010 until 19-March-2010
Justification	- Interruption in energy supply by the local grid and utility (Ligth Energia SA)
Date	11-May-2010 until 18-May-2010
Justification	- Low methane flow and high oxygen level due the disruption, caused for the landfill dowser, in the gas pipeline.
Date	15-Jun-2011
Justification	- Low biogas extraction pressure in the main pipeline for a sludge blocked in a condensate trap.
Site	**Marambaia**
Date	01-July-2010 until 25-July-2010
Justification	- Interruption in energy supply by the local grid and utility (Ligth Energia SA) - low biogas flow and low Methane percentage and high oxygem level
Date	01-August-2010 until 10-August-2010
Justification	- Low biogas flow and Low Methane percentage and high oxygem level - Interruption in energy supply by the local grid and utility (Ligth Energia SA)
Date	01-September-2010 until 30-September-2010
Justification	Low biogas flow and Low Methane percentage and high oxygem level

In some times, the system was turned off for preventive maintenance and to replace a part, inspection or cleaning. Also in Marambaia Landfill, for extraordinary conditions, quality (low percentage of Methane) or the production (low Flow) of the biogas, system was turned off for security and safe work conditions.

The low flow and gas quality (Methane percentage) in Marambaia site indicated that operation is not economically viable and satisfactory. The LFG operation for capture gas and flaring in Marambaia site has been closed in December 21, 2010

Following the internal procedures, the information of downtimes is recorded in specific form.

B.2. Revision of the monitoring plan

N/A

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

N/A

B.4. Notification or request of approval of changes

N/A

SECTION C. Description of the monitoring system

C.1. Description of the Monitoring Equipment

The following equipments are used to monitor the operation of the project and to monitor the Emission Reduction. The control of the periodic time for each maintenance and inspection was defined in Novagerar procedures and monitored by the Automatic Indicator Hours (hour meter).

Flow Meter

The flow meter is used to measure the gas flow to the flare. The manufacturer of this flow meter is Thermal Instrument Company, and the periodic calibration is done every 18 months. Although the methodology AM0003 indicates that the flow should be monitored in m3 (cubic meter), for conservative calculation, the Project uses a the Thermal Mass 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 for hour).

Gas Analyzer

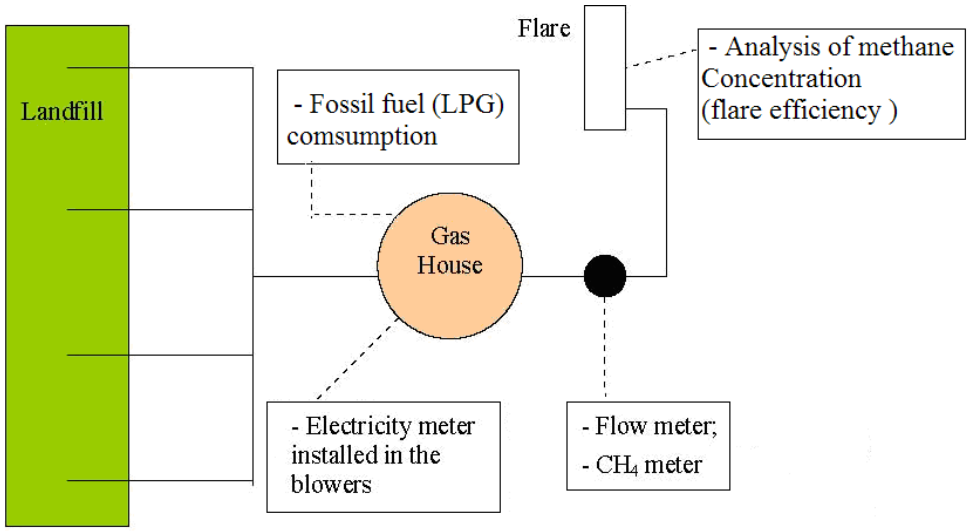
The gas analyzer is used to measure the gas composition. The manufacturer of the gas analyzer is CES Landtec Inc, and the periodic calibration is done every 6 months.

Flare

The manufacturer of the flare system is John Zinc Company, the flare system is monitored every 6 months to assess the flare efficiency. The flare temperature is continuously monitored by the automatic control system to operate in 1,700 °F.

The following figure indicates the location of the monitoring equipment

Figure 5 - Diagram of the project site



C.2. Involvement of Third Parties

The Brazil Novagerar Landfill Gas to Energy Project has two sub contracted parties involved:

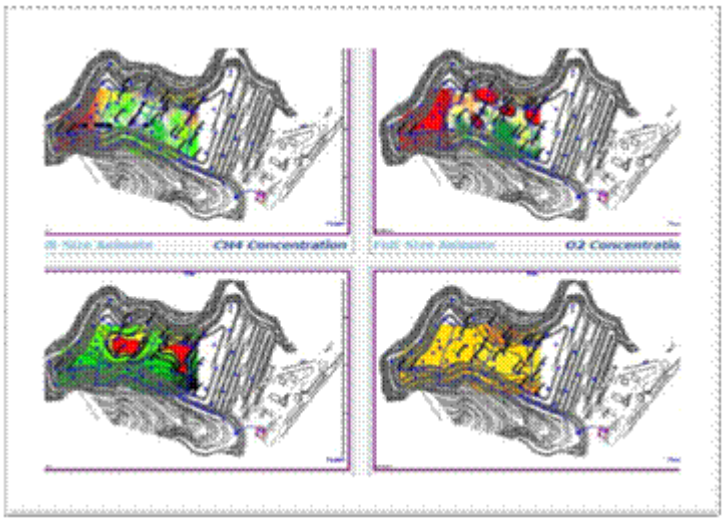
- **ECOSAMPLING AMBIENTAL LTDA**

As the analysis of methane concentration in the exhaust gas is done every 6 months, Novagerar hired *Ecosampling Ambiental Ltda*, a national and certified laboratory to develop the gas analysis and calculation the flare efficiency.

- **CES LANDTEC**

LANDTEC is a leading provider of monitoring systems for renewable energy and Green House Gas (GHG) reduction validation. All readings and files of the Novagerar project are being monitored by LANDTEC System Software

Figure 6 – Concentration gas maps for the CTR Nova Iguaçu Landfill



The software (ENVIROCOMP LFG Pro) analyses the maps of each important component to determine the status of the landfill gas production, if the collection system have leakages and if there is something to improve in the operation.

The ENVIROCOMP provide in graphics the historical and on-line information of what is happening on the system, in the graph shows the trends and variations on the operational parameter and readings of the percentage of Methane, Flow, Temperature and others.
Also, the software can show the readings of any variable of the process in real time, and has possibility of make the reports of the readings in any historical time. Therefore, when necessary, adjustments were made in lines, enabling an effective control system. In the reference period (1/1/2010-30/06/2011), the field monitoring took place without any incidents or problems in the field operations of the biogas extraction.

