CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Pioneiros Bagasse Cogeneration Project
Version 1
26/04/2006

A.2. Description of the project activity:

The Pioneiros Bagasse Cogeneration Project (hereinafter PBCP) consists of increasing efficiency in the bagasse (a renewable fuel source, residue from sugarcane processing) cogeneration facility, through the installation of a new cogeneration unit at Destilaria Pioneiros S/A, a Brazilian sugar mill. With the implementation of this project activity, the mill will be able to sell electricity to the national grid within the S-SE-CO connected system and avoid the dispatch of the same amount of energy produced by fossil-fuelled thermal plants to that grid. By that, the initiative avoids CO2 emissions, also contributing to the regional and national sustainable development.

Destilaria Pioneiros S/A belongs to Crystal Serve Group, which is responsible by 11% of total Brazilian sugar exportation and 4% of the worldwide commercialized sugar. In 2005's crop season, the amount of alcohol anhydrous produced by Destilaria Pioneiros S/A achieved 49 748.223 m^3, while the hydrated alcohol achieved 5 361.894 m^3. The sugar production, in the same crop season, corresponded to 83 384.30 tons, of which 10 429.35 tons were commercialized in internal market and 72 891.95 were exported. Currently Destilaria Pioneiros S/A produces sugar and alcohol in four shifts and counts on 300 employers.

The sponsors of the PBCP are convinced that bagasse cogeneration is a sustainable source of energy that brings not only advantages for mitigating global warming, but also creates a sustainable competitive advantage for the agricultural production in the sugarcane industry in Brazil. Using the available natural resources, the PBCP project activity helps to enhance the consumption of renewable energy and demonstrates the feasibility of electricity generation as a side-business source of revenue for the sugar industry. It is worthy to highlight that out of approximately 320 sugar mills in Brazil, the great majority produces energy for on-site use only, and not for grid supply, which is mainly due to the low-efficiency of the cogeneration equipment installed on those sugar mills.

Furthermore, bagasse cogeneration plays an important role on national economic development and energy strategy, as Brazil's sugarcane-based industry provides for approximately 1.8 million jobs and represents one of the major agribusiness products within the trade balance of the country. Moreover the cogeneration is an alternative that allows postponing the installation of fossil fuel power plants and/or dispatch of electricity produced by fossil-fuelled generation utilities.

It is also relevant to consider that Brazilian heavy industry has developed the technology to supply the sugarcane industry with equipments to provide expansion for the cogeneration; therefore such heavy industry development also helps the country to create jobs and achieve sustainable development.

In this context, the sale of the CER generated by the project activity will boost the attractiveness of bagasse cogeneration projects, helping to increase the production of this energy and decrease dependency on fossil fuel sources.

Destilaria Pioneiros S/A, also believes that sustainable development will be achieved not only by the implementation of a renewable energy production facility, but also by carrying out activities which corresponds to the company social and environmental responsibilities, as described below:

a) Contribution to the local environmental sustainability:
The PBCP installation and certification demands the company to follow strict control of the environmental impacts, bringing direct environmental benefits. The implementation of a strict emission control, for instance, guarantees an air quality improvement in the mills' nearby areas. Moreover, the operation of the project itself improves the environmental conditions, once the use of renewable energy sources lower the use of non-renewable ones.

b) Contribution to the improvement of working conditions and employment creation:
PBCP represents a new business for Destilaria Pioneiros S/A. Therefore, a specialized and dedicated work involved in the installation, operation and maintenance of the cogeneration plant is made necessary. Hence, PBCP's operation contributes not only for direct employment generation, but also for indirect employment, being those mainly from the technology field, as in research and development, as in the production and maintenance of equipments.

c) Contribution to income distribution:
The PBCP implementation creates a new income option through the electricity sale in addition to CERs revenue, ensuring a higher financial and energetic sustainability. This enables the company to expand its alcohol and sugar production. Hence, new job positions are created, as in the sugarcane harvest as in the industrial operation itself. As workers in these positions, mainly in the agricultural area, are usually low qualified, the project contributes to income distribution.

d) Contribution to technological development and capacity building:
The sugar and alcohol sector has always explored biomass (bagasse) in an inefficient way, using low pressure boilers, considered as a simple operational technology. The inefficient procedures and the lack of financial incentives for steam generation forbid additional electric energy to be produced for sale. But investments made in a more efficient technology, such as higher pressure boilers, and the CERs revenues have been allowing a few companies in the sugar and alcohol sector to increase their internal installed capacity and then enhance the amount of electricity available for sale.
In this way, this project contributes to the technological development in Brazil.

e) Contribution to regional integration and cooperation with other sectors:
The creation of new opportunities for the mills of sugar and alcohol sector, through the cogeneration project using bagasse for electricity generation and sale in addition to CERs revenue, promoted a higher interaction between the sugarcane and Brazilian power sectors.

It is also important to note that the implementation and operation of PBCP requires a number of services provided by local entrepreneurs, such as food supply, medical assistance, technical and maintenance services that promote the regional integration and cooperation.

A.3. 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)	• Destilaria Pioneiros S/A (Brazilian private entity) • Econergy Brasil Ltda. (Brazilian private entity)	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 of 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

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

São Paulo

A.4.1.3. City/Town/Community etc:

Sud Mennucci

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

Sud Mennucci is located in the northwest of the State of São Paulo, 614 km away from the state capital, São Paulo, as illustrated in Figure 1.

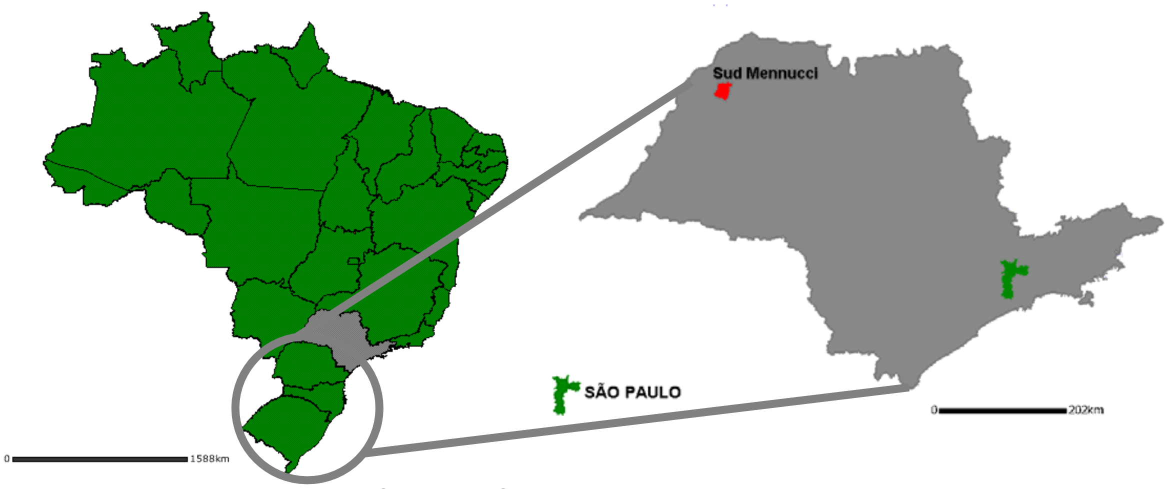


Figure 1. Geographical position of the city of Sud Mennucci

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

Sectorial Scope: 1-Energy industries (renewable / non-renewable sources)

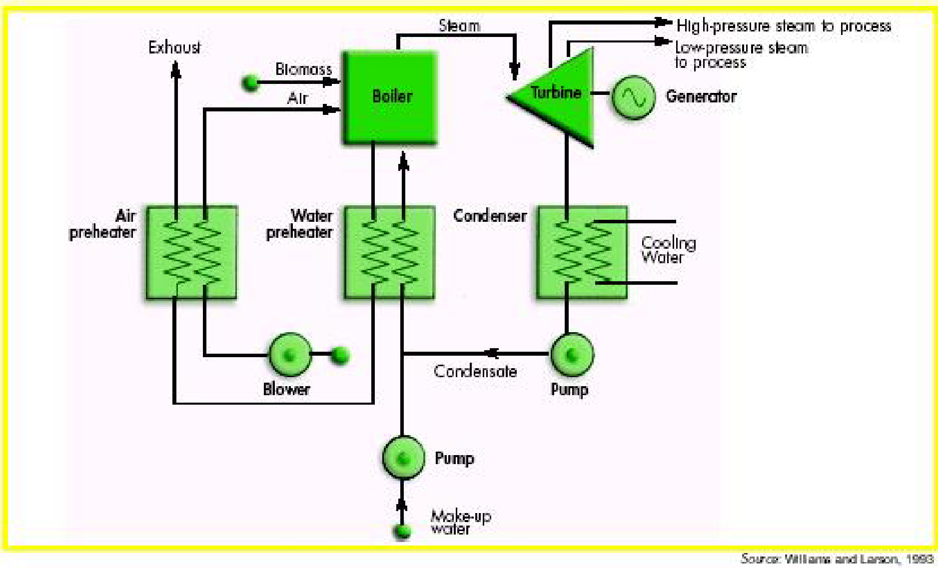
A.4.3. Technology to be employed by the project activity:

The predominant technology in all parts of the world today for generating megawatt (MW) levels of electricity from biomass is the steam-Rankine cycle, which consists of direct combustion of biomass in a boiler to generate steam, which is then expanded through a turbine. Most steam cycle plants are located at industrial sites, where the waste heat from the steam turbine is recovered and used for meeting industrial process heat needs. Such combined heat and power (CHP) or cogeneration systems provide greater levels of energy services per unit of biomass consumed than systems that generate electric power only.

The steam-Rankine cycle involves heating pressurized water, with the resulting steam expanding to drive a turbine-generator, and then condensing back to water for partial or full recycling to the boiler. A heat exchanger is used in some cases to recover heat from flue gases to preheat combustion air, and a de-aerator must be used to remove dissolved oxygen from water before it enters the boiler.

Steam turbines are designed as either "backpressure" or "condensing" turbines. CHP applications typically employ backpressure turbines, wherein steam expands to a pressure that is still substantially above environmental pressure. It leaves the turbine still as a vapour and is sent to satisfy industrial heating needs, where it condenses back to water. It is then partially or fully returned to the boiler. Alternatively, if process steam demands can be met using only a portion of the available steam, a condensing-extraction steam turbine (CEST) might be used. This design includes the capability for some steam to be extracted at one or more points along the expansion path for meeting process needs (Figure 2). Steam that is not extracted continues to expand to sub-atmospheric pressures, thereby increasing the amount of electricity generated per unit of team compared to the backpressure turbine. The non-extracted steam is converted back to liquid water in a condenser that utilizes ambient air and/or a cold water source as the coolant[1].

