MONITORING REPORT

AURÁ LANDFILL GAS PROJECT
AURÁ LANDFILL
CITY OF BELÉM, PARÁ, BRASIL
(CDM REGISTRATION REFERENCE NUMBER 0888)

MONITORING PERIOD JANUARY 1, 2007 – SEPTEMBER 30, 2008

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Prepared by:
Conestoga-Rovers & Associates

651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

Office: (519) 884-0510
Fax: (519) 884-0525

web: http:\\www.CRAworld.com

OCTOBER 2008
REF. NO. 046241 (4)

TABLE OF CONTENTS

LIST OF TABLES
(Following Text)

LIST OF APPENDICES

1.0 INTRODUCTION

This Monitoring Report has been prepared by Conestoga-Rovers & Associates (CRA) for the landfill gas (LFG) collection and flaring system (System) constructed at the Aurá Landfill Site (Site) located in Belém, Pará, Brasil. This report quantifies the emission reductions achieved at the Aurá landfill for the monitoring period of January 1, 2007 to September 30, 2008.

The *Aurá Landfill Gas Project* (herin called Project) is being implemented by CRA according to the Project Design Document Version 4 of October 22, 2006. The project is registered at the UNFCCC's web site as of April 30, 2007 with the CDM Registration Reference Number 0888.

1.1 PROJECT ACTIVITY

The project was developed at the Aurá Landfill, originally called the Aterro Sanitário do Aurá. The Site received non-hazardous solid municipal, industrial, commercial, institutional, and some agricultural wastes for approximately 15 years. Carbon dioxide (CO_2) and methane (CH_4) are generated by the anaerobic decomposition of the above-noted wastes placed at the Site. These compounds are then passively emitted to the atmosphere.

The project involved the construction of a LFG collection system consisting of horizontal trenches and vertical LFG extraction wells, centrifugal blower(s), and all other supporting mechanical and electrical subsystems and appurtenances necessary to collect the LFG.

The LFG collected from the Site is combusted in an enclosed LFG flare with full process controls and instrumentation installed and operating. The state-of-the-art flare is capable of providing sufficient temperature and retention time of the extracted LFG for complete destruction of hydrocarbons.

The purpose of the project activity is to collect LFG at the Aurá Landfill and combust the extracted LFG over a ten year-period, utilizing a high efficiency enclosed flare, thereby reducing greenhouse gas emissions (GHG) and generating Certified Emission Reductions (CERs).

1.2 PROJECT PARTICIPANTS

A list of the parties involved is provided below:

Name of Party Involved	*Private and/or public entities*
Brasil (Host Country)	Prefeitura Municipal de Belém, City of Belém, State of Pará (Public Entity)
Brasil (Host Country)	Conestoga-Rovers & Associados Engenharia S/A (Project Sponsor; Private Entity)
United Kingdom	Grey K Environmental (Europe) Ltd. (Private Entity)

1.3 PROJECT LOCATION

The Aurá Landfill is located 19 kilometers (km) from the centre of the City of Belém, State of Pará, and is 8 km from the centre of the City of Ananindeua. The entire Site covers an area of 120 hectares (ha) and the waste fill area of the Site is approximately 30 ha in size. The Site is located west of Curuperé Creek and east of the Parque Ambiental de Belém.

1.4 PROJECT DESCRIPTION

The technology used to gather the LFG is a grid of vertical gas extraction wells within the landfill, connected to a centralized blower system used to induce vacuum. Upon collection of the LFG, the methane component of the LFG is combusted in a state-of-the-art high-efficiency enclosed flare. The Global Warming Potential (GWP) of the LFG is reduced by the destruction of the methane portion of the LFG.

Vertical gas extraction wells are established in the waste material and are connected to the blower system through a network of underground piping installed on and around the perimeter of the landfill.

The extraction wells are connected to the subheader or directly to the header through smaller diameter laterals. As the blower is operated, a vacuum is applied through the piping network, which in turn applied a vacuum to each well and extracts LFG out of

the waste. The flow is controlled at each of the individual extraction wells through the use of a valve located at the top of the well piping. Each well is individually controlled to ensure that the collection system is effectively setup and balanced. The system is manually monitored and controlled at each wellhead and is equipped with a secure monitoring chamber and monitoring ports for gas composition, pressure, and temperature readings.

Non-perforated LFG collection piping will be utilized to convey the LFG from the extraction wells to the gas control plant. The LFG collection piping consists of a perimeter header, subheaders, and laterals. Header piping conveys the LFG collected from subheader collection piping to the gas control plant. Subheader piping conveys LFG from lateral piping to header piping, and lateral piping conveys LFG collected primarily at vertical gas extraction wells to the subheader piping.

The blower system is located in the gas control plant. An additional blower is available to allow for regular down time for maintenance and to provide backup in the event of a component failure. The blower system exerts vacuum through the piping system to the system of vertical wells. Extracted LFG is sent to the high-efficiency enclosed flare for destruction of the methane component of the extracted LFG. The stack height of the flare was selected to provide sufficient residence time for destruction of components in the gas at high temperature and in a controlled environment to destroy extracted methane. Flare temperature is controlled by a system of automatically and manually controlled air inlet dampers and thermocouples located in the stack.