C.3. Documented Procedures and Management Plan

C.3.1. Procedures and Roles and responsibilities:

The following flow-charts represent the procedures and Roles and Responsibilities on the monitoring of each parameter:

I) METHANE CONCENTRATION:

Equipment:
Methane Analyzer
Location:
Field Analytical Unit
Manufacturer:
Landtec
Model:
FAU
Range:
0-100%
Reading Frequency:
Every 2 minutes
Responsibility:
PLC (continuously) and AEMS _ Automatic Extraction Monitoring System (CES Landtec)

Equipment:
Supervisory System
Reading Frequency:
Every 4 minutes
Responsibility
PLC (continuously) and AEMS _ Automatic Extraction Monitoring System (CES Landtec)

Equipment:
Supervisory System and Envirocomp (Landtec software)
Reading Frequency
Every 2 minutes
Responsibility
Envirocomp (the Software of CES Landtec, and Plant supervisor (monthly)

Methodology :
Calibration Frequency
Every hour for automatic field calibration and every 6 months, with a standard gas certified by Laboratories or Manufacturer

Methodology :
Every day the project engineer will check the calibration readings and the Novagerar procedures.

FLOW TO FLARE:

Equipment:
Thermal Mass Flow Meter

Location:
Entrance of the flare

Manufacturer:
Thermal Instrument Co.

Model:
62-9/9500

Range:
0- 3000 Nm3/h

Reading Frequency:
Every 2 minutes

Responsibility:
PLC (continuously) and AEMS _ Automatic Extraction Monitoring System (CES Landtec)

Equipment:
Supervisory System

Reading Frequency
Every 4 minutes

Responsibility
PLC (continuously) and AEMS _ Automatic Extraction Monitoring System (CES Landtec)

Equipment:
Supervisory System and Envirocomp (Landted software)

Reading Frequency
Every 2 minutes

Responsibility
Envirocomp (the Software of CES Landtec, and
Plant supervisor (monthly)

Methodology :
Calibration Frequency
Every 18 months, with a standard gas certified by Laboratories or Manufacturer

Methodology :
Every day the project engineer will check the readings and the Novagerar procedures.

II) FLARE EFFICIENCY:

Methodology :
The gas analysis and calculation the flare efficiency was make by *Ecosampling Ambiental Ltda*. For assure the quality in the Novagerar project, the *Ecosampling Ambiental Ltda* confirmed the calculations following the steps of calculation of the Annex 13 – UNFCC - "Tool to determine project emissions from flaring gases containing methane" in the EB 28 Meeting Report

Reading Frequency
Every 6 months

Responsibility
Specialized company on gas analysis

Methodology :
Reports and MS Excel spreadsheet

Reading Frequency
NA

Responsibility
Project manager

Methodology :
Reports and MS Excel spreadsheet

Reading Frequency
NA

Responsibility
Project manager

Methodology :
NA

Reading Frequency
NA

Responsibility
NA

Methodology :
The project manager is responsible for checking and developing the Monitoring Report of the flare efficiency.

C.3.2. Training program

All training was performed before project's implementation and certified at the initial verification. Also, if the procedures have any revision, the training is conducted again.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors	
(Copy this table for each data and parameter. To report multiple values, a table may be used)	
Data / Parameter:	**GWP_{CH4}**
Data unit:	tCO2e/tCH4
Description:	Global warming potential of CH4
Source of data used:	IPCC
Value(s) :	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	

Data / Parameter:	**D_{CH4}**
Data unit:	tCH4/m3CH4
Description:	CH4 Density
Source of data used:	AM0003, Version 1
Value(s) :	0.00067899
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	

Data / Parameter:	**AF**
Data unit:	%
Description:	Adjustment Factor
Source of data used:	AM0003, Version 1
Value(s) :	20
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline (only applicable to Marambaia site)
Additional comment:	

As described in the monitoring plan, the following parameters will be monitored during Phase II. Since during the current monitoring period (01/01/2010-30/06/2011) only Phase I has been implemented and no electricity generation using LFG occurred in the Project, these parameters were not monitored.

Data / Parameter:	EGy
Data unit:	MWh
Description:	Amount of electricity generated using LFG
Source of data to be used:	Project Developer
Value (s)	N/A
Indicate what the data are used for (Baseline/ Project/	Baseline

Leakage emission calculations)	
Additional comment:	Not monitored in the current monitoring period (01/01/2009-31/12/2009). As per the monitoring plan, it will be monitored during Phase II

Data / Parameter:	Heat Rate
Data unit:	GJ/MWh
Description:	Generator heat rate
Source of data to be used:	Project Developer
Value (s)	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Additional comment:	Not monitored in the current monitoring period (01/01/2009-31/12/2009). As per the monitoring plan, it will be monitored during Phase II

D.2. Data and parameters monitored

(Copy this table for each data and parameter. To report multiple values, a table may be used)

Data / Parameter:	$\mathbf{Q_{biogas}}$
Data unit:	Nm^3
Description:	Amount of biogas sent to flare, at normal Temperature and Pressure
Measured /Calculated /Default:	Measured
Source of data:	Project Developer
Value(s) of monitored parameter:	Refer to table 1 and 2 of section E.1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**For Adrianopolis Site:** are available two flow metes, only one flow-meter is used in operation, the other flow-meter is used for spare part (back-up), also is used when the other flow-meter is in calibration period. **For Marambaia Site:** is available only one flow-meter. In the calibration period the flare system was turned off and the Base line emission is zero (BE = 0)

Type: Thermal Mass Flow Meter			
Location	**Adrianopolis**		**Marambaia**
Accuracy class:	± 0,5% off full scale		± 0,5 % off full scale
Serial number:	2008186	2006354	2006355
Calibration frequency:	18 months after the start of operation		18 months after the start of operation
Calibration Date	18/June/2008	10/February/2006	11/December2008
Operation Period	10/September/2008 to 10/March/2010	15/March/2007 to 10/September/2008	15/December/2008 to 17/May/2010
Calibration Date	19/May/2010	11/October/2008	1/June/2010
Operation Period	10/September/2011 to 10/March/2013	10/March/2010 to 10/September/2011	09/June/2010 to 09/December/2011

Measuring/ Reading/ Recording frequency:	Data is measured continuously (average value in a time interval not greater than 10 minutes). Data aggregated monthly and yearly Data will be kept on the electronic spreadsheet for 2 years after the end of the crediting period
Calculation method (if applicable):	N/A
QA/QC procedures applied:	The record of operation and calibration of the instruments listed on the form (FORM.NIG.070) and specifics internal procedures.

