



**CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006**

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SECTION A. General description of project activity**A.1 Title of the project activity:**

Ferrari Cogeneration Project
PDD Version Number 01
11/09/2007

A.2. Description of the project activity:

The Ferrari Cogeneration Project (hereafter, the “Project”) developed by Ferrari Termoelétrica S/A (hereafter referred to as the “Project Developer”) is a bagasse cogeneration project in Pirassununga Municipality (São Paulo State, Brazil), hereafter referred to as the “Host Country”.

One fundamental goal of the project is to efficiently use resources while minimizing the impact on the environment. The project consists of the installation of modernized cogeneration equipment which will efficiently use bagasse from the facility to produce heat and electricity. The new cogeneration equipment will enable the alcohol and sugar mill to generate enough surplus power to sell to the grid and, at the same time, generate carbon credits by reducing greenhouse gases emissions while contributing to sustainable development.

The plant has the objective to provide renewable electricity to the S-SE-CO interconnected system (hereafter referred to as “the Grid”) and also supply the demand of the sugar and ethanol mill for electricity and heat; this will thus eliminate the consumption of energy from the grid for the expanding capacity of the facility and also deliver surplus electricity to the national grid. This electricity provided to the grid will displace energy that would have provided partially from fossil fuelled power plants. The Project Activity will encompass greenhouse gas emissions reductions from on-site electricity generation and the sale of surplus electricity to the grid; the heat component of the cogeneration facility is produced also from bagasse in the baseline, thus it does not lead to further emission reductions.

This renewable energy project is owned by [Ferrari Termoelétrica S/A](#), a Special Purpose Entity (SPE) created by Ferrari Group to operate the cogeneration plant. The Group is an agribusiness company, with its main activities based on sugar and ethanol fuel production. During the last 2006/07 crop season, the project developer processed about 1.2 million tonne of sugar cane, produced 23.6 million liters of Ethanol fuel, 21 million liters of Anhydrous ethanol and around 120 thousand tonnes of sugar.

The project is helping the Host Country fulfil its goals of promoting sustainable development. Specifically, the project:

- Increases employment opportunities in the area where the project is located;
- Diversifies the source of electricity generation;
- Uses a clean and efficient technology which result in the conservation of natural resources;
- Acts as a clean technology demonstration project;

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- Uses the state-of-art practices of energy efficiency and electricity production, therefore providing an example to encourage other similar companies that want to replicate this experience.

A.3. Project participants:

Table - Project participants

Name of party involved (*) ((host) indicates a host party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	Ferrari Termoelétrica S/A	No
United Kingdom of Great Britain and Northern Ireland	EcoSecurities Group Plc	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time requesting registration, the approval by the Party(ies) involved is required.

A.4. Technical description of the project activity:**A.4.1. Location of the project activity:****A.4.1.1. Host Party(ies):**

Brazil. (the “Host Country”)

A.4.1.2. Region/State/Province etc.:

São Paulo State

A.4.1.3. City/Town/Community etc:

Pirassununga Municipality.

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project will be located on the “*Fazenda da Rocha*”, SP-215 Highway (rodovia SP-215), Km 84, Zona Rural, Pirassununga Municipality, São Paulo State, Brazil. Postal Code (CEP): 13.631-301. Latitude: 21° 50’ 32” S; Longitude: 47° 21’ 39” W.

A.4.2. Category(ies) of project activity:

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According to Annex A of the Kyoto Protocol, this project fits in Sectoral Scope 01, Energy industries (renewable - / non-renewable sources)¹.

A.4.3. Technology to be employed by the <u>project activity</u>:

The project uses direct combustion technologies, which are the most widely known option for simultaneous power and heat generation from biomass. These technologies involve the oxidation of biomass with excess air in a process that yields hot gases that are used to produce steam in boilers. The steam is used to produce electricity in a Rankine cycle turbine. The Rankine cycle configurations at the project site could also be classified into two types: condensing and back pressure, depending on the proportion of the steam used for industrial processes and where in the turbine that steam is obtained. Ferrari Cogeneration Project will result in GHG emissions reductions through the displacement of electricity generation from fossil-fuel thermal plants that would have otherwise dispatched to the grid by renewable energy. Ferrari Termoelétrica S/A will utilize bagasse to generate power; this biomass residue is a by product of different agricultural processes. In the absence of the project, the bagasse would be used to generate power generation for internal use.

For the estimation of emission reductions from electrical energy, a baseline emission factor is calculated as the combined margin of the operating and build margin emission factors. To determine these two factors, the project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. Similarly, the connected electricity system is defined as an 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. To determine the baseline grid emission factor for this project, the system is defined as the S-SE-CO interconnected system.

The project replaces old equipment and will operate with a new configuration of 1 boiler, 1 back pressure turbine, 1 condensing turbine and 2 generators. The old equipment will be decommissioned, to be used as a backup during emergencies. The project will displace energy from the grid by both avoiding the consumption of power from the grid and by delivering clean energy to the grid.

Table 1 – Equipment technical description

Baseline Equipments	Project Equipments
Boiler Manufacturer: Zanini S/A Model: AZ-340 Year of Manufacture: 1982 Manufacture number: 376/82 Maximum Output: 40 tonnes of steam/hour Work pressure: 21 kgf/cm ² Work temperature: 300°C Fuel: sugar cane bagasse	Boiler Manufacturer: Dedini S/A Model: BGV/M-225 Year of Manufacture: 2007 Maximum Output: 225 tonnes of steam/hour Work pressure: 65 kgf/cm ² Work temperature: 490°C Fuel: sugar cane bagasse

¹ <http://cdm.unfccc.int/DOE/scopes.html>



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<p>Boiler Manufacturer: Caldeiraria S. Caetano Ltda. (retrofitted by Caldema Equipamentos Industriais Ltda.) Model: 2CTVP-2150 Year of Retrofit: 2004 Manufacture number: 94-288 Maximum Output: 90 tonnes of steam/hour Work pressure: 25 kgf/cm² Work temperature: 312°C Fuel: sugar cane bagasse</p>	
<p>Generator Manufacturer: WEG Model: SPW-710 Year of Manufacture: 2006 Installed Capacity: 6 MW</p>	<p>Generator Manufacturer: GEVISA S.A. (General Electric) Year of Manufacture: 2007 Installed Capacity: 22.5 MW</p>
<p>Generator Manufacturer: Toshiba Year of Manufacture: 1982 Installed Capacity: 2 MW</p>	<p>Generator Manufacturer: GEVISA S.A. (General Electric) Year of Manufacture: 2007 Installed Capacity: 35 MW</p>
<p>Generator Manufacturer: Siemens Year of Manufacture: 1994 Installed Capacity: 2 MW</p>	
<p>Turbine Manufacturer (Toshiba Generator): Worthington Model: 703 LEWK Year of Manufacture: 2000 Installed Capacity: 2 MW</p>	<p>Turbine Manufacturer (22.5 MW Generator): NG Metalúrgica Ltda Type: Condensing Model: HC 800E Year of Manufacture: 2007 Installed Capacity: 22.5 MW</p>
<p>Turbine Manufacturer (Siemens Generator): Dedini Model: 185 CE Year of Manufacture: 1995 Installed Capacity: 2 MW</p>	<p>Turbine Manufacturer (35 MW Generator): NG Metalúrgica Ltda Type: Back pressure Model: HB 750 Year of Manufacture: 2007 Installed Capacity: 35 MW</p>

A.4.4 Estimated amount of emission reductions over the chosen <u>crediting period</u>:



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Table 2 - Estimated emissions reductions from the project

Years	Annual estimation of emission reductions in tonnes of CO ₂ e
2008 (April-Dec)	41,884
2009	55,845
2010	55,845
2011	55,845
2012	55,845
2013	55,845
2014	55,845
2015 (Jan-March)	13,961
Total estimated reductions (tonnes of CO ₂ e)	390,915
Total number of Crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	55,845

A.4.5. Public funding of the project activity:

The project will not receive any public funding from Parties included in Annex I of the UNFCCC.



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SECTION B. Application of a baseline and monitoring methodology**B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:**

The project uses approved methodology ACM0006 (“Consolidated baseline methodology for grid-connected electricity generation from biomass residues”), Version 06, Valid from 10 Aug 07 onwards.

For spatial extent of the project electricity system, including issues related to the calculation of the build margin (BM) and operating margin (OM), ACM0006 refers to the “Tool to calculate the emission factor for an electricity system”, version 1, in effect as of EB35. For demonstration of additionality, ACM0006 refers to the “Combined tool to identify the baseline scenario and demonstrate additionality”, Version 02.1, EB 28 Meeting Report.

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

The project activity complies with all the applicability requirements of ACM0006 and it consists of a grid-connected and biomass residue fired electricity generation project activity. The project is applicable under scenario 18, better described in section B.4. The project activity includes:

- **Energy efficiency improvement projects:** The improvement of energy efficiency of an existing power plant by installing a more efficient plant that replaces the existing plant.

