Clean Development Mechanism

Monitoring Report – Version 01

São João Landfill Gas to Energy Project (SJ)

1st Verification

Biogás Energia Ambiental SA

São Paulo
July 19, 2007

ARCADIS TETRAPLAN

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Glossary

CDM	Clean Development Mechanism
CDM-EB	Clean Development Mechanism Executive Board
PDD	Project Design Document
CER	Certified Emission Reduction
GHG	Greenhouse Gas
GWP	Global Warming Potential
CH_4	Methane
EF	Grid CO_2 Electricity Emission Factor

1. General Project Activity and Monitoring Information

1.1. Title and Registration Number of the Project Activity

São João Landfill Gas to Energy Project (SJ), Registration Number 0373

1.2. Short Description of the Project Activity:

São João Landfill Gas to Energy Project (SJ) is a project designed to explore the landfill gas produced in São João landfill, one of the biggest landfills in Brazil. This landfill is located in the metropolitan region of São Paulo, Brazil's biggest city and financial center of the country. With an estimated population of around 10 million citizens in 2000, São Paulo generates nearly 15.000 tons of waste daily. São João Landfill Gas to Energy Project (SJ)'s goal is to explore the gas produced in São João landfill, using it to generate electricity.

1.3. Real Project Implementation

The SJ includes high density polyethylene pipes connected to the landfill wells; blowers to extract the gas from the landfill; facilities for gas treatment, such as heat exchangers, chillers; and the flares, which will destroy the methane previously released to the atmosphere. The project will also produce 20 MW of electricity from January 25th 2008 on (by the time of the 1st Verification, the power house was under construction – the engines were already acquired).

The degassing station will be responsible for extracting the landfill gas from the landfill and transport it to the flares and, in the future, to the gas engines in the power plant. During the transportation, the gas goes through a treatment to allow its use as fuel for energy generation. Other functions of the degassing station are: drying landfill gas by gas coolers; and measuring and analyzing the quantity and quality of the landfill gas for safety, process and operating purposes.

The landfill gas will be cooled down when transported from the landfill, resulting in a condensate. This will be drained to condensate shafts, to be placed nearby the gas pipes. Once in the degassing station, the gas will be measured and sent to a flaring system. Biogás will install chillers in order to remove moisture in July/2007 – the chiller was already acquired. This is a very important step in the gas treatment process, since the condensate, which contains silicium components, could block the gas pipes and also damage the gas engines, due to the silicium. After this step, the gas will be heated again through a second heat exchanger, or economizer, to a temperature of around 25ºC, far enough from the dew point of 4ºC to avoid further condensation.

Blowers will be used for transportation of the landfill gas from the landfill to the flares. These blowers will be equipped with all the necessary safety equipment, including a noise reducing housing.

The figure below presents the installation of all collecting equipment from SJ, the location of the degassing station and the future location of the power house.