Data / Parameter:	**Flare Efficiency**
Data unit:	%
Description:	Percentage of methane in the biogas
Measured /Calculated /Default:	Calculated
Source of data:	Project Developer
Value(s) of monitored parameter:	Refer to table 1 and 2 of section E.1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	For the monitoring period in 2010, was made two (semi-annual) analyses of flare efficiency. And the monitoring period in 2011, was made one analysis of the flare efficiency. These three analyses were developed by *Ecosampling Ambiental Ltda* in July/2010, December/2010 and June/2011. Type: Chromatograph Accuracy class: ± 0.5% of Full Scale % Serial number: X10004 Calibration frequency: Calibration every 30 minutes and indicated in report
Measuring/ Reading/ Recording frequency:	This parameter is monitored every 6 months or monthly if unstable according to the applied Methodology AM0003. Version 1. Data will be kept on the electronic spreadsheet for 2 years after the end of the crediting period
Calculation method (if applicable):	Calculated according to the "Tool to determine project emissions from the flaring gases containing methane" (Step 6) using data from methane content in the exhaust gas, methane content in the residual gas and recorded temperature (i.e., if the temperature is less than 760°C for any particular hour, then it shall be assumed that during that hour the flare efficiency is zero). The gas analysis and calculation is done by Laboratories.
QA/QC procedures applied:	The Project Participants or Laboratories provided the calculations, for the flare efficiency following the steps, of calculation of the Annex 13 – UNFCC - "Tool to determine project emissions from flaring gases containing methane" in the EB 28 Meeting Report

<table>
<tr><td>Data / Parameter:</td><td>Tf</td></tr>
<tr><td>Data unit:</td><td>ºC</td></tr>
<tr><td>Description:</td><td>Temperature of the Flare</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>Refer to table 1 and 2 of section E.1</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Baseline emissions. If Tf is below 760°C for any particular hour, then it shall be assumed that during that hour the flare efficiency is zero and therefore the baseline emissions are zero.</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>The Flare System installed in Adrianopolis and Marambaia Site have a high performance automatic system for control the flare temperature composed by three thermocouples, located in different length of the Flare. Also, is available other one (for each site) thermocouples for spare parts (back-up).
<table>
<tr><td colspan="9">Type: Thermocouple - Tipe K</td></tr>
<tr><td>Location</td><td colspan="4">Adrianopolis</td><td colspan="4">Marambaia</td></tr>
<tr><td>Accuracy class:</td><td colspan="4">± 2.2° C</td><td colspan="4">± 2.2° C</td></tr>
<tr><td>Serial number:</td><td>86440/1/1</td><td>86440/1/2</td><td>86440/1/3</td><td>86440/1/4</td><td>86440/1/5</td><td>86440/1/6</td><td>86440/1/7</td><td>86440/1/8</td></tr>
<tr><td>Calibration frequency:</td><td colspan="4">5 years</td><td colspan="4">5 years</td></tr>
<tr><td>Date of last calibration:</td><td>28-Feb-07</td><td>28-Feb-07</td><td>28-Feb-07</td><td>28-Feb-07</td><td>28-Feb-07</td><td>28-Feb-07</td><td>28-Feb-07</td><td>28-Feb-07</td></tr>
<tr><td>Validity:</td><td colspan="4">28-Feb-2012</td><td colspan="4">28-Feb-2012</td></tr>
</table></td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Data is measured continuously (average value in a time interval not greater than 10 minutes).
Data aggregated monthly and yearly
Data will be kept on the electronic spreadsheet for 2 years after the end of the crediting period</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
<tr><td>QA/QC procedures applied:</td><td>The calibration period is set according to manufacture specifications and the operating history. (Described in the maintenance procedure)</td></tr>
</table>

Data / Parameter:	**% CH4**
Data unit:	m^3 CH_4/ m^3 LFG
Description:	Percentage of methane in the biogas
Measured /Calculated /Default:	Measured

Source of data:	Project Developer
Value(s) of monitored parameter:	Refer to table 1 and 2 of section E.1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**For Adrianopolis Site:** are available two gas analyser (serial number 8636 and 8800), but only one gas analyser is used in operation (continuous monitoring) , the other Gas analyser is used for spare part (back-up), also it is used when the other gas analyser is in calibration period. **For Marambaia Site:** are available two gas analyser (serial number 8183 and 8801), but only one gas analyser is used in operation (continuous monitoring), the other Gas analyser is used for spare part (back-up), also it is used when the other gas analyser is in calibration period.
Measuring/ Reading/ Recording frequency:	Data is measured continuously (average value in a time interval not greater than 10 minutes) Data will be aggregated monthly and yearly. Data will be kept on the electronic spreadsheet for 2 years after the end of the crediting period
Calculation method (if applicable):	N/A
QA/QC procedures applied:	The record of operation and calibration of the instruments listed on the form (FORM.NIG.072) and an specifics procedures.

Type: FAU (Gas Analyzer)				
Location	**Adrianopolis**		**Marambaia**	
Accuracy class:	± 1%		± 1%	
Serial number:	8636	8800	8183	8801
Calibration frequency:	6 months after the start of operation		6 months after the start of operation	
Calibration Data	11/7/2008	5/30/2008	5/30/2008	1/13/2009
Operation Period	03/03/2009 to 26/08/2009	3/9/2008 to 3/3/2009	7/11/2008 to 6/5/2009	6/5/2009 to 6/11/2009
Calibration Date	9/1/2009	4/1/2009	6/16/2009	4/29/2010
Operation Period	26/2/2010 to 26/8/2010	26/8/2009 to 26/02/2010	6/11/2009 to 6/5/2010	06/05/2010 to 6/8/2010
Calibration Date	9/22/2010	3/19/2010	7/22/2010	8/25/2010
Operation Period	26/2/2011 to 16/05/2011	26/08/2010 to 26/02/2011	06/8/2010 to 22/12/2010	NA
Calibration Date	7/12/2011	3/14/2011	NA	NA
Operation Period	16/11/2011 to 16/05/2012	16/05/2011 to 16/11/2011	NA	NA

Data / Parameter:	**PE_{LPG}**
Data unit:	tCO2e
Description:	Project emissions from fossil fuel (LPG) combustion
Measured /Calculated /Default:	Calculated
Source of data:	2006 IPCC Guidelines for national Greenhouse Gas Inventories
Value(s) of monitored parameter:	Refer to table 8 and 9 of section E.2.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Data will be kept on the electronic spreadsheet for 2 years after the end of the crediting period
Calculation method (if applicable):	Calculated by multiplying number of ignitions used to ignite the flare system, times the emissions per ignition.
QA/QC procedures applied:	