2.0 CONTRIBUTION OF THE PROJECT ACTIVITY TO SUSTAINABLE DEVELOPMENT

The project will make a strong contribution to sustainable development in Brasil. Over and above reducing emissions of GHGs, there are other benefits to sustainable development such as:

- contribution to recycling activities (help organize the wastepickers in a formal co-operative, improving work conditions and reducing health and safety hazards while increasing recycling rates);
- contribution to human health and the environment (cleaner and healthier environment, improved air quality, reduced risk of landfill gas subsurface migration, minimized landfill fire, diminished potential for groundwater contamination);
- contribution to the improvement of working conditions and employment creation (local employment during construction and operational phases);
- contribution to income generation (generation of royalty revenue for local government entities throughout the ten-year crediting period of the project);
- contribution to technological capacity building (local personnel training and information sharing); and
- contribution to regional integration and cooperation with other sectors (reference for other municipalities to implement similar projects at their landfill sites).

3.0 BASELINE METHODOLOGY

The approved baseline methodology applied to this project is the approved ACM0001 ver. 4 (dated July 2006) – Consolidated Baseline Methodology for Landfill Gas Project Activities.

All greenhouse gas (GHG) emission reductions generated by the implementation of the project activity are considered fully additional based on the lack of previous LFG management activities and the current environmental regulations in Brasil.

There are no existing or pending regulatory requirements requiring the Site to implement any form of LFG emission reductions program. There was no LFG recovery and combustion system in place at the Site prior to the project implementation. Therefore, the project baseline is the uncontrolled release of LFG to the atmosphere.

4.0 MONITORING METHODOLOGY

The approved monitoring methodology applied to this project activity is the ACM0001 version 4 – Consolidated Monitoring Methodology for Landfill Gas Project Activities. The LFG monitoring program is a relatively straightforward program designed to collect System operating data required to safely and effectively operate the System as required for the verification of CERs. This data is collected in real time, and provides a continuous record that is easy to monitor, review, and verify.

The monitoring methodology is based on the direct measurement of the quantity of LFG captured and destroyed by the LFG management system. The actual tonnage of methane emissions reduced by the project is calculated based on the flow rate of the LFG, methane concentration, and destruction/conversion efficiency of the combustion equipment. The monitoring plan provides for the continuous measurement of both LFG quantity and quality using a continuous flow meter and online LFG analyzer. The methane emissions reduced by the flare are determined based on the operating hours measure by a run-time meter. The destruction efficiency of the flare is directly correlated to the internal combustion temperature and the retention time of the unit.

A summary of the data collected requirements for the project activity is provided in Table 1.

4.1 FLOW MEASUREMENT

LFG collected by the System and subsequently flared is measured via a flow measuring device suitable for measuring the velocity and volumetric flow of a gas. The flow measurements are taken within the piping itself, and the flow sensors are connected to a transmitter that is capable of collecting and sending continuous data to the recording device in this case a datalogger. The flow sensors are calibrated according to a specified temperature, pressure, and composition of the gas; thus the flow actually measured is corrected according to actual temperature, pressure, and composition, in order to provide the actual density of the gas measured. The equipment selected allows for dynamic compensation of these parameters, normalized to a standard temperature, pressure, and gas composition. For reporting purposes, the flows are required to be normalized to 0 degrees Celsius and 1 atm at standard gas composition of 50 percent methane and carbon dioxide each by volume.

Equipment calibration procedures are specified by the equipment manufacturer, and calibration of the sensors is required on a regular basis to ensure the quality and validity

of the data. The accuracy of a flow meter is dependent on the design of the equipment, and the specific type of sensor used. The equipment selected provides a minimum accuracy of +/- 2 percent by volume. The measured flow is aggregated approximately once per second.

All data that is collected is recorded for the permanent record. Both electronic and hard copies of the data are maintained for auditing purposes and for use in the calculation of CERs.

4.2 GAS QUALITY

The two parameters that are most pertinent to the verification of CERs, as well as the safe and efficient operation of the system, are the concentrations of methane and oxygen in the gas stream. These two parameters are measured via a common sample line that is run to the main collection system piping, and measured in real time by two separate sensors, one each for methane and oxygen.

Although compensation for temperature and pressure is not required for the methane and oxygen sensors, the sensors are designed to operate within specified temperature and pressure conditions. Equipment calibration procedures are specified by the equipment manufacturer, and calibration of the sensors is required on a regular basis to ensure the quality and validity of the data. Regular calibration of the equipment is especially important, as the accuracy of the methane and oxygen sensors is greatest within the expected calibration range of the gas stream to be measured. The equipment selected provides an accuracy of at least +/- 1 percent by volume. Gas compositions are aggregated approximately once per second.

4.3 OPERATIONAL MONITORING

Additional operational monitoring of the LFG collection wellfield is conducted in order to optimize the system and ensure it is operating both correctly and efficiently. Periodic adjustments to the extraction wells will be required to optimize the collection system effectiveness. The collection field adjustments are undertaken based upon a review of the extraction well performance history considered within the context of the overall field operation in order to maximize the collection of methane balanced against the minimization of any oxygen in the system which could introduce unsafe operating conditions. Monitoring at each extraction well consists of using portable measuring devices to measure the following parameters:

- Valve position;
- Individual well flow;
- Individual well vacuum; and
- Composition of gas collected (i.e., methane, carbon dioxide, and oxygen).

5.0 EMISSION REDUCTIONS

5.1 OPERATIONAL DATA SOURCES

The operational data for the LFG collection and flaring system were obtained from the system datalogger, the Landtec Field Service Unit (FSU). Flow rate data, the gas composition data, and flare temperature data are all recorded and transmitted via the FSU. Daily volumetric flow rates of LFG are obtained from an average of multiple daily flow rates measured by the on-Site flow meter and recorded by the FSU. The LFG composition is analyzed by the Landtec Field Analytical Unit (FAU). Daily volumetric gas compositions of LFG are obtained from an average of multiple gas compositions measured by the on-Site gas analyzer and recorded by the FSU. Calculation of the operational run time for the flare is based on the number of minute-by-minute temperature readings.