The project activity is the operation of a power generation unit located in an agro-industrial plant that will generate the biomass residues (by-products of sugar and ethanol production) used in the project activity. The project complies with all the conditions limiting the applicability of the methodology:

- a) No other biomass types than biomass residues are used in the project plant and these biomass residues are the predominant fuel used in the project plant. Biomass is defined as a by-product, residue or waste stream from agriculture, forestry and related industries.

The primary fuel in the project plant is a biomass residue consisting of sugar cane bagasse. The bagasse used in the Ferrari Cogeneration Project comes from the production of sugar in the same facility where the project is located.

- b) The implementation of the project shall not result in an increase of the processing capacity of raw input or other substantial changes in the process:

Any increase in the bagasse production will be due to the project developer’s typically expanding business and will not be attributed to the implementation of the cogeneration project. The graph below shows that the production for the sugar mill has historically been increasing (see Figure 1); the trend of increasing production has been occurring since long before the implementation of the project activity. As this project does not have an impact on processing capacity, Ferrari Termoeletrica S/A will not increase their installed capacity because of this project. The processing capacity will increase but this is due to the recent and remarkable expansion of sugar production which is mainly due to the expanding ethanol market in Brazil. The production of ethanol in the Brazil is increasing due to the consistently increasing demand for ethanol caused by the use of flex-fuel cars, which can run either with gasoline, ethanol or any blend of these two fuels.

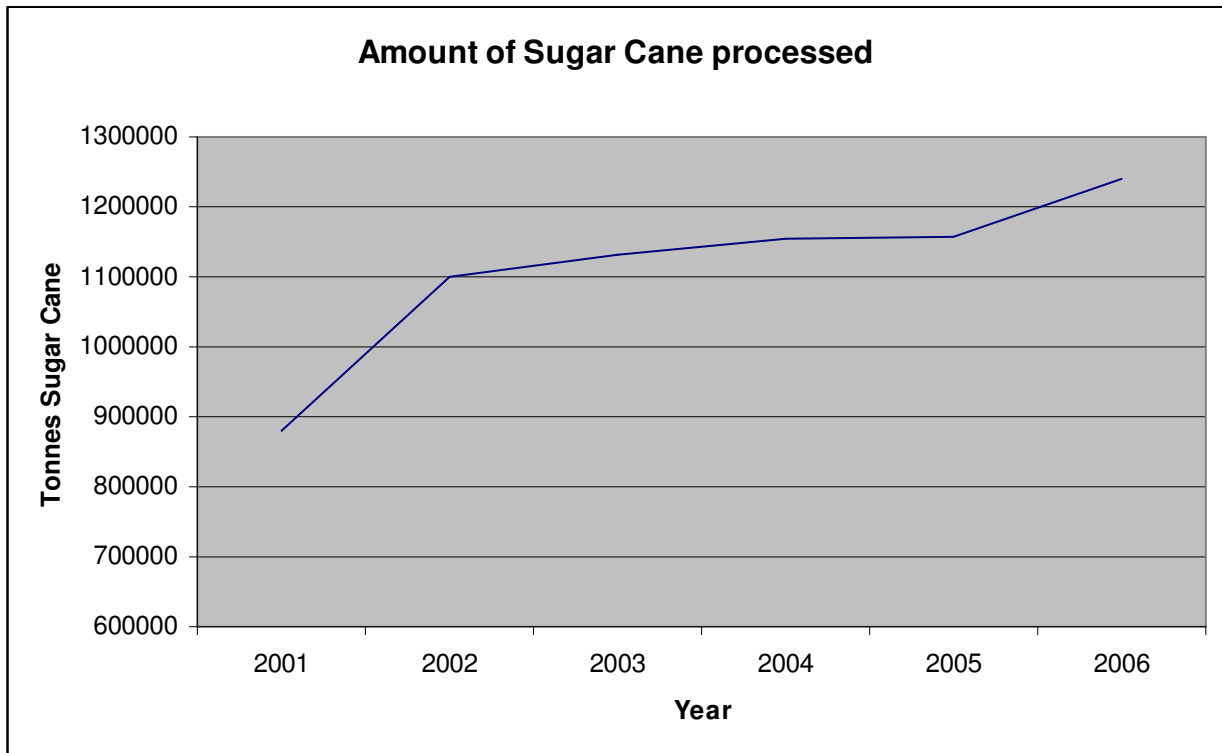


Figure 1 – Amount of sugar cane processed for ethanol and sugar production (Source: Ferrari internal report “Balanço de Bagaço das Safras”)

- c) The biomass used by the project facility should not be stored for more than one year.

The sugar mills generally store a minimal amount of bagasse for the next season in order to start plant operations when the new crop season/ harvest begins. The bagasse is stored from the end of the harvest season - December - until the beginning of the following harvest season - March. The volume of bagasse stored between seasons is insignificant - less than 5% of the total amount of bagasse generated during the year or during the harvest period – and it is stored for only 4 months

- d) No significant energy quantities, except for transportation of the biomass, are required to prepare the biomass residues for fuel consumption.

The biomass used in this project is not prepared in any way before being used for fuel consumption.

The project activity meets all the conditions above and is therefore applicable to the methodology.

B.3. Description of the sources and gases included in the project boundary

The project boundary is assessed in terms of the emission sources and spatial extent.

The emission sources in the project boundary include:

- CO₂ emissions from fossil fuel fired power plants connected to the electricity system;
- CO₂ emissions from fossil fuel based heat generation that is displaced through the project activity;

For the Project activity, there are no expected emissions, as explained below and further elaborated in the table.

- Onsite: no fossil fuel consumption due to the project activity is expected.



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- Transportation: all biomass transportation is onsite and would occur in absence of the project activity.
- CH₄: methane avoidance due to anaerobic decay is not included in the project boundary, thus emissions from biomass burning are not accounted for.

The spatial extent of the project boundary includes:

- The new biomass co-generation plant
- All power plants connected physically to the grid electricity system that the Project power plant is also connected (S-SE-CO interconnected system)

The project activity fulfils all the methodology requirements and applicability conditions for *Energy efficiency improvement projects*.

	Source	Gas	Included	Justification/Explanation
Baseline	Grid electricity generation	CO ₂	Yes	Main emission source.
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
	Heat Generation	CO ₂	Yes	Main emission source.
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass residues	CO ₂	No	It is assumed that CO ₂ emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH ₄	No	Project participants decided to not include this emission source, because case B4 of ACM0006 is the most likely baseline scenario.
		N ₂ O	No	Excluded for simplification. This is conservative. Note also that emissions from natural decay of biomass are not included in GHG inventories as anthropogenic sources.
Project Activity	On-site fossil fuel and electricity consumption due to the project activity (stationary or mobile)	CO ₂	Yes	May be an important emission source. For this project, there are no emissions due to fossil fuel or electricity consumption forecasted, but they will be monitored.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
	Off-site transportation of biomass residues	CO ₂	Yes	May be an important emission source. For this project, as bagasse is produced inside the mills, no increase of off-site transportation is forecasted, but this will be monitored.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.



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Combustion of biomass residues for electricity and / or heat generation.	CO ₂	No	It is assumed that CO ₂ emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
	CH ₄	No	This emission source is not included because CH ₄ emissions from uncontrolled burning or decay of biomass in the baseline scenario are not included.
	N ₂ O	No	Excluded for simplification. This emission source is assumed to be small.
Storage of biomass residues	CO ₂	No	It is assumed that CO ₂ emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
	CH ₄	No	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small.
	N ₂ O	No	Excluded for simplification. This emissions source is assumed to be very small.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The Ferrari Cogeneration Project uses bagasse for the generation of heat and electricity. The project activity involves the replacement of an existing biomass residue fired power plant by a new, more efficient biomass residue fired power plant. The replacement increases the power generation capacity. In the absence of the project activity, the existing plant would also be replaced by a new biomass residue fired power plant (referred to as “reference plant”); however, this reference plant would have a lower efficiency of electricity generation than the project plant (e.g. by using a low-pressure boiler instead of a high-pressure boiler). The same type and quantity of biomass residues as in the project plant would be used in the reference plant.

The methodology scenario under which the project is analyzed was identified after a study of the alternatives for the different components of the project. The result of the analysis of the components gave the following results: 1) the power generated by the project plant would in the absence of the project activity be generated (a) in the reference plant (alternative P5) and – since power generation is larger in the project plant than in the reference plant – (b) partly by power plants in the grid (alternative P4). The new project plant has the same technical lifetime as the reference plant. 2) Use of biomass residues: in the absence of the project, the biomass residues would have used for heat and/or electricity generation at the project site (alternative B4); 3) Heat generation: in the absence of the project activity, the heat generated by the project plant would be generated in the reference plant. The efficiency of heat generation in the project plant is smaller or the same compared to the reference plant (alternative H2).

The identified alternatives for the different components of the project activity correspond to scenario 18.