Data / Parameter:	**PE_{EC}**
Data unit:	tCO_2
Description:	Project emissions from electricity consumption
Measured /Calculated /Default:	Calculated
Source of data:	Publication by Brazilian Ministry of Science and Technology of values for OMgrid and BMgrid
Value(s) of monitored parameter:	Refer to table 4 and 5 of section E.2.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Data is measured continuously (average value in a time interval not greater than 10 minutes) Data will be aggregated monthly and yearly.
Calculation method (if applicable):	This parameter is calculated using the "Tool to calculate the emission factor for an electricity system" Version 2, involving the calculation of the $EF_{grid,CM,y}$, which in its turn is calculated using the OM_{grid} and BM_{grid} published by Brazilian Ministry of Science and Technology
QA/QC procedures applied:	

Data / Parameter:	**EC**
Data unit:	MWh
Description:	Electrical energy consumed
Measured /Calculated /Default:	Measured
Source of data:	Project Developer (measured by the Project Developer in the Adrianopolis site, and by the Local Supplier Energy (Light Energia SA) in the Marambaia Site)
Value(s) of monitored parameter:	Refer to table 4 and 5 of section E.2.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions
Monitoring equipment (type,	

accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Electrical Meter Accuracy class: ± 2% Serial number: 5006993 Calibration frequency: 5 years Date of last calibration: 05-Feb-2007 Validity: 05-Feb-2012
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	N/A
QA/QC procedures applied:	The calibration period is set according to the operating history, and this endpoint indicated by the supplier.(Described in the maintenance procedure)

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The Baseline emissions are calculated in the following way:

[Q_{biogas}] - Amount of biogas sent to flare (Nm3 of LFG)

⇩

[%CH4] - Multiplied by the percentage of methane in the biogas (%)

⇩

Amount of methane combusted in flare (Nm3 CH4)

⇩

[Flare Efficiency] - Multiplied by flare efficiency (%)

⇩

Net amount of methane combusted in flare (Nm3 CH4)

⇩

[D_{CH4}] - Multiplied by methane density (tonnes of CH4)

⇩

[GWP] - Multiplied by Global Warming Potential of methane (tonnes of CO2 e)

⇩

[BE] – Baseline emissions (tCO2e)

Other way to determine the emission reductions calculations can be demonstrated in the expression:

$$\mathbf{BE = Q_{biogas} * \%CH4* Flare\ Efficiency * D_{CH4} * GWP\ (tCO2e)}$$

NOTE: For Marambaia site this result is further discounted by a factor of 20%
(Adjustment Factor - AF = 0.2)

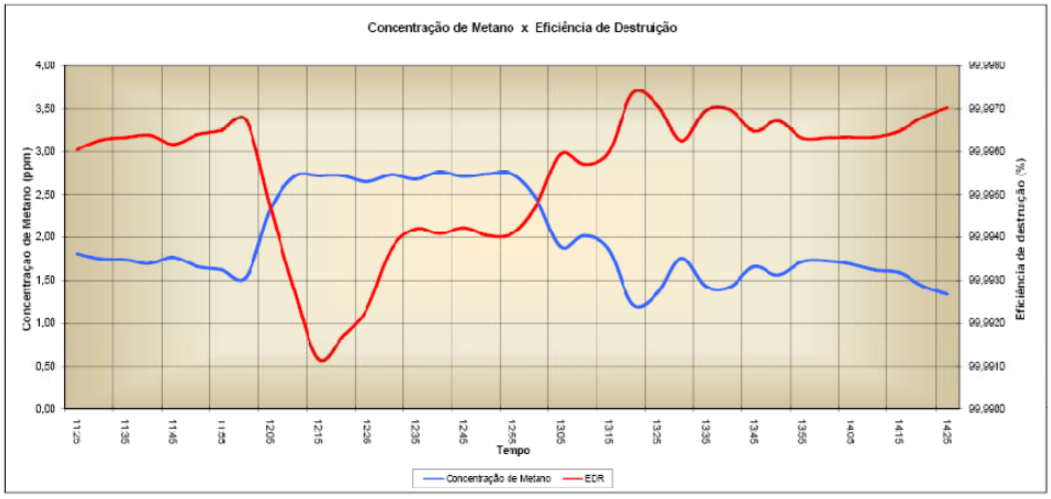
For conservative calculation, if the flare temperature is lower that 1,400 °F, the value of the Baseline emissions will be zero.

Flare Efficiency

The flare efficiency from 01st January, 2010 to 30th June, 2010, was calculated using *Ecosampling Ambiental Ltda* analysis made on June, 2010. The flare efficiency from 1st July 2010 to 31st December 2010 was calculated using *Ecosampling Ambiental Ltda* analysis made on December 2010. The flare efficiency from 01st January, 2011 to 30th June, 2011, was calculated using *Ecosampling Ambiental Ltda* analysis made on May, 2011.

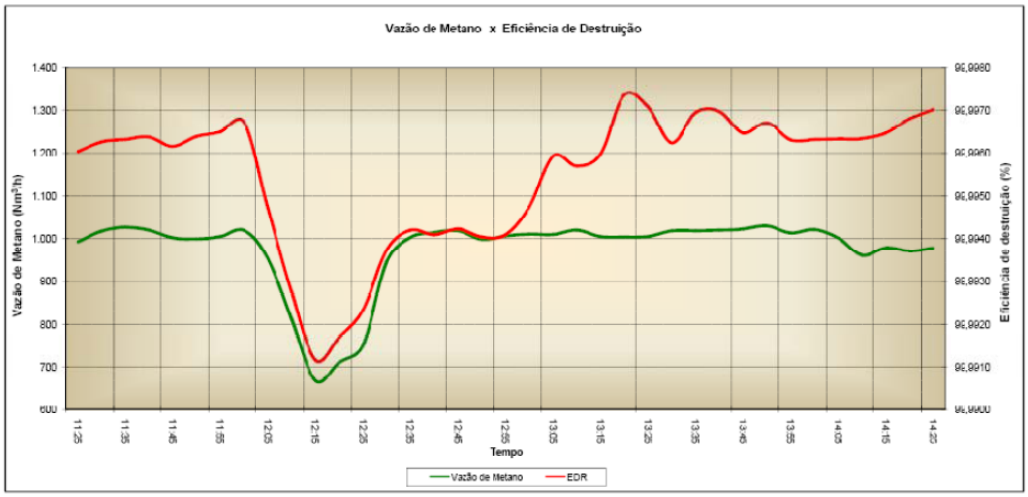
All analyses indicated that the flare efficiency is higher than 99,99%.
The following figure (Figure 9.1) shows the flare efficiency (Red line) and the concentration of methane (Blue line) in exhaust gas, measured in the normal conditions of the operation in the Adrianopolis Site. This analysis was made in May of 2011.