5.2 EMISSION REDUCTION CALCULATIONS

The amount of LFG collected and destroyed by combustion is monitored at a centralized location using a flow meter. Project emissions are comprised of the quantity of methane collected and not flared due to flare inefficiency and the quantity of energy required to operate the system based on the carbon dioxide emission intensity of the power source. This amount is subtracted from the measured quantity of collected methane. The overall flaring efficiency is estimated at 90 percent at the Site from the start of the monitoring period until the measurement of the flare efficiency was conducted on August 26, 2008. Based on stack sampling, the flaring efficiency of hydrocarbons for the enclosed flare is 99.99 percent, and this value was used for all data after August 26, 2008.

A summary of the monthly emission reductions achieved at the Site is provided in Table 2.

The following formulae was used to estimate emission reductions for the project activity:

$$ER_y = (MD_{project} - MD_{reg,y})*GWP_{CH4}$$

where:

- ER_y are the emission reductions, measured in tCO_2e;
- $MD_{project,y}$ is the amount of methane actually destroyed/combusted during time period T, measured in tCH_4;
- $MD_{reg,y}$ is the amount of methane that would have been destroyed/combusted during time period t in the absence of the project activity, measured in tCH_4; and
- GWP_{CH4} is the approved Global Warming Potential value for methane, 21 tCO_2e/tCH_4.

The total amount of methane destroyed by the flare in a given period is calculated as:

$$MD_{flared,y} = LFG_{flare,y} \times w_{CH4,y} \times D_{CH4} \times FE$$

where:

- $MD_{flared,y}$ is the quantity of methane destroyed by flaring in a given time period t, measured in tCH_4;
- LFG_{flare} is the quantity of LFG flared during a given time period t, measure in cubic meters (m^3);
- w_{CH4} is the average methane fraction of the LFG as measured during the given time period t and expressed as a fraction of CH_4 volume per LFG volume (m^3CH_4/m^3 LFG);
- D_{CH4} is the methane density, expressed in tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4), and measured at standard pressure (1 atm) and temperature (0°C) conditions, which is 0.0007168 tCH_4/m^3CH_4 (as per consolidated methodology ACM0001 version 4); and
- FE is the flare efficiency (the fraction of the methane destroyed, as determined by quarterly flare stack monitoring).

6.0 CER VOLUME CLAIMED

The CER volume claimed for the monitoring period extending from January 1, 2007 to September 30, 2008 is 34,140 tCO_2e.

CALCULATION MEMO

Variable	*Unit*	*Quantity*
CO_2 Equivalent Reduced	tCO_2e	34,155
Total Electricity Consumed	MW	31.0
CO_2 Emissions Produced	tCO_2	15.1
Total CO_2 Equivalent Reduced	tCO_2e	34,140

Note:

1. CO_2 Equivalent Reduced includes a reduction for uncombusted methane due to flare destruction efficiency.
2. An estimate of the grid emission factor for Brasil is calculated as 489 kg CO_2/MWh based on the default emission factor for the Brazilian North-Northeast interconnected grid.

TABLE 1

SUMMARY OF DATA COLLECTION REQUIREMENTS
Aurá Landfill Gas Project
Aurá Landfill
Belém, Pará, Brasil

ID number	*Data Variable*	*Source of data*	*Data Unit*	*Measured (m), calculated ('c), estimated (e)*	*Recording Frequency*	*Proportion of data to be monitored*	*Method of data archival (electronic/paper)*	*Comment*
1. $LFG_{total,y}$	Total amount of landfill gas captured	Online LFG flow meter	m^3	m	Continuous	100%	Daily: electronic Monthly: paper	Measured by a flow meter
2. $LFG_{flare,y}$	Total amount of landfill gas flared	Online LFG flow meter	m^3	m	Continuous	100%	Daily: electronic Monthly: paper	Measured by a flow meter or calculated using flare efficiency from 1.
5. FE	Flare/combustion efficiency determined by the operation hours (1) and the methane content in the exhaust gas (2).	Thermistors, Samples	%	m/c	(1) continuously; (2) quarterly, monthly if unstable	100%	Daily: electronic Monthly: paper	(1) The flare operation shall be continuously monitored by continuous measurement of operation time of flare using a run time meter connected to a flame detector or a flame continuous temperature controller, irrespective of whether the flare efficiency is monitored. (3) The enclosed flares shall be operated and maintained as per the specification prescribed by the manufacturer.
6. $w_{CH4,y}$	Methane fraction in the landfill gas	Online LFG analyzer	m^3 CH_4/ m^3 LFG	m	Continuous	100%	Daily: electronic Monthly: paper	Measured by continuous gas quality analyzer
7. T	Temperature of the landfill gas	Temperature Probe	^oC	m	Continuous	100%	Daily: electronic Monthly: paper	Measured to determine the density of methane D_{CH4}. No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters.
8. P	Pressure of the landfill gas	Pressure Gauge	Pa	m	Continuous	100%	Daily: electronic Monthly: paper	Measured to determine the density of methane D_{CH4}. No separate monitoring of pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters.
10. EL_{IMP}	Total amount of electricity imported to meet project requirements	Electricity Meter	MWh	m	Continuous	100%	Daily: electronic Monthly: paper	Required to determine CO2 emissions from use of electricity
11.	CO_2 emission intensity of the electricity and/or other energy carriers in ID9	Calculated	tCO_2/MWh	c	As specified in ACM0002	100%	Daily: electronic Monthly: paper	In case a specific source is displaced or used for imports, the emission factor is estimated for that specific source.
13.	Regulatory requirements relating to landfill gas projects	Test	Test	n/a	At the renewal of crediting period	100%	Periodically	The information, though recorded annually, is used for changes to the adjustment factor (AF) or directly $MD_{reg,y}$ at renewal of the credit period.