Table 3 - Key information and data used to determine the Baseline Scenario

Variable / Information / Data	Unit / Type	Source
Production of the Company	Tonnes of sugar cane per	Report “ <i>Balanço de Bagaço das</i> ”



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	year	<i>Safras</i>
Historic power production of the company	MWh/yr	Project Developer
Historic efficiency of power production	Amount of bagasse/MWh	Project Developer

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

The start of the communication between Carbon Consultants from EcoSecurities and the Project Developer was on 25 January 2007. The Project Developer presented in March 2007 a description of the project to the Brazilian Development Bank (BNDES) in order to apply for financing. As financing was not applied for until after contact between EcoSecurities and the Project Developer, it can be assured that there was CDM consideration prior to any real action on the project activity, as in compliance with paragraph 76 of the EB33 meeting report.

In order to determine if the project activity is additional, the “Combined tool to identify the baseline scenario and demonstrate additionality”, version 03, approved at EB29, is applied.

STEP 1. Identification of alternative scenarios

Step 1a. Define alternative scenarios to the proposed CDM project activity

- Scenario 1** Continuation of current practices, i.e. electricity will continue to be generated by the existing generation mix operating in the grid and the installation of a biomass residue fired power plant (the reference plant) fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity than the project plant and therefore with a lower power output than in the project case.
- Scenario 2** The Project Activity not taken as a CDM project.

Sub-step 1b. Consistency with mandatory applicable laws and regulations:

Scenario 1 – Is consistent with current laws and regulations. There is no regulation in Brazil to prevent continuation of the current practice.

Scenario 2 – Is consistent with current laws and regulations. There is no regulation in Brazil to prevent implementation of thermoelectric plants. According to law 9074, issued on 07/07/1995, thermoelectric plants can be subject to either a governmental tender or an authorization, but there is no regulation preventing this kind of plants.

All possible scenarios are in complete compliance with all applicable legal and regulatory requirements.



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STEP 2. Barrier analysis***Sub-step 2a. Identify barriers that would prevent the implementation of alternative scenarios:*****Investment/Economical Barrier**

Investment barriers are related to the power purchase agreement (PPA). The PPA is required in order to obtain long-term financing from a bank. The lack of adequate commercial agreements from the energy buyers may influence directly the negotiation between banks and the project developers. Most of the power producing companies (mainly utilities) in Brazil do not have a satisfactory credit risk thus representing a barrier to obtain long-term funding.

Acting to promote renewable energy, Brazilian Government created the Proinfa - *Programa de Incentivo às Fontes Alternativas de Energia Elétrica* (Program of Incentives to Alternative Energy Sources), law n° 10 438, enacted in April 2002. The creation of Proinfa indicates that renewable energy projects need support in order to be implemented. Among others, one of this initiative's goals is to increase the renewable energy sources share in the Brazilian electricity market, thus contributing to greater sustainability.

In order to achieve the goals of Proinfa, the Brazilian government has designated the federal state-owned power utility Eletrobras - *Centrais Elétricas Brasileiras S/A* to act as the primary offtaker of electric energy generated by alternative energy facilities in Brazil. Eletrobras enters into long-term PPAs (Power Purchase Agreements) with alternative energy producers at a guaranteed price of at least 80% of the average energy supply tariff charged to ultimate consumers.

The existence of Proinfa demonstrates that a sound incentive is necessary to promote the construction of renewable energy projects in Brazil. Proinfa legislation proposed to increase the capacity of renewable energy power generation to about 3,300 MW by 2006, but from the 1,100 MW Proinfa reserved for biomass energy sources, only 685.24 MW have been contracted so far. According to *Brasil Energia*, a Brazilian energy magazine², the main reason for this is that the average IRR for the investment in the production of sugar cane/ethanol is 3% higher than the average IRR for the investment in cogeneration. In 2005, BNDES presented another version of its financing incentive line to Proinfa, different to the one first considered for the program, as it was considered insufficient.

This means that during the last 5 years, the government has had to present yet another proposal (or incentive), in order to convince the developers to invest in renewable energy projects. In addition to the barriers mentioned above, sugar mills do not have a strong incentive to invest in their own power plants; in general, the revenues of selling electricity in a cogeneration project represent a small part of the total revenues of a sugar mill. Thus, sugar mills tend to invest in their core business, sugar and ethanol, instead of investing in electricity generation for the grid.

Technological Barrier

The supporting company of the project developer is a sugar mill; its core business is produce sugar and ethanol. To generate electricity a Special Purpose Entity (SPE) was created by the developer. Operational personnel must be hired and trained in order to operate the Project.

² *Brasil Energia*, n. 299, October, 2005. P.83



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Although the Project is located in São Paulo State which is one of the most developed states in Brazil, the project faces technological barriers because electricity generation is not the core business of the Project developer. The sugar mill currently generates about 4MW of electricity, but the technology employed is significantly different from the project technology. The current electricity generation is based on low efficiency boilers and generators. Also, the current electricity is only for internal consumption. There is no requirement to operate the plant in a more efficient manner.

The project will be connected to the Brazilian Interconnected Grid which is strongly regulated by three entities: the National Electricity Agency (ANEEL – *Agência Nacional de Energia Elétrica*), responsible for inspection and regulation of production, transmission, distribution and commercialization of electricity; the system operator (ONS – *Operador Nacional do Sistema*), responsible for optimization, coordination, control and operation of the system; and the commercialization chamber (CCEE – *Câmara de Comércio de Energia Elétrica*), responsible for electricity transactions control.

To control the electricity system operation the ONS developed procedures, called Grid Procedures; these were elaborated by the ONS with participation of the generation companies and were approved by the ANEEL. These procedures define all necessary steps and requirements needed to accomplish the planning and operation activities and transmission management. The Grid Procedures aim, inter alia, to legitimize, guarantee and demonstrate transparency, integrity, and excellence of the Brazilian Interconnected System (SIN – from the Portuguese *Sistema Interconectado Nacional*) operation.

Complying with these procedures is necessary only if facility delivers electricity to the grid, as it will in the Project activity. In the baseline activity, the plant would generate electricity for its own consumption only, therefore no extra regulation or control would be necessary. There is therefore a lack of infrastructure of the company to handle the necessary interconnection procedures.

Institutional and Core Business Barrier

Since 1995, government electricity market policies have been continuously changing in Brazil. Many different laws and regulations, such as PROINFA, were created to try to organize and to provide incentives for new investments in the energy sector. The results of such regulatory instability were the contrary to what was trying to be achieved; the instability resulted in a major fluctuation of electricity prices. For example, in 2001 and 2002, Brazil went through an electricity supply crisis. During this crisis, a rationing campaign was done to minimize the probability of a major blackout throughout the country. Even with the campaign, the supply risk made electricity prices increase. The price surpassed R\$ 600/MWh and the forecasted marginal price of the new energy reached levels of R\$ 120 – 150/MWh. In contrast, in mid-2004, the average price was below R\$ 50/MWh. This relatively high volatility of the electricity price in Brazil makes electricity business risky and contributes to difficulty the project developers have on trusting the stability of the electricity market to make long term investment decisions.

The history of the sugarcane industry has demonstrated that the industry is traditionally a stable business and has consistently helped to support the country's economy. The industry has historically enjoyed governmental support, such as fixed prices and subsidies. A characteristic of this sector is the specialization in commodity (sugar and ethanol) transactions. In addition to the barriers mentioned in this document, it is important to understand that the sale of electricity from cogeneration represents only a small share of total annual revenues of sugar mills. As a consequence, sugar mills prefer investing in equipment related to their core business and revenue, the production of sugar and molasses. In general, the revenues of selling



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electricity in a cogeneration project represent about 10% of the total revenues of a sugar mill, a small share to justify the risks involved in an interconnected cogeneration project.

In regards to interest within the electricity sector, according to COELHO (2004)³, many utilities still don't demonstrate interest in purchasing electricity generated by self-producers, independent energy producers, especially when it comes to long-term contracts. In the case of bagasse cogeneration specifically, the electricity is generated only during the crop season, which, in the utilities' point of view, does not characterize an offer of firm energy.

Therefore, utilities see as a disadvantage what is one of the biggest advantages of the bagasse cogeneration: the energy is produced during the annual drought – which coincides with the crop season - when the hydroelectric power stations face difficulties due to the low level of rain. (COELHO, 1999)⁴ “By not having a legal compulsory nature for the purchase of the electricity generated from renewable sources (as in other countries), the utilities can choose other options for energy”.

Although there has been important change of mentality in the sector's mills towards support for on-site power generation from bagasse, the reluctance in what regards the sale of spare electric power still persists. According to COELHO (2004), such reluctance can be explained by the “fear as for the involved risks and for the distrust regarding the maintenance, in the medium and long terms, of a solid politics of institutional incentive.” The public sector renewable energy policies are not considered reliable enough for the executives of the private sector to give support to the expansion of the cogeneration in the sugar mills.

Still to be considered is the lack of a direct communication channel between the mills, ANEEL and BNDES, which would facilitate the explanation of doubts, mainly regarding the implementation or expansion of electricity generation plants (COELHO, 2004).

The alternative scenario to this project activity is the continuation of the current situation in which the developer focuses mainly in its core business, the production of sugar and alcohol. Therefore, as the barriers mentioned above are directly related to entering into a new business (electricity sale), there is no incentive for a sugar mill to diverge from its core business.

