CLEAN DEVELOPMENT MECHANISM
MONITORING REPORT

Central Energética do Rio Pardo Cogeneration Project

(CDM Registration Reference Number 0209)

Monitored Period: 01 January 2007 to 31 December 2007
Crediting Period: 01 May 2003 to 30 April 2010

-- TABLE OF CONTENTS –

Section A. General description of project activity

A.1. Title of the project activity

Central Energética do Rio Pardo cogeneration project ("CERPA Cogeneration Project").

Document version number: 01, 23/01/2008.

Monitoring Report based on the PDD Version Number: 4B, from 21/12/2005.

A.2. Description of the project activity

The primary objective of the CERPA Cogeneration Project is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to the environmental, social and economic sustainability by increasing renewable energy's share of the total Brazilian (and the Latin America and the Caribbean region's) electricity consumption.

Usina da Pedra is a sugar mill located in Serrana, state of São Paulo. The company is owned by the Biagi family, which is one of the most traditional producers in the sugar industry in Brazil. Irmãos Biagi S/A, the family company, owns two other sugarcane mills (Ibirá Mill and Buriti Mill). Usina da Pedra produces sugar, anhydrous and hydrated alcohol, as well as generates its own electricity.

In 2003, CERPA upgraded its equipment with the objective of using bagasse more efficiently to cogenerate electricity. A more efficient cogeneration of this renewable fuel allows Usina da Pedra mill to sell a surplus of electricity to the grid and creates a competitive advantage. The electricity sold to the grid diversifies income to the mill and it helps meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to the environmental, social and economic sustainability by increasing renewable energy's share of the total Brazilian (and the Latin America and the Caribbean region's) electricity consumption.

In May 2003, CERPA, which is the thermoelectric plant of Usina da Pedra, sold its first MWh to the local power utility CPFL (*Companhia Paulista de Força e Luz*). Currently, there is a PPA signed with CPFL to commercialise 18 MW.

CERPA operates with a configuration using a high-pressure boiler and a multiple stage backpressure turbine coupled with two new 15 MW generators. There are 12 MW for internal consuming and 18 MW of power surplus, operating at full capacity during the crop-season (May to November) and part of the capacity out of the crop season, when the production allows it.

Usina da Pedra produced, during harvest 06/07 (April – November/2006) 4,101,266 tones of sugar cane[1], corresponding to 1,178,704 tones of bagasse (see annexed CERPA's energy balance). From this quantity, CERPA consumed the equivalent of 330,525 tones of bagasse to generate electricity, which represent 28% of the total produced in the project

[1] this number can be checked at : Sugar Cane Industry Union (from the Portuguese *UNICA*) http://www.portalunica.com.br/portalunica/?Secao=referência&SubSecao=estatísticas&SubSubSecao=ranking

boundary, and the equivalent of 730,309.00 tones of bagasse to supply Usina da Pedra's and CERPA's thermal needs, which represent 62% of the total bagasse produced. The additional 10% of bagasse produced is stored (what can be checked on-site). Hence, there was plenty of bagasse residues to be used as fuel by CERPA.

The implementation of the project did not increase the bagasse production in the facility. In 2003, CERPA produced 3,699,457 tones of sugar cane. In 2006, they produced 4,101,266 tones of sugar cane. It is important to emphasize that this production expansion did not happen because of the Project but to attend the recent and remarkable expansion of the sugar and ethanol market. Besides, good climate conditions in 2006 led to a higher than average productivity. This sugar cane production expansion made possible the export of more electricity and, consequently, higher emission reductions. The article "Ethanol Demand Driving the Expansion of Brazil's Sugar Industry", prepared in June 2007 by the Economic Research Service of the United States Department of Agriculture, evidences, in page 32, the clear expansion of sugar cane production in Brazil from 2003 to 2006[2].

It can be added that there is a rising demand for energy in Brazil, but it is not being attended by biomass plants. The most recent energy auction in Brazil, which took place in July 26, 2007, resulted in an increase of 1.781,8 MW into National Electric System, **all of them** from oil thermo plants[3].