TABLE 2

MONTHLY CERTIFIED EMISSION REDUCTIONS SUMMARY
JANUARY 1, 2007 TO SEPTEMBER 30, 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

	CO_2 *Equivalent* Reduced (tCO_2 *e/day)*	CO_2 *Emissions* Produced (tCO_2 *e)*	Total CO_2 *Equivalent* Reduced (tCO_2 *e/day)*
January 1, 2007 to August 31, 2007	0	0	0
Month - 2007			
September	1,355	0.81	1,354
October	1,472	0.98	1,471
November	1,953	1.02	1,952
December	1,941	0.99	1,940
Month - 2008			
January	1,768	0.59	1,767
February	652	0.85	651
March	1,574	1.04	1,573
April	2,327	1.01	2,326
May	2,710	1.13	2,709
June	2,593	1.20	2,592
July	1,396	1.40	1,395
August	5,709	1.55	5,707
September	8,705	2.57	8,702
Total Project Emissions/Reductions:	**34,155**	**15.1**	**34,140**

APPENDIX A

MONTHLY EMISSION REDUCTION SUMMARIES

TABLE A.1

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
SEPTEMBER 2007
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	7,652	436	11.2	1,053	90.0	12
2	6,478	422	11.0	921	90.0	10
3	3,710	413	10.7	539	90.0	5
4	-	-	-	-	-	-
5	-	-	-	-	-	-
6	1,389	508	31.1	164	90.0	6
7	621	438	35.5	85	90.0	3
8	10,299	437	35.4	1,414	90.0	49
9	10,022	428	34.6	1,405	90.0	47
10	10,094	428	34.3	1,415	90.0	47
11	9,533	413	35.6	1,385	90.0	46
12	9,697	408	36.6	1,426	90.0	48
13	10,044	437	33.8	1,379	90.0	46
14	10,325	440	32.3	1,408	90.0	45
15	9,798	414	34.4	1,420	90.0	46
16	7,390	439	35.1	1,010	90.0	35
17	14,024	616	34.0	1,366	90.0	65
18	14,337	708	36.0	1,215	90.0	70
19	10,316	709	36.9	873	90.0	52
20	6,869	688	38.6	599	90.0	36
21	9,827	684	38.9	862	90.0	52
22	12,667	678	38.4	1,121	90.0	66
23	12,134	676	39.0	1,077	90.0	64
24	13,664	666	39.0	1,231	90.0	72
25	13,718	659	39.5	1,249	90.0	73
26	14,105	652	38.5	1,298	90.0	74
27	14,985	674	37.1	1,334	90.0	75
28	14,553	663	36.5	1,317	90.0	72
29	13,439	642	37.5	1,256	90.0	68
30	14,098	636	37.3	1,330	90.0	71

Total CO_2 Equivalent Reduced (tCO_2e)	**1,355**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**1.649**
CO_2 Emissions Produced (tCO_2e/ month)	**0.81**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**1,354**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.2

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
OCTOBER 2007
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	15,071	684	34.9	1,322	90.0	71
2	14,636	685	34.5	1,282	90.0	68
3	14,997	674	34.3	1,335	90.0	70
4	15,243	673	34.6	1,359	90.0	71
5	14,227	684	35.8	1,248	90.0	69
6	6,706	664	35.6	606	90.0	32
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
11	-	-	-	-	-	-
12	-	-	-	-	-	-
13	-	-	-	-	-	-
14	-	-	-	-	-	-
15	-	-	-	-	-	-
16	8,654	758	28.3	685	90.0	33
17	16,874	739	31.1	1,370	90.0	71
18	16,554	733	32.7	1,355	90.0	73
19	15,738	700	34.2	1,349	90.0	73
20	15,768	730	31.7	1,296	90.0	68
21	17,098	756	30.7	1,357	90.0	71
22	15,766	692	33.7	1,367	90.0	72
23	13,965	630	37.5	1,330	90.0	71
24	14,256	635	37.2	1,347	90.0	72
25	14,207	630	37.0	1,353	90.0	71
26	13,646	617	37.4	1,327	90.0	69
27	13,950	620	36.9	1,350	90.0	70
28	14,003	627	35.9	1,340	90.0	68
29	15,731	682	32.5	1,384	90.0	69
30	15,823	695	33.2	1,366	90.0	71
31	12,916	617	38.4	1,256	90.0	67

Total CO_2 Equivalent Reduced (tCO_2e)	**1,472**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.014**
CO_2 Emissions Produced (tCO_2e/ month)	**0.98**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**1,471**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.3

