



2nd MONITORING REPORT

CRUZ ALTA BAGASSE COGENERATION PROJECT (CABCP)

CDM Registration Reference Number 0216

Monitoring Period:

From 1 July, 2006 to 31 October, 2009

Prepared by Econergy Brasil Ltda.



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1. Introduction

This document reports the Emission Reductions (ERs) generated by Cruz Alta Bagasse Cogeneration Project (hereinafter CABCP), CDM Registration Reference Number 216, in the following Monitoring Periods:

Year	Monitoring Period	
	Date (DD/MM/YY)	
	From	To
2006	01/07/06	31/12/06
2007	01/01/07	31/12/07
2008	01/01/08	31/12/08
2009	01/01/09	31/10/09

The CABCP operation has been monitored in accordance with the requirements of the applicable Monitoring Methodology AM0015: “Bagasse-based cogeneration connected to an electricity grid” as described in its registered Project Design Document. Quality Assurance and Quality Control Mechanism stipulated in the Monitoring Methodology have been applied. The metering equipments were calibrated every two years in accordance with the System National Operator’s regulations.

Configuration of the cogeneration power plant before and after project implementation

Error! Reference source not found. (below) shows how Cruz Alta’s cogeneration infrastructure will be updated according to CABCP phases:

Table 1 - Cogeneration equipment upgrades

PHASE 0 Total Installed Capacity 10.4 MW	PHASE 1 Total Installed Capacity 29.8 MW	PHASE 2 Total Installed Capacity 39.8 MW
ACTIVE	ACTIVE	ACTIVE
TURBOGENERATORS: Two 4 MW (backpressure) One 2.4MW (backpressure)	TURBOGENERATORS: Two 4 MW (backpressure) One 21.8 MW (backpressure)	TURBOGENERATORS: One 4 MW (backpressure) One 21.8 MW (backpressure) One 10MW (backpressure)
BOILERS*: Three 22 bar boilers**	BOILERS: Three with 22 bar** One with 63 bar	BOILERS: Five with 22 bar*** One with 63 bar
	UNINSTALLED	STAND BY
	TURBOGENERATOR: One 2.4 MW (backpressure)	TURBOGENERATOR: One 4 MW (backpressure)

(*) All pressures here referred are absolute pressures unless otherwise mentioned.

(**)A fourth 22 bar boiler was used to feed directly the mill production process and was not used for electricity generation purposes. It was not connected to the cogeneration process.

(***)In Phase 2 the fourth existing 22 bar boiler was integrated to the cogeneration system. And a new 22 bar boiler was also installed, totalizing five 22 bar boilers

2. Emission Reductions Calculation Formula

ERs generated by the CABCP are calculated as follows:

$$\left\{ \begin{array}{l} \text{Net generation from project} \\ \text{during the monitoring period} \\ \text{(MWh)} \end{array} \right\} \times \left\{ \begin{array}{l} \text{Baseline emission factor} \\ \text{(tCO}_2\text{e /MWh)} \end{array} \right\} = \left\{ \begin{array}{l} \text{Net CO}_2 \text{ emissions avoided at grid} \\ \text{(tCO}_2\text{e)} \end{array} \right\}$$

Where the ex-ante baseline emission factor is 0.2677 tCO₂e/MWh, for the first crediting period, according to the Cruz Alta PDD registered.

The project activity follows the steps provided by the methodology taking into account the (b) Simple Adjusted OM calculation for the STEP 1, since there would be no available data for applying to the preferred option – (c) *Dispatch Data Analysis OM*. For STEP 2, the option 1 was chosen. The following table presents the key information and data used to determine the baseline scenario.

Table 2- Parameters used to determine baseline scenario

Variable	Data type	Value	Unit	Data Source
EG _y	Electricity supplied to the grid by the Project.	Obtained throughout project activity lifetime.	MWh	Cruz Alta
EF _y	CO ₂ emission factor of the Grid.	0.2677	tCO ₂ e/MWh	Calculated
EF _{OM,y}	CO ₂ Operating Margin emission factor of the grid.	0.4310	tCO ₂ e/MWh	This value was calculated using data from ONS (National System Operator).
EF _{BM,y}	CO ₂ Build Margin emission factor of the grid.	0.1045	tCO ₂ e/MWh	This value was calculated using data from ONS
λ _y	Fraction of time during which low-cost/ must-run sources are on the margin.	λ ₂₀₀₂ = 0.5053 λ ₂₀₀₃ = 0.5312 λ ₂₀₀₄ = 0.5041	-	This value was calculated using data from ONS.