Barriers due to prevailing practice

As mentioned above, the sugarcane industry is well established, stable and enjoys governmental support. A characteristic of this sector is the specialization in commodity (sugar and ethanol) transactions. However, electricity negotiation in the energy market is something relatively new to this industry.

Electricity transactions which are based on long-term contracts (PPA) represent a significant breakthrough in the business approach of the sugar industry. Power Purchase Agreements (PPAs) require different negotiation skills, which are not core to the sugar industry. For instance, when signing a long-term electricity contract, the PPA, the sugar mill has to be confident that it will produce sufficient biomass to supply its cogeneration project. This is difficult to predict as the volatility of sugar cane productivity may range from 75 to 120 ton of sugar cane per hectare annually depending on the rainfall.

³ COELHO, Suani Teixeira. A biomassa como fonte de energia. *Eletricidade Moderna* v. 32, n. 365, p. 226, Ago. 2004.

⁴ COELHO, Suani T. *Mecanismos para implementação da cogeração de eletricidade a partir de biomassa: um modelo para o Estado de São Paulo*. São Paulo: Programa interunidades de pós-graduação em energia, 1999

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According to the World Alliance for the Decentralized Energy, WADE (2004)⁵, as, until recently, the sale of electricity surpluses was not common practice in the sector, the industry developed units of low efficiency that were low cost and had an efficiency only high enough to guarantee self-sufficiency of energy and steam while dealing with the problem of bagasse accumulation. Moreover, at the time the sugar mills' cogeneration facilities are replaced, or when a new cogeneration unit is created, the equipment will have a lifetime of more than 20 years, and there is no incentive for the mill to replace the equipment with anything other than low cost and low efficiency equipment. The decision to purchase low efficiency equipment demonstrates that plants do not take advantage of potential surpluses of electricity which could be sold to the grid. Therefore, the choice of the equipment is essential in order for the plant to realize its electricity surplus potential (COELHO, 2004). Thus, in Brazil, the distributed generation has a minimum participation in the supply of electric energy, despite the great potential. The energetic potential of the sugar cane biomass residues is used inefficiently in the alcohol and sugar cane industry because of the difficulty to export electricity to the grid and the higher cost of and lack of incentive to use more efficient equipment.

Sub-step 2b. Eliminate alternative scenarios which are prevented by the identified barriers:

According to the “Combined tool to identify the baseline scenario and demonstrate additionality”, after STEP 2, if there is only one alternative scenario that is not prevented by any barrier, and if this alternative is not the proposed project activity undertaken without being registered as a CDM project activity, then this alternative scenario is identified as the baseline scenario. Hence the baseline scenario is identified as scenario 1, the continuation of current practices. Therefore, the project scenario is not the same as the baseline scenario, and these are defined as follows:

Table 4 - Summary of barrier analysis

	Scenario 1	Scenario 2
Investment/Economical Barrier	No	Yes
Technological Barrier	No	Yes
Institutional and Core Business Barrier	No	Yes
Barriers due to prevailing practice	No	Yes

- The **Baseline scenario** is represented by scenario 1, continuation of current practices.
- The **Project scenario** is represented by the implementation of the electricity cogeneration project.

STEP 4. Common practice analysis

Although some sugar mills have optimized their power plants in order to export electricity, numerous risks and barriers have prevented the implementation of the proposed project activity among the majority of the

⁵ WADE *Bagasse Cogeneration – Global Review and potential*. 2004. Available on <http://www.cogensp.com.br>



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sugar mills. In the Brazilian South Region, less than 20% of the mills have developed expansion programs for their power plants (Anuário da Cana, Procana: 2003).

One of the points that must be considered when analyzing a renewable energy project investment in Brazil is the possibility to participate in the Proinfa Federal Government Program, which is considered one of the more viable financing alternatives for these projects and provides long-term PPAs and special financing conditions. This project activity was not able to participate in the Program due to the timing of its implementation.

Both processes of negotiating a PPA with utility companies and obtaining funding from BNDES are always very cumbersome. BNDES also requires several guarantees in order to provide financing. Other risks and barriers are related to the operational and technical issues associated with small cogeneration projects, including their capability to comply with the PPA contract and the potential nonperformance penalties. Moreover, traditional sugar producers would prefer to concentrate investments on where they have know-how: on sugar or ethanol production not power generation.

Because of reasons mentioned above, less than 20% of the sugar mills in the Brazilian South region have developed similar activities to that Project Activity. Some of the new projects have taken into consideration CDM in their decision to expand their cogeneration plant. According to ANEEL the installed capacity of cogeneration plants already operating with bagasse is about 3.7GW, from a total potential of 12GW (http://www.unica.com.br/pages/publicacoes_3.asp). Moreover, only about 7% of the total amount of bagasse produced in Brazil is used for electricity generation⁶.

Therefore, based on this data, it is clearly demonstrated that the prevailing practice of the electric and sugar and alcohol sectors is not electricity generation using a high efficiency bagasse cogeneration plant.

The impact of registration of this project will contribute to overcoming the barriers described above. All steps of the Tool for the demonstration and assessment of additionality were satisfied, thus the project is additional to what would have occurred in absence of the project activity.

⁶ Brasil. Ministério de Minas e Energia. Empresa de Pesquisa Energética Balanço Energético Nacional 2006: Ano base 2005. Relatório final / Ministério de Minas e Energia. Empresa de Pesquisa Energética. – Rio de Janeiro : EPE, 2006. (http://www.ben.epe.gov.br/downloads/BEN2006_Versao_Completa.pdf)



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B.6 Emission reductions**B.6.1. Explanation of methodological choices:****Project emissions:**

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \cdot (PE_{Biomass,CH4,y} + PE_{WW,CH4,y}) \quad (1)$$

PET_y	CO2 emissions during the year y due to transport of the biomass residues to the project plant (tCO2/yr)
$PEFF_y$	CO2 emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuel consumption at the project site that is attributable to the project activity (tCO2/yr)
$PEEC_y$	CO2 emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO2/yr)
GWP_{CH4}	Global Warming Potential for methane valid for the relevant commitment period
$PE_{Biomass,CH4,y}$	CH4 emissions from the combustion of biomass residues during the year y (tCH4/yr)
$PE_{WW,CH4,y}$	CH4 emissions from waste water generated from the treatment of biomass residues in year y (tCH4/yr)

Biomass residues are generated inside the project site, therefore PET_y is zero.

CO₂ emissions from on-site combustion of fossil fuels ($PEFF_y$) is calculated using the latest approved version of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”. Project emissions from two combustion processes will be considered. These are:

- Fossil fuels combusted in the project plant during the year y ($FF_{project\ plant,i,y}$);
- Fossil fuels combusted at the project site for other purposes that are attributable to the project activity during year y ($FF_{project\ site,i,y}$).

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (2)$$

$PE_{FC,j,y}$	are the CO2 emissions from fossil fuel combustion in process j during the year y (tCO2 / yr);
$FC_{i,j,y}$	is the quantity of fuel type i combusted in process j during the year y (mass or volume unit / yr);
$COEF_{i,y}$	is the CO2 emission coefficient of fuel type i in year y (tCO2 / mass or volume unit);
i	are the fuel types combusted in process j during the year y.

Option B was selected to calculate $COEF_{i,y}$:



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$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (3)$$

COEF _{i,y}	is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ / mass or volume unit);
NCV _{i,y}	is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit);
EF _{CO₂,i,y}	is the weighted average CO ₂ emission factor of fuel type i in year y (tCO ₂ /GJ);
i	are the fuel types combusted in process j during the year y.

CO₂ emissions from on-site electricity consumption ($PE_{EC,y}$) is calculated using the latest approved version of the “Tool to calculate project emissions from electricity consumption”. Case A was selected as the most appropriated.

Case A: Electricity consumption from the grid. The electricity consumed by the project activity is purchased from the grid. Either no captive power plant is installed at the project site or if any on-site captive power plant exists, it is not operating or it cannot provide electricity to the project activity.

$$PE_{EC,y} = EC_{PJ,y} \cdot EF_{grid,y} \cdot (1 + TDL_y) \quad (4)$$

PE _{EC,y}	are the project emissions from electricity consumption by the project activity during the year y (tCO ₂ / yr);
EC _{PJ,y}	is the quantity of electricity consumed by the project activity during the year y (MWh);
EF _{grid,y}	is the emission factor for the grid in year y (tCO ₂ /MWh)
TDL _y	are the average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site

Combustion of biomass residues for electricity and/or heat generation are excluded from the project boundary because CH₄ emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are excluded. Therefore PE_{Biomass,CH₄,y} is zero.

There is no waste water from the treatment of biomass residues degraded under anaerobic conditions, therefore PE_{WW,CH₄,y} is zero.

Emission reductions due to displacement of electricity:

$$ER_{electricity,y} = EG_y \cdot EF_{electricity,y} \quad (5)$$

ER _{electricity,y}	Emission reductions due to displacement of electricity during the year y (tCO ₂ /yr)
EG _y	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh)
EF _{electricity,y}	CO ₂ emission factor for the electricity displaced due to the project activity during the year y (tCO ₂ /MWh)

Step 1: Determination of EF_{electricity,y}:

The Project Activity is connected to the Brazilian Interconnected Grid. The grid emission factor is calculated according to the “Tool to calculate the emission factor for an electricity system”



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Calculate the Operating Margin emission factor: OM calculation was based on the simple OM method, option (b) – Simple Adjusted method – of the methodology. This method was selected because low-cost/must run resources constitute more than 50% of total grid generation in average of the five most recent years. For more information please see Annex 3.