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
NOVEMBER 2007
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	14,002	611	38.8	1,375	90.0	74
2	13,256	598	38.8	1,330	90.0	70
3	13,247	587	38.5	1,354	90.0	69
4	13,809	611	37.6	1,356	90.0	70
5	13,972	627	36.2	1,337	90.0	69
6	13,769	607	36.3	1,361	90.0	68
7	13,447	608	36.3	1,327	90.0	66
8	14,156	625	35.3	1,359	90.0	68
9	13,674	598	36.7	1,372	90.0	68
10	13,532	597	39.4	1,360	90.0	72
11	12,886	592	40.1	1,306	90.0	70
12	12,581	582	40.7	1,297	90.0	69
13	13,124	582	39.9	1,353	90.0	71
14	13,083	592	39.6	1,326	90.0	70
15	12,644	580	39.7	1,308	90.0	68
16	13,011	574	39.3	1,360	90.0	69
17	12,148	578	38.1	1,261	90.0	63
18	3,644	565	38.4	387	90.0	19
19	8,619	612	40.1	845	90.0	47
20	12,857	577	38.8	1,337	90.0	68
21	12,311	563	38.3	1,312	90.0	64
22	12,566	576	38.0	1,309	90.0	65
23	12,890	567	38.2	1,364	90.0	67
24	11,888	572	37.8	1,247	90.0	61
25	10,992	576	37.6	1,145	90.0	56
26	12,952	583	37.5	1,333	90.0	66
27	13,799	607	37.0	1,364	90.0	69
28	13,518	589	37.3	1,377	90.0	68
29	13,049	590	37.5	1,327	90.0	66
30	12,535	575	37.9	1,308	90.0	64

Total CO_2 Equivalent Reduced (tCO_2e)	**1,953**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.089**
CO_2 Emissions Produced (tCO_2e/ month)	**1.02**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**1,952**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.4

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
DECEMBER 2007
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	12,927	572	38.0	1,356	90.0	67
2	9,202	551	39.6	1,002	90.0	49
3	13,207	604	38.4	1,312	90.0	69
4	12,657	608	37.3	1,249	90.0	64
5	13,623	601	37.7	1,360	90.0	70
6	12,689	587	37.0	1,297	90.0	64
7	7,571	593	37.7	766	90.0	39
8	13,266	603	36.9	1,320	90.0	66
9	13,560	600	37.1	1,356	90.0	68
10	12,665	585	36.7	1,299	90.0	63
11	10,770	595	36.9	1,086	90.0	54
12	13,132	596	38.1	1,322	90.0	68
13	12,675	590	37.3	1,289	90.0	64
14	12,857	598	36.9	1,290	90.0	64
15	13,047	613	37.0	1,277	90.0	65
16	8,400	623	37.2	809	90.0	42
17	7,929	606	40.7	785	90.0	44
18	12,441	580	39.3	1,287	90.0	66
19	11,589	578	38.6	1,203	90.0	61
20	11,241	586	39.0	1,151	90.0	59
21	12,705	563	38.3	1,354	90.0	66
22	12,358	573	37.2	1,294	90.0	62
23	12,535	575	36.9	1,308	90.0	63
24	12,957	605	35.3	1,285	90.0	62
25	13,073	609	37.4	1,288	90.0	66
26	13,438	599	37.8	1,346	90.0	69
27	13,033	575	39.3	1,360	90.0	69
28	12,453	547	42.1	1,366	90.0	71
29	11,303	543	43.7	1,249	90.0	67
30	11,045	534	45.2	1,241	90.0	68
31	11,835	526	45.6	1,350	90.0	73

Total CO_2 Equivalent Reduced (tCO_2e)	**1,941**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.024**
CO_2 Emissions Produced (tCO_2e/ month)	**0.99**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**1,940**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.5

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
JANUARY 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	10,487	531	45.2	1,185	90.0	64
2	11,518	532	45.1	1,299	90.0	70
3	11,337	505	44.7	1,347	90.0	69
4	10,592	484	46.6	1,313	90.0	67
5	11,600	500	46.9	1,392	90.0	74
6	10,652	515	46.1	1,241	90.0	67
7	11,531	521	46.0	1,328	90.0	72
8	11,247	501	46.5	1,347	90.0	71
9	10,970	504	46.8	1,306	90.0	70
10	7,508	495	47.0	910	90.0	48
11	10,973	525	46.2	1,254	90.0	69
12	10,696	513	45.5	1,251	90.0	66
13	9,294	487	46.8	1,145	90.0	59
14	10,603	489	45.8	1,301	90.0	66
15	11,056	498	44.4	1,332	90.0	67
16	10,807	489	46.6	1,326	90.0	68
17	11,148	490	45.7	1,365	90.0	69
18	9,976	468	46.6	1,279	90.0	63
19	10,274	472	47.1	1,306	90.0	66
20	6,293	456	47.3	828	90.0	40
21	10,757	498	47.3	1,296	90.0	69
22	10,858	488	46.5	1,335	90.0	68
23	11,147	504	44.8	1,327	90.0	68
24	10,601	506	45.3	1,257	90.0	65
25	12,629	571	40.3	1,327	90.0	69
26	13,721	613	35.2	1,343	90.0	65
27	9,656	615	40.0	942	90.0	52
28	2,694	738	23.2	219	90.0	8
29	-	-	-	-	-	-
30	-	-	-	-	-	-
31	94	1,403	18.5	4	90.0	0

Total CO_2 Equivalent Reduced (tCO_2e)	**1,768**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**1.214**
CO_2 Emissions Produced (tCO_2e/ month)	**0.59**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**1,767**

NOTES:

- **-** System down
- (1) Flow data recorded by the flow meter
- (2) Methane percentage recorded by the Landtec FAU Gas Analyzer
- (3) System up-time
- (4) Assumption based on the flare methane destruction efficiency measurement
- (5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.6