Figure 2. Schematic diagram of a biomass-fired steam-Rankine cycle for cogeneration using a condensing-extraction steam turbine



[1] Williams & Larson, 1993 and Kartha & Larson, 2000, p.101

The steam-Rankine cycle uses different boiler designs, depending on the scale of the facility and the characteristics of the fuel being used. The initial pressure and temperature of the steam, together with the pressure to which it is expanded, determine the amount of electricity that can be generated per kilogram of steam. In general, the higher the peak pressure and temperature of the steam, the more efficient, sophisticated, and costly the cycle is.

The installation of a new steam-Rankine cycle as the basic technology of its cogeneration system includes one new backpressure turbo-generator of 10 MW, one new backpressure condensing turbo generator of 32 MW and a 70 bar boiler, Destilaria Pioneiros achieved an improvement on energy efficiency generation and a surplus on it installed power corresponding to 22 MW, which is available for sale.

There is an intention to supply the grid with renewable energy around the amount between 83.941 MWh and 140.000 MWh, according to the contract with Eletrobras under the PROINFA (Promotion Program for Electricity Generated from Renewable Sources), which starts on 28/12/2005. It is an advantage to buy energy produced by a sugar mill, as the baseload for the utilities in Brazil is supported mainly through hydro generation, and the sugarcane crop season is during the dry period. However, as will be put in more details further in this report, the intermittence of the electricity supply (during harvest season only) is seen as a major issue by the distributors.

The exhibit below shows when and with which equipments PBCP took place:

Table 1. PBCP's Technical Data

	Active / Activating		**Deactivating / Stand By**
Before the Expansion Plan	Three backpressure turbo generator of 1.2 MW		
	Two 21 bar boilers		
After the Expansion Plan (2006)	One backpressure turbo generator of 10 MW	One backpressure condensing turbo generator of 32 MW	three backpressure turbo generator of 1.2 MW
	One 70 bar (300 °C / 150 tsph) boiler		Two 21 bar boilers

Figures 3 and 4 present a process flow chart before and after the project activity implementation, respectively. It important to explain that, after the project activity implementation, the turbines used in sugarcane process, started to consume the on site generated electric energy, saving steam to electric generation.

Figure 3: Process Flow Chart Before Project Activity Implementation

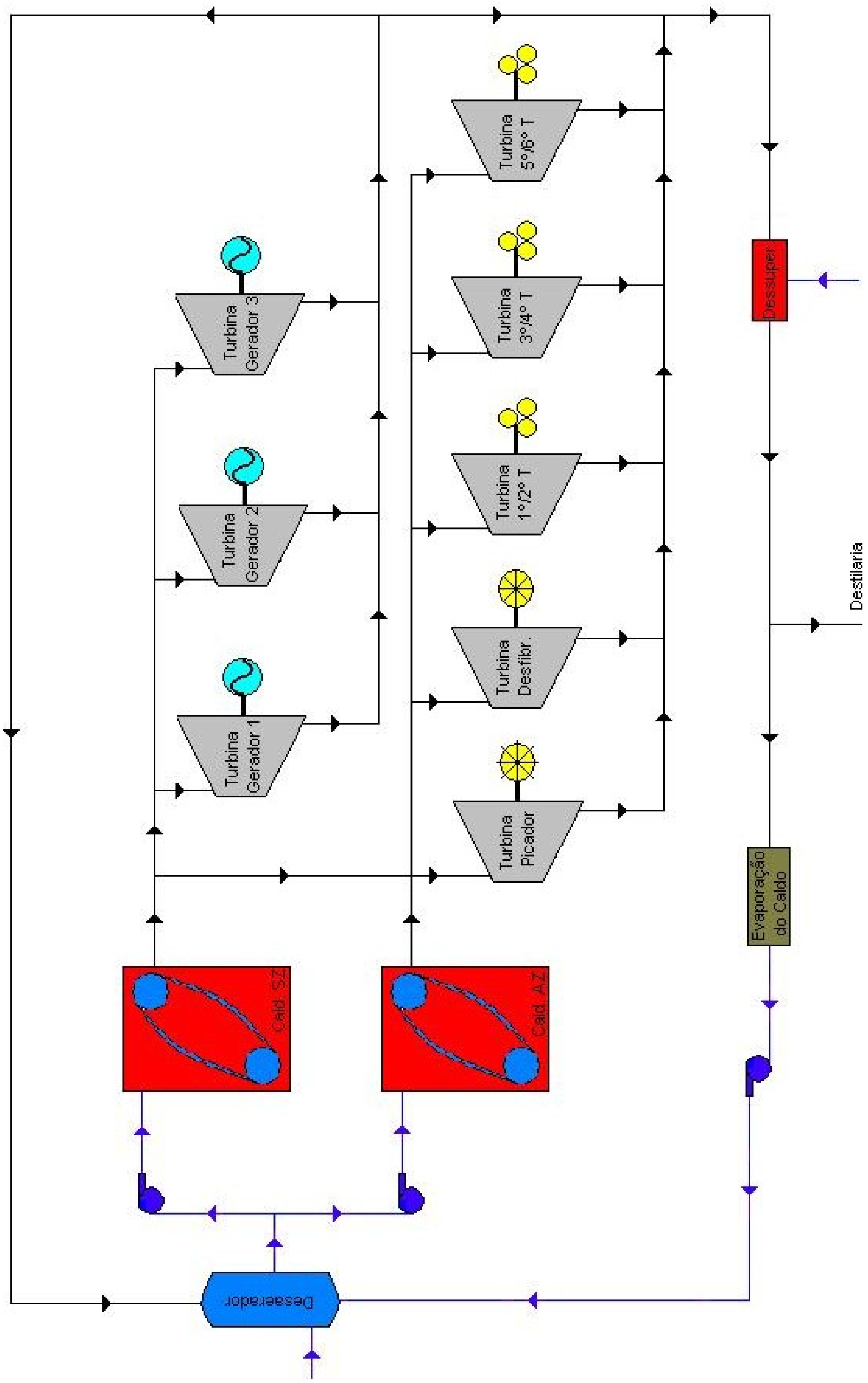
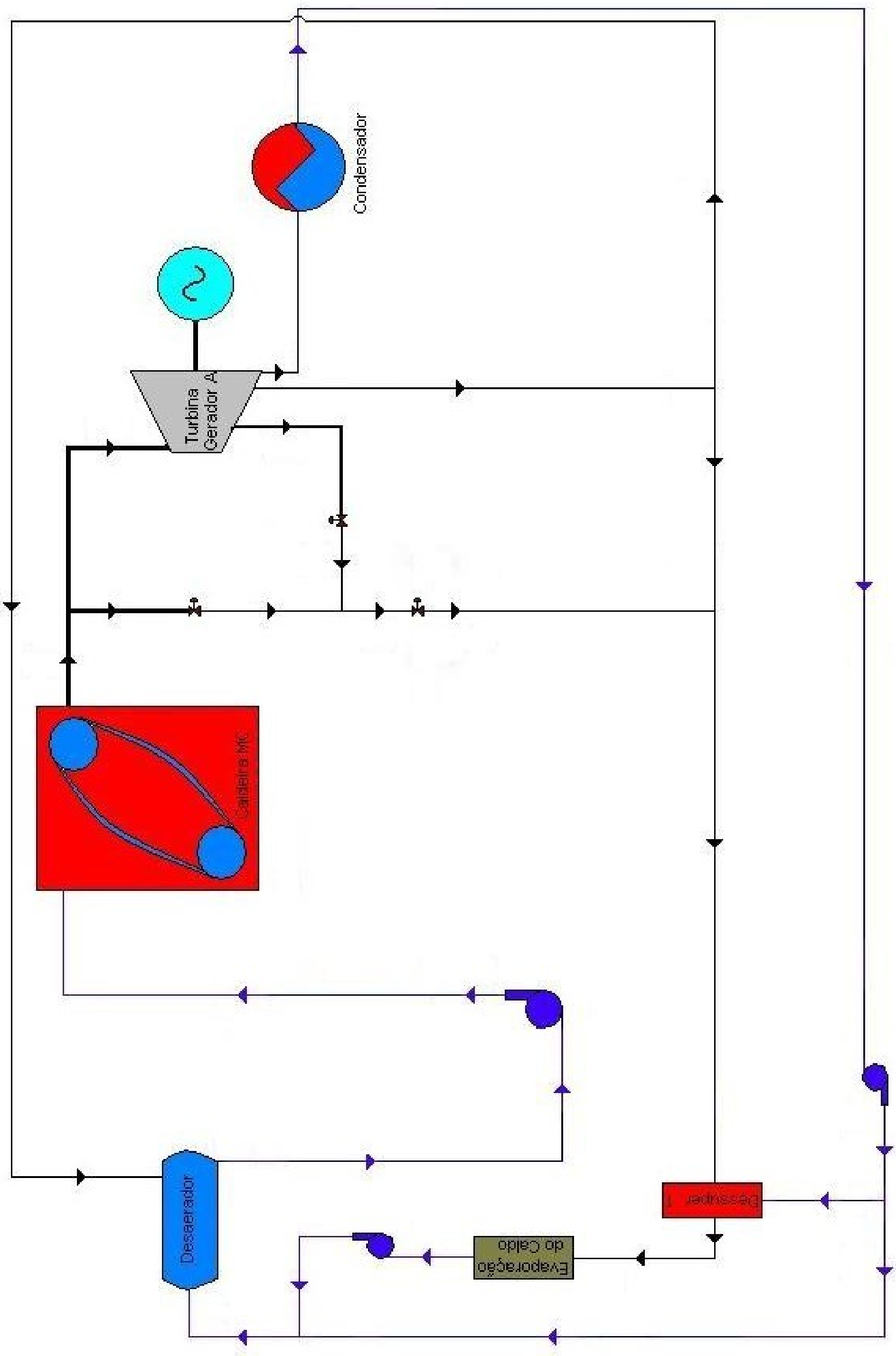


Figure 4: Process Flow Chart After Project Activity Implementation



A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

By dispatching renewable electricity to the grid, electricity that would otherwise be produced using fossil fuel is displaced. This electricity displacement will occur at the system's margin, i.e. this CDM project will displace electricity that is produced by marginal sources (mainly fossil fuel thermal plants) which have higher electricity dispatching costs and are solicited only over the hours that baseload sources (low-cost or must-run sources) cannot supply the grid (due to higher marginal dispatching costs or fuel storage – in case of hydro sources – constraints).

Bagasse is a fibrous biomass by-product from sugarcane processing, which accounts for about 25 percent on weight of fresh cane and approximately one third of the cane's energy content. In a typical Brazilian sugarcane mill, burning bagasse for heat generation to both process and power production is a practice already established, but most of this energy is produced for self-consumption and in an inefficient manner.

The Brazilian electric sector legislation currently recognizes the role of independent power producers, which has triggered interest in increasing electricity generation at mills, allowing the production of enough electricity not only to satisfy sugar mill's needs but also to provide surplus amount of electricity for selling to the electricity market. Furthermore, the ever increasing electricity demand opens an opportunity for some bagasse cogeneration power plants in Brazil. Additionally, the feature of electricity generation from sugarcane coinciding with dry months of the year, when hydroelectric generation system – the most important electricity source in the country – is under stress, should provide considerable complementary energy and make bagasse cogeneration electricity attractive for any potential purchasers.