There are no thermal plants burning bagasse, in Brazil, outside sugar mills, because of the high transport costs. An academic article[4] shows that transport may represent 75% of bagasse cost. That is why the generation of electrical energy from biomass represents only 2.64% of the total generation of electricity in Brazil[5]. And the generation of electrical energy from CERPA represents 0.0451% of the total generation of electricity in Brazil[6].

[2] Source: <http://www.ers.usda.gov/Briefing/Sugar/sugarpdf/EthanolDemandSSS249.pdf>.

[3] Source: <http://www.epe.gov.br/Lists/LeilaoA32007/DispForm.aspx?ID=44>.

[4] Source: "Co-Geração de Energia a Partir e Bagaço de Cana" (Cogeneration of energy fro sugar cane bagasse - copy under request) by Daniela Bacchi Bartholomeu, José Vitor Salvi and Marcelo Theoto Rocha, from ESALQ (*Escola Superior de Agricultura Luiz de Queiroz* – Agriculture College Luiz de Queiroz), in Piracicaba, Brazil, page 7.

[5] Source: <http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoGeracaoTipo.asp?tipo=5&ger=Combustivel&principal=Biomassa>

[6] Source: <http://www.aneel.gov.br/aplicacoes/AgenteGeracao/ResumoEmpresa.asp?lbxEmpresa=3128:Central%20Energ%C3%A9tica%20Rio%20Pardo%20Ltda.>

Brazil - Operating plants (as of 25/09/2007)							
Type		**Installed capacity**		**%**	**Total**		**%**
		Number of plants	**(kW)**		**Number of plants**	**(kW)**	
Hydro		657	76,761,350	70.96	657	76,761,350	70.96
Gas	Natural	77	10,171,160	9.40	107	11,322,138	10.47
	Processed	30	1,150,978	1.06			
Oil	Diesel	569	2,904,381	2.68	590	4,346,435	4.02
	Residual fuel	21	1,442,054	1.33			
Biomass	Sugarcane bagasse	233	2,857,701	2.64	277	3,915,675	3.62
	Black liquor	13	794,817	0.73			
	Wood	26	224,207	0.21			
	Biogas	2	20,03	0.02			
	Rice residues	3	18,92	0.02			
Nuclear		2	2,007,000	1.86	2	2,007,000	1.86
Coal	Coal	7	1,415,000	1.31	7	1,415,000	1.31
Wind		15	236,85	0.22	15	236,85	0.22
Import	Paraguay		5,650,000	5.46		8,170,000	7.55
	Argentina		2,250,000	2.17			
	Venezuela		200	0.19			
	Uruguay		70	0.07			
Total		**1,655**	**108,174,448**		**1,655**	**108,174,448**	

Source: ANEEL, 2007[7]

Hence, an increase of 11.4% in CERPA's energy production (from the forecasted 65,000 MWh, as shown in page 51 of the PDD, to the measured 72,391.98 MWh) is irrelevant both compared to the amount of energy sold at the energy auction in July 2007 and to attend Brazil's higher energy demands. It is clear that the increase of bagasse production at CERPA has not been caused by high fuel demand in Brazil, since this demand is being supplied recently by fuel oil - as shown by the result of the most recent energy auction -, not bagasse.

A.3. Cerpa Energia Monitoring Report

[7] Available at : http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.asp

The GHG emissions reduction during the period from January 2007 to December 2007 was achieved through the dispatched electricity generated by Usina da Pedra, that displaced a mix of electricity generation in the Brazilian South-Southeast-Midwest interconnected grid.

The Monitoring Report is based on the electricity delivered to the grid by Usina da Pedra. The amount of energy delivered is monitored by the energy producer (seller) and by the power utility (buyer) meters. The power utility – Companhia Paulista de Força e Luz (CPFL) - is responsible to inform CCEE – *Câmara Comercializadora de Energia Elétrica* about the total of the energy delivered to the grid. CCEE makes feasible and regulates the electricity energy commercialization.