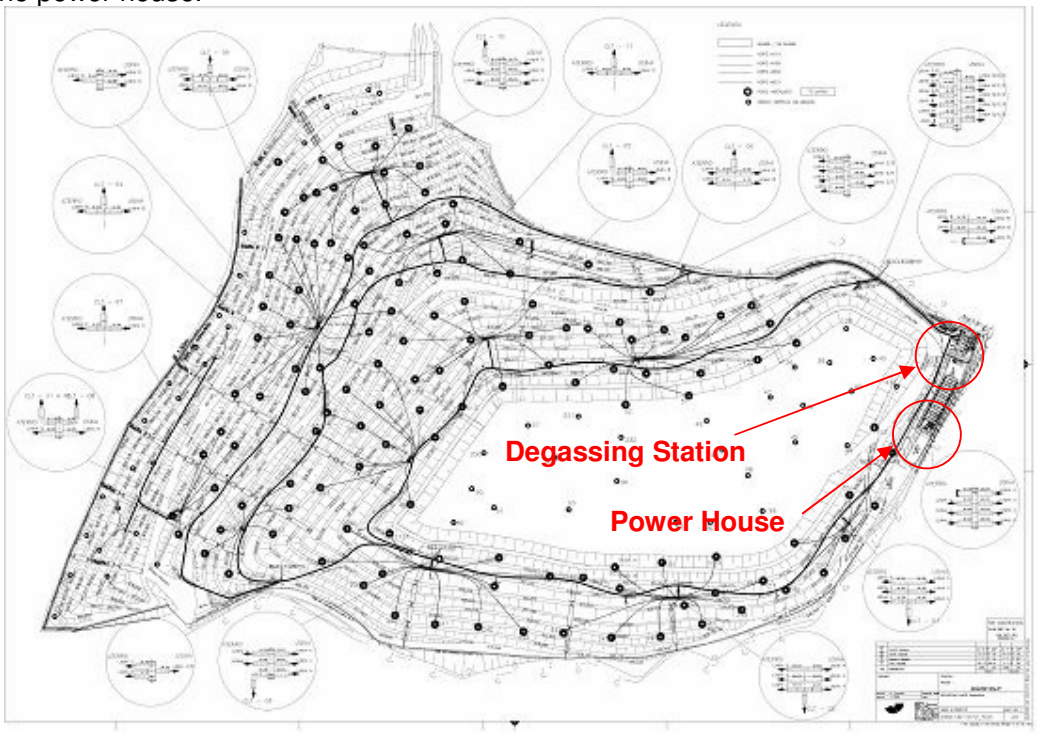

Figure 1.1: SJ Lay-out

Figure 1.2: Degassing Station

Figure 1.3: Future location of the Power House

The pictures below illustrate the collecting system of the SJ project.

Figure 1.4: Wellhead

Figure 1.5: Wellhead and Collection Pipeline

Figure 1.6: Transmission Pipeline

Figure 1.7: Gas entrance in the Degassing Station

On the pressure side of the degassing station, all kinds of gas analyzing and gas measuring instruments are present. These instruments are very important for safety, process and operating purposes. SJ counts, actually, with three mass-meters (Pitot): one measures the total gas collected (tag FIT610) and the other two measures the gas sent to the two existing flares (flares tags: F520 and F540; mass-meters tags: FIT524 and FIT544).

SJ will replace FIT610 by a turbine flow-meter (tag FIR600) and will install two turbines flow-meters: one to measure the gas sent to the flares (tag FIR500) and the other to measure the gas sent to the power house (tag FIR800). SJ will also install e third flare (tag F560), with a mass-meter connected (tag FIT564).

While the power house has not been installed, SJ will generate electricity through a diesel engine installed in the degassing station. The electricity produced is registered continuously by the PLC and the diesel consumed is registered via the contract between Biogás and the diesel supplier.

The pictures below presents the above mentioned installed equipment and the lay-out of the degassing station locating of the measuring equipment (installed and to be installed).