Nevertheless, some barriers pose a challenge for implementation of this kind of projects. In most cases, the sponsors' culture in the sugar industry is very much influenced by the commodities – sugar and ethanol – market. Therefore, they need an extra incentive to invest in electricity production due to the fact that it is a product that can never be stored in order to speculate with price. The Power Purchase Agreement (PPA) requires different negotiation skills, which is not the core of the sugar industry. For instance, when signing a long-term electricity contract, the PPA, a given sugar mill has to be confident that it will produce sufficient biomass to supply its cogeneration project. Although it seems easy to predict, the volatility of sugarcane productivity may range from 75 to 120 ton of sugarcane per hectare annually depending on the rainfall. So, the revenue from GHG emission reductions and other benefits associated with CDM certification offer a worthy financial comfort for the sugar mills, like Pioneiros, which is investing to improve its installed capacity, in order to produce electricity for sale in a more efficient way.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO2e
2006	5 549
2007	38 840
2008	38 840

2009	38 840
2010	38 840
2011	38 840
2012	38 840
2013	33 291
Total estimated reductions (tonnes of CO_2e)	271 879
Total Number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	38 839

It is relevant to note that the crediting period will be from November 2006 to October 2013.

A.4.5. Public funding of the project activity:

There is no Annex I public funding involved in PBCP project activity.

SECTION B. Application of a baseline methodology

B.1. Title and reference of the approved baseline methodology applied to the project activity:

Approved consolidated baseline methodology ACM0006/Version 2 *"Consolidated baseline methodology for grid-connected electricity generation from biomass residues"*

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

ACM0006 is applicable to this project activity due to the following conditions:

i) Bagasse, a biomass residue from the sugar-cane industry, is the only type of biomass available for cogeneration purposes in the project plant.

ii) The project activity will not result in an increase of bagasse production. Bagasse will only increase due to the mill's natural expanding business and could not be attributed to the implementation of the cogeneration project, as show in the picture below:

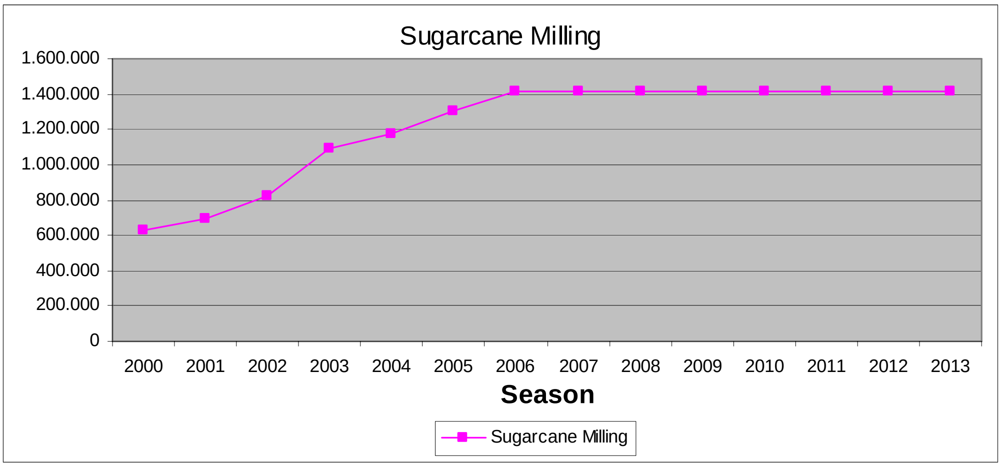


Figure 5. Estimative of Pioneiros' sugarcane production (Source: Destilaria Pioneiros SA.)

iii) The bagasse will not be stored for more than one year.

iv) The sugarcane bagasse is a by product of a sugar mill process and this type of biomass is directly burned in boilers, aiming the steam production. Due to that, no energy is required to prepare the biomass.

B.2. Description of how the methodology is applied in the context of the project activity:

The identification of the baseline scenario will be made through the analysis of the following alternatives:

- how power would be generated in the absence of the CDM project activity;
- what would happen to the biomass in the absence of the project activity; and
- in case of cogeneration projects: how the heat would be generated in the absence of the project activity.

In the absence of PBCP, power would continue to be produced at the existing low-efficient power plant, fired with the same kind of biomass (bagasse), the same quantity of biomass would continue to be used to produce heat and electricity and the heat would continue to be produced with the same type and amount of biomass.

PBCP is a cogeneration project that improves the installed capacity of Destilaria Pioneiros S/A. power plant through the acquisition of a high-pressure boiler and two turbo-generators. These equipments increase the power capacity (production of electricity per quantity of fuel fired) while the thermal biomass firing capacity is maintained.

If the project would not be implemented, Destilaria Pioneiros S/A. would continue to operate the existing power plant, producing heat and power for self-consumption, until it would need to be replaced. There will be no increase of biomass fired as in the existing power plant.

The power generated by the existing plant would in the absence of the PBCP be generated in the same plant (without project implementation) and – since power generation is larger due to the energy efficiency improvements – (b) partly in power plants in the grid.

The heat generated by the existing plant would be generated in the same plant, with the same configuration (the heat generated per biomass input is the same).

This analysis applies for **Scenario 14** as the baseline.

To calculate the emission reductions, an emission factor is applied in order to estimate the amount of CO_2e emitted at the baseline scenario, following steps provided by ACM0002 – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", taking into account the (b) Simple Adjusted OM calculation for the STEP 1, since the would be no available data for applying to the preferred option – *(c) Dispatch Data Analysis OM.* For STEP 2, the option 1 was chosen.

The following table presents the key information and data used to determine the baseline scenario.

Table 2: Summary of the data used to determine the baseline scenario

Variable	Data Variable	Value	Data Unit	Methodology	Data Source
$EG_{project\ plant\ y}$	Net quantity of electricity generated in the project plant during the year y	Obtained throughout project activity lifetime.	MWh	ACM 0006	Destilaria Pioneiros S/A.
EG_y	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y	Obtained throughout project activity lifetime.	MWh	ACM 0006	Destilaria Pioneiros S/A.
BF i,y	Quantity of biomass type *i* combusted in the project plant during the year *y*	424 800	ton	ACM 0006	Destilaria Pioneiros S/A.
NCV i	Net calorific value of biomass	0,00224	MWh/kg	ACM 0006	IPCC
$\varepsilon_{el,\ project\ plant,y}$	Average net energy efficiency of electricity generation in the project plant	0,024	$MWh_{el}/MWh_{biomass}$	ACM 0006	Calculated based on Destilaria Pioneiros S/A.data
$\varepsilon_{el,\ pre\ project}$	is the net efficiency of electricity generation in the project plant prior to project implementation	Obtained throughout project activity lifetime.	$MWh_{el}/MWh_{biomass}$	ACM 0006	Calculated based on Destilaria Pioneiros S/A.data
EF_y	CO_2 emission factor of the Grid.	0,2636	tCO_2e/MWh	ACM 0002	Calculated
$EF_{OM,y}$	CO_2 Operating Margin emission factor of the grid.	0,4310	tCO_2e/MWh	ACM 0002	This value was calculated using data from ONS, the Brazilian electricity system manager.

$EF_{BM,y}$	CO_2 Build Margin emission factor of the grid.	0,0962	tCO_2e/MWh	ACM 0002	This value was calculated using data from ONS.
λ_y	Fraction of time during which low-cost/ must-run sources are on the margin.	$\lambda_{2002} = 0,5053$ $\lambda_{2003} = 0,5312$ $\lambda_{2004} = 0,5041$	-	ACM 0002	This value was calculated using data from ONS.

B.3. 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:

Application of the Tool for the demonstration and assessment of additionality of Destilaria Pioneiros/S.A.

Step 0. Preliminary screening based on the starting date of the project activity

Step 0 is not applicable since PBCP will start its operation on 07/04/2006.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity

There were only two possibilities to implement this project activity:

- The current situation of the sugar mill, focusing only on the production of sugar and alcohol and thus investing to enhance the efficiency and increasing the scale of its core business.
- The project activity not undertaken as CDM project, which is the investment made to increase steam efficiency and production for electricity sales purposes by acquiring high-efficiency boilers and turbo-generators.

Sub-step 1b: Enforcement of applicable laws and regulations
Both alternatives are in compliance with the all applicable legal and regulatory Brazilian requirements

Step 3. Barrier analysis

Sub-step 3a: Identify barriers that would prevent the implementation of type of the proposed project activity
COELHO *et alii* (2002)[2] stand out that the potential energy surplus from the sugar and alcohol industry "will only become effectively available in its totality if adequate politics are implemented in the country". Such politics should refer to the several barriers that limit the development of the sector, which are:

[2] COELHO, S.T., VARKULYA JR, A., PALETTA, C.E.M., SILVA, O.C. – *A importância e o potencial brasileiro da cogeração de energia a partir da biomassa.* CENBIO – Centro Nacional de Referência em Biomassa. Instituto de Eletrotécnica da USP. 2002.

Institutional / Political Barriers:

From the electric sector point of view, according to COELHO (2004), many utilities still don't demonstrate interest for purchasing the electricity generated by self-producers, independent energy producers and cogenerators, especially when it comes to long-term contracts. In the case PBCP, 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, the utilities see as a disadvantage what is one of the biggest advantages of the bagasse cogeneration: that the energy is produced during the drought, when the hydroelectric power stations face difficulties due to the low level of rains (COELHO, 1999)[3]. "by not having a legal compulsory nature for the purchase of the electricity generated from renewable sources and/or cogenerators (as in other countries), the utilities can choose other options in the offer of energy".

From the sugar mill's point of view, one can notice an "important change of mentality in the sector's mills, which start to demonstrate a significant interest for the generation of electricity, which didn't happen until some time ago". Even though this change of mentality is already widespread, 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 politics of the public section for renewable energy 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. This supposition is clearly demonstrated by the following list of rules and/or regulations in the energy sector that have been released in the last 10 years:

- March 1993: Law 8631 sets a tariff regulation for electric energy;
- February 1995: Law 8987 establish public concession for energy;
- July 1995: Law 9074 regulates concession for electric energy sector;
- December 1996: Law 9427 creates National Energy Agency (ANEEL);
- August 1997: Law 9478 sets the National Council for Energy Planning (CNPE);
- October 1997: Decree 2335 regulates the ANEEL task;
- December 1997: Implements ANEEL;
- May 1998: Law 9648 establishes the Spot Market for Electric Energy (MAE) and the National System Operator (ONS);
- July 1998: Decree 2655 regulates MAE and ONS tasks;
- February 2000: Decree 3371 regulates the Thermoelectricity Priority Plan (PPT);
- April 2002: Law 10438 disciplines the Program for Incentive of Alternative Electric Energy (PROINFA). It states that contracts shall be signed within 24 months from its date and that there will be different economic values for the acquisition of 3.300MW of electricity capacity from renewable sources by the state owned Eletrobrás, for plants starting operations before December 30, 2006;

[3] 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

- August 2002: MP 64 is a presidential act to change the constitution in order to permit the energy sector regulation including the PROINFA;
- December 2002: Resolution 4541 from ANEEL regulates the implementation of PROINFA, stating that economic values would be defined within 90 days;
- March 2003: Decree 4644 postponed for 180 days, from its date, the economic value and operational guidelines announcement;
- June 2003: Decree 4758 indefinitely postponed the date for the economic value and operational guidelines announcement and revoked the above mentioned Decree 4.644;
- November 2003: Law 10762 of 11 November/03 revised Law 10438 of 26 April 2002 institutes PROINFA;
- March 2004: Decree 5025 regulates the Law 10438 as of 26 April 2002.