Calculation of the emissions reduction is based on validated and registered parameters fixed in the PDD and justified during the validation. The baseline emission factor for project activities as Cerpa Project for the Brazilian South-Southeast-Midwest grid is 0.2677 tCO2/MWh.

A.4. Period of the monitoring report and amount of monitored emissions reductions

Period of the monitoring report: 01 January 2007 – 31 December 2007

Amount of monitored emissions reductions: 26,820 tCO_2

Total crediting period of the project: 01 May 2003 – 30 April 2010

A.6. Personnel Responsible

Project Manager – Sylvio Ortega Filho (Central Energética do Rio Pardo Ltda.)

Monitoring Report – Ricardo Esparta (Ecoinvest Assessoria Ltda.)

Section B. Monitoring methodology and plan

B.1. Name and reference of approved monitoring methodology applied to the project activity

AM0015 – "Bagasse-based cogeneration connected to an electricity grid"

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

CERPA is a cogeneration project connected to the electricity grid. The project has fulfilled all the "additionality" requisites (see application of the "additionality tool[8]" below) and has demonstrated why the project would not occur in the absence of the CDM.

During a period of restructuring the entire electricity market, as is the current Brazilian situation, investment uncertainty is the main barrier for small renewable energy power projects. In this scenario these projects compete with existing plants (operating margin) and with new projects (build margin), which usually attract the attention of financial investors. Operating and Build Margins have been used to calculate the emission factor for the connected grid.

The methodology AM0015, for cogeneration projects, uses derived margins, which have been applied in the context of the project activity through the determination of the emissions factor for the South-Southeast-Midwest subsystem of the interconnected Brazilian grid (electricity system that is connected by transmission lines to the project electricity system and in which power plants can be dispatched without significant transmission constraints).

The sugarcane process capacity did not change between before and after the project activity, that is 24,000 ton per day. The variation in the annual processing amount to meet market demand is adjusted varying the days of operation of the plant.

[8] Tool for the demonstration and assessment of additionality. UNFCCC, CDM Executive Board 16th Meeting Report, 22 October 2004, Annex 1. Web-site: http://cdm.unfccc.int/

B.3. Data to be monitored:

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of monitored data	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Electricity generation of the Project delivered to grid	EG_y	MWh	m	15 minutes measurement and Monthly Recording	100%	Electronic and paper	During the credit period and two years after	The electricity delivered to the grid is monitored both by the project owner (seller) and the energy buyer. A Brazilian government entity, CCEE – Câmara Comercializadora de Energia Elétrica - controls and monitors the electricity available on the national interconnected grid. The amount of electricity delivered to the grid by the project activity is available on CCEE's web-site.
2	CO_2 emission factor of the grid	EF_y	tCO_2/MWh	c	At the validation	0%	Electronic	During the credit period and two years after	Data will be archived according to internal procedures.
3	CO_2 Operating Margin emission factor of the grid	$EF_{OM,y}$	tCO_2/MWh	c	At the validation	0%	Electronic	During the credit period and two years after	
4	CO_2 Build Margin emission factor of the grid	$Ef_{BM,y}$	tCO_2/MWh	c	At the validation	0%	Electronic	During the credit period and two years after	
5	Fraction of time during which	λ_y	Non dimensiona	c	At the validation	0%	Electronic	During the credit period	Data is available under request. Factors were calculated according to the Approved

	low-cost/must-run sources are on the margin		1					and two years after	monitoring methodology AM0015.

Section C. Monitored data

As the project is neither associated with leakage effects nor with new emissions of pollutants and all other pertinent data is necessary to be analysed and presented only at the validation phase of the project, the only data that has to be monitored going forward during the life of the contract is the electricity supplied to the grid by the project (EG_y).

The main data to be considered in determining the emissions reductions is the electricity exported to the grid. The emissions reduction is reached by applying an emissions factor through the electricity dispatched to the grid, that is verified and monitored by a two party verification: by the power plant that sells the electricity and by the utility company that buys the electricity.