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
FEBRUARY 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	807	1,345	7.5	36	90.0	1
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	-	-	-	-	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
11	-	-	-	-	-	-
12	-	-	-	-	-	-
13	2,340	360	43.5	390	90.0	14
14	4,130	366	42.5	677	90.0	24
15	3,772	552	37.9	410	90.0	19
16	11,231	531	35.1	1,269	90.0	53
17	10,956	546	31.9	1,204	90.0	47
18	13,556	631	31.9	1,289	90.0	59
19	8,288	645	28.0	771	90.0	31
20	2,504	483	45.0	311	90.0	15
21	7,107	515	42.3	828	90.0	41
22	10,363	595	34.4	1,045	90.0	48
23	11,174	649	25.6	1,033	90.0	39
24	7,128	720	23.3	594	90.0	23
25	13,946	618	26.6	1,354	90.0	50
26	12,436	564	30.4	1,323	90.0	51
27	13,459	626	24.2	1,290	90.0	44
28	15,725	711	21.4	1,327	90.0	46
29	15,362	735	22.3	1,254	90.0	46

Total CO_2 Equivalent Reduced (tCO_2e)	**652**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**1.745**
CO_2 Emissions Produced (tCO_2e/ month)	**0.85**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**651**

NOTES:

- **-** System down
- (1) Flow data recorded by the flow meter
- (2) Methane percentage recorded by the Landtec FAU Gas Analyzer
- (3) System up-time
- (4) Assumption based on the flare methane destruction efficiency measurement
- (5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.7

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
MARCH 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	11,226	492	29.7	1,369	90.0	45
2	4,522	628	25.4	432	90.0	16
3	4,004	509	37.7	472	90.0	20
4	11,349	521	34.9	1,307	90.0	54
5	9,576	451	39.5	1,274	90.0	51
6	9,607	439	40.7	1,313	90.0	53
7	9,040	483	39.4	1,123	90.0	48
8	10,685	508	38.2	1,262	90.0	55
9	11,637	555	33.1	1,258	90.0	52
10	13,137	645	27.9	1,222	90.0	50
11	11,342	1,123	8.4	606	90.0	13
12	10,140	778	24.7	782	90.0	34
13	11,308	500	37.9	1,357	90.0	58
14	10,373	469	39.0	1,327	90.0	55
15	11,585	513	33.3	1,355	90.0	52
16	10,820	506	35.4	1,283	90.0	52
17	12,737	557	32.5	1,372	90.0	56
18	11,797	535	34.5	1,323	90.0	55
19	12,490	549	34.5	1,365	90.0	58
20	12,860	594	32.2	1,299	90.0	56
21	13,226	603	35.2	1,316	90.0	63
22	11,214	597	35.3	1,127	90.0	54
23	8,023	438	39.1	1,099	90.0	42
24	10,065	452	38.6	1,336	90.0	53
25	9,880	456	38.6	1,300	90.0	52
26	10,278	503	35.8	1,226	90.0	50
27	12,814	548	35.6	1,403	90.0	62
28	15,266	651	32.8	1,407	90.0	68
29	14,228	698	33.4	1,223	90.0	64
30	16,024	730	30.9	1,317	90.0	67
31	15,627	676	31.1	1,387	90.0	66

Total CO_2 Equivalent Reduced (tCO_2e)	**1,574**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.127**
CO_2 Emissions Produced (tCO_2e/ month)	**1.04**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**1,573**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.8

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
APRIL 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	9,608	548	36.7	1,052	90.0	48
2	11,955	529	43.1	1,356	90.0	70
3	14,543	630	38.9	1,385	90.0	77
4	10,073	580	43.4	1,042	90.0	59
5	13,506	583	45.2	1,390	90.0	83
6	11,550	516	45.2	1,343	90.0	71
7	13,596	592	42.6	1,378	90.0	78
8	11,713	516	43.9	1,362	90.0	70
9	11,997	532	45.9	1,353	90.0	75
10	13,573	591	43.1	1,378	90.0	79
11	13,928	619	41.5	1,350	90.0	78
12	11,850	614	39.7	1,158	90.0	64
13	13,283	586	39.6	1,360	90.0	71
14	8,594	548	40.7	941	90.0	47
15	7,970	558	44.3	857	90.0	48
16	9,293	529	44.8	1,054	90.0	56
17	14,068	609	41.1	1,386	90.0	78
18	14,567	717	44.2	1,219	90.0	87
19	17,083	773	42.8	1,326	90.0	99
20	17,332	753	43.5	1,381	90.0	102
21	13,498	781	42.8	1,037	90.0	78
22	13,957	796	42.5	1,052	90.0	80
23	19,205	803	40.1	1,435	90.0	104
24	19,383	815	39.6	1,427	90.0	104
25	19,594	847	38.8	1,388	90.0	103
26	20,580	877	38.6	1,408	90.0	108
27	12,040	840	40.2	860	90.0	66
28	20,297	854	38.9	1,426	90.0	107
29	11,749	866	38.6	814	90.0	61
30	14,409	911	38.2	949	90.0	75

Total CO_2 Equivalent Reduced (tCO_2e)	**2,327**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.073**
CO_2 Emissions Produced (tCO_2e/ month)	**1.01**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**2,326**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.9