Figure 9.1: Flare efficiency and concentration of methane in exhaust gas – Adrianopolis Site. May 2011 analysis



The Figure 9.2 shows the flare efficiency (red line) and the methane flow to flare (Green line), measured in the normal conditions of the operation in the Adrianopolis Site. This analysis was made in May of 2011.

Figure 9.2: Flare efficiency and methane flow to flare – Adrianopolis Site. May 2011 analysis



The following tables show the collected data, from the period 1st January, 2010 to 30st June, 2011 in the Adrianopolis and Marambaia site.

Table 1: Data Monitored for Adrianopolis Site in 4th monitoring period (01/01/2010 - 30/06/2011)

	Calculation ERs - Adrianopolis Site 4rd monitoring period (01/01/2010 - 30/06/2011)					FORM.NIG.112 Revision: 01 Data:29/08/2011 Page: 1 de 1	
Parameter:	BE (tCO2)	Q_{biogas} (Nm3)	CH4 (%)	Flare Effciency (%)	D_{CH4} (tCH4/m3CH4)	GWPCH4	Tf (ºC)
Month / Year	Baseline Emissions	Amount of biogas sent to flare, at normal Temperature and Pressure	Average of the Percentage of methane in the biogas	Efficiency of the destruction of Methane	CH4 Density	Global warming potential of CH4	Average of the Flare Temperature
January / 2010	5,178	993,365	36.92	99.99%	0.00067899	21	896.78
February / 2010	4,538	873,933	36.60	99.99%	0.00067899	21	901.09
March / 2010	6,431	1,076,507	42.32	99.99%	0.00067899	21	908.32
April / 2010	7,547	1,240,645	42.77	99.99%	0.00067899	21	874.67
May / 2010	7,450	1,257,744	41.49	99.99%	0.00067899	21	905.35
June / 2010	9,634	1,585,005	42.30	99.99%	0.00067899	21	917.75
July / 2010	10,203	1,671,086	42.79	99.99%	0.00067899	21	924.32
August / 2010	10,099	1,707,964	41.45	99.99%	0.00067899	21	925.05
September / 2010	9,630	1,605,860	41.99	99.99%	0.00067899	21	913.16
October / 2010	9,344	1,555,361	42.06	99.99%	0.00067899	21	929.99
November / 2010	9,220	1,500,365	43.11	99.99%	0.00067899	21	914.11
December / 2010	11,907	1,915,246	43.52	99.99%	0.00067899	21	919.08
January / 2011	9,460	1,594,923	41.56	99.99%	0.00067899	21	918.47
February / 2011	8,978	1,314,119	47.62	99.99%	0.00067899	21	913.69
March / 2011	10,871	1,645,111	46.29	99.99%	0.00067899	21	924.61
April / 2011	10,055	1,715,164	41.21	99.99%	0.00067899	21	918.90
May / 2011	12,354	1,938,976	44.64	99.99%	0.00067899	21	926.15
June / 2011	13,234	1,860,045	49.88	99.99%	0.00067899	21	907.70

Table 2: Data Monitored for Marambaia Site in in 4th monitoring period (01/01/2010 - 30/06/2011)

	Calculation ERs - Marambaia Site 4rd monitoring period (01/01/2010 - 30/06/2011)					FORM.NIG.112 Revision: 01 Date:29/08/2011 Page: 1 de 1	
Parameter:	BE (tCO2)	Q_{biogas} (Nm3)	CH4 (%)	Flare Effciency (%)	D_{CH4} (tCH4/m3CH4)	GWPCH4	Tf (ºC)
Month / Year	Baseline Emissions	Amount of biogas sent to flare, at normal Temperature and Pressure	Average of the Percentage of methane in the biogas	Efficiency of the destruction of Methane	CH4 Density	Global warming potential of CH4	Average of the Flare Temperature
January / 2010	105	30,449.76	12.92	99.99%	0.00067899	21	832.77
February / 2010	19	6,070.89	18.18	99.99%	0.00067899	21	782.90
March / 2010	78	20,945.25	22.93	99.99%	0.00067899	21	790.91
April / 2010	19	4,717.70	21.60	99.99%	0.00067899	21	781.43
May / 2010	6	1,452.42	20.04	99.99%	0.00067899	21	791.49
June / 2010	118	34,084.76	22.63	99.99%	0.00067899	21	822.17
July / 2010	124	40,985.68	19.22	99.99%	0.00067899	21	794.07
August / 2010	178	63,602.82	18.80	99.99%	0.00067899	21	790.52
September / 2010	65	20,471.38	20.33	99.99%	0.00067899	21	794.60
October / 2010	19	40,985.68	19.92	99.99%	0.00067899	21	790.93
November / 2010	15	4,315.30	19.19	99.99%	0.00067899	21	802.64
December / 2010	136	37,579.48	23.62	99.99%	0.00067899	21	841.88
January / 2011	0	0.00	0.00	0.00	0.00	0.00	0.00
February / 2011	0	0.00	0.00	0.00	0.00	0.00	0.00
March / 2011	0	0.00	0.00	0.00	0.00	0.00	0.00
April / 2011	0	0.00	0.00	0.00	0.00	0.00	0.00
May / 2011	0	0.00	0.00	0.00	0.00	0.00	0.00
June / 2011	0	0.00	0.00	0.00	0.00	0.00	0.00

Table 3: Summary of the project variables

		Summary of the Project Variables 4rd monitoring period (01/01/2010 - 30/06/2011)				
Parameter:	Q_{biogas} (Nm3)	%CH4 (%)	Flare Effciency (%)	D_{CH4} (tCH4/m3CH4)	GWPCH4	BE = Qbiogas * %CH4* Flare Efficiency * DCH4 * GWP)
Local	**Amount of biogas sent to flare, at normal Temperature and Pressure**	**Average of the Percentage of methane in the biogas**	**Efficiency of the destruction of Methane**	**CH4 Density**	**Global warming potential of CH4**	**Total Gross ERs (tCO2e)**
Marambaia Site	**305,661**	**19.95%**	**99.99%**	**0.00067899**	**21**	**1,018**
Adrianópolis Site	**27,051,422**	**42.69%**	**99.99%**	**0.00067899**	**21**	**166,131**

E.2. Project emissions calculation

The Project emissions are calculated using the following formula:

$$\mathbf{PE = PE_{EC} + PE_{LPG}}$$

Where:
PE_{EC} : Project emissions from electricity consumption
PE_{LPG}: Project emissions from fuel (LPG) consumption

E.2.1. Project emissions from electricity consumption (PE_{EC})