Figure 1.8: FIT610

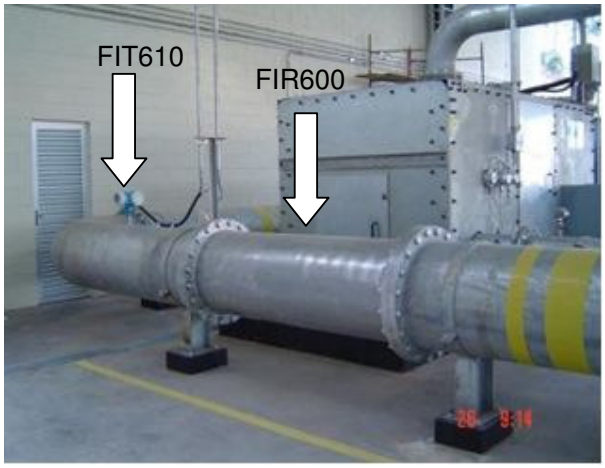

Figure 1.9: Future location of the turbine flow-meter FIR600

Figure 1.10: Future location of the turbine flow-meters FIR500 and FIR800

Figure 1.11: Flares F520 and F540

Figure 1.12: FIT524

Figure 1.13: FIT544

Figure 1.14: Future location of the flare F560

Figure 1.15: Blower

Figure 1.16: Detail of the blower

Figure 1.17: Methane Analyser A400

Figure 1.18: Future location of the chiller

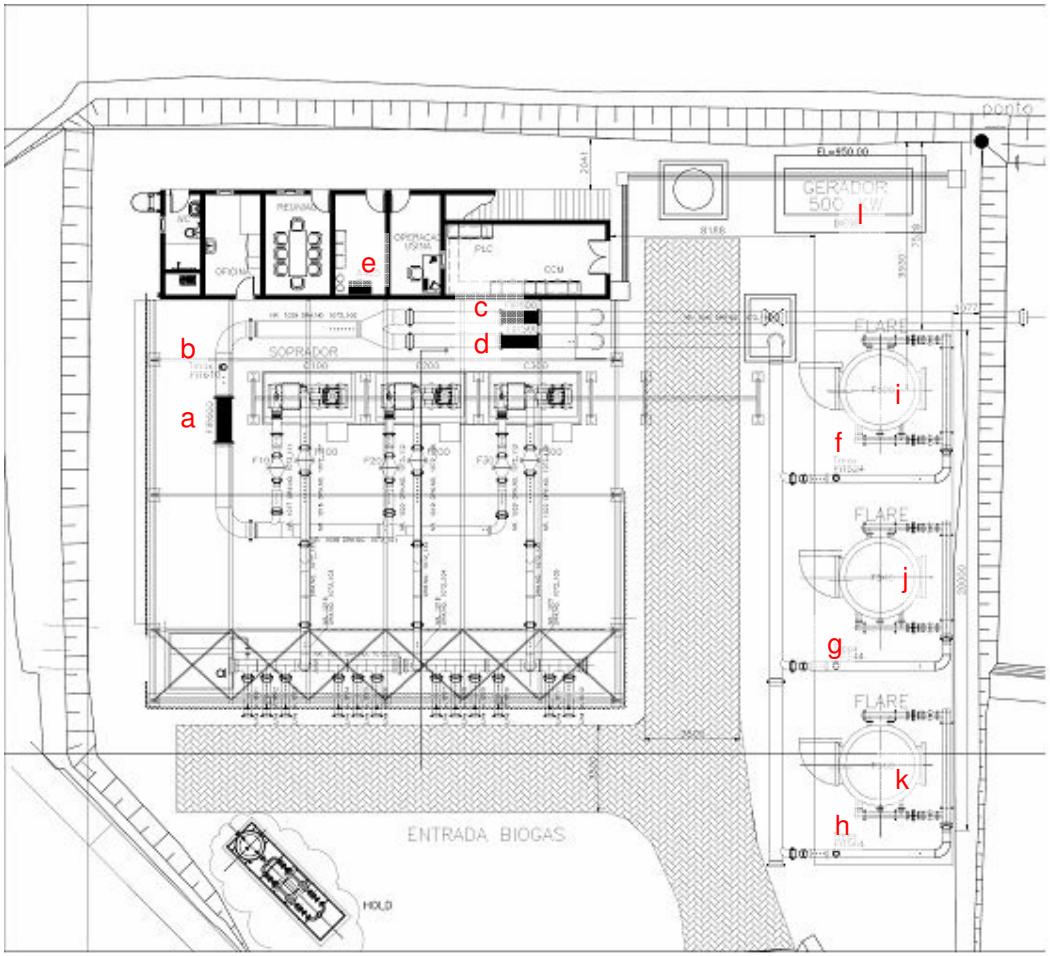

Figure 1.19: Lay-out of the Degassing Station

a) FIR600 – Turbine Flow-meter **(installed in 02/07/2007)**
b) FIT610 – Mass-meter
c) FIR500 – Turbine Flow-meter **(installed in 02/07/2007)**
d) FIR800 – Turbine Flow-meter **(installed in 02/07/2007)**
e) A400 – Methane Analyzer
f) FIT524 – Mass-meter
g) FIT544 – Mass-meter
h) FIT564 – Mass-meter **(to be installed)**
i) F520 – Flare
j) F540 – Flare
k) F560 – Flare **(to be installed)**
l) Diesel Electricity Generator

The whole process will be controlled by an electrical control system. This control system will be provided with a PLC (Programmable Logical Controller). All the measured process signals will be processed by the PLC to output signals for the gas-coolers, blowers, flares and gas-engines. Also the system will count on a SCADA system (visualization of the process on a personal computer). With this system it will be possible to control and monitor the installation at a distance, including through the internet.

The picture below presents the screen of the PLC.

Figure 1.20: Screen of the PLC

1.4. Changes against the PDD

For this 1st Verification, the only change against the PDD is the operation of the project only with flares. The project will begin to generate electricity only on January 25th 2008.

1.5. Monitoring Period

The monitoring period is from 22 May 2007 to 30 June 2007.

1.6. Methodology applied to the project activity (incl. version number):

1.6.1. Baseline methodology:

The baseline applied to this project activity is **ACM0001 – version 2: "Consolidated baseline methodology for landfill gas project activities".**

1.6.2. Monitoring methodology:

The monitoring methodology applied to this project activity is **ACM0001 – version 2: "Consolidated monitoring methodology for landfill gas project activities".**

1.7. Changes since last verification:

Not applicable, since it's the 1st Verification.