This data is monitored through a spreadsheet that collects information by meters installed in the exit of the mill and entrance of the transmission lines and by the sales receipts issued by the electricity utility to the mill.

C.1. Data collected in order to monitor project emissions

According Monitoring Methodology AM0015 – "Bagasse-based cogeneration connected to an electricity grid", data of CO2 emissions from fossil fuels combusted due to the project activity at the project site are required, where relevant.

The only emissions due to fossil fuels at the project site are due to the transportation of sugar cane, by trucks, to the sugar mill. This transportation existed already in the baseline, and did not change because of the project, so that there are no net changes in CO_2 emissions from fossil fuels due to the project activity. A document provided by Equipalcool - the boilers´ manufacturer - stating that the equipment was designed to burn sugar cane bagasse and must not be put in operation burning other types of fuels were presented to DOE.

Also, CERPA monitors constantly that there are no relevant sources of fossil fuel emissions due to the project activity at the project site, and confirms that project emissions are zero.

Considering information above, GHG emissions by the project activity are zero.

C.2. Data collected in order to monitor baseline emissions

USINA DA PEDRA GENERATION (MWh)

MONTH	2007
January	2.770,62
February	0
March	48,01
April	5.069,26
May	8.062,06
June	11.327,37
July	10.473,68
August	11.665,59
September	12.816,12
October	12.482,53
November	12.382,78
December	13.088,26
TOTAL	**100.186,28**

Table 1 – Electricity generation delivered to grid by Usina da Pedra
(Sources: Usina da Pedra)

Emission factors for the Brazilian South-Southeast-Midwest interconnected grid				
Baseline (including imports)	EF_{OM} [tCO2/MWh]	Load [MWh]	LCMR [GWh]	Imports [MWh]
2002	0,8504	275.402.896	258.720	1.607.395
2003	0,9378	288.493.929	274.649	459.586
2004	0,8726	297.879.874	284.748	1.468.275
	Total (2001-2003) =	**861.776.699**	**818.118**	**3.535.256**
	$EF_{OM,\ simple\text{-}adjusted}$ [tCO2/MWh]	$EF_{BM,2004}$	Lambda	
	0,4310	0,1045	λ_{2002}	
	Alternative weights	Default weights	0,5053	
	w_{OM} = 0,75	w_{OM} = 0,5	λ_{2003}	
	w_{BM} = 0,25	w_{BM} = 0,5	0,5312	
	EF_{CM} [tCO2/MWh]	Default EF_{OM} [tCO2/MWh]	λ_{2004}	
	0,3494	0,2677	0,5041	

Table 2 – CO_2 emission factor of the grid/ CO_2 Operating Margin emission factor of the grid/ CO_2 Build Margin emission factor of the grid

Section D. Calculation of GHG emission by sources

The Monitoring Report applies the *ex ante* validated emission factor for project activities for the Brazilian South-Southeast-Midwest interconnected grid. Calculation of the emissions reduction is based on validated and registered parameters fixed in the PDD and justified during the validation. As shown in the table above, the CO2 emission factor of the grid is 0.2677 tCO2e/MWh.

D.1 Describe the formulae used to calculate emissions reductions

The emission reductions by the project activity (ERy) during a given period of year y are the product of the baseline emissions factor (*EFy*, in tCO2e/MWh) times the electricity supplied by the project to the grid at the same period of year y (*EGy*, in MWh), as follows:

$$ER_y = EF_y \cdot EG_y \qquad \textbf{Equation 1}$$

D.2 Tables providing values obtained when applying formulae above

USINA DA PEDRA EMISSION REDUCTION			
Year	**Electricity Generation (MWh)**	**Baseline Emission Factor (tCO2e/MWh)**	**Emissions Reduction (tCO2e)**
2007 (01 Jan 2007 to 31 Dec 2007)	100.186	0,2677	26.820
		TOTAL (tCO2e)	**26.820**

Annexes

Annex 1 - Contact information

Organization:	Cerpa – Central Energética Rio Pardo Ltda.
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