The Project emissions from electricity consumption are calculated using the following formula:

$$\mathbf{PE_{EC} = EF_{grid,CM} * EC \ \ (tCO2e)}$$

The emission factor of the grid ($EF_{grid,CM}$) is calculated following an official calculation of the OM and BM developed by the Brazilian DNA (Inter-ministerial Commission on Climate Change), using the following formula:

$$\mathbf{EF_{grid,\ CM} = (0.5*OM) + (0.5*BM)\ (tCO2/MWh)}$$

The following tables show the values for Adrianopolis and Marambaia site

Table 4: Project Emissions from Electricity Consumption in Adrianópolis Site

	Electrical Energy Emission - Adrianopolis 4rd monitoring period (01/01/2010 - 30/06/2011)				FORM.NIG.147 Revision: 01 Date:29/08/2011 Page: 1 de 1
Parameter:	**EC (MWh)**	**OM (tCO2/MWh)**	**BM (tCO2/MWh)**	**$EF_{grid, CM}$ (tCO2/MWh)**	**PE_{EC} (tCO2e)**
Reference Month / Year	**MWh used in the project**	**Operating Margin**	**Build Margin**	**Emission factor of the grid**	**Project emissions from electricity consumption**
January / 2010	**7.13**	**0.2111**	**0.0794**	**0.1453**	**1.04**
February / 2010	**5.52**	**0.2798**	**0.0794**	**0.1796**	**0.99**
March / 2010	**5.42**	**0.2428**	**0.0794**	**0.1611**	**0.87**
April / 2010	**6.84**	**0.2379**	**0.0794**	**0.1587**	**1.08**
May / 2010	**4.43**	**0.3405**	**0.0794**	**0.2100**	**0.93**
June / 2010	**4.22**	**0.4809**	**0.0794**	**0.2802**	**1.18**
July / 2010	**6.85**	**0.4347**	**0.0794**	**0.2571**	**1.76**
August / 2010	**5.59**	**0.6848**	**0.0794**	**0.3821**	**2.14**
September / 2010	**5.84**	**0.7306**	**0.0794**	**0.4050**	**2.37**
October / 2010	**5.59**	**0.7320**	**0.0794**	**0.4057**	**2.27**
November / 2010	**4.83**	**0.7341**	**0.0794**	**0.4068**	**1.97**
December / 2010	**11.53**	**0.6348**	**0.0794**	**0.3571**	**4.12**
January / 2011	**6.66**	**0.4787**	**0.0794**	**0.2790**	**1.86**
February / 2011	**9.72**	**0.4787**	**0.0794**	**0.2790**	**2.71**
March / 2011	**9.89**	**0.4787**	**0.0794**	**0.2790**	**2.76**
April / 2011	**12.61**	**0.4787**	**0.0794**	**0.2790**	**3.52**
May / 2011	**11.58**	**0.4787**	**0.0794**	**0.2790**	**3.23**
June / 2011	**12.33**	**0.4787**	**0.0794**	**0.2790**	**3.44**

Table 5: Project Emissions from Electricity Consumption in Marambaia Site

	Electrical Energy Emission - Marambaia 4rd monitoring period (01/01/2010 - 30/06/2011)				FORM.NIG.147 Revision: 01 Date:28/03/2011 Page: 1 de 1
Parameter:	**EC (MW.h)**	**OM (tCO2e/MWh)**	**BM (tCO2e/MWh)**	**$EF_{grid, CM}$ (tCO2e/MWh)**	**PE_{EC} (tCO2e)**
Reference Month / Year	**MWh used in the project**	**Operating Margin**	**Build Margin**	**Emission factor of the grid**	**Project emissions from electricity consumption**
January / 2010	**0.31**	**0.2111**	**0.0794**	**0.1453**	**0.04**
February / 2010	**0.65**	**0.2798**	**0.0794**	**0.1796**	**0.12**
March / 2010	**0.83**	**0.2428**	**0.0794**	**0.1611**	**0.13**
April / 2010	**0.74**	**0.2379**	**0.0794**	**0.1587**	**0.12**
May / 2010	**0.75**	**0.3405**	**0.0794**	**0.2100**	**0.16**
June / 2010	**0.40**	**0.4809**	**0.0794**	**0.2802**	**0.11**
July / 2010	**0.79**	**0.4347**	**0.0794**	**0.2571**	**0.20**
August / 2010	**0.86**	**0.6848**	**0.0794**	**0.3821**	**0.33**
September / 2010	**0.86**	**0.7306**	**0.0794**	**0.4050**	**0.35**
October / 2010	**0.79**	**0.7320**	**0.0794**	**0.4057**	**0.32**
November / 2010	**0.59**	**0.7341**	**0.0794**	**0.4068**	**0.24**
December / 2010	**0.49**	**0.6348**	**0.0794**	**0.3571**	**0.17**
January / 2011	0.00	0.00	0.00	0.00	0.00
February / 2011	0.00	0.00	0.00	0.00	0.00
March / 2011	0.00	0.00	0.00	0.00	0.00
April / 2011	0.00	0.00	0.00	0.00	0.00
May / 2011	0.00	0.00	0.00	0.00	0.00
June / 2011	0.00	0.00	0.00	0.00	0.00

E.2.2. Project emissions from fuel consumption (PE_{LPG})

The Brazil Novagerar Landfill Gas Energy Project uses LPG (Liquefied Petroleum Gas) for the ignition of the flare system. These emissions are being monitored according to the following process audited since the First Verification:

The calculation of the amount of LPG consumed in the flare system follows the instructions extracted from the 2006 IPCC Guidelines for national Greenhouse Gas Inventories: Reference Manual - Energy to determine the LPG consumed and hence the CO2e emissions for only one ignition in the flare system. Then, the number of ignitions is monitored by the PLC, which is programmed to count each time that an ignition occurs, storing the value in the database (Envirocomp) in the Landtec server. Finally, the Project emissions from fuel consumption are calculated by multiplying the tCO2e per ignition times the number of ignitions.

$$\mathbf{PE_{LPG} = LPG_{Emission} * N_{LPG\text{-}Ignition}}$$

The calculation of the project emissions from the LPG consumption for one ignition uses the following formula:

$$\mathbf{LPG_{Emission}} = F_{ox} * EF_{LPG} * F_{tCO2/tC} * F_{TJ/BTU} * \Phi * \xi \ \mathbf{(tCO2e)}$$

Where:

Table 6: Parameters used in the calculation of the LPG emissions per ignition of the flare