The OM was calculated *ex-ante*, using the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission.

The Simple OM emission factor ($EF_{OM, simple_adjusted}$) is calculated as the generation-weighted average emissions per electricity unit (tCO₂/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants and by all low-cost/must-run resources, as follows:

$$EF_{OM, simple_adjusted, y} (tCO_2 / MWh) = (1 - \lambda_y) \frac{\sum_{i,j} EG_{j,y} * EF_{ELj,y}}{\sum_j GEN_{j,y}} + \lambda_y \frac{\sum_{i,k} EG_{k,y} * EF_{ELk,y}}{\sum_k GEN_{k,y}} \quad (6)$$

k refers to power plants / units which are either low-cost or are must-run

j is the set of plants delivering electricity to the grid, not including low-cost or must-run plants and carbon financed plants;

$EF_{ELj,y}$ is the carbon emission factor for each plant (tCO₂/MWh); default values are applied. More information, see Annex 3.

GEN_j is the electricity (MWh) delivered to the grid by source j .

λ_y is defined as follows:

$$\lambda_y = \frac{\text{number of hours per year for which low-cost / must-run are on margin}}{8760 \text{ hours per year}}$$

Calculate the Build Margin emission factor: the calculation was done as the generation-weighted average emission factor (tCO₂/MWh) of a sample of power plants m , applying *Option 1* of the methodology, as follows:

$$EF_{BM} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (7)$$

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Where $EG_{m,y}$, $EF_{ELm,y}$ are analogous to the variables described for the simple adjusted OM method above, for plants m . This sample includes either the last five plants built or the most recent plants that combined account for 20% of the total generation, whichever is greater (in MWh). From these two options the sample group that comprises the larger annual generation is the five most recent plants.

The option of using the plants that comprise 20% of the generation was chose to calculate the Build Margin emission factor *ex-ante* based on the most recent information available on plants already built for sample group m at the time of PDD submission.

Calculate the baseline emission factor: the calculation was done as the weighted average of the Operating Margin emission factor and the Build Margin emission factor:

$$EF = w_{OM} \cdot EF_{OM, simple} + w_{BM} \cdot EF_{BM} \quad (8)$$

where the weights w_{OM} and w_{BM} , by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO₂/MWh.

Step 2: Determination of EG_y:

$$EG_y = EG_{project\ plant,y} \cdot \left(1 - \frac{\varepsilon_{el, baseline\ plant}}{\varepsilon_{el, project\ plant,y}} \right) \quad (9)$$

EG_y	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh)
$EG_{project\ plant,y}$	Net quantity of electricity generated in the project plant during the year y (MWh)
$\varepsilon_{el, baseline\ plant}$	Average efficiency of electricity generation in the baseline plant (MWh _{el} /MWh _{biomass})
$\varepsilon_{el, project\ plant,y}$	Average efficiency of electricity generation in the project plant (MWh _{el} /MWh _{biomass})

$$\varepsilon_{el, project\ plant,y} = \frac{EG_{project\ plant,y}}{\sum_k NCV_k \cdot BF_{k,y} + \sum_i NVC_i \cdot FF_{project\ plant,i,y}} \quad (10)$$

$\varepsilon_{el, project\ plant,y}$	Average net energy efficiency of electricity generation in the project plant
$EG_{project\ plant,y}$	Net quantity of electricity generated in the project plant during the year y (MWh)
$BF_{k,y}$	Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter or liter)
NCV_k	Net calorific value of the biomass residue type k (GJ/ton of dry matter or GJ/liter)
NCV_i	Net calorific value of fossil fuel type i (GJ / mass or volume unit)

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$FF_{\text{project plant},i,y}$ Quantity of fossil fuel type i combusted in the project plant during the year y (mass or volume unit per year)

Leakage emissions:

The main source of leakage in the methodology is considered to be the increase of fossil fuel consumption due to the diversion of the biomass. No diversion of biomass occurs, therefore no leakage is present. For the reasons explained, leakage (L_y) is considered to be zero.

Emission reductions:

$$ER = ER_{\text{heat},y} + ER_{\text{electricity},y} + BE_{\text{biomass},y} - PE_y - L_y \quad (11)$$

ER_y Emissions reductions of the project activity during the year y (tCO₂/yr)
 $ER_{\text{electricity},y}$ Emission reductions due to displacement of electricity during the year y (tCO₂/yr)
 $ER_{\text{heat},y}$ Emission reductions due to displacement of heat during the year y (tCO₂/yr)
 $BE_{\text{biomass},y}$ Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO₂e/yr)
 PE_y Project emissions during the year y (tCO₂/yr)
 L_y Leakage emissions during the year y (tCO₂/yr)

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$EF_{\text{OM, simple adjusted}}$
Data unit:	tCO ₂ /MWh
Description:	Grid Operating Margin
Source of data used:	See Annex 3
Value applied:	0.4349
Justification of the choice of data or description of measurement methods and procedures actually applied :	OM is calculated according to option (b) of the STEP 2 - Simple Adjusted OM method, from the “Tool to calculate the emission factor for an electricity system” For further information please refer to Annex 3.
Any comment:	

Data / Parameter:	$F_{i,y}$
Data unit:	TJ
Description:	Amount of each fossil fuel consumed by each power source.
Source of data used:	See Annex 3.



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Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	All values were provided by governmental agencies. Those agencies are responsible to control the electric system.
Any comment:	

Data / Parameter:	COEF_i
Data unit:	tCO ₂ /TJ
Description:	CO ₂ emission factor for each fossil fuel consumed.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	

Data / Parameter:	GEN_{iknv}
Data unit:	MWh
Description:	Electricity generation of each power source
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	All values were provided by governmental agencies. Those agencies are responsible to control the electric system.
Any comment:	

Data / Parameter:	Plant name
Data unit:	Text
Description:	Identification of power sources for OM.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures	See Annex 3.



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actually applied :	
Any comment:	

Data / Parameter:	Plant name
Data unit:	Text
Description:	Identification of power sources for BM.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	

Data / Parameter:	GEN_{ijklv} IMPORTS
Data unit:	MWh
Description:	Electricity imports to the grid.
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	

Data / Parameter:	COEF_{ijv}
Data unit:	tCO ₂ /TJ
Description:	CO ₂ emission coefficient of fuels used in connected electricity systems (if imports occur)
Source of data used:	See Annex 3.
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3.
Any comment:	



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Data / Parameter:	w_{OM}
Data unit:	Fraction
Description:	Weighting
Source of data used:	ACM0002
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default weighting value for Operating Margin taken from the “Tool to calculate the emission factor for an electricity system”
Any comment:	

Data / Parameter:	EF_{BM}
Data unit:	tCO ₂ /MWh
Description:	Grid Build Margin
Source of data used:	See Annex 3
Value applied:	0.0872
Justification of the choice of data or description of measurement methods and procedures actually applied :	BM is calculated according to the “Tool to calculate the emission factor for an electricity system”. For further information please refer to Annex 3.
Any comment:	

Data / Parameter:	w_{BM}
Data unit:	Fraction
Description:	Weighting
Source of data used:	ACM0002
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default weighting value for Build Margin taken from the “Tool to calculate the emission factor for an electricity system”
Any comment:	

Data / Parameter:	EF_v
Data unit:	tCO ₂ /MWh
Description:	Grid emission factor
Source of data used:	See Annex 3
Value applied:	0.2611



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Justification of the choice of data or description of measurement methods and procedures actually applied :	The Baseline Emission Factor calculation consists of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system”. Detailed information is attached in Annex 3.
Any comment:	

Data / Parameter:	λ_{2003}
Data unit:	Fraction
Description:	Number of hours per year for which low-cost must-run sources are on margin, for 2003
Source of data used:	See Annex 3
Value applied:	0.5312
Justification of the choice of data or description of measurement methods and procedures actually applied :	λ calculation was done according to the “Tool to calculate the emission factor for an electricity system”.
Any comment:	

Data / Parameter:	λ_{2004}
Data unit:	Fraction
Description:	Number of hours per year for which low-cost must-run sources are on margin, for 2004
Source of data used:	See Annex 3
Value applied:	0.5055
Justification of the choice of data or description of measurement methods and procedures actually applied :	λ calculation was done according to the “Tool to calculate the emission factor for an electricity system”.
Any comment:	

Data / Parameter:	λ_{2005}
Data unit:	Fraction
Description:	Number of hours per year for which low-cost must-run sources are on margin, for 2005
Source of data used:	See Annex 3
Value applied:	0.5130
Justification of the choice of data or description of measurement methods and procedures actually applied :	λ calculation was done according to the “Tool to calculate the emission factor for an electricity system”.
Any comment:	



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measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$\epsilon_{el, \text{reference plant}}$
Data unit:	$MW_{\text{hel}} / MWh_{\text{biomass}}$
Description:	Average net energy efficiency of power or heat generation in the reference power plant that would use the biomass residues fired in the project plant in the absence of the project activity
Source of data used:	Use the efficiency of electricity or heat generation, as identified as part of the baseline scenario selection procedure. Consider commonly installed new biomass residue fired power plants that are common practice for new plants in the respective industry sector in the country or region. Choose the efficiency in a conservative manner, i.e. choose a higher efficiency within a plausible range of efficiencies that are reached by new plants in the relevant sector, document relevant sources of information (relevant studies, measurements and/or expert judgments) in the CDM PDD and justify the choice.
Value applied:	2.32%
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Applicable to scenario 18

B.6.3 Ex-ante calculation of emission reductions:

All equations used to estimate the emission reductions were provided in section B.6.1. The grid emission factor was calculated using equations 6 - 8, according to the description provided in the consolidated methodology ACM0002. Baseline emissions were considered to be the sum of the 3 first parameters of equation 11.