Still to be considered is the lack of a direct communication channel between the mills, ANEEL and BNDES, in order to facilitate the explanation of doubts, mainly in what refers to the implantation or expansion of electricity generation plants (COELHO, 2004).

Even if UNICA and COGEN (2005)[4] mention the gradual removal process of some of those barriers, their consequences are still noticed in the whole Sugar and Alcohol sector.

Therefore, the Pioneiros's decision to sign a long-term PPA, undoubtedly represented a significant risk that the mill was willing to take, partially thanks to the expected CDM revenue.

Economic / financial Barriers:

COELHO (2004) affirms that, in what concerns the financing process, the amount of warranties demanded by the financing entities consists in a barrier to the implantation of cogeneration projects. Besides, the interest rates don't make the more efficient technological options possible.

Other barriers have more to do with the lack of adequate commercial contractual agreements from the energy buyers (i.e. bankable long-term contracts and payment guarantee mechanisms for non-creditworthy local public-sector and private customers) making it much more difficult to obtain long-term financing from a commercial bank and/or a development bank. Some other financing barriers occur simply due to prohibitively high transaction costs, which include the bureaucracy to secure the environmental license.

In what concerns the energy commercialization, the main barriers are the lack of warranty of purchase from the utilities in long term Power Purchase Agreements; the not competitive price offered by them; the payment of high transmission and distribution tariffs; and connection difficulties with the local transmission net.

Currently, there is no mechanism that guarantees the purchase of the energy surplus produced by the cogenerator in long term contracts, which puts in risk the invested capital return warranty. Another difficulty in this case is the sector's conservative positioning.

[4] UNICA e COGEN-SP, Inserção da Bioeletricidade na Matriz Energética – Agregando valor ao terceiro produto da agroindústria canavieira. 2005.

In terms of the access to the transmission and distribution net, the viability of commercializing the energy surplus produced by the cogeneration units sees itself hindered by the high tariffs to be paid by the utilities. Furthermore, the high value of the tariffs is an important factor in what concerns the choice of the capacity to be installed in the cogeneration unit: autonomous producers with installed capacity over 30 MW do not have the right to the 50% discount in the distribution tariff, which leaves them much less competitive.

Still according to UNICA (2004), the tax amount imposed to the cogeneration projects burdens the installation and operation costs, hindering the project's economical viability.

Cultural Barriers:

The country has technologies sufficiently efficient and commercially available. It is worth to stand out, still, that the bagasse cogeneration in the country usually works with systems of low thermodynamic efficiency, which generates few surpluses or even limits to the self-sufficiency.

According to the world alliance for the decentralized energy, WADE (2004)[5], as, until recently, the sale of surpluses was not a common practice in the sector, the industry developed units of low efficiency exclusively to guarantee self-sufficiency of energy and steam and to deal with the problem of the bagasse accumulation and elimination. Moreover, at the time the sugar mills' cogeneration facilities are replaced, or when a new cogeneration unit is created, the equipments will have a lifetime of more than 20 years. The decision to go for purchasing low efficiency equipments addresses that plant do not take advantage of its potential surpluses of electricity for sale. Therefore, the choice of the equipments is decisive in order the plant to make its electricity surplus potential available. (COELHO, 2004)

Due to the nature of the business in the sugar industry the marketing approach is narrowly focused on commodity (sugar and ethanol) type of transaction. Therefore, the electricity transaction based on long-term contract (Power Purchase Agreement) represents a significant breakthrough in their business model. In this case, the electricity transaction has to represent a secure investment opportunity from both economical and social-environmental perspective for convincing Pioneiros to invest in.

However, TEIXEIRA[6] believes in the existence of "rejection and opposition of environmentalists and parts of the population, due to the lack of culture in this kind of systems in Brazil".

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

The alternative to PBCP would be to maintain the current situation and to focus strictly in the main activity, the sugar and alcohol production. Therefore, as the barriers mentioned above are directly related to the entrance in a new business (sale of energy), there is no obstacle for the sugar mills to maintain (or even invest) in their main activity.

Step 4. Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity

The sugar sector, historically, always exploited its biomass (bagasse) in an inefficient manner by making use of low-pressure boilers. Although they consume almost all of their bagasse for self-energy generation

[5] WADE *Bagasse Cogeneration – Global Review and potential.* 2004. Disponível em http://www.cogensp.com.br

[6] TEIXEIRA, F.N. – Cogeração. In: Núcleo de Estudos de Sistemas Térmicos.

purposes, it is done in such a manner that no surplus electric energy is available for sale, and no sugar company has ventured in the electricity market until the recent years.

Similar project activities have been implemented by leading companies in this industry, Vale do Rosário project served as a sector benchmark. However, these are few examples in a universe of about 320 sugar mills. Currently, similar project activities are under implementation, for example, Cia Energética Santa Elisa, Moema, Equipav, Nova América. Added together, similar projects in the sugar industry in Brazil account to approximately 10% of the sugar industry. The additional 90% are still burning their bagasse for on-site use only in the old-fashioned inefficient way. That clearly shows that just a small part of this sector is willing to invest in cogeneration projects.

Sub-step 4b: Discuss any similar options that are occurring

This project activity type is not considered as a widely spread activity in Brazil as only a small portion of the existing sugar mills in the country actually produce electricity for sale purposes.

Step 5. Impact of CDM registration

The impact of registration of PBCP project activity will contribute to overcoming all the barriers described in this Tool: institutional / political, economic / financial and cultural barriers. The registration also will enhance the security of the investment itself and will foster and support the project owners' breakthrough decision to expand their business activities. Along these lines, the project activity is already engaged in a deal to sell its expected CERs.

Notwithstanding, the benefits and incentives mentioned in the text of the Tool for demonstration and assessment of additionality, published by the CDM-EB, will be experienced by the project activities such as: the project will achieve the aim of anthropogenic GHG reductions; financial benefit of the revenue obtained by selling CERs will bring more robustness to the project's financial situation; and its likely to attract new players and new technology (there are companies currently developing new type of boilers – extra-efficient – and the purchase of such equipment is to be fostered by the CER sales revenue) and reducing the investor's risk.

Registration will also have an impact on other sugarcane industry players, who will see the feasibility of implementing renewable energy commercialization projects in their facilities with the CDM. Moreover, hard-currency inflows are highly desirable in a fragile and volatile economy as is the Brazilian one.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

The definition of the project boundary related to the baseline methodology is applied to the project activity in the following way:

Baseline energy grid: For PBCP, the South-Southeast and Midwest subsystem of the Brazilian grid is considered as a boundary, since it is the system to which Destilaria Pioneiros S/A. is connected and therefore receives all the bagasse-based produced electricity.

Bagasse cogeneration plant: the bagasse cogeneration plant considered as boundary comprises the whole site where the cogeneration facility is located.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

1. Date of completing the final draft of this baseline section: 26/04/2006.

2. Name of person/entity determining the baseline:

ECONERGY BRASIL (Contact information in Annex 1), which is a participant in this project, is responsible for the technical services related to GHG emission reductions, and is therefore, in behalf of Destilaria Pioneiros S/A., the developer of this document, and all its contents.

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:

07/04/2006

C.1.2. Expected operational lifetime of the project activity:

30y 0m

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:

01/11/2006

C.2.1.2. Length of the first crediting period:

7y-0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Left blank on purpose.

C.2.2.2. Length:

Left blank on purpose.

SECTION D. Application of a monitoring methodology and plan

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

Approved consolidated monitoring methodology ACM0006 /Version 2 *“Consolidated monitoring methodology for grid-connected electricity generation from biomass residues”*.

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

The monitoring methodology of PBCP project activity was designed to be applied according to scenario 14 of ACM 0006 (energy efficiency projects), which involves the improvement energy efficiency of an existing power plant by retrofit or replacement of the existing biomass power plant. The chosen monitoring methodology is applicable to biomass-based cogeneration projects connected to the grid. The methodology considers monitoring emission reductions generated from cogeneration projects using sugarcane bagasse which is exactly the case of PBCP, so the choice of methodology is justified.

Since the PBCP power generation capacity is more than 15 MW and it displaces electric energy from other grid-connected sources, the emission factor used corresponds to grid emission factor, and it is calculated as a combined margin (CM), following ACM 0002.

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

There is no project emission to be considered in this project activity.

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Left blank on purpose.

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Left blank on purpose.

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1. $EG_{project\ plant\ y}$	Net quantity of electricity generated in the project plant during the year y	Destilaria Pioneiros S/A.	MWh	*m*	Continuously	*100%*	Electronic and paper	-

2. BF i,y	Quantity of biomass type *i* combusted in the project plant during the year *y*	Destilaria Pioneiros S/A.	kg	*m*	Continuously prepare annually an energy balance	*100%*	Electronic and paper	The quantity of biomass combusted should be collected separately for all types of biomass. (PBCP uses only sugarcane bagasse)
3. NCV i	Net calorific value of biomass	Destilaria Pioneiros S/A.	MWh/mass or volume unit	*e*	Annually	*100%*	Electronic and paper	The quantity of biomass combusted should be collected separately for all types of biomass residues.
4.$\varepsilon_{el, project plant,y}$	Average net energy efficiency of electricity generation in the project plant	Destilaria Pioneiros S/A.	%	*c*	Quarterly	*100%*	Electronic and paper	-
5. EF_y	CO_2 emission factor of the Grid.	Calculated	tCO_2e/MWh	*c*	At the validation and yearly after registration	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.
6. $EF_{OM,y}$	CO_2 Operating Margin emission factor of the grid.	ONS (National System Operator	tCO_2e/MWh	*c*	At the validation and yearly after registration	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.