LPG EMISSION FOR ONLY ONE THE IGNITION							
SYMBOL	$LPG_{Emission}$ =	F_{ox}	EF_{LPG}	$F_{tCO2/tC}$	$F_{TJ/BTU}$	Φ	ξ
VARIABLES NAME	LPG emission for one ignition (tCO2e)	Fraction Carbon Oxidized (%)	Carbon Emission Factor (tC/TJ)	Conversion Factor (tCO2/tC)	Units Conversion TJ/BTU	Ignition Heat (BTU/hr)	Ignition Time (hr)
VALUE	9.92E-11 =	0.995	17.2	3.6667	9.484E-16	50,000	0.033333
SOURCE	N/A	Fraction Carbon Oxidised- 2006 IPCC Guidelines for national GHG Inventor	Carbon Emission Factor - 2006 IPCC Guidelines for national GHG Inventor:	Periodic Table: [44/12= 3.6667] Atomic Mass of the "CO2" (44) divided by the Atomic Mass of the "C" (12)	Handbook of Engineering Formulas - Heat and Mass Transfer, GIECK, 2001	Fixed default Variable of the Project (John Zinc)	Fixed default Variable of the Project (John Zinc)

The calculation of volume from the LPG consumption for one ignition uses the following formula:

$$\mathbf{LPG_{Volume} = (F_{TJ/BTU} * 1{,}000 * \Phi * \xi) / (NCV * LPG_{Density})\ (m3)}$$

Where:

Table 7: Parameters used in the calculation of the LPG emissions per ignition of the flare

LPG VOLUME FOR ONLY ONE THE IGNITION						
SYMBOL	LPG_{volume} =	($F_{TJ/BTU}$ * 1,000 *	Φ *	ξ) /	(NCV *	$LPG_{Density}$)
VARIABLES NAME	LPG Volume for only one the ignition (tCO2e)	Units Conversion TJ/BTU	Ignition Heat (BTU/hr)	Ignition Time (hr)	Net Calorific Value (TJ/tonnes)	LPG Density (kg/m3)
VALUE	1.59E-08 =	9.484E-16	50,000	0.033333	0.04731	2.1
SOURCE	N/A	Handbook of Engineering Formulas - Heat and Mass Transfer, GIECK, 2001	Ignition Heat - Fixed default Variable of the Project (John Zinc)	Ignition Time - Fixed default Variable of the Project (John Zinc)	2006 IPCC Guidelines for national Greenhouse Gas Inventor:	LPG Density - Ultragaz do Brasil (Novagerar LPG Supplier)

Table 8: Project Emissions from LPG consumption in Adrianópolis site

	Emission Calculation From LPG - Adrianopolis 4rd monitoring period (01/01/2010 - 30/06/2011)				FORM.NIG.146 Revision: 01 Date: 29/08/2011 Página: 1 de 1
Parameter:	$N_{LPG\text{-}Ignition}$	$LPG_{Emission}$	PE_{LPG} (tCO2e)	Volume of the LPG for only one Ignition (m3)	LPG Volume (m3)
Reference Month / Year	Number of the Ignitions	Total emission for only one Ignition (tCO2e)	LPG Emission (tCO2e)		
January / 2010	5	9.92E-11	**4.96E-10**	1.59E-08	**7.95E-08**
February / 2010	6	9.92E-11	**5.95E-10**	1.59E-08	**9.55E-08**
March / 2010	11	9.92E-11	**1.09E-09**	1.59E-08	**1.75E-07**
April / 2010	10	9.92E-11	**9.92E-10**	1.59E-08	**1.59E-07**
May / 2010	20	9.92E-11	**1.98E-09**	1.59E-08	**3.18E-07**
June / 2010	5	9.92E-11	**4.96E-10**	1.59E-08	**7.95E-08**
July / 2010	4	9.92E-11	**3.97E-10**	1.59E-08	**6.36E-08**
August / 2010	1	9.92E-11	**9.92E-11**	1.59E-08	**1.59E-08**
September / 2010	3	9.92E-11	**2.98E-10**	1.59E-08	**4.77E-08**
October / 2010	2	9.92E-11	**1.98E-10**	1.59E-08	**3.18E-08**
November / 2010	3	9.92E-11	**2.98E-10**	1.59E-08	**4.77E-08**
December / 2010	4	9.92E-11	**3.97E-10**	1.59E-08	**6.36E-08**
January / 2011	6	9.92E-11	**5.95E-10**	1.59E-08	**9.55E-08**
February / 2011	8	9.92E-11	**7.94E-10**	1.59E-08	**1.27E-07**
March / 2011	0	9.92E-11	**0.00E+00**	1.59E-08	**0.00E+00**
April / 2011	5	9.92E-11	**4.96E-10**	1.59E-08	**7.95E-08**
May / 2011	0	9.92E-11	**0.00E+00**	1.59E-08	**0.00E+00**
June / 2011	7	9.92E-11	**6.94E-10**	1.59E-08	**1.11E-07**

Table 9: Project Emissions from LPG consumption in Marambaia site

	Emission Calculation From LPG - Marambaia 4rd monitoring period (01/01/2010 - 30/06/2011)				FORM.NIG.146 Revision: 01 Date: 29/08/2011 Page: 1 de 1
Parameter:	$N_{LPG\text{-}Ignition}$	$LPG_{Emission}$	PE_{LPG} (tCO2e)	Volume of the LPG for only one Ignition (m3)	LPG Volume (m3)
Reference Month / Year	Number of Ignitions	Total emission for only one Ignition (tCO2e)	LPG Emission (tCO2e)		
January / 2010	4	9.92E-11	**3.97E-10**	1.59E-08	**6.36E-08**
February / 2010	7	9.92E-11	**6.94E-10**	1.59E-08	**1.11E-07**
March / 2010	7	9.92E-11	**6.94E-10**	1.59E-08	**1.11E-07**
April / 2010	6	9.92E-11	**5.95E-10**	1.59E-08	**9.55E-08**
May / 2010	6	9.92E-11	**5.95E-10**	1.59E-08	**9.55E-08**
June / 2010	23	9.92E-11	**2.28E-09**	1.59E-08	**3.66E-07**
July / 2010	7	9.92E-11	**6.94E-10**	1.59E-08	**1.11E-07**
August / 2010	8	9.92E-11	**7.94E-10**	1.59E-08	**1.27E-07**
September / 2010	4	9.92E-11	**3.97E-10**	1.59E-08	**6.36E-08**
October / 2010	6	9.92E-11	**5.95E-10**	1.59E-08	**9.55E-08**
November / 2010	11	9.92E-11	**1.09E-09**	1.59E-08	**1.75E-07**
December / 2010	17	9.92E-11	**1.69E-09**	1.59E-08	**2.70E-07**
January / 2011	0.00	0.00	0.00	0.00	0.00
February / 2011	0.00	0.00	0.00	0.00	0.00
March / 2011	0.00	0.00	0.00	0.00	0.00
April / 2011	0.00	0.00	0.00	0.00	0.00
May / 2011	0.00	0.00	0.00	0.00	0.00
June / 2011	0.00	0.00	0.00	0.00	0.00

E.3. Leakage calculation

N/A.