1.8. Person(s) responsible for the preparation and submission of the monitoring report:

This monitoring report was developed and revised by:

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2. Key monitoring activities according to the monitoring plan for the monitoring period stated in 1.5.

2.1. Monitoring equipment:

The following equipment are used to monitor the operation of the project and to monitor the Emission Reduction

2.1.1. Degassing Station

1 – Flow-meter FIT610 (Total Gas Collected)

Variable	Type of Equipment	Manufacturer	Model	Error (+/- %)
Gas Flow	Flow Meter	Endress & Hauser	65I-40AA0AD1AAABAB	5,000%
Temperature	Temperature Transmiter	Endress & Hauser	TMT187-B31FGA	0,010%
Pressure	Pressure Transmiter	Endress & Hauser	Cerabar PMC41GE12F1H11N1	0,050%

2 – Flow-meter FIT524 (Gas sent to Flare F520)

Variable	Type of Equipment	Manufacturer	Model	Error (+/- %)
Gas Flow	Flow Meter	Endress & Hauser	65I-20AA0AD1AAABAB	5,000%
Temperature	Temperature Transmiter	Endress & Hauser	TMT187-B31FGA	0,010%
Pressure	Pressure Transmiter	Endress & Hauser	Cerabar PMC41GE12F1H11N1	0,050%

3 – Flow-meter FIT544 (Gas sent to Flare F540)

Variable	Type of Equipment	Manufacturer	Model	Error (+/- %)
Gas Flow	Flow Meter	Endress & Hauser	65I-20AA0AD1AAABAB	5,000%
Temperature	Temperature Transmiter	Endress & Hauser	TMT187-B31FGA	0,010%
Pressure	Pressure Transmiter	Endress & Hauser	Cerabar PMC41GE12F1H11N1	0,050%

4 – Methane Analyzer A400

Variable	Type of	Manufacturer	Model	Error (+/- %)

	Equipment			
Methane Analyzer	Analyser Panel	Fisher & Rosemount	Binos 100	0,5%

4 – Exhaust Gas Methane Concentration
Analysis made by specialized company.

2.1.2. Involvement of Third Parties:

For this 1st Verification SJ has only one third party involved:

- Specialized company on gas analysis: As the analysis of methane concentration in the exhaust gas is made periodically, Biogás hired TASQA, a national and certified laboratory, to develop the analysis.

2.2. Data collection (accumulated for the whole monitoring period):

2.2.1. List of fixed default values:

Global Warming Potential of CH_4 (GWP_{CH4}) = 21 tCO_2e/tCH_4;
Methane Destruction in the Baseline = 20% of total gas collected;
Density of Methane, at STP (D_{CH4}) = 0,0007168 tons/m^3
Emission Factor of Diesel Engines = 0,9 tCO_2e/MWh

2.2.2. List of variables:

$Q_{biogas,\ collected}$ = amount of biogas collected from the landfill (Nm^3)
$Q_{biogas,\ flares}$ = amount of biogas sent to flares (Nm^3)
$\%_{CH4}$ = percentage of methane in the biogas (% volume);
$EG_{FF,\ y}$ = amount of electricity consumed from the diesel engines (MWh);
FE = Flare Efficiency (calculated using data from methane sent to flares and methane content in the exhaust gas)

2.2.3. Data concerning GHG emissions by sources of the project activity (referring to paragraph 53(a)):

During the 1st verification period, SJ had one source of project emissions: electricity consumed from diesel engines, as presented in the table below.

DATE	Electricity consumed from the diesel engines (MWh)
22/05/2007	0
23/05/2007	0
24/05/2007	0
25/05/2007	0
26/05/2007	0
27/05/2007	0
28/05/2007	0
29/05/2007	0
30/05/2007	0

DATE	Electricity consumed from the diesel engines (MWh)
31/05/2007	0
01/06/2007	0,8678
02/06/2007	0,8706
03/06/2007	0,8553
04/06/2007	0,8466
05/06/2007	0,7629
06/06/2007	0,8322
07/06/2007	0,6937
08/06/2007	0,8335
09/06/2007	0,5902
10/06/2007	0,6250
11/06/2007	0,4507
12/06/2007	0,8333
13/06/2007	0,7994
14/06/2007	0,8729
15/06/2007	1,0692
16/06/2007	0,7954
17/06/2007	0,7986
18/06/2007	0,7932
19/06/2007	0,7983
20/06/2007	0,7945
21/06/2007	0,8009
22/06/2007	0,8018
23/06/2007	0,7998
24/06/2007	0,8072
25/06/2007	0,8142
26/06/2007	0,8276
27/06/2007	0,8400
28/06/2007	0,8381
29/06/2007	0,6969
30/06/2007	0,8012

Obs: from 22 May 2007 to 31 May 2007 the flares operated only in testing regime – the operation of the system began on 01 June 2007, according with the Environmental License.