3. Dispatched energy to the grid in the Monitoring Periods

Table 3 – Net amount of electricity sold to the grid from 1st July 2006 to 31st October 2009

Date		Invoice number	Invoice emission date	Net amount of energy sold to the grid (MWh)
From	To			
1-Jul-06	31-Jul-06	358109	8-Aug-06	7,440.00
		358110	8-Aug-06	1,673.50
1-Aug-06	31-Aug-06	363598	11-Sep-06	7,440.00
		363599	11-Sep-06	1,488.22
1-Sep-06	30-Sep-06	368351	10-Oct-06	7,200.00
		368352	10-Oct-06	881.01
1-Oct-06	31-Oct-06	373342	9-Nov-06	7,440.00
		373343	9-Nov-06	169.82
1-Nov-06	30-Nov-06	377945	7-Dec-06	5,547.12
1-Dec-06	31-Dec-06	382707	12-Jan-07	1,949.34
1-Jul-06	31-Dec-06			41,229.01
1-Jan-07	31-Jan-07	-	-	-
1-Feb-07	28-Feb-07	-	-	-
1-Mar-07	31-Mar-07	-	-	-
1-Apr-07	30-Apr-07	400064	11-May-07	2,412.46
1-May-07	31-May-07	405838	14-Jun-07	7,440.00
		405837	14-Jun-07	1,312.30
1-Jun-07	30-Jun-07	410045	12-Jul-07	7,200.00
		410046	12-Jul-07	1,800.00
		410047	12-Jul-07	722.55
1-Jul-07	31-Jul-07	414201	8-Aug-07	7,440.00
		414202	8-Aug-07	1,860.00
		414204	8-Aug-07	481.39
1-Aug-07	31-Aug-07	418449	10-Sep-07	7,440.00
		418450	10-Sep-07	1,860.00
		418451	10-Sep-07	1,161.80
1-Sep-07	30-Sep-07	422901	9-Oct-07	7,200.00
		422902	9-Oct-07	1,800.00
		422903	9-Oct-07	645.38
1-Oct-07	31-Oct-07	428084	12-Nov-07	7,440.00
		428085	12-Nov-07	1,176.07
1-Nov-07	30-Nov-07	432508	12-Dec-07	6,546.50
1-Dec-07	31-Dec-07	435820	10-Jan-08	2,507.55
1-Jan-07	31-Dec-07			68,446.00
1-Jan-08	31-Jan-08	440887	19-Feb-08	196.29

1-Feb-08	28-Feb-08	-	-	-
1-Mar-08	31-Mar-08	1581	10-Apr-08	5.11
1-Apr-08	30-Apr-08	6880	14-May-08	4,152.45
1-May-08	31-May-08	11694	12-Jun-08	7,440.00
		11697	12-Jun-08	774.70
1-Jun-08	30-Jun-08	15372	7-Jul-08	7,200.00
		15373	7-Jul-08	1,800.00
		15374	7-Jul-08	57.67
1-Jul-08	31-Jul-08	21360	13-Aug-08	7,440.00
		21361	13-Aug-08	1,609.65
1-Aug-08	31-Aug-08	26623	11-Sep-08	7,440.00
		26624	11-Sep-08	1,693.10
1-Sep-08	30-Sep-08	32035	9-Oct-08	6,844.22
1-Oct-08	31-Oct-08	38374	10-Nov-08	6,033.81
1-Nov-08	30-Nov-08	43310	5-Dec-08	3,869.60
1-Dec-08	31-Dec-08	49071	12-Jan-09	861.72
1-Jan-08	31-Dec-08			57,418.31
1-Jan-09	31-Jan-09	-	-	-
1-Feb-09	28-Feb-09	-	-	-
1-Mar-09	31-Mar-09	-	-	-
1-Apr-09	30-Apr-09	71380	8-May-09	2.73
		73895	21-May-09	5,795.02
1-May-09	31-May-09	76747	5-Jun-09	7,440.00
		76765	5-Jun-09	27.35
1-Jun-09	30-Jun-09	82801	10-Jul-09	7,200.00
		82818	10-Jul-09	608.93
1-Jul-09	31-Jul-09	89081	12-Aug-09	6,841.31
1-Aug-09	31-Aug-09	95158	10-Sep-09	7,196.71
1-Sep-09	30-Sep-09	100551	7-Oct-09	6,103.87
1-Oct-09	31-Oct-09	105695	9-Nov-09	5,883.81
1-Apr-09	31-Oct-09			47,099.73
TOTAL				214,193.05

Invoices are available with the project participants.