7. $EF_{BM,y}$	CO_2 Build Margin emission factor of the grid.	ONS	tCO_2e/MWh	*c*	At the validation and yearly after registration	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.
8. λ_y	Fraction of time during which low-cost/ must-run sources are on the margin.	ONS	index	*c*	At the validation and yearly after registration	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

$$EG_y = EG_{projectplant,y} \cdot \left[1 - \frac{\varepsilon_{el,preproject}}{\varepsilon_{el,projectplant,y}}\right] \text{ (MWh)}$$

$$EF_{OM,simple\_adjusted,y} = (1-\lambda_y)\frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}} + \lambda_y \frac{\sum_{i,k} F_{i,k,y} \cdot COEF_{i,k}}{\sum_k GEN_{k,y}} \text{ (tCO}_2\text{e/GWh)}$$

$$EF_{BM} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_m GEN_{m,y}} \text{ (tCO}_2\text{e/GWh)}$$

$$EF_{electricity} = \frac{EF_{OM} + EF_{BM}}{2} \text{ (tCO}_2\text{e/GWh)}$$

$$BE_{electricity,y} = EF_{electricity} \cdot EG_y$$

EG_y is the net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y in MWh,
EG project plant,y is the net quantity of electricity generated in the project plant, during the year y in MWh,
$\varepsilon_{el, pre project}$ is the net efficiency of electricity generation in the project plant prior to project implementation, expressed in MWh el/MWH biomass
$\varepsilon_{el, project plant,y}$ is the average net energy efficiency of electricity generation in the project plant expressed in MWh el/MWh biomass;
$F_{i,j(or\ m),y}$ Is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year(s) *y*
j,m Refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports4 from the grid
$COEF_{i,j(or\ m)\ y}$ Is the CO2 emission coefficient of fuel *i* (tCO2 / mass or volume unit of the fuel), taking intoaccount the carbon content of the fuels used by relevant power sources j (or m) and the percent oxidation of the fuel in year(s) y, a
$GEN_{j(or\ m),y}$ Is the electricity (MWh) delivered to the grid by source *j (or m)*
$BE_{electricity,y}$ Are the baseline emissions due to displacement of electricity during the year y in tons of CO_2
and
$EF_{electricity,y}$ Is the CO_2 baseline emission factor for the electricity.

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

Left blank on purpose.

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Left blank on purpose.

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

Left blank on purpose.

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Left blank on purpose.

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Left blank on purpose.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

$ER = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - L_y - PE_y$ $ER_{heatl,y} = 0$ $BE_{biomass,y} = 0$ $PE_y = 0$ $L_y = 0$ $ER_{electricity,y} = EF_{electricity} . EG_y$	ER_y: are the emissions reductions of the project activity during the year y in tons of CO_2 $BE_{biomass,y}$ are the baseline emissions due to natural decay or burning of anthropogenic sources of biomass during the year *y* in tons of CO_2, $ER_{electricity,y}$: Are the baseline emissions due to displacement of electricity during the year y in tons of CO_2 $ER_{heat,y}$: Are the baseline emissions due to displacement of thermal energy during the year y in tons of CO_2 PE_y: Are the project emissions during the year y in tons of CO_2. L_y: Are the leakage emissions during the year y in tons of CO_2.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1.	*Low*	The consistency metered net electricity generation should be cross-checked with receipts from sales (if available) and the quantity of biomass fired (e.g. check whether the electricity generation divided by the quantity of biomass fired results in a reasonable efficiency that is comparable to previous years).
2.	*Low*	Any direct measurement with mass or volume meters at the plant site should be cross-checked with an annual energy balance that is based on the purchased quantities and stock changes
3.	*Low*	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

4.	*Low*	Check consistency with manufacturers information or the efficiency of comparable plants
5.	*Low*	Data will be calculated after the end of the first credit period
6.	*Low*	Data will be calculated after the end of the first credit period
7.	*Low*	Data will be calculated after the end of the first credit period
8.	*Low*	Data will be calculated after the end of the first credit period

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The structure for monitoring this project activity will basically consist of registering the amount of energy produced by the turbo-generators, through the electricity meter installed at the software that controls the operation, and registering the amount of sugarcane crushed monthly.

D.5 Name of person/entity determining the monitoring methodology:

ECONERGY BRASIL (Contact information in Annex 1), which is a participant in this project, is responsible for the technical services related to GHG mission reductions, and is therefore, on behalf of Destilaria Pioneiros S/A, the developer of this document, and all its contents.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

This project activity does not burn any additional quantity of fossil fuel due to the project implementation. Therefore, the variable PE_y, presented in the methodology, does not need to be monitored.

Thus, $\mathbf{PE_y = 0}$

E.2. Estimated leakage:

Destilaria Pioneiros S/A did not sell sugarcane bagasse before the implementation of the project.

Thus, $\mathbf{L_y = 0}$

E.3. The sum of E.1 and E.2 representing the project activity emissions:

$\mathbf{L_y + PE_y = 0}$

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

The baseline methodology considers the determination of the emissions factor for the grid to which the project activity is connected as the core data to be determined in the baseline scenario.

According to Approved consolidated monitoring methodology ACM0006/Version 2 *"Consolidated monitoring methodology for grid-connected electricity generation from biomass residues"* the emission associate to heat generation will be estimated as 0, since the same type of biomass will be used in the initial heat generation.

In Brazil, there are two main grids, South-Southeast-Midwest and North-Northeast, therefore the South-Southeast-Midwest Grid is the relevant one for this project.

The method that will be chosen to calculate the Operating Margin (OM) for the electricity baseline emission factor is the option (b) *Simple Adjusted OM,* since the preferable choice (c) *Dispatch Data Analysis OM* would face the barrier of data availability in Brazil.

In order to calculate the Operating Margin, daily dispatch data from the Brazilian electricity system manager (ONS) needed to be gathered. ONS does not regularly provide such information, which implied in getting it through communicating directly with the entity.

The provided information comprised years 2002, 2003 and 2004, and is the most recent information available at this stage.

Simple Adjusted Operating Margin Emission Factor Calculation

According to the methodology, the project is to determine the Simple Adjusted OM Emission Factor ($EF_{OM,\ simple\ adjusted,\ y}$) . Therefore, the following equation is to be solved:

$$EF_{OM,simple\_adjusted,y} = (1-\lambda_y)\frac{\sum_{i,j} F_{i,j,y}.COEF_{i,j}}{\sum_j GEN_{j,y}} + \lambda_y \frac{\sum_{i,k} F_{i,k,y}.COEF_{i,k}}{\sum_k GEN_{k,y}} \text{ (tCO}_2\text{e/GWh)}$$

It is assumed here that all the low-cost/must-run plants produce zero net emissions.

$$\frac{\sum_{i,k} F_{i,k,y}.COEF_{i,k}}{\sum_k GEN_{k,y}} = 0 \text{ (tCO}_2\text{e/GWh)}$$

Please refer to the methodology text or the explanations on the variables mentioned above.

The ONS data as well as the spreadsheet data with the calculation of emission factors have been provided to the validator (DOE). In the spreadsheet, the dispatch data is treated as to allow calculation of the emission factor for the most three recent years with available information, which are 2002, 2003 and 2004.

The Lambda factors were calculated in accordance with methodology requests. More detailed information is provided in Annex 3. The table below presents such factors.

Year	Lambda
2002	0,5053
2003	0,5312
2004	0,5041

Electricity generation for each year needs also to be taken into account. This information is provided in the table below.

Year	Electricity Load (MWh)
2002	275.402.896
2003	288.493.929
2004	297.879.874

Using therefore appropriate information for $F_{i,j,y}$ and $COEF_{i,j}$, OM emission factors for each year can be determined, as follows.

$$EF_{OM,simple\_adjusted,2002} = (1-\lambda_{2001})\frac{\sum_{i,j} F_{i,j,2002}.COEF_{i,j}}{\sum_j GEN_{j,2002}} \therefore EF_{OM,simple\_adjusted,2002} = 0{,}4207 \text{ tCO}_2\text{/MWh}$$

$$EF_{OM,simple\_adjusted,2003} = (1-\lambda_{2003})\frac{\sum_{i,j} F_{i,j,2003}.COEF_{i,j}}{\sum_j GEN_{j,2003}} \therefore EF_{OM,simple\_adjusted,2003} = 0{,}4397 \text{ tCO}_2\text{/MWh}$$

$$EF_{OM,simple\_adjusted,2004} = (1-\lambda_{2004})\frac{\sum_{i,j} F_{i,j,2004}.COEF_{i,j}}{\sum_{j} GEN_{j,2004}} \therefore EF_{OM,simple\_adjusted,2004} = 0{,}4327 \text{ tCO}_2\text{/MWh}$$

Finally, to determine the baseline *ex-ante*, the mean average among the three years is calculated, finally determining the $EF_{OM,simple\_adjusted}$.

$$EF_{OM,simple\_adjusted\ 2002\_2004} = 0{,}4310 \text{ tCO}_2\text{/MWh}$$

According to the methodology used, a Build Margin emission factor also needs to be determined.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y}.COEF_{i,m}}{\sum_{m} GEN_{m,y}}$$

Electricity generation in this case means 20% of total generation in the most recent year (2004), as the 5 most recent plants built generate less than such 20%. Calculating such factor one reaches:

$$EF_{BM,2004} = 0{,}0962 \text{ tCO}_2\text{/MWh}$$

Finally, the electricity baseline emission factor is calculated through a weighted-average formula, considering both the OM and the BM, being the weights 50% and 50% by default. That gives:

$$EF_{electricity,2002-2004} = 0{,}5 * 0{,}4310 + 0{,}5 * 0{,}0962 = 0{,}2636 \text{ tCO}_2\text{/MWh}$$

It is important to note that adequate considerations on the above weights are currently under study by the Meth Panel, and there is a possibility that such weighing changes in the methodology applied here.

The baseline emissions would be then proportional to the electricity delivered to the grid throughout the project's lifetime. Baseline emissions due to displacement of electricity are calculated by multiplying the electricity baseline emissions factor ($EF_{electricity,2002-2004}$) with the electricity generation of the project activity.

$BE_{electricity,y} = EF_{electricity,2002-2004} . EG_y$

EG_y is determined as the follow equation:

$$EG_y = EG_{projectplant,y}.\left[1-\frac{\varepsilon_{el,preproject}}{\varepsilon_{el,projectplant,y}}\right] \text{(MWh)}$$

Therefore, for the first crediting period, the baseline emissions will be calculated as follows:

$BE_{electricity,y}$ = 0,2636 tCO_2/MWh .EGy

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

The emission reductions of this project activity are:

$$ER = ER_{heat,\,y} + ER_{electricity,y} + BE_{biomass,\,y} - L_y - PE_y$$

$$ER_{heatl,\,y} = 0$$

$$BE_{biomass,\,y} = 0$$

$$PE_y = 0$$

$$L_y = 0$$

$$ER_{electricity,\,y} = EF_{electricity} \,.\, EG_y = EFelectricity \cdot EG_{projectplant,\,y} . \left[1 - \frac{\varepsilon_{el,preproject}}{\varepsilon_{el,projectplant,y}}\right]$$

Thus,

$$ER = 0{,}2636\ tCO_2/MWh \,.\, EG_y = 0{,}2636 \cdot EG_{projectplant,\,y} . \left[1 - \frac{\varepsilon_{el,preproject}}{\varepsilon_{el,projectplant,y}}\right]$$

E.6. Table providing values obtained when applying formulae above:

Year	**Estimation of project activity emission reductions (tonnes of CO_2e)**	**Estimation of the baseline emission reductions (tonnes of CO_2e)**	**Estimation of leakage (tonnes of CO_2e)**	**Estimation of emission reductions (tonnes of CO_2e)**
2006	5 549	0	0	5 549
2007	38 840	0	0	38 840
2008	38 840	0	0	38 840
2009	38 840	0	0	38 840
2010	38 840	0	0	38 840
2011	38 840	0	0	38 840
2012	38 840	0	0	38 840
2013	33 291	0	0	33 291
Total (tonnes of CO_2e)	271 879	0	0	271 879

It is relevant to note that the crediting period will be from November 2006 to October 2013.