2.2.4. Data concerning GHG emissions by sources of the baseline (referring to paragraph 53(b)):

The following table presents the collected data from the period 22/05/2007 to 30/06/2007.

	COLLECTING SYSTEM			FLARING SYSTEM				
DAY	LFG Collected (Nm3)	Methane (%)	Methane Collected (N.m³)	Methane sent to F520 (N.m³)	F520 Efficiency (%)	Methane sent to F540 (N.m³)	F540 Efficiency (%)	Total Methane Destroyed (Nm³)
22/05/2007	0	0	0	0	0	0	0	0
23/05/2007	0	0	0	0	0	0	0	0

	COLLECTING SYSTEM			FLARING SYSTEM				
DAY	LFG Collected (Nm3)	Methane (%)	Methane Collected (N.m³)	Methane sent to F520 (N.m³)	F520 Efficiency (%)	Methane sent to F540 (N.m³)	F540 Efficiency (%)	Total Methane Destroyed (Nm³)
24/05/2007	0	0	0	0	0	0	0	0
25/05/2007	0	0	0	0	0	0	0	0
26/05/2007	0	0	0	0	0	0	0	0
27/05/2007	0	0	0	0	0	0	0	0
28/05/2007	0	0	0	0	0	0	0	0
29/05/2007	0	0	0	0	0	0	0	0
30/05/2007	0	0	0	0	0	0	0	0
31/05/2007	0	0	0	0	0	0	0	0
01/06/2007	227.235,2031	60,0583	136.473,6757	71.984,8955	99,9400%	72.437,4162	99,9400%	144.335,6583
02/06/2007	192.585,6094	59,9667	115.487,1704	71.875,0254	99,9400%	72.326,8555	99,9400%	144.115,3597
03/06/2007	216.806,1406	60,0261	130.140,2425	71.946,2455	99,9400%	72.398,5233	99,9400%	144.258,1620
04/06/2007	214.909,1094	60,3833	129.769,2839	72.374,4349	99,9400%	72.829,4045	99,9400%	145.116,7171
05/06/2007	201.188,7969	57,4739	115.631,0742	68.887,2533	99,9400%	69.320,3013	99,9400%	138.124,6301
06/06/2007	226.539,5781	56,5292	128.060,9357	67.754,8964	99,9400%	68.180,8260	99,9400%	135.854,1610
07/06/2007	224.972,1406	56,3458	126.762,4274	67.535,1562	99,9400%	67.959,7044	99,9400%	135.413,5637
08/06/2007	205.945,3438	56,0833	115.501,0136	67.220,5282	99,9400%	67.643,0986	99,9400%	134.782,7085
09/06/2007	171.400,0000	56,5111	96.860,0444	67.733,2553	99,9400%	68.159,0489	99,9400%	135.810,7688
10/06/2007	207.920,0000	56,3000	117.058,9600	67.480,2211	99,9400%	67.904,4240	99,9400%	135.303,4144
11/06/2007	207.920,0000	56,0000	116.435,2000	67.120,6463	99,9400%	67.542,5888	99,9400%	134.582,4371
12/06/2007	199.368,8750	56,5458	112.734,7918	67.774,8728	99,9400%	68.200,9280	99,9400%	135.894,2153
13/06/2007	222.375,5781	55,8208	124.131,9008	66.905,9001	99,9400%	67.326,4927	99,9400%	134.151,8534
14/06/2007	225.922,0000	55,7333	125.913,8613	66.801,0241	99,9400%	67.220,9574	99,9400%	133.941,5683
15/06/2007	210.266,2813	55,5792	116.864,2469	66.616,2426	99,9400%	67.035,0142	99,9400%	133.571,0661
16/06/2007	219.151,8438	55,7250	122.122,3649	66.791,0359	99,9400%	67.210,9064	99,9400%	133.921,5412
17/06/2007	224.608,8906	55,9875	125.752,9026	67.105,6640	99,9400%	67.527,5123	99,9400%	134.552,3963
18/06/2007	222.907,4688	58,5857	130.591,9328	70.219,8394	99,9400%	70.661,2644	99,9400%	140.796,5751
19/06/2007	228.262,7500	58,9917	134.656,0006	70.706,4070	99,9400%	71.150,8907	99,9400%	141.772,1833
20/06/2007	222.770,9449	58,7182	130.807,0485	70.378,6127	99,9400%	70.821,0358	99,9400%	141.114,9287
21/06/2007	216.952,7188	58,9318	127.854,1818	70.634,6736	99,9400%	71.078,7064	99,9400%	141.628,3520
22/06/2007	216.788,3594	58,7043	127.264,1925	70.362,0315	99,9400%	70.804,3504	99,9400%	141.081,6821
23/06/2007	216.992,9375	58,3917	126.705,7928	69.987,2572	99,9400%	70.427,2201	99,9400%	140.330,2286
24/06/2007	220.227,4219	58,6792	129.227,6159	70.331,8498	99,9400%	70.773,9790	99,9400%	141.021,1653
25/06/2007	231.238,6719	59,2875	137.095,6276	71.060,9878	99,9400%	71.507,7005	99,9400%	142.483,1471
26/06/2007	228.655,9531	59,1875	135.335,7423	70.941,1295	99,9400%	71.387,0888	99,9400%	142.242,8213
27/06/2007	227.699,3750	58,9875	134.314,1688	70.701,4129	99,9400%	71.145,8652	99,9400%	141.762,1698
28/06/2007	228.731,1172	59,1083	135.199,1512	70.846,2416	99,9400%	71.291,6045	99,9400%	142.052,5634
29/06/2007	198.349,3594	60,0083	119.026,1447	71.924,9663	99,9400%	72.377,1104	99,9400%	144.215,4954
30/06/2007	228.061,4219	60,0708	136.998,3966	71.999,8778	99,9400%	72.452,4927	99,9400%	144.365,6990