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
MAY 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume* (Nm^3)	*Flow* [1] (Nm^3/h)	*Methane* [2] (%)	*Net Flare Operational Period* [3] (min)	*Flare Destruction Efficiency* [4] (%)	*CO_2 Equivalent Reduced* (tCO_2e)
1	20,107	959	32.2	1,258	90.0	88
2	14,106	915	34.8	925	90.0	67
3	16,178	869	37.7	1,117	90.0	83
4	13,526	957	30.2	848	90.0	55
5	19,374	911	34.0	1,276	90.0	89
6	16,980	806	41.1	1,264	90.0	95
7	17,325	774	41.3	1,343	90.0	97
8	14,225	716	41.1	1,192	90.0	79
9	11,096	642	42.5	1,037	90.0	64
10	15,086	670	42.6	1,351	90.0	87
11	5,449	755	41.3	433	90.0	30
12	10,245	674	42.5	912	90.0	59
13	18,678	787	40.6	1,424	90.0	103
14	18,846	810	39.8	1,396	90.0	102
15	18,000	750	45.8	1,440	90.0	112
16	11,081	801	46.5	830	90.0	70
17	9,883	872	44.8	680	90.0	60
18	9,886	817	47.5	726	90.0	64
19	20,074	847	45.2	1,422	90.0	123
20	15,664	867	43.3	1,084	90.0	92
21	17,309	893	39.7	1,163	90.0	93
22	21,264	886	37.7	1,440	90.0	109
23	18,583	829	38.7	1,345	90.0	97
24	18,594	784	38.3	1,423	90.0	96
25	17,286	774	38.9	1,340	90.0	91
26	17,924	766	42.5	1,404	90.0	103
27	17,900	750	43.9	1,432	90.0	106
28	17,878	757	43.1	1,417	90.0	104
29	17,399	728	43.7	1,434	90.0	103
30	14,327	679	45.2	1,266	90.0	88
31	16,398	689	45.7	1,428	90.0	102

Total CO_2 Equivalent Reduced (tCO_2e)	**2,710**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.303**
CO_2 Emissions Produced (tCO_2e/ month)	**1.13**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**2,709**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.10

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
JUNE 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	16,921	709	45.2	1,432	90.0	104
2	16,075	674	48.0	1,431	90.0	105
3	18,544	777	44.8	1,432	90.0	113
4	18,936	799	40.4	1,422	90.0	104
5	18,333	816	39.5	1,348	90.0	98
6	19,438	819	38.9	1,424	90.0	102
7	11,865	823	38.3	865	90.0	62
8	3,298	767	41.7	258	90.0	19
9	19,392	808	37.8	1,440	90.0	99
10	18,642	807	39.8	1,386	90.0	101
11	18,854	804	38.0	1,407	90.0	97
12	18,816	784	42.3	1,440	90.0	108
13	12,129	827	45.7	880	90.0	75
14	11,831	803	47.3	884	90.0	76
15	19,949	837	43.5	1,430	90.0	118
16	20,594	872	38.2	1,417	90.0	107
17	21,031	888	38.6	1,421	90.0	110
18	20,351	881	37.9	1,386	90.0	104
19	20,558	865	34.7	1,426	90.0	97
20	17,326	884	35.9	1,176	90.0	84
21	18,965	896	34.5	1,270	90.0	89
22	7,983	892	33.7	537	90.0	36
23	15,406	951	31.4	972	90.0	66
24	22,483	952	32.8	1,417	90.0	100
25	19,129	861	34.6	1,333	90.0	90
26	20,612	1,041	17.9	1,188	90.0	50
27	29,191	1,271	21.3	1,378	90.0	84
28	17,456	947	27.3	1,106	90.0	65
29	16,386	918	28.6	1,071	90.0	63
30	16,456	816	31.6	1,210	90.0	70

Total CO_2 Equivalent Reduced (tCO_2e)	**2,593**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.463**
CO_2 Emissions Produced (tCO_2e/ month)	**1.20**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**2,592**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.11

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
JULY 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	16,391	705	35.3	1,395	90.0	78
2	15,826	706	34.2	1,345	90.0	73
3	966	707	34.7	82	90.0	5
4	4,219	711	31.9	356	90.0	18
5	8,734	712	31.4	736	90.0	37
6	5,217	705	31.4	444	90.0	22
7	8,639	828	35.5	626	90.0	42
8	20,033	895	32.5	1,343	90.0	88
9	20,272	897	31.5	1,356	90.0	87
10	15,333	888	31.4	1,036	90.0	65
11	-	-	-	-	-	-
12	12,231	1,425	19.4	515	90.0	32
13	33,018	1,410	16.2	1,405	90.0	72
14	32,294	1,398	14.8	1,386	90.0	65
15	35,575	1,549	14.5	1,378	90.0	70
16	23,911	1,676	15.4	856	90.0	50
17	35,799	1,682	14.1	1,277	90.0	68
18	32,462	1,572	9.4	1,239	90.0	41
19	28,982	1,290	9.0	1,348	90.0	35
20	25,372	1,131	12.0	1,346	90.0	41
21	19,130	981	13.5	1,170	90.0	35
22	13,375	829	15.9	968	90.0	29
23	14,593	888	17.3	986	90.0	34
24	17,546	858	17.2	1,227	90.0	41
25	19,908	916	15.1	1,304	90.0	41
26	13,350	1,125	13.6	712	90.0	25
27	7,288	1,107	11.9	395	90.0	12
28	8,449	902	13.9	562	90.0	16
29	12,069	821	31.2	882	90.0	51
30	13,299	930	37.5	858	90.0	68
31	26,335	1,354	37.3	1,167	90.0	133

Total CO_2 Equivalent Reduced (tCO_2e)	**1,396**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**2.860**
CO_2 Emissions Produced (tCO_2e/ month)	**1.40**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**1,395**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.12