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

According to the Brazilian laws, the possible environmental impacts are to be analyzed by State Secretary of Environment (SMA – Secretaria de Estado do Meio Ambiente) through CETESB (Companhia de Tecnologia de Saneamento Ambiental) – State of São Paulo Environmental Agency. The project has already been licensed by SMA and CETESB, which issued the Previous License and the Provisory Operational License for the cogeneration plant on 25/11/2003 and on 26/09/2005, respectively.

Destilaria Pioneiros S/A will make all efforts in order to accomplish the environmental requirements, in order to receive the Operational License. All requirements are listed at the Installation License, like the annual execution of tests to analyze the emissions of NOx and Particle Material (PM) from the boiler.

Considering the installation and operation of the new equipment for electricity cogeneration relates to procedures that are already in place at the industrial site, no major environmental impacts are expected. Moreover, this new equipment, being more efficient and modern, has more sophisticated control devices and is therefore even less likely to cause any environmental problems.

There will be no transboundary impacts resulting from PBCP. All the relevant impacts occur within Brazilian borders and have been mitigated to comply with the environmental requirements for project's implementation. Therefore PBCP will not affect by any means any country surrounding Brazil.

F.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:

The impacts from PBCP are not considered significant. They arise from activities (cane crushing and bagasse burning) that were already in place before the project, though in different conditions and circumstances. It has been concluded that the project is feasible in legal and techno-environmental terms and the PBCP can achieve its goal, established and developed according to the Brazilian Environmental Laws.

SECTION G. Stakeholders' comments

G.1. Brief description how comments by local stakeholders have been invited and compiled:

As a requirement of the Brazilian Interministerial Commission on Global Climate Change, the Brazilian DNA (Designated National Authority), Destilaria Pioneiros S/A invited several organizations and institutions to comment the CDM project being developed. Letters[7] were sent to the following recipients:

- Prefeitura Municipal de Sud Mennucci / *Municipal Administration of SudMenucci – SP;*
- Câmara Municipal de Sud Menucci – SP / *Municipal Legislation Chamber of Sud Menucci –SP;*

[7] The copies of these invitations are available from the Project participants.

- Ministério Público / *Federal Prosecutor's Office ;*
- Fórum Brasileiro de ONGs / *Brazilian NGO Forum ;*
- Companhia de Tecnologia de Saneamento Ambiental /*State of São Paulo Environmental Agency;*
- Secretaria de Estado do Meio Ambiente do Estado de São Paulo */ Environment Secretary of State;*

G.2. Summary of the comments received:

Destilaria Pioneiros S/A received no stakeholder comments.

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

Since no comments were received, Destilaria Pioneiros S/A proceeded with the project as initially planned.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project Participant -1:

Organization:	Econergy Brasil Ltda.
Street/P.O.Box:	Rua Pará, 76 cj 41
Building:	Higienópolis Office Center
City:	São Paulo
State/Region:	SP
Postfix/ZIP:	01243-020
Country:	Brazil
Telephone:	+ 55 (11) 3219-0068
FAX:	+55 (11) 3219-0693
E-Mail:	-
URL:	http://www.econergy.com.br
Represented by:	
Title:	Mr.
Salutation:	
Last Name:	Diniz Junqueira
Middle Name:	Schunn
First Name:	Marcelo
Department:	-
Mobile:	+55 (11) 8263-3017
Direct FAX:	Same above
Direct tel:	+ 55 (11) 3219-0068 ext 25 and/or mobile
Personal E-Mail:	junqueira@econergy.com.br

Project Participant -2:

Organization:	Destilaria Pioneiros S/A
Street/P.O.Box:	Fazenda Santa Maria da Mata , PO Box 12
Building:	
City:	Sud Menucci
State/Region:	São Paulo
Postfix/ZIP:	15360-000
Country:	Brazil
Telephone:	+55 (18) 3786-9000
FAX:	
E-Mail:	
URL:	
Represented by:	Luiz Gustavo Scartezini Rodrigues
Title:	Industrial Director
Salutation:	Mr.
Last Name:	Rodrigues
Middle Name:	Scartezini
First Name:	Luiz Gustavo
Department:	Industrial
Mobile:	
Direct FAX:	+55 (18) 3567-9009
Direct tel:	+55 (18) 3786-9001
Personal E-Mail:	luiz.gustavo@pioneiros.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no Annex I public funding involved in PBCP project activity.

Annex 3

BASELINE INFORMATION

The Brazilian electricity system has been historically divided into two subsystems: the North-Northeast (N-NE) and the South-Southeast-Midwest (S-SE-CO). This is due mainly to the historical evolution of the physical system, which was naturally developed nearby the biggest consuming centers of the country.

The natural evolution of both systems continues to demonstrate that integration will happen in the future. In 1998, the Brazilian government announced the first leg of the interconnection line between S-SE-CO and N-NE. With investments of around US$700 million, the connection had the main purpose, in the government's view, at least, to help solve energy imbalances in the country: the S-SE-CO region could supply the N-NE in case it was necessary and vice-versa.

Nevertheless, even after the interconnection was established, technical papers continue to divide the Brazilian system in two (Bosi, 2000)[8]:

"… where the Brazilian Electricity System is divided into three separate subsystems:

(i) The South/Southeast/Midwest Interconnected System;
(ii) The North/Northeast Interconnected System; and
(iii) The Isolated Systems (which represent 300 locations that are electrically isolated from the interconnected systems)"

Moreover, Bosi (2000) gives a strong argumentation in favor of having so-called *multi-project baselines*:

> *"For large countries with different circumstances within their borders and different power grids based in these different regions, multi-project baselines in the electricity sector may need to be disaggregated below the country-level in order to provide a credible representation of 'what would have happened otherwise."*

Finally, one has to take into account that even though the systems today are connected, the energy flow between N-NE and S-SE-CO is heavily limited by the transmission lines capacity. Therefore, only a fraction of the total energy generated in both subsystems is sent one way or another. It is natural that this fraction may change its direction and magnitude (up to the transmission line's capacity) depending on the hydrological patterns, climate and other uncontrolled factors. But it is not supposed to represent a significant amount of each subsystem's electricity demand. It should also be noted that only in 2004 the interconnection between SE and NE was concluded, i.e., if project proponents are to be coherent with the generation database they have available as of the time of the PDD submission for validation, a situation where the electricity flow between the subsystems was even more restricted is to be considered.
The Brazilian electricity system nowadays comprises of around 101,3 GW of installed capacity, in a total of 1.482 electricity generation enterprises. From those, nearly 70% are hydropower plants, around 10%

[8] Bosi, M. *An Initial View on Methodologies for Emission Baselines: Electricity Generation Case Study.* International Energy Agency. Paris, 2000.

are natural gas-fired power plants, 4,5% are diesel and fuel oil plants, 3,2% are biomass sources (sugarcane bagasse, black liquor, wood, rice straw and biogas), 2% are nuclear plants, 1,4% are coal plants, and there are also 8,17 GW of installed capacity in neighboring countries (Argentina, Uruguay, Venezuela and Paraguay) that may dispatch electricity to the Brazilian grid[9]. This latter capacity is in fact comprised by mainly 5,65 GW of the Paraguayan part of *Itaipu Bi-national*, a hydropower plant operated by both Brazil and Paraguay, but whose energy almost entirely is sent to the Brazilian grid.

The approved methodology ACM0002 asks project proponents to account for "all generating sources serving the system". In that way, project proponents in Brazil should search for, and research, all power plants serving the Brazilian system.

However, information on such generating sources is not publicly available in Brazil. The national dispatch center, ONS – National System Operator – argues that dispatching information is strategic to the power agents and therefore cannot be made available. On the other hand, ANEEL, the electricity agency, provides information on power capacity and other legal matters on the electricity sector, but no dispatch information can be got through this entity.

In that regard, project proponents looked for a plausible solution in order to be able to calculate the emission factor in Brazil in the most accurate way. Since real dispatch data is necessary after all, the ONS was specifically contacted and the reason for data collection was explained. After several months of talks, plants' daily dispatch information was made available for years 2002, 2003 and 2004 by ONS.

Project proponents, discussing the feasibility of using such data, concluded it was the most proper information to be considered when determining the emission factor for the Brazilian grid. According to ANEEL, in fact, ONS centralized dispatched plants accounted for 75.547 MW of installed capacity by 31/12/2004, out of the total 98.848,5 MW installed in Brazil by the same date[10], which includes capacity available in neighboring countries to export to Brazil and emergency plants, that are dispatched only during times of electricity constraints in the system. Such capacity in fact is constituted by plants with 30 MW installed capacity or above, connected to the system through 138kV power lines, or at higher voltages. Therefore, even though the emission factor calculation is carried out without considering all generating sources serving the system, about 76,4% of the installed capacity serving Brazil is taken into account, which is a fair amount if one looks at the difficulty in getting dispatch information in Brazil. Moreover, the remaining 23,6% are plants that do not have their dispatch coordinated by ONS, since: either they operate based on power purchase agreements which are not under control of the dispatch authority; or they are located in non-interconnected systems to which ONS has no access. In that way, this portion is not likely to be affected by the CDM projects, and this is another reason for not taking them into account when determining the emission factor.

In an attempt to include all generating sources, project developers considered the option to research for available, but non-official data, to supply the existing gap. The solution found was the International Energy Agency database built when carrying out the study "Road-Testing Baselines For Greenhouse Gas Mitigation Projects in the Electric Power Sector", published in October 2002. Merging ONS data with the IEA data in a spreadsheet, project proponents have been able to consider all generating sources connected to the relevant grids in order to determine the emission factor. The emission factor calculated was found more conservative when considering ONS data only, as the table below shows the build margin in both cases.

[9] www.aneel.gov.br
[10] www.aneel.gov.br/arquivos/PDF/Resumo_Gráficos_mai_2005.pdf

IEA/ONS Merged Data Build Margin (tCO_2/MWh)	ONS Data Build Margin (tCO_2/MWh)
0,205	0,0962

Therefore, considering all the rationale explained, the project developers selected to use ONS information only, as it was capable of properly addressing the issue of determining the emission factor and doing it in the most conservative way.