Obs: from 22 May 2007 to 31 May 2007 the flares operated only in testing regime – the operation of the system began on 01 June 2007, according with the Environmental License.

2.2.5. Data concerning leakage (referring to paragraph 53(c)):

According with ACM0001 – version 02, no leakage needs to be considered.

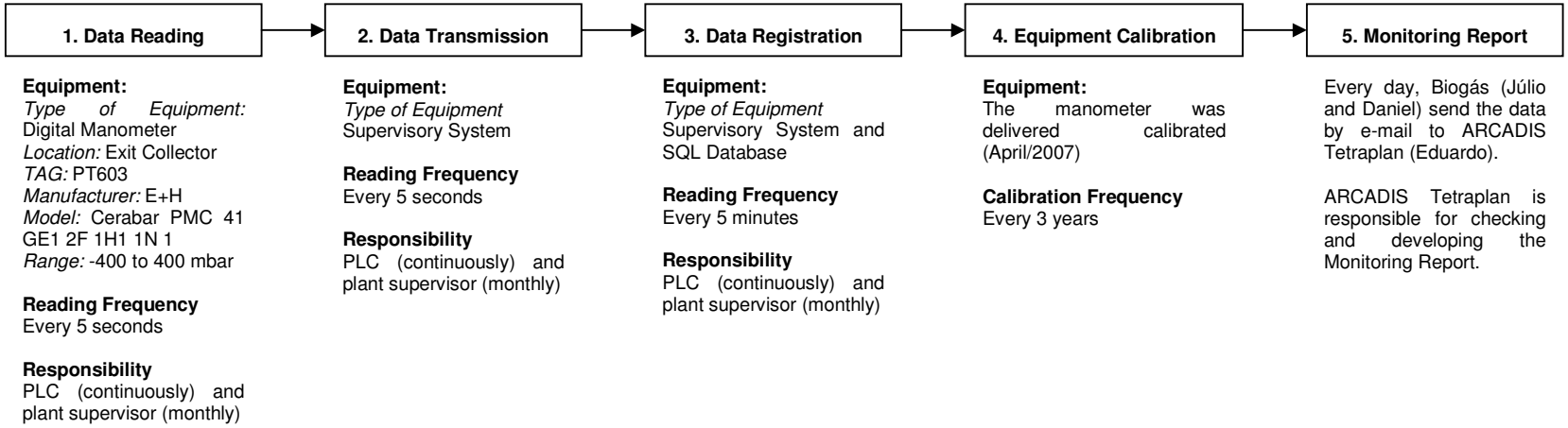
3. Quality assurance and quality control measures