Emission reductions due to displacement of heat are considered to be zero. The thermal efficiency in the project plant is larger or similar compared with the thermal efficiency of the plant considered in baseline scenario and then $ER_{\text{heat},y} = 0$.

CH₄ emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are not included, therefore $PE_{\text{Biomass,CH}_4,y} = 0$. No waste water is generated from biomass residues treatment or preparation, hence $PE_{\text{WW,CH}_4,y} = 0$.

All biomass residues are generated in site, thus no emissions are accounted due to biomass transportation, $PET_y = 0$.

Detailed information of how the equations were used, and values applied are provided in Table 5.



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Table 5 - The ex-ante emission reductions values and calculations

Parameter	Formula	Value	Unit
BM	provided in section B.6.1	0.0872	tCO ₂ /MWh
wBM	-	0.5	-
OM	provided in section B.6.1	0.4349	tCO ₂ /MWh
wOM	-	0.5	-
EF	provided in section B.6.1	0.2611	tCO ₂ /MWh
EG _{project plant,y}	-	251,850	MWh
ε _{el,baseline plant}	-	2.32%	-
ε _{el,project plant,y}	-	15.39%	-
EG _y	provided in section B.6.1	213,885	MWh
PET	-	0	tCO ₂ e
PEFF	provided in section B.6.1	0	tCO ₂ e
PE _{EC}	provided in section B.6.1	55,845	tCO ₂ e
ER _{heat}	-	0	tCO ₂ e
ER _{electricity}	=PE _{EC}	55,845	tCO ₂ e
BE _{biomass}	-	0	tCO ₂ e
BE	=ER _{heat} +ER _{electricity} +BE _{biomass}	55,845	tCO ₂ e
PE	=PET + PEFF + PE _{EC}	0	tCO ₂ e
L	-	0	tCO ₂ e
ER	=ER _{electricity} + BR _{biomass} - PE - L	55,845	tCO ₂ e

B.6.4 Summary of the ex-ante estimation of emission reductions:
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Table 6 - Summary of the ex-ante estimation of emission reductions

Year	Estimation of project activity emissions (tonnes of CO ₂ e)	Estimation of baseline emissions (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
2008 (April - December)	0	41,884	0	41,884
2009	0	55,845	0	55,845
2010	0	55,845	0	55,845
2011	0	55,845	0	55,845



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2012	0	55,845	0	55,845
2013	0	55,845	0	55,845
2014	0	55,845	0	55,845
2015(January - March)	0	13,961	0	13,961
Total (tonnes of CO ₂ e)	0	390,915	0	390,915

B.7 Application of the monitoring methodology and description of the monitoring plan:**B.7.1. Data and parameters monitored:**

Data / Parameter:	EG_{project plant y}
Data unit:	MWh
Description:	Net quantity of electricity generated in the project plant during the year y
Source of data to be used:	Readings of the energy meter connected to the project plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	251,850
Description of measurement methods and procedures to be applied:	Electricity generation and internal consumption will be measured regularly. Meters will undergo to maintenance and/or calibration according to the manufacturer requirements.
QA/QC procedures to be applied:	The consistency of metered net electricity generation should be cross-checked with receipts from electricity sales (if available), internal consumption measurements and the quantity of fuels/biomass fired (e.g. check whether the electricity generation divided by the quantity of fuels/biomass fired results in a reasonable efficiency that is comparable to previous years).
Any comment:	All the data will be recorded monthly, and archived during the crediting period plus two years.

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net quantity of increased electricity generation as a result of the project activity during the year y
Source of data to be used:	Calculated according to equation 2, in section B.6.1
Value of data applied for the purpose of calculating expected emission reductions in	213,885



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section B.5	
Description of measurement methods and procedures to be applied:	This value is not measured, but calculated monthly.
QA/QC procedures to be applied:	The calculation will be audited monthly by project participants.
Any comment:	All the data will be recorded monthly, and archived during the crediting period plus two years.

Data / Parameter:	$\epsilon_{el,project\ plant,y}$
Data unit:	%
Description:	Electric energy efficiency
Source of data to be used:	Net energy efficiency of electricity generation in the project plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	15.39%
Description of measurement methods and procedures to be applied:	Calculated monthly, based on the amount of fuel input and electricity output.
QA/QC procedures to be applied:	
Any comment:	All the data will be recorded monthly, and archived during the crediting period plus two years.

Data / Parameter:	$BF_{bagasse}$
Data unit:	Metric tonnes
Description:	Quantity of bagasse combusted in the project plant during the year y
Source of data to be used:	Internal Report
Value of data applied for the purpose of calculating expected emission reductions in section B.5	267.681
Description of measurement methods and procedures to be applied:	All sugarcane is measured and the bagasse amount is estimated. Historical value is used to estimate the amount of bagasse, 0.2413 tones of bagasse per tones of sugar cane processed is applied.
QA/QC procedures to	Crosscheck the measurements with historical energy balance (it is based on



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be applied:	sugarcane purchased and/or consumed and quantities and stock changes).
Any comment:	All the data will be recorded monthly, and archived during the crediting period plus two years.

Data / Parameter:	NCV_{bagasse}
Data unit:	TJ/tonnes
Description:	Net calorific value of bagasse
Source of data to be used:	Either conduct measurements or use accurate and reliable local or national data where available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	9.21
Description of measurement methods and procedures to be applied:	In case of measurements: At least every six months, taking at least three samples for each measurement. In case of other data sources: Review the appropriateness of the data annually.
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	

Data / Parameter:	$EF_{\text{co}_2, \text{FF}}$
Data unit:	tCO ₂ /tonnes
Description:	CO ₂ emission factor for fossil fuel type <i>i</i>
Source of data to be used:	Either conduct measurements or use accurate and reliable local or national data where available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applied any value in the section B.5. No fossil fuel consumption is expected.
Description of measurement methods and procedures to be applied:	In case of measurements: At least every six months, taking at least three samples for each measurement. In case of other data sources: Review the appropriateness of the data annually.
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	

Data / Parameter:	$FF_{\text{project plant}, i, v}$
Data unit:	tCO ₂ /tonnes



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Description:	Quantity of fossil fuel type <i>i</i> combusted in the project plant during the year <i>y</i>
Source of data to be used:	Either conduct measurements or use accurate and reliable local or national data where available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0
Description of measurement methods and procedures to be applied:	Sales invoices will be used. Fossil fuel providers have accurate measurement procedures and the accurate amount of fuel is stated in sales invoices.
QA/QC procedures to be applied:	Data will be cross-checked with the annual energy balance and/or with internal stock control.
Any comment:	

Data / Parameter:	$FF_{\text{project site},i,y}$
Data unit:	tCO ₂ /tonnes
Description:	Quantity of fossil fuel type <i>i</i> combusted at the project site for other purposes that are attributable to the project activity during the year <i>y</i>
Source of data to be used:	Either conduct measurements or use accurate and reliable local or national data where available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0
Description of measurement methods and procedures to be applied:	Sales invoices will be used. Fossil fuel providers have accurate measurement procedures and the accurate amount of fuel is stated in sales invoices.
QA/QC procedures to be applied:	Data will be cross-checked with the annual energy balance and/or with internal stock control.
Any comment:	

B.7.2 Description of the monitoring plan:
--

Data that has to be monitored are the net quantity of electricity generated at the project plant ($EG_{\text{project plant},y}$) and the quantity of bagasse (and its NCV). Below is the description of monitoring procedures for data measurement, quality assurance and quality control.