The fossil fueled plants efficiencies were also taken from the IEA paper. This was done considering the lack of more detailed information on such efficiencies from public, reliable and credible sources.

From the mentioned reference:

> *"The fossil fuel conversion efficiency (%) for the thermal power plants was calculated based on the installed capacity of each plant and the electricity actually produced. For most of the fossil fuel power plants under construction, a constant value of 30% was used as an estimate for their fossil fuel conversion efficiencies. This assumption was based on data available in the literature and based on the observation of the actual situation of those kinds of plants currently in operation in Brazil. The only 2 natural gas plants in combined cycle (totaling 648 MW) were assumed to have a higher efficiency rate, i.e. 45%.."*

Therefore only data for plants under construction in 2002 (with operation start in 2002, 2003 and 2004) was estimated. All others efficiencies were calculated. To the best of our knowledge there was no retrofit/modernization of the older fossil-fuelled power plants in the analyzed period (2002 to 2004). For that reason project participants find the application of such numbers to be not only reasonable but the best available option.

The aggregated hourly dispatch data received from ONS was used to determine the lambda factor for each of the years with available data (2002, 2003 and 2004). The Low-cost/Must-run generation was determined as the total generation minus the generation from fossil-fuelled thermal plants generation, this one determined through daily dispatch data provided by ONS. All this information has been provided to the validators, and extensively discussed with them, in order to make all points crystal clear.

On the following pages, a summary of the analysis is provided. First, the Tables 3 and 4 with the 126 plants dispatched by ONS are provided. Then, a table with the summarized conclusions of the analysis of the emission factor calculation and the load duration curves for the S-SE-CO sub system are presented.

Table 3: ONS Dispatched Plants -1/2

	Subsystem*	Fuel source**	Power plant	Operation start [2, 4, 5]	Installed capacity (MW) [1]	Fuel conversion efficiency (%) [2]	Carbon emission factor (tC/TJ) [3]	Fraction carbon oxidized [3]	Emission factor (tCO2/MWh)
1	S-SE-CO	G	Termo Rio	Nov-2004	423,3	0,30	15,3	99,5%	0,670
2	S-SE-CO	H	Candonga	Sep-2004	140,0	1,00	0,0	0,0%	0,000
3	S-SE-CO	H	Queimado	May-2004	105,0	1,00	0,0	0,0%	0,000
4	S-SE-CO	G	Norte Fluminense	Feb-2004	860,2	0,30	15,3	99,5%	0,670
5	S-SE-CO	H	Jauru	Sep-2003	121,5	1,00	0,0	0,0%	0,000
6	S-SE-CO	H	Gauporé	Sep-2003	120,0	1,00	0,0	0,0%	0,000
7	S-SE-CO	G	Três Lagoas	Aug-2003	306,0	0,30	15,3	99,5%	0,670
8	S-SE-CO	H	Funil (MG)	Jan-2003	180,0	1,00	0,0	0,0%	0,000
9	S-SE-CO	H	Itiquira I	Sep-2002	156,1	1,00	0,0	0,0%	0,000
10	S-SE-CO	G	Araucária	Sep-2002	484,5	0,30	15,3	99,5%	0,670
11	S-SE-CO	G	Canoas	Sep-2002	160,6	0,30	15,3	99,5%	0,670
12	S-SE-CO	H	Piraju	Sep-2002	81,0	1,00	0,0	0,0%	0,000
13	S-SE-CO	G	Nova Piratininga	Jun-2002	384,9	0,30	15,3	99,5%	0,670
14	S-SE-CO	O	PCT CGTEE	Jun-2002	5,0	0,30	20,7	99,0%	0,902
15	S-SE-CO	H	Rosal	Jun-2002	55,0	1,00	0,0	0,0%	0,000
16	S-SE-CO	G	Ibirité	May-2002	226,0	0,30	15,3	99,5%	0,670
17	S-SE-CO	H	Cana Brava	May-2002	465,9	1,00	0,0	0,0%	0,000
18	S-SE-CO	H	Sta. Clara	Jan-2002	60,0	1,00	0,0	0,0%	0,000
19	S-SE-CO	H	Machadinho	Jan-2002	1.140,0	1,00	0,0	0,0%	0,000
20	S-SE-CO	G	Juiz de Fora	Nov-2001	87,0	0,28	15,3	99,5%	0,718
21	S-SE-CO	G	Macaé Merchant	Nov-2001	922,6	0,24	15,3	99,5%	0,837
22	S-SE-CO	H	Lajeado (ANEEL res. 402/2001)	Nov-2001	902,5	1,00	0,0	0,0%	0,000
23	S-SE-CO	G	Eletrobolt	Oct-2001	379,0	0,24	15,3	99,5%	0,837
24	S-SE-CO	H	Porto Estrela	Sep-2001	112,0	1,00	0,0	0,0%	0,000
25	S-SE-CO	G	Cuiaba (Mario Covas)	Aug-2001	529,2	0,30	15,3	99,5%	0,670
26	S-SE-CO	G	W. Arjona	Jan-2001	194,0	0,25	15,3	99,5%	0,804
27	S-SE-CO	G	Uruguaiana	Jan-2000	639,9	0,45	15,3	99,5%	0,447
28	S-SE-CO	H	S. Caxias	Jan-1999	1.240,0	1,00	0,0	0,0%	0,000
29	S-SE-CO	H	Canoas I	Jan-1999	82,5	1,00	0,0	0,0%	0,000
30	S-SE-CO	H	Canoas II	Jan-1999	72,0	1,00	0,0	0,0%	0,000
31	S-SE-CO	H	Igarapava	Jan-1999	210,0	1,00	0,0	0,0%	0,000
32	S-SE-CO	H	Porto Primavera	Jan-1999	1.540,0	1,00	0,0	0,0%	0,000
33	S-SE-CO	D	Cuiaba (Mario Covas)	Oct-1998	529,2	0,27	20,2	99,0%	0,978
34	S-SE-CO	H	Sobragi	Sep-1998	60,0	1,00	0,0	0,0%	0,000
35	S-SE-CO	H	PCH EMAE	Jan-1998	26,0	1,00	0,0	0,0%	0,000
36	S-SE-CO	H	PCH CEEE	Jan-1998	25,0	1,00	0,0	0,0%	0,000
37	S-SE-CO	H	PCH ENERSUL	Jan-1998	43,0	1,00	0,0	0,0%	0,000
38	S-SE-CO	H	PCH CEB	Jan-1998	15,0	1,00	0,0	0,0%	0,000
39	S-SE-CO	H	PCH ESCELSA	Jan-1998	62,0	1,00	0,0	0,0%	0,000
40	S-SE-CO	H	PCH CELESC	Jan-1998	50,0	1,00	0,0	0,0%	0,000
41	S-SE-CO	H	PCH CEMAT	Jan-1998	145,0	1,00	0,0	0,0%	0,000
42	S-SE-CO	H	PCH CELG	Jan-1998	15,0	1,00	0,0	0,0%	0,000
43	S-SE-CO	H	PCH CERJ	Jan-1998	59,0	1,00	0,0	0,0%	0,000
44	S-SE-CO	H	PCH COPEL	Jan-1998	70,0	1,00	0,0	0,0%	0,000
45	S-SE-CO	H	PCH CEMIG	Jan-1998	84,0	1,00	0,0	0,0%	0,000
46	S-SE-CO	H	PCH CPFL	Jan-1998	55,0	1,00	0,0	0,0%	0,000
47	S-SE-CO	H	S. Mesa	Jan-1998	1.275,0	1,00	0,0	0,0%	0,000
48	S-SE-CO	H	PCH EPAULO	Jan-1998	26,0	1,00	0,0	0,0%	0,000
49	S-SE-CO	H	Guilmam Amorim	Jan-1997	140,0	1,00	0,0	0,0%	0,000
50	S-SE-CO	H	Corumbá	Jan-1997	375,0	1,00	0,0	0,0%	0,000
51	S-SE-CO	H	Miranda	Jan-1997	408,0	1,00	0,0	0,0%	0,000
52	S-SE-CO	H	Noav Ponte	Jan-1994	510,0	1,00	0,0	0,0%	0,000
53	S-SE-CO	H	Segredo (Gov. Ney Braga)	Jan-1992	1.260,0	1,00	0,0	0,0%	0,000
54	S-SE-CO	H	Taquaruçu	Jan-1989	554,0	1,00	0,0	0,0%	0,000
55	S-SE-CO	H	Manso	Jan-1988	210,0	1,00	0,0	0,0%	0,000
56	S-SE-CO	H	D. Francisca	Jan-1987	125,0	1,00	0,0	0,0%	0,000
57	S-SE-CO	H	Itá	Jan-1987	1.450,0	1,00	0,0	0,0%	0,000
58	S-SE-CO	H	Rosana	Jan-1987	369,2	1,00	0,0	0,0%	0,000
59	S-SE-CO	N	Angra	Jan-1985	1.874,0	1,00	0,0	0,0%	0,000
60	S-SE-CO	H	T. Irmãos	Jan-1985	807,5	1,00	0,0	0,0%	0,000
61	S-SE-CO	H	Itaipu 60 Hz	Jan-1983	6.300,0	1,00	0,0	0,0%	0,000
62	S-SE-CO	H	Itaipu 50 Hz	Jan-1983	5.375,0	1,00	0,0	0,0%	0,000
63	S-SE-CO	H	Emborcação	Jan-1982	1.192,0	1,00	0,0	0,0%	0,000
64	S-SE-CO	H	Nova Avanhandava	Jan-1982	347,4	1,00	0,0	0,0%	0,000
65	S-SE-CO	H	Gov. Bento Munhoz - GBM	Jan-1980	1.676,0	1,00	0,0	0,0%	0,000

* Subsystem: S - south, SE-CO - Southeast-Midwest

** Fuel source (C, bituminous coal; D, diesel oil; G, natural gas; H, hydro; N, nuclear; O, residual fuel oil).

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

[2] Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A.F. Simoes, H. Winkler and J.M. Lukamba. *Road testing baselines for GHG mitigation projects in the electric power sector.* OECD/IEA information paper, October 2002.

[3] Intergovernamental Panel on Climate Change. *Revised 1996 Guidelines for National Greenhouse Gas Inventories.*

[4] Operador Nacional do Sistema Elétrico. Centro Nacional de Operação do Sistema. *Acompanhamento Diário da Operação do SIN* (daily reports from Jan. 1, 2001 to Dec. 31, 2003).

[5] 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).