3.1. Documented procedures and management plan:

3.1.1. Roles and responsibilities:

The following flow-chart represents the procedures and responsibilities on the monitoring of each parameter, according with an internal procedure from Biogás:

a) Pressure Readings



b) Temperature Readings

1. Data Reading	2. Data Transmission	3. Data Registration	4. Equipment Calibration	5. Monitoring Report
Equipment: *Type of Equipment:* Digital Termometer *Location:* Exit Collector *TAG:* TT604 *Manufacturer:* E+H *Model:* TMT 187– 31GFA *Range:* 0 to 150°C **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System and SQL Database **Reading Frequency** Every 5 minutes **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** The manometer was delivered calibrated (April/2007) **Calibration Frequency** Every 3 years	Every day, Biogás (Júlio and Daniel) send the data by e-mail to ARCADIS Tetraplan (Eduardo). ARCADIS Tetraplan is responsible for checking and developing the Monitoring Report.

c) Total Flow

1. Data Reading	2. Data Transmission	3. Data Registration	4. Equipment Calibration	5. Monitoring Report
Equipment: *Type of Equipment:* Digital Mass-meter *Location:* Exit Collector *TAG:* FIT610 *Manufacturer:* E+H *Model:* 65I-40AA0AD1AAABAB *Range:* 900-20.000 m^3/h **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System and SQL Database **Reading Frequency** Every 5 minutes **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** The manometer was delivered calibrated (April/2007) **Calibration Frequency** Every 5 years	Every day, Biogás (Júlio and Daniel) send the data by e-mail to ARCADIS Tetraplan (Eduardo). ARCADIS Tetraplan is responsible for checking and developing the Monitoring Report.

d) Flow to Flare F520

1. Data Reading	2. Data Transmission	3. Data Registration	4. Equipment Calibration	5. Monitoring Report
Equipment: *Type of Equipment:* Digital Mass-meter *Location:* Entrance of flares F520 *TAG:* FIT524 *Manufacturer:* E+H *Model:* 65I-20AA0AD1AAABAB *Range:* 500-7.000 m^3/h **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System and SQL Database **Reading Frequency** Every 5 minutes **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** The manometer was delivered calibrated (April/2007) **Calibration Frequency** Every 5 years	Every day, Biogás (Júlio and Daniel) send the data by e-mail to ARCADIS Tetraplan (Eduardo). ARCADIS Tetraplan is responsible for checking and developing the Monitoring Report.

e) Flow to Flare F540

1. Data Reading	2. Data Transmission	3. Data Registration	4. Equipment Calibration	5. Monitoring Report
Equipment: *Type of Equipment:* Digital Mass-meter *Location:* Entrance of flares F540 *TAG:* FIT544 *Manufacturer:* E+H *Model:* 65I-20AA0AD1AAABAB *Range:* 500-7.000 m^3/h **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System **Reading Frequency** Every 5 seconds **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System and SQL Database **Reading Frequency** Every 5 minutes **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** The manometer was delivered calibrated (April/2007) **Calibration Frequency** Every 5 years	Every day, Biogás (Júlio and Daniel) send the data by e-mail to ARCADIS Tetraplan (Eduardo). ARCADIS Tetraplan is responsible for checking and developing the Monitoring Report.

f) Methane Concentration

1. Data Reading	2. Data Transmission	3. Data Registration	4. Equipment Calibration	5. Monitoring Report
Equipment: *Type of Equipment:* Methane Analyzer *Location:* Analyzer Room *TAG:* A400 *Manufacturer:* E+H *Model:* Binos 100-CH_4 *Range:* 0-100% **Reading Frequency** Every 5 minutes **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System **Reading Frequency** Every 5 minutes **Responsibility** PLC (continuously) and plant supervisor (monthly)	**Equipment:** *Type of Equipment* Supervisory System and SQL Database **Reading Frequency** Every 5 minutes **Responsibility** Plant supervisor (monthly)	**Equipment:** The manometer was delivered calibrated (April/2007) **Calibration Frequency** Weekly, with a standard gas certified by INMETRO	Every day, Biogás (Júlio and Daniel) send the data by e-mail to ARCADIS Tetraplan (Eduardo). ARCADIS Tetraplan is responsible for checking and developing the Monitoring Report.