E.4. Emission reductions calculation / table

The Emission reductions for both Adrianópolis and Marambaia site are calculated using the following formula:

ER = BE – PE

Where:
BE: Baseline emissions
PE: Project emissions
The tables below show the values for emission reduction in Adrianopolis and Marambaia sites.

Table 10: Values for emission reduction in Adrianopolis site in the 4rt monitoring period (01/01/2010 - 30/06/2011)

	Calculation ERs - Adrianópolis 4rd monitoring period (01/01/2010 - 30/06/2011)				FORM.NIG.079 Revision: 01 Date:29/08/2011 Page: 1 de 1
Reference Month / Year	**BE: Baseline emissions (tCO2e)**	**Projetc Emissions (tCO2e) PE = PE_{EC} + PE_{LPG}**		**Total Emission Reduction ERs (tCO2e)**	**ERs Accumuladed (tCO2e)**
		PE_{EC} (tCO_2)	**PE_{LPG} (tCO2e)**		
January / 2010	5,178	1.04	4.96E-10	**5,177**	5,177
February / 2010	4,538	0.99	5.95E-10	**4,537**	9,714
March / 2010	6,431	0.87	1.09E-09	**6,430**	16,143
April / 2010	7,547	1.08	9.92E-10	**7,546**	23,689
May / 2010	7,450	0.93	1.98E-09	**7,449**	31,138
June / 2010	9,634	1.18	4.96E-10	**9,633**	40,771
July / 2010	10,203	1.76	3.97E-10	**10,201**	50,972
August / 2010	10,099	2.14	9.92E-11	**10,097**	61,069
September / 2010	9,630	2.37	2.98E-10	**9,627**	70,696
October / 2010	9,344	2.27	1.98E-10	**9,342**	80,038
November / 2010	9,220	1.97	2.98E-10	**9,218**	89,256
December / 2010	11,907	4.12	3.97E-10	**11,903**	101,159
January / 2011	9,460	1.86	5.95E-10	**9,458**	110,616
February / 2011	8,978	2.71	7.94E-10	**8,975**	119,591
March / 2011	10,871	2.76	0.00E+00	**10,868**	130,459
April / 2011	10,055	3.52	4.96E-10	**10,052**	140,511
May / 2011	12,354	3.23	0.00E+00	**12,351**	152,862
June / 2011	13,234	3.44	6.94E-10	**13,230**	**166,092**

Table 11: Values for emission reduction in Marambaia site in the 4th monitoring period (01/01/2010 - 30/06/2011)

	Calculation ERs - Marambaia 4rd monitoring period (01/01/2010 - 30/06/2011)						FORM.NIG.079 Revision: 01 Date:29/08/2011 Page: 1 de 1
Reference Month / Year	BE: Baseline emissions without AF (tCO2e)	AF = 20% (tCO2e)	BE: Baseline emissions with AF (tCO2e)	Projetc Emissions (tCO2e) PE = PE_{EC} + PE_{LPG}		Total Emission Reduction ERs (tCO2e)	ERs Accumuladed (tCO2e)
				PE_{EC} (tCO2e)	PE_{LPG} (tCO2e)		
January / 2010	105	21	84	0.04	3.97E-10	**84**	84
February / 2010	19	4	15	0.12	6.94E-10	**15**	99
March / 2010	78	16	63	0.13	6.94E-10	**63**	162
April / 2010	19	4	15	0.12	5.95E-10	**15**	177
May / 2010	6	1	5	0.16	5.95E-10	**4**	181
June / 2010	118	24	94	0.11	2.28E-09	**94**	275
July / 2010	124	25	99	0.20	6.94E-10	**99**	374
August / 2010	178	36	142	0.33	7.94E-10	**142**	516
September / 2010	65	13	52	0.35	3.97E-10	**51**	568
October / 2010	19	4	16	0.32	5.95E-10	**15**	583
November / 2010	15	3	12	0.24	1.09E-09	**11**	595
December / 2010	136	27	109	0.17	1.69E-09	**109**	703
January / 2011	0	0	0	0.00	0.00	**0**	703
February / 2011	0	0	0	0.00	0.00	**0**	703
March / 2011	0	0	0	0.00	0.00	**0**	703
April / 2011	0	0	0	0.00	0.00	**0**	703
May / 2011	0	0	0	0.00	0.00	**0**	703
June / 2011	0	0	0	0.00	0.00	**0**	703

The total amount of Emission Reduction, for the 4th monitoring period (01/01/2010 - 30/06/2011), is **166,796 tCO2e** in Adrianopolis and Marambaia Sites, and is consolidated in the following table.

Table 13– Summary of the emission reduction (tCO2e) in the 4rt monitoring period (01/01/2010 - 30/06/2011)

	Summary ERs of the Project Activity **4rd monitoring period (01/01/2010 - 30/06/2011)**			Code:FORM.NIG.080 Revision: 00 Date: 28/08/11 Page: 1 de 1
Reference Month / Year	***ERs Adrianopolis (tCO2e)***	***ERs Marambaia (tCO2e)***	***Total ERs (tCO2e)***	***ERs Accumuladed (tCO2e)***
January / 2010	5,177	84	5,261	**5,261**
February / 2010	4,537	15	4,552	**9,813**
March / 2010	6,430	63	6,492	**16,305**
April / 2010	7,546	15	7,561	**23,866**
May / 2010	7,449	4	7,454	**31,319**
June / 2010	9,633	94	9,727	**41,046**
July / 2010	10,201	99	10,300	**51,346**
August / 2010	10,097	142	10,239	**61,585**
September / 2010	9,627	51	9,679	**71,264**
October / 2010	9,342	15	9,357	**80,621**
November / 2010	9,218	11	9,229	**89,850**
December / 2010	11,903	109	12,011	**101,862**
January / 2011	9,458	0	9,458	**111,320**
February / 2011	8,975	0	8,975	**120,294**
March / 2011	10,868	0	10,868	**131,163**
April / 2011	10,052	0	10,052	**141,215**
May / 2011	12,351	0	12,351	**153,565**
June / 2011	13,230	0	13,230	**166,796**

Summary of Emission Reduction (tCO2e) in the monitored period (1/1/2010-30/06/2011)	**166,796**

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

The following table shows a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	**Values applied in ex-ante calculation of the registered CDM-PDD**		**Actual values reached during the monitoring period**
Emission reductions (tCO_2e)	**YEAR**	**Value**	**1/1/2010-31/12/2010: 101,862** **1/1/2011-30/06/2011: 64,934** **TOTAL: 166,796**
	1/1/2010-31/12/2010	**433,987**	
	1/1/2011-30/06/2011	**245,684**	
	TOTAL	**679,671**	

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

N/A since the actual value is below the PDD value

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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		