The energy meters were calibrated and were working in accordance with Brazilian requirements.

It is important to explain that until October 11th 2007 no backup meter was used to measure the exported electricity and the main (and only) meter was controlled by the concessionary (CPFL). Since October 2007, the energy meter was substituted by 2 meters (main and backup) to be in compliance with the new Brazilian Requirements from Brazilian Electrical System Operator (ONS)¹.

¹ <http://www.ons.org.br>

4. ERs Generated in the Monitoring Period

4.1. Table providing information on the energy meters used (including type, manufacturer, model, serial number, location, information to specific uncertainty and range):

Measuring equipment – Electricity consumption (grid)

Instrument	Manufacturer	Model	Serial Number	Category	Location	Range	Period	Starting period	Finishing period	Calibration		Error ² (+/-%)	Uncertainty ³
										Calibration frequency	Date of the last external calibration		
Grid Meter (Electricity consumption in the grid)	Elo	Elo 2180 SP	40084920-9	Main	Control room	90-200 V 5-10 A	Period 1	10-Nov-04	10-Nov-06	2 years	10-Nov-04	0.20%	0.000%
	Elo	Elo 2180 SP	40085996-3	Main			Period 2	11-Oct-07	11-Oct-09		11-Oct-07	0.20%	0.041%
	Elo	Elo 2180 SP	40085996-3	Main			Period 3	25-Nov-09	25-Nov-11		25-Nov-09	0.20%	0.000%

The ER calculation was made after discounting the equipments error and uncertainty for the whole monitoring period. A simple example of the discount is shown below, and the detailed calculation is presented in the Cruz Alta Monitoring Report Spreadsheet.

$$[\text{Measurement Error (\%)}] = \{ [\text{Error (\%)} + \text{Uncertainty (\%)}]^2 \}^{1/2}$$

$$\text{Corrected Electricity Sold to the grid (MWh)} = \left\{ \left[\text{Electricity Sold to the grid (MWh)} \right] * \left[1 - \text{Measurement Error (\%)} \right] \right\}$$

² Extracted from the manufacturer specification ELO 2180 SP.

³ Extracted from METROWATT Calibration Certificate dated on 11/10/2007.

Table 4 – Emission Reductions from 1st July 2006 to 31st October 2009

Period	Net electricity dispatched to the grid (MWh)⁴	Baseline Emission Factor	Emission Reductions (ERs)
From 01/07/2006 to 31/12/2006	41,143.48	0.2677	11,014.11
From 01/01/2007 to 31/12/2007	68,281.04	0.2677	18,278.84
From 01/01/2008 to 31/12/2008	57,279.94	0.2677	15,333.84
From 01/01/2009 to 31/10/2009	46,988.63	0.2677	12,578.86
TOTAL	213,693.09	0.2677	57,205

In accordance with the formula in section 2, the CABCP has in the monitoring periods generated: **57,205 (fifty seven thousand, two hundred and five) tCO₂e**.

$$(213,693.09 \text{ MWh}) * 0.2677 \text{ tCO}_2\text{e/MWh} = 57,205 \text{ tCO}_2\text{e}$$

The reason for the increase in the emission reductions from 35,393⁵ CERs as estimated in the PDD, to 57,205 CERs for the respective monitoring period, is the increase of bagasse consumed in the cogeneration plant.

This occurred because the sugarcane processed and the duration of the crop season also increased due to the high demand of sugar and alcohol in the region and consequently the greater production of sugar and alcohol at the mill.

The 4 graphics⁶ below show some parameters that influenced the CERs.