g) Flare Efficiency

1. Data Reading	2. Data Transmission	3. Data Registration	4. Equipment Calibration	5. Monitoring Report
Equipment: *Type of Equipment:* According with APEX-EPA 18 *Location:* *Manufacturer:* *Model:* *Range:* **Reading Frequency** Every 3 months **Responsibility** Specialized company on gas analysis	**Equipment:** *Type of Equipment* MS Excel spreadsheet **Reading Frequency** NA **Responsibility** Plant supervisor (every 3 months)	**Equipment:** *Type of Equipment* MS Excel spreadsheet **Reading Frequency** NA **Responsibility** Plant supervisor (every 3 months)	**Equipment:** NA **Calibration Frequency** NA	Every 4 months, Biogás (Júlio and Daniel) send the data by e-mail to ARCADIS Tetraplan (Eduardo). ARCADIS Tetraplan is responsible for checking and developing the Monitoring Report.

3.1.2. Trainings:

All training was supplied before the project's implementation. The training certificates will be presented to the Verification Team by the time of the on-site audit.

3.1.3. Calibration:

According with an internal procedure from Biogás, the measuring equipment will be calibrated according with the following table:

Equipment	Location	Date of the last calibration	Date of the next calibration
Mass-meter FIT610	Degassing Station (totalizer)	Apr/2007	Apr/2012
Turbine flow-meter FIR600	Degassing Station (totalizer)	Jun/2007	Apr/2012
Turbine flow-meter FIR500	Degassing Station (gas to the power house)	Jun/2007	Apr/2012
Turbine flow-meter FIR800	Degassing Station (gas to the flares)	Jun/2007	Apr/2012
Methane Analyzer	Degassing Station	Apr/2007	Apr/2010
Mass-meter FIT524	Flare F520	Apr/2007	Apr/2012
Mass-meter FIT544	Flare F540	Apr/2007	Apr/2012
Mass-meter FIT564	Flare F560	Apr/2007	Apr/2012

4. Calculation of GHG emission reductions

4.1. Table providing the formulas used:

From 22/05/2007 to 30/06/2007

Variable	Description
A	Methane sent to F520
B	F520 Efficiency
C	Total methane destroyed in F520
D	FIT624 error
E	Temperature error
F	Pressure error
G	Methane Concentration error
H = $\sqrt{D^2 + E^2 + F^2 + G^2}$	Total error the gas destroyed in F520
I = C . (1-H)	**Total methane corrected destroyed at F520**
J	Methane sent to F540
K	F540 Efficiency
L	Total methane destroyed in F540
M	FIT644 error
N	Temperature error
O	Pressure error
P	Methane Concentration error
Q = $\sqrt{D^2 + E^2 + F^2 + G^2}$	Total error the gas destroyed in F540
R = L . (1-Q)	**Total methane corrected destroyed at F540**
S = I + R	**Total methane destroyed at the flares corrected**
T = 0,0007168	Density of Methane at the STPC
U = S . T	Total weight of methane destroyed
V = 21	CO_2 equivalency
W = U . V	Total equivalent carbon
X = 20%	Baseline
Y = W . (1-X)	**Total Liquid Carbon**
Z	Electricity consumed from the diesel generators
AA = 0,9 tCO_2/MWh	Diesel CO_2 Emission Factor
AB = Z . AA .	**Project Emissions due to the consumption of electricity**
AC = Y – AB	**TOTAL CREDITS DURING THE PERIOD**

4.2. Description and consideration of measurement uncertainties and error propagation:

The formulae used to calculate the error was (given specific error for each monitoring equipment, as presented on B.1):

$$\varepsilon = \sqrt{(Gas\ flow)^2 + (Temperature)^2 + (Pressure)^2 + (Gas\ analysis)^2}$$

4.2.1. Gas to Flare F520:

e = SQRT(5^2 + $0{,}01^2$ + $0{,}05^2$ + 1^2) = 5,100 %

4.2.2. Gas to Flare F540:

e = SQRT(5^2 + $0{,}01^2$ + $0{,}05^2$ + 1^2) = 5,100 %

4.3. GHG emission reductions (referring to B.2. of this document):

4.3.1. Project emissions:

$PE_{monitoring\ period}$ = 21 tCO_2e

4.3.2. Baseline emissions:

$BE_{monitoring\ period}$ = 47.745 tCO_2e

4.3.3. Leakage:

$L_{monitoring\ period}$ = 0

4.3.4. Summary of the emissions reductions during the monitoring period:

Total CO_2e from methane destroyed in flares	47.745
Total CO_2e from electricity consumption	21
TOTAL CO_2e	**47.724**