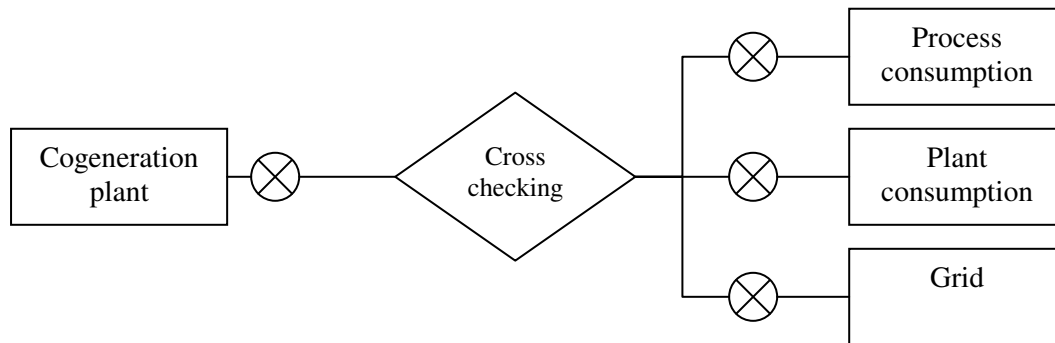
1. Monitoring organisation

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The grid operator reads the Grid electricity Meter on a monthly basis and this data will be used by the project developer to issue electricity sale invoices. These invoices include the amount of electricity delivered to the grid and will be used to calculate the amount of CERs generated by the project activity.

Power plant operators read, on a monthly basis, the amount of electricity generated, consumed on site and delivered to the grid, in order to check the plant operation.



Metering of Electricity Supplied to the Grid

The main electricity meter for establishing the amount of electricity delivered to the grid is owned by the Project Developer. As this meter provides the main data for CER measurement, it will be the key part of the verification process.

Data will also be measured continuously by the plant operator and at the end of each month the monitoring data will be filed electronically and a back-up will be made regularly. Data will be archived electronically and will be kept for at least two years after the crediting period.

Biomass consumption

All sugar cane processed onsite is measured. The biomass residue, bagasse, amount is calculated based on a factor of bagasse generated per tonne of cane processed (in percentage). It is based on historical values, already used either by the project developer and sugar and alcohol sector. Data will be recorded continuously and reported monthly by plant operators. The monitoring data will be filed electronically and a back-up will be made regularly. Data will be archived electronically and will be kept for at least two years after the crediting period.

Quality Control and Quality Assurance

Quality control and quality assurance procedures will guarantee the quality of data collected. The electricity meter(s) will undergo regular maintenance. When necessary, equipment and meters are repaired and/or calibrated, as required by the manufacturer guidelines.

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To guarantee the consistency and accuracy of the data collected from the electricity meter(s), data will be cross-checked with the sale invoices and internal consumption electricity. The sum of electricity generated and the electricity consumed shall be very similar. Generation and consumption will be cross-checked.

Sugarcane is the main raw material in Ferrari Termoeletrica S/A, thus, there is a strict control of sugarcane entrance. All the trucks entrance carrying sugarcane are weighed. There is no significant stock of sugarcane, it is consumed in a timely fashion. To check the consistency of the amount of bagasse consumed, the efficiency of boilers is checked to know if it is meeting the expected efficiency range.

The organisation of the monitoring team will be established and clear roles and responsibilities will be assigned to all staff involved in the CDM project. The monitoring will be performed according to internal procedure that will be available at the time of verification as the project activity is currently not operating.

The information will be recorded by Ferrari Termoeletrica S/A. This information will be transferred to EcoSecurities on a monthly basis in order to monitor emission reductions. EcoSecurities will check all the data and analyze if there are any abnormalities or problems in the data recorded. In case of problems, corrections or clarification will be requested.

The energy generating equipment will not be transferred from another activity; therefore, leakage effects do not need to be accounted.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

The baseline study and the monitoring methodology were concluded on 29/10/2007. The entity determining the baseline study and the monitoring methodology and participating in the project as the Carbon Advisor is EcoSecurities, listed in Annex 1 of this document.

Personnel responsible for the baseline and monitoring of this project:

Mr. Leandro Noel	EcoSecurities Brasil Ltda.	Project Manager	leandro.noel@ecosecurities.com
Mr. Luis Filipe Kopp	EcoSecurities Brasil Ltda.	Monitoring Manager	luis.kopp@ecosecurities.com
Mr. Pablo Fernandez	EcoSecurities Brasil Ltda.	Team Leader	pablo@ecosecurities.com
Ms. Courtney Blodgett	EcoSecurities Group plc	Technical Reviewer	Courtney@ecosecurities.com

Contact: EcoSecurities Brasil Ltda., Rua Lauro Müller 116, 4303/4304, Botafogo, Rio de Janeiro, Brazil.
CEP: 22290-160. Phone: +55 (21) 2546-4150



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SECTION C. Duration of the project activity / crediting period**C.1 Duration of the project activity:****C.1.1. Starting date of the project activity:**01/08/2007⁷**C.1.2. Expected operational lifetime of the project activity:**

30 years

C.2 Choice of the crediting period and related information:**C.2.1. Renewable crediting period****C.2.1.1. Starting date of the first crediting period:**

The crediting period will start on 01/09/2008, or on the date of registration of the CDM project activity, whichever is later.

C.2.1.2. Length of the first crediting period:

7 years.

C.2.2. Fixed crediting period:**C.2.2.1. Starting date:**

Not applicable

C.2.2.2. Length:

Not applicable

⁷ This date, taken as the first real action for the implementation of the project activity, is a technical proposal sent by the technology provider to the project developer.

**SECTION D. Environmental impacts****D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:**

Regarding regulatory permits, the project developer has authorization to operate issued by ANEEL (ANEEL Dispatch n° 1987, issued on 28/08/2006).

Regarding environmental permits, the project has the necessary environmental licenses. In Brazil, the sponsor of a project that involves construction, installation, expansion or operation, even with no new significant environmental impact, must obtain new licenses. The licenses required by the Brazilian environmental regulation are (Resolution n. 237/97):

- The preliminary license (“*Licença Prévia*” or L.P.),
- The construction license (“*Licença de Instalação*” or L.I.); and
- The operating license (“*Licença de Operação*” or L.O.).

The license of installation was issued by the state environmental agency, CETESB – *Companhia de Tecnologia de Saneamento Ambiental* the environmental agency of the state of São Paulo (Installation License - n° 43002774 dated of 02/02/2007).

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Not applicable as no significant environmental impacts are expected from the project activity.



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SECTION E. Stakeholders' comments**E.1. Brief description how comments by local stakeholders have been invited and compiled:**

According to Resolution #1 dated December 2nd, 2003 from the Brazilian Inter-Ministerial Commission of Climate Change (Comissão Interministerial de Mudança Global do Clima -CIMGC), any CDM project must send a letter with a description of the project and an invitation for comments by local stakeholders. In this case, letters were sent to the following local stakeholders:

- City Hall of Pirassununga;
- District Attorney (known in Portuguese as Ministério Público, i.e. the permanent institution essential for legal functions responsible for defending the legal order, democracy and social/individual interests);
- Chamber of Deputy of Pirassununga;
- CETESB Companhia de Tecnologia de Saneamento Ambiental (Environmental Agency of the State of São Paulo);
- Brazilian Fórum of NGOs;
- Secretaria do Meio Ambiente de Pirassununga;
- Local community associations

Local stakeholders were invited to raise their concerns and provide comments on the project activity for a period of 30 days after receiving the letter of invitation.

E.2. Summary of the comments received:

To date no formal comments have been received from stakeholders.

E.3. Report on how due account was taken of any comments received:

Not applicable, given that no comments were received.



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Annex 1**CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

Organization:	Ferrari Termoeletrica S/A
Street/P.O.Box:	Rodovia SP-215, Km 84
Building:	Fazenda da Rocha
City:	Pirassununga
State/Region:	São Paulo
Postfix/ZIP:	13.631-301
Country:	Brazil
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	Waldemar Sinefonte Ferrari
Title:	President
Salutation:	Mr.
Last Name:	Ferrari
Middle Name:	Sinefonte
First Name:	Waldemar
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Project Annex 1 participant:

Organization:	EcoSecurities Group Plc.
Street/P.O.Box:	40 Dawson Street
Building:	
City:	Dublin
State/Region:	
Postfix/ZIP:	02
Country:	Ireland
Telephone:	+353 1613 9814
FAX:	+353 1672 4716
E-Mail:	info@ecosecurities.com
URL:	www.ecosecurities.com
Represented by:	
Title:	President
Salutation:	Dr.
Last Name:	Moura Costa
Middle Name:	



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First Name:	Pedro
Mobile:	
Direct FAX:	
Direct tel:	+44 1865 202 635
Personal E-Mail:	cdm@ecosecurities.com



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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This project will not receive any public funding from Annex 1 parties.