⁴ After error discount

⁵ CruzAltaMonitoringReportv1_2009.11.25_JAS.xls

⁶ CruzAltaMonitoringReportv1_2009.11.25_JAS.xls

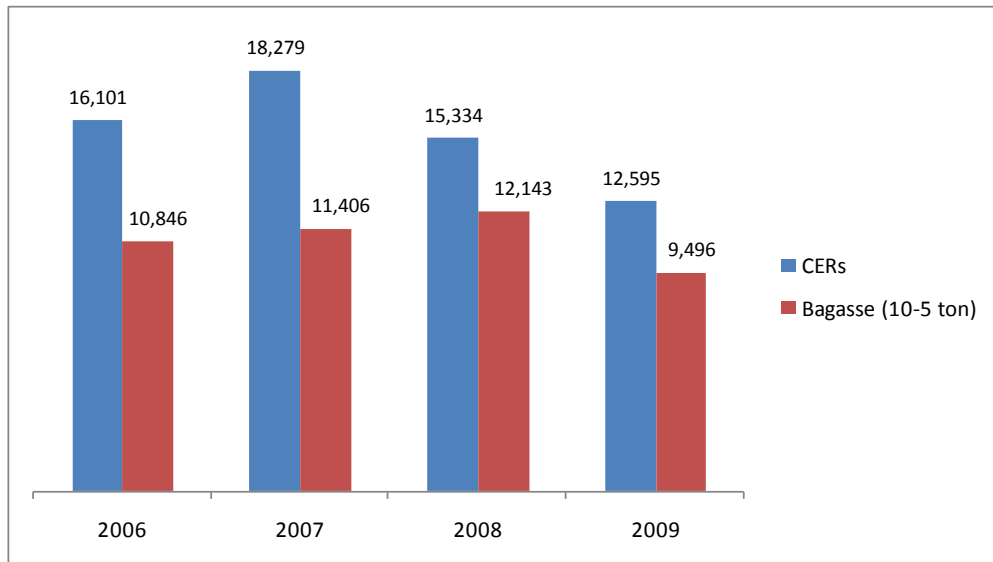


Figure 1- Calculated Emission Reductions and Amount of Bagasse Consumed from January 2006 to October 2009

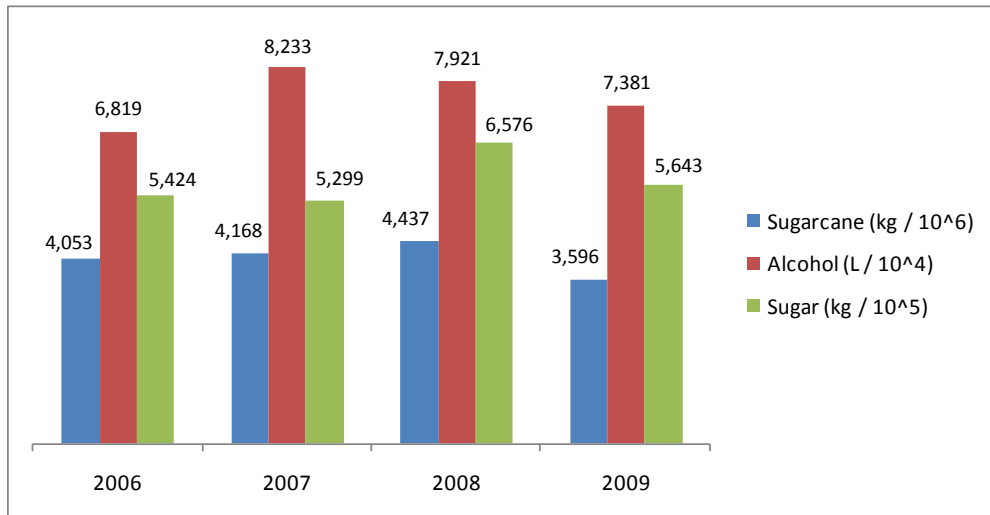


Figure 2- Sugar and Ethanol production and quantity of sugarcane crushed from January 2006 to October 2009