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
AUGUST 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume* (Nm^3)	*Flow* [1] (Nm^3/h)	*Methane* [2] (%)	*Net Flare Operational Period* [3] (min)	*Flare Destruction Efficiency* [4] (%)	*CO_2 Equivalent Reduced* (tCO_2e)
1	32,735	1,413	36.2	1,390	90.0	161
2	20,419	891	35.9	1,375	90.0	99
3	32,584	1,426	36.3	1,371	90.0	160
4	33,628	1,433	36.3	1,408	90.0	165
5	34,315	1,515	35.2	1,359	90.0	164
6	36,876	1,577	35.8	1,403	90.0	179
7	36,413	1,610	35.9	1,357	90.0	177
8	37,996	1,610	35.2	1,416	90.0	181
9	33,276	1,516	37.7	1,317	90.0	170
10	33,038	1,395	41.9	1,421	90.0	188
11	35,629	1,497	41.2	1,428	90.0	199
12	35,519	1,519	39.8	1,403	90.0	192
13	34,037	1,482	36.6	1,378	90.0	169
14	33,693	1,444	36.7	1,400	90.0	168
15	34,477	1,464	36.3	1,413	90.0	170
16	33,488	1,421	35.3	1,414	90.0	160
17	29,333	1,375	35.4	1,280	90.0	141
18	32,573	1,475	35.5	1,325	90.0	157
19	34,605	1,455	34.8	1,427	90.0	163
20	34,781	1,479	34.9	1,411	90.0	164
21	34,762	1,560	37.8	1,337	90.0	178
22	41,544	1,731	39.8	1,440	90.0	224
23	39,623	1,719	38.0	1,383	90.0	204
24	39,858	1,707	38.9	1,401	90.0	210
25	38,774	1,731	41.4	1,344	90.0	217
26	37,480	1,761	41.3	1,277	90.0	210
27	36,976	1,817	39.7	1,221	99.99	221
28	30,704	1,859	36.9	991	99.99	171
29	44,180	1,876	38.6	1,413	99.99	257
30	42,528	1,879	38.5	1,358	99.99	246
31	42,528	1,879	38.5	1,358	99.99	246

Total CO_2 Equivalent Reduced (tCO_2e)	**5,709**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**3.172**
CO_2 Emissions Produced (tCO_2e/ month)	**1.55**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**5,707**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Assumption based on the flare methane destruction efficiency measurement until Aug.26
Following Aug 26 destruction efficiency is based on stack test measurements
(5) Default emission factor for the Brazilian North-Northeast interconnected grid

TABLE A.13

CERTIFIED EMISSION REDUCTIONS (CER) CALCULATIONS
SEPTEMBER 2008
Aurá Landfill Gas Project
Belém, Pará, Brasil

Day	*Volume (Nm^3)*	*Flow [1] (Nm^3/h)*	*Methane [2] (%)*	*Net Flare Operational Period [3] (min)*	*Flare Destruction Efficiency [4] (%)*	*CO_2 Equivalent Reduced (tCO_2e)*
1	41,652	1,872	39.4	1,335	99.99	247
2	45,766	2,085	37.1	1,317	99.99	256
3	54,275	2,377	33.3	1,370	99.99	272
4	52,980	2,374	38.1	1,339	99.99	304
5	48,978	2,245	38.5	1,309	99.99	284
6	48,881	2,232	43.6	1,314	99.99	321
7	46,090	2,207	42.8	1,253	99.99	297
8	49,343	2,221	44.9	1,333	99.99	333
9	43,520	2,319	45.8	1,126	99.99	300
10	53,084	2,469	41.2	1,290	99.99	329
11	38,774	2,537	40.0	917	99.99	233
12	54,888	2,454	42.7	1,342	99.99	353
13	54,627	2,358	45.7	1,390	99.99	376
14	45,465	2,165	46.4	1,260	99.99	318
15	54,951	2,345	45.0	1,406	99.99	372
16	52,726	2,333	44.0	1,356	99.99	349
17	54,312	2,303	42.7	1,415	99.99	349
18	53,727	2,248	41.2	1,434	99.99	333
19	50,246	2,220	42.7	1,358	99.99	323
20	45,678	2,252	42.2	1,217	99.99	290
21	50,353	2,342	42.1	1,290	99.99	319
22	54,498	2,324	41.1	1,407	99.99	337
23	51,014	2,244	40.3	1,364	99.99	309
24	48,909	2,153	38.7	1,363	99.99	285
25	51,458	2,218	41.3	1,392	99.99	320
26	52,731	2,268	41.2	1,395	99.99	327
27	23,888	2,243	41.5	639	99.99	149
28	-	-	-	-	-	-
29	15,162	2,534	41.7	359	99.99	95
30	51,346	2,519	42.0	1,223	99.99	325

Total CO_2 Equivalent Reduced (tCO_2e)	**8,705**
CO_2 Emission Intensity [5] (tCO2e/MWh)	**0.489**
Quantity of Electricity Imported (MWh)	**5.263**
CO_2 Emissions Produced (tCO_2e/ month)	**2.57**
Total CO_2 Equivalent Reduced (tCO_2e/month)	**8,702**

NOTES:

- System down
(1) Flow data recorded by the flow meter
(2) Methane percentage recorded by the Landtec FAU Gas Analyzer
(3) System up-time
(4) Determined by the flare methane destruction efficiency measurement
(5) Default emission factor for the Brazilian North-Northeast interconnected grid