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Annex 3**BASELINE INFORMATION****Grid Emission Factor Information**

Generation data used to calculate the Grid Emission Factor (Combined Margin) is from ONS – The National System Operator and ANEEL – The Electricity National Agency. Figures below shows the data used to calculate the Grid EF:

Fuel (i)		COEF _i (tCO ₂ /TJ)
Bituminous Coal	C	94,15
Diesel	D	73,33
Natural Gas	G	55,82
Hydro	H	0,00
Nuclear	N	0,00
Fuel Oil	O	76,59

	2003					2004					2005					
	Generation (MWh)	Fuel Consumption (TJ)	Fuel	BM	OM	Generation (MWh)	Fuel Consumption (TJ)	Fuel	BM	OM	Generation (MWh)	Fuel Consumption (TJ)	Fuel	BM	OM	
JAIURU	78.921					TermoRio	129.328	1.444	G	X	Quebra Queixo	16.191				
GUAPORÉ	86.201					Candonga	129.327				Ouroinhos	25.167				
TRES LAGOAS	233.793	2.806	G		X	Queimado	360.952				Barra Grande	248.690				
FUNIL (MG)	370.111					Norte Fluminense	1.507.181	18.086	G	X	Mimoso	48.329				
ITIOQUIRA I	408.728					JAIURU	487.636				Ponte de Pedra	439.462				
ARAUCÁRIA	182.256	2.187	G		X	GUAPORÉ	335.127				Almores	122.877				
CANOAS	417.894					TRES LAGOAS	1.419.067	17.029	G	X	Santa Clara PR	321.818				
PIRAJU	47.847					FUNIL (MG)	667.597				Monte Claro	243.331				
N. PIRATININGA	0					ITIOQUIRA I	856.539				TermoRio	1.150.380	8.283	G	X	X
PCT CGTEE	0					ARAUCÁRIA	22				PCH CESP	0				
ROSAL	316.262					CANOAS	527.587	6.331	G	X	Candonga	565.935				
IBIRITÉ	530.761	6.369	G		X	PIRAJU	466.728				Queimado	598.857				
CANA BRAVA	2.200.434					N. PIRATININGA	13.929				Norte Fluminense	3.835.646	26.177	G	X	X
STA CLARA	169.471					PCT CGTEE	0				JAIURU	514.779				
MACHADINHO	3.436.304					ROSAL	384.555				GUAPORÉ	389.619				
JUIZ DE FORA	5.845	75	G		X	IBIRITÉ	1.245.228	14.943	G	X	TRES LAGOAS	690.051	7.763	G	X	X
Macaé Merchant	2.389.507	35.843	G		X	CANA BRAVA	2.214.839				FUNIL (MG)	800.466				
LAJEADO (ANEEL res. 402/2001)	4.457.790					STA CLARA	345.880				ITIOQUIRA I	1.104.190				
ELETROBOLT	242.364	3.635	G		X	MACHADINHO	4.337.018				ARAUCÁRIA	0				
D. FRANCISCA	895.131					JUIZ DE FORA	66.002	849	G	X	CANOAS	927.537	10.435	G	X	X
Porto Estrela	410.136					Macaé Merchant	740.098	11.101	G	X	PIRAJU	446.366				
Cuiabá (Mario Covas)	2.228.109	26.737	G		X	LAJEADO (ANEEL res. 402/2001)	4.331.991				N. PIRATININGA	231.010	2.599	G	X	X
WARJONA	549.729	7.916	G		X	ELETROBOLT	1.324.501	19.868	G	X	PCT CGTEE	0				
URUGUAIANA	1.751.486	24.251	G		X	D. FRANCISCA	683.674				ROSAL	421.691				
S.CAXIAS	5.556.125					Porto Estrela	554.865				IBIRITÉ	490.201	5.515	G	X	X
CANOAS I	594.298					Cuiabá (Mario Covas)	1.659.230	19.911	G	X	CANA BRAVA	2.316.663				
CANOAS II	507.843					WARJONA	538.087	7.748	G	X	STA CLARA MG	332.249				
IGARAPAVA	1.140.260					URUGUAIANA	2.270.176	31.433	G	X	MACHADINHO	4.480.027				
P.PRIMAVERA	9.059.670					S.CAXIAS	6.015.459				JUIZ DE FORA	232.477	2.615	G	X	X
Cuiabá (Mario Covas)	0					CANOAS I	578.928				Macaé Merchant	119.568	1.345	G	X	X
SOBRAGI	341.073					CANOAS II	496.299				LAJEADO (ANEEL res. 402/2001)	4.539.333				
PCH EMAE	103.188					IGARAPAVA	1.090.945				ELETROBOLT	190.904	2.148	G	X	X
PCH CEEE	240.724					P.PRIMAVERA	9.472.700				D. FRANCISCA	761.279				
PCH ENERSUL	119.405					SOBRAGI	395.652				Porto Estrela	593.357				
PCH CEB	76.857					PCH EMAE	137.132				Cuiabá (Mario Covas)	1.229.232	13.829	G	X	X
PCH ESCELSA	260.910					PCH CEEE	215.617				WARJONA	728.835	8.199	G	X	X
PCH CELESC	442.080					PCH ENERSUL	174.892				URUGUAIANA	1.733.424	12.481	G	X	X
PCH CEMAT	966.348					PCH CEB	109.606				S.CAXIAS	5.920.260				
PCH CELG	80.656					PCH ESCELSA	353.471				CANOAS I	555.667				
PCH CERJ	256.284					PCH CELESC	468.240				CANOAS II	441.828				
PCH COPEL	421.439					PCH CEMAT	1.353.714				IGARAPAVA	1.297.196				
PCH CEMIG	564.461					PCH CELG	73.309				P.PRIMAVERA	9.886.480				
PCH CPFL	328.332					PCH CERJ	297.264				SOBRAGI	385.988				
S. MESA	4.490.258					PCH COPEL	707.277				PCH EMAE	149.526				
PCH EPAULO	0					PCH CEMIG	672.548				PCH CEEE	173.917				
Guilimam Amorim	511.414					PCH CPFL	458.822				PCH ENERSUL	162.165				
CORUMBÁ	1.804.930					S. MESA	4.397.135				PCH CEB	114.097				
MIRANDA	1.778.457					Guilimam Amorim	661.366				PCH ESCELSA	500.563				
NOVA PONTE	2.208.901					CORUMBÁ	2.163.267				PCH CELESC	481.799				
SEGREDO (Gov. Ney Braga)	5.253.636					MIRANDA	1.069.831				PCH CEMAT	1.515.897				
TAQUARUCU	2.251.810					NOVA PONTE	1.302.583				PCH CELG	72.592				
MANSO	841.600					SEGREDO (Gov. Ney Braga)	5.897.593				PCH CERJ	311.762				
ITA	5.222.285					TAQUARUCU	2.022.042				PCH COPEL	578.787				
ROSANA	2.029.045					MANSO	732.036				PCH CEMIG	619.029				
ANGRA	13.355.432					ITA	6.054.272				PCH CPFL	461.440				
T. IRMAOS	2.493.761					ROSANA	1.864.543				S. MESA	4.731.322				
ITAIPU 60 Hz	46.309.279					ANGRA	11.581.987				PCH EPAULO	0				
ITAIPU 50 Hz	36.692.448					T. IRMAOS	2.058.733				Guilimam Amorim	632.333				
EMBORCACAÇÃO	3.928.062					ITAIPU 60 Hz	46.853.256				CORUMBÁ	1.923.111				
Nova Avanhandava	1.377.657					ITAIPU 50 Hz	36.935.778				MIRANDA	1.480.071				
Gov. Bento Munhoz - GBM	4.178.204					EMBORCACAÇÃO	4.312.481				NOVA PONTE	2.015.019				



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Table with multiple columns listing project details, locations, and values for various CDM projects across different Brazilian states.

A summary of the calculation is provided below, as well as all sources of information used to calculate the Grid EF.

Table titled 'Emission factors for the Brazilian South-Southeast-Midwest interconnected grid' showing Baseline (including imports) for years 2003, 2004, and 2005, along with Total (2003-2005) and various weighted emission factors (EF OM, Alternative EF y, Default EF y).



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Sources:

Fossil Fuel Conversion Efficiency	Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. Road testing baselines for greenhouse gas mitigation projects in the electric power sector. OECD and IEA information paper, October 2002. / Planilha R. Shaeffer: COPPE-2002-IEA termo 1
Carbon emission factor (tC/TJ)	Intergovernmental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories.
Fraction carbon oxidized	Intergovernmental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories.
Fossil fuel conversion efficiency for Operation Margin calculation (%)	Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. Road testing baselines for greenhouse gas mitigation projects in the electric power sector. OECD and IEA information paper, October 2002. / Planilha R. Shaeffer: COPPE-2002-IEA termo 1

Agência Nacional de Energia Elétrica. *Banco de Informações da Geração* (<http://www.aneel.gov.br/>, data collected in november 2004).

Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. *Road testing baselines for greenhouse gas mitigation projects in the electric power sector*. OECD and IEA information paper, October 2002. / Planilha R. Shaeffer: COPPE-2002-IEA termo 1

Intergovernmental Panel on Climate Change. *Revised 1996 Guidelines for National Greenhouse Gas Inventories*.

Operador Nacional do Sistema Elétrico. Centro Nacional de Operação do Sistema. *Acompanhamento Diário da Operação do SIN* (daily reports from Jan. 1, 2002 to Dec. 31, 2004).

Agência Nacional de Energia Elétrica. Superintendência de Fiscalização dos Serviços de Geração. *Resumo Geral dos Novos Empreendimentos de Geração* (<http://www.aneel.gov.br/>, data collected in november 2004).

Centrais Elétricas Brasileiras S/A. Plano anual de combustíveis - Sistema interligado S/SE/CO 2005 (released December 2004).



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Annex 4

MONITORING INFORMATION

Please refer to section B.7 above.