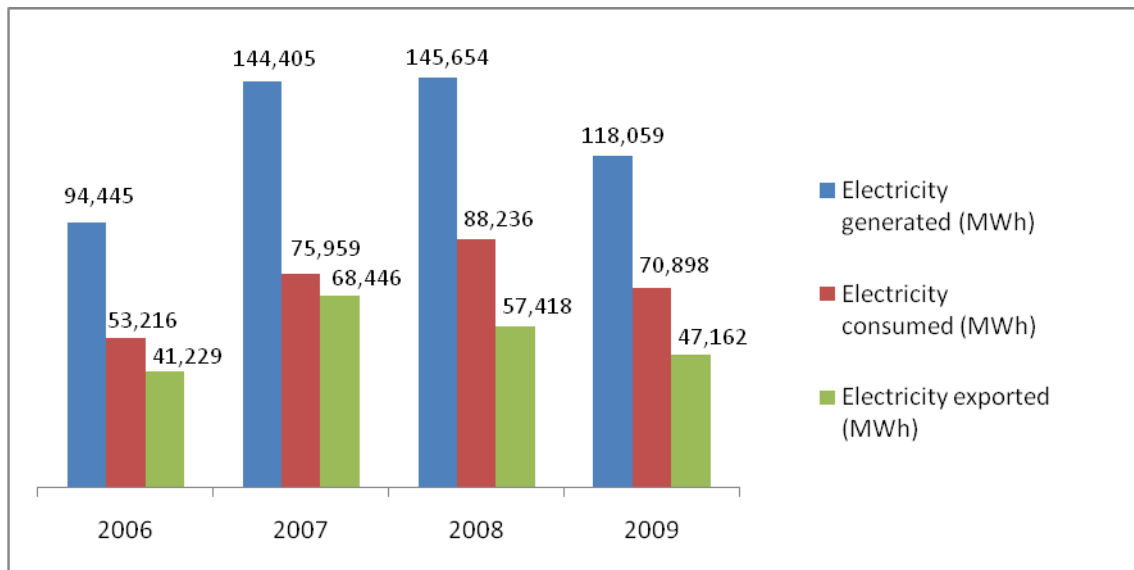


Figure 3- Generated, consumed and exported Electricity from January 2006 to October 2009

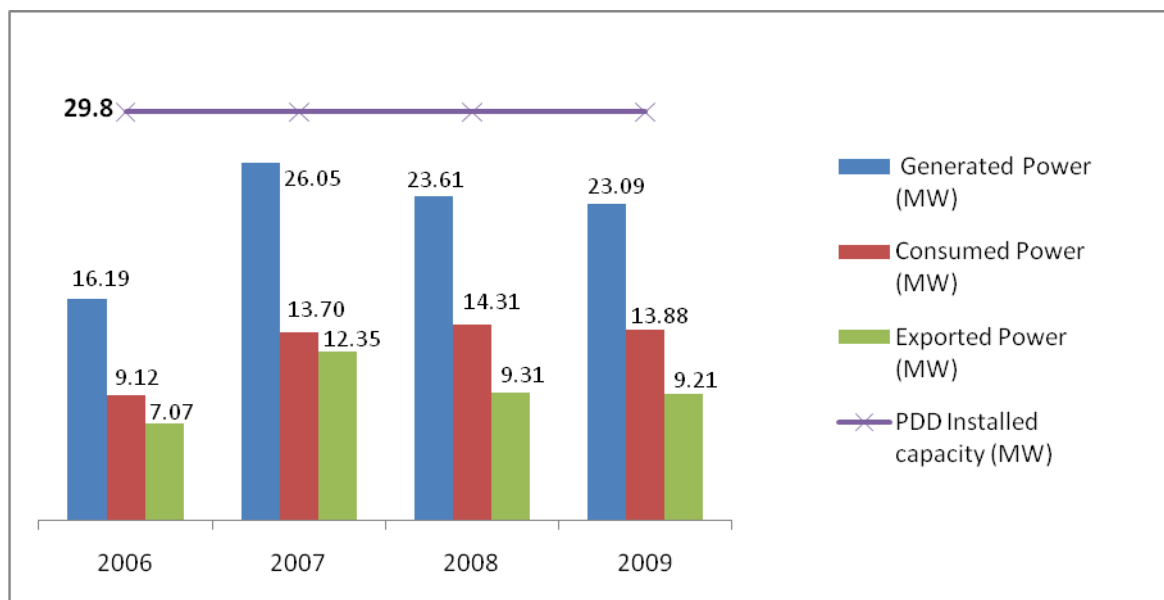


Figure 4- Generated, consumed and exported power from January 2006 to October 2009

As shown in Figure 4 above, it is important to highlight that the addition of a 10 MW turbo-generator to the cogeneration plant at Cruz Alta do not result any increase in the project electricity generation. As explained in Table 1, the 10 MW turbo-generation became active replacing the 4 MW turbo-generator sent to standby.

5. Quality assurance and quality control measures

All the procedures related to the Monitoring System and Procedures are available at the Guarani internal database system