Table 4: ONS Dispatched Plants -2/2

	Subsystem*	Fuel source**	Power plant	Operation start [2, 4, 5]	Installed capacity (MW) [1]	Fuel conversion efficiency (%) [2]	Carbon emission factor (tC/TJ) [3]	Fraction carbon oxidized [3]	Emission factor (tCO2/MWh)
66	S-SE-CO	H	S.Santiago	Jan-1980	1.420,0	1,00	0,0	0,0%	0,000
67	S-SE-CO	H	Itumbiara	Jan-1980	2.280,0	1,00	0,0	0,0%	0,000
68	S-SE-CO	O	Igarapé	Jan-1978	131,0	0,30	20,7	99,0%	0,902
69	S-SE-CO	H	Itauba	Jan-1978	512,4	1,00	0,0	0,0%	0,000
70	S-SE-CO	H	A. Vermelha (Jose E. Moraes)	Jan-1978	1.396,2	1,00	0,0	0,0%	0,000
71	S-SE-CO	H	S.Simão	Jan-1978	1.710,0	1,00	0,0	0,0%	0,000
72	S-SE-CO	H	Capivara	Jan-1977	640,0	1,00	0,0	0,0%	0,000
73	S-SE-CO	H	S.Osório	Jan-1975	1.078,0	1,00	0,0	0,0%	0,000
74	S-SE-CO	H	Marimbondo	Jan-1975	1.440,0	1,00	0,0	0,0%	0,000
75	S-SE-CO	H	Promissão	Jan-1975	264,0	1,00	0,0	0,0%	0,000
76	S-SE-CO	C	Pres. Medici	Jan-1974	446,0	0,26	26,0	98,0%	1,294
77	S-SE-CO	H	Volta Grande	Jan-1974	380,0	1,00	0,0	0,0%	0,000
78	S-SE-CO	H	Porto Colombia	Jun-1973	320,0	1,00	0,0	0,0%	0,000
79	S-SE-CO	H	Passo Fundo	Jan-1973	220,0	1,00	0,0	0,0%	0,000
80	S-SE-CO	H	Passo Real	Jan-1973	158,0	1,00	0,0	0,0%	0,000
81	S-SE-CO	H	Ilha Solteira	Jan-1973	3.444,0	1,00	0,0	0,0%	0,000
82	S-SE-CO	H	Mascarenhas	Jan-1973	131,0	1,00	0,0	0,0%	0,000
83	S-SE-CO	H	Gov. Parigot de Souza - GPS	Jan-1971	252,0	1,00	0,0	0,0%	0,000
84	S-SE-CO	H	Chavantes	Jan-1971	414,0	1,00	0,0	0,0%	0,000
85	S-SE-CO	H	Jaguara	Jan-1971	424,0	1,00	0,0	0,0%	0,000
86	S-SE-CO	H	Sá Carvalho	Apr-1970	78,0	1,00	0,0	0,0%	0,000
87	S-SE-CO	H	Estreito (Luiz Carlos Barreto)	Jan-1969	1.050,0	1,00	0,0	0,0%	0,000
88	S-SE-CO	H	Ibitinga	Jan-1969	131,5	1,00	0,0	0,0%	0,000
89	S-SE-CO	H	Jupiá	Jan-1969	1.551,2	1,00	0,0	0,0%	0,000
90	S-SE-CO	O	Alegrete	Jan-1968	66,0	0,26	20,7	99,0%	1,040
91	S-SE-CO	G	Campos (Roberto Silveira)	Jan-1968	30,0	0,24	15,3	99,5%	0,837
92	S-SE-CO	G	Santa Cruz (RJ)	Jan-1968	766,0	0,31	15,3	99,5%	0,648
93	S-SE-CO	H	Paraibuna	Jan-1968	85,0	1,00	0,0	0,0%	0,000
94	S-SE-CO	H	Limoeiro (Armando Salles de Olivie	Jan-1967	32,0	1,00	0,0	0,0%	0,000
95	S-SE-CO	H	Caconde	Jan-1966	80,4	1,00	0,0	0,0%	0,000
96	S-SE-CO	C	J.Lacerda C	Jan-1965	363,0	0,25	26,0	98,0%	1,345
97	S-SE-CO	C	J.Lacerda B	Jan-1965	262,0	0,21	26,0	98,0%	1,602
98	S-SE-CO	C	J.Lacerda A	Jan-1965	232,0	0,18	26,0	98,0%	1,869
99	S-SE-CO	H	Bariri (Alvaro de Souza Lima)	Jan-1965	143,1	1,00	0,0	0,0%	0,000
100	S-SE-CO	H	Funil (RJ)	Jan-1965	216,0	1,00	0,0	0,0%	0,000
101	S-SE-CO	C	Figueira	Jan-1963	20,0	0,30	26,0	98,0%	1,121
102	S-SE-CO	H	Furnas	Jan-1963	1.216,0	1,00	0,0	0,0%	0,000
103	S-SE-CO	H	Barra Bonita	Jan-1963	140,8	1,00	0,0	0,0%	0,000
104	S-SE-CO	C	Charqueadas	Jan-1962	72,0	0,23	26,0	98,0%	1,462
105	S-SE-CO	H	Jurumirim (Armando A. Laydner)	Jan-1962	97,7	1,00	0,0	0,0%	0,000
106	S-SE-CO	H	Jacui	Jan-1962	180,0	1,00	0,0	0,0%	0,000
107	S-SE-CO	H	Pereira Passos	Jan-1962	99,1	1,00	0,0	0,0%	0,000
108	S-SE-CO	H	Tres Marias	Jan-1962	396,0	1,00	0,0	0,0%	0,000
109	S-SE-CO	H	Euclides da Cunha	Jan-1960	108,8	1,00	0,0	0,0%	0,000
110	S-SE-CO	H	Camargos	Jan-1960	46,0	1,00	0,0	0,0%	0,000
111	S-SE-CO	H	Santa Branca	Jan-1960	56,1	1,00	0,0	0,0%	0,000
112	S-SE-CO	H	Cachoeira Dourada	Jan-1959	658,0	1,00	0,0	0,0%	0,000
113	S-SE-CO	H	Salto Grande (Lucas N. Garcez)	Jan-1958	70,0	1,00	0,0	0,0%	0,000
114	S-SE-CO	H	Salto Grande (MG)	Jan-1956	102,0	1,00	0,0	0,0%	0,000
115	S-SE-CO	H	Mascarenhas de Moraes (Peixoto)	Jan-1956	478,0	1,00	0,0	0,0%	0,000
116	S-SE-CO	H	Itutinga	Jan-1955	52,0	1,00	0,0	0,0%	0,000
117	S-SE-CO	C	S. Jerônimo	Jan-1954	20,0	0,26	26,0	98,0%	1,294
118	S-SE-CO	O	Carioba	Jan-1954	36,2	0,30	20,7	99,0%	0,902
119	S-SE-CO	O	Piratininga	Jan-1954	472,0	0,30	20,7	99,0%	0,902
120	S-SE-CO	H	Canastra	Jan-1953	42,5	1,00	0,0	0,0%	0,000
121	S-SE-CO	H	Nilo Peçanha	Jan-1953	378,4	1,00	0,0	0,0%	0,000
122	S-SE-CO	H	Fontes Nova	Jan-1940	130,3	1,00	0,0	0,0%	0,000
123	S-SE-CO	H	Henry Borden Sub.	Jan-1926	420,0	1,00	0,0	0,0%	0,000
124	S-SE-CO	H	Henry Borden Ext.	Jan-1926	469,0	1,00	0,0	0,0%	0,000
125	S-SE-CO	H	I. Pombos	Jan-1924	189,7	1,00	0,0	0,0%	0,000
126	S-SE-CO	H	Jaguari	Jan-1917	11,8	1,00	0,0	0,0%	0,000
				Total (MW) =	**66.007,1**				

* Subsystem: S - south, SE-CO - Southeast-Midwest

** Fuel source (C, bituminous coal; D, diesel oil; G, natural gas; H, hydro; N, nuclear; O, residual fuel oil).

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

[2] Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A.F. Simoes, H. Winkler and J.M. Lukamba. *Road testing baselines for GHG mitigation projects in the electric power sector.* OECD/IEA information paper, October 2002.

[3] Intergovernamental Panel on Climate Change. *Revised 1996 Guidelines for National Greenhouse Gas Inventories.*

[4] Operador Nacional do Sistema Elétrico. Centro Nacional de Operação do Sistema. *Acompanhamento Diário da Operação do SIN* (daily reports from Jan. 1, 2001 to Dec. 31, 2003).

[5] 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).

Table 5: Emission factors for the Brazilian South-Southeast-Midwest Sub system

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
	$EF_{OM, simple-adjusted}$ [tCO2/MWh]	$EF_{BM,2004}$	Lambda	
	0,4310	0,0962	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_{CM} [tCO2/MWh]	λ_{2004}	
	0,3473	0,2636	0,5041	

Figure 6. Load duration curve for the S-SE-CO sub system, 2002

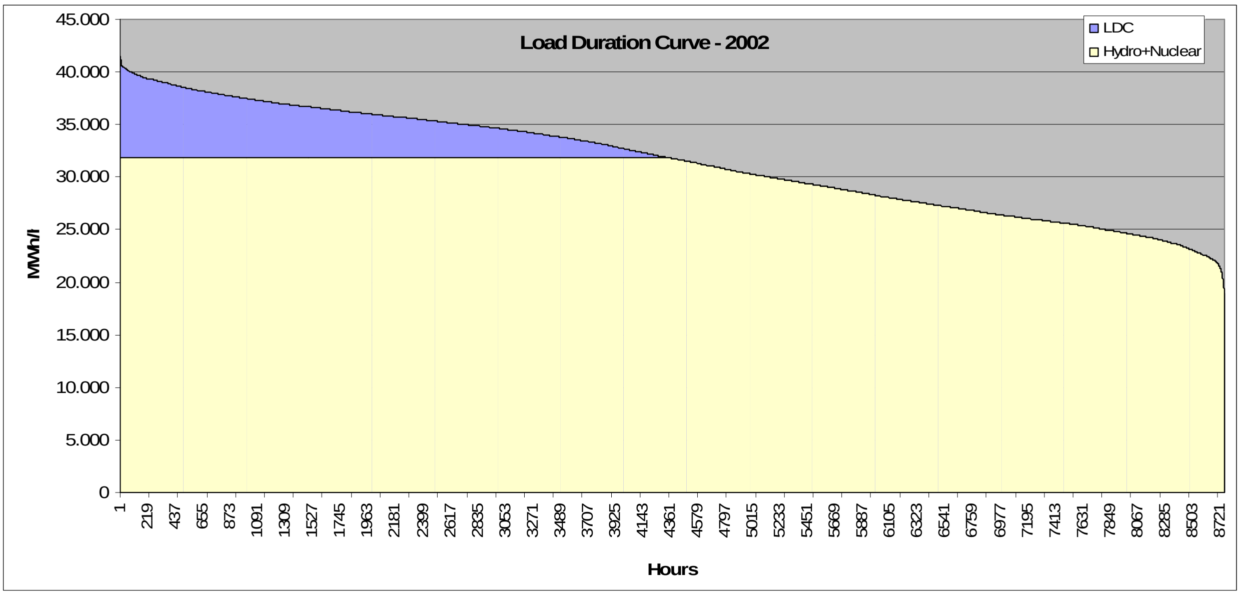


Figure 7. Load duration curve for the S-SE-CO sub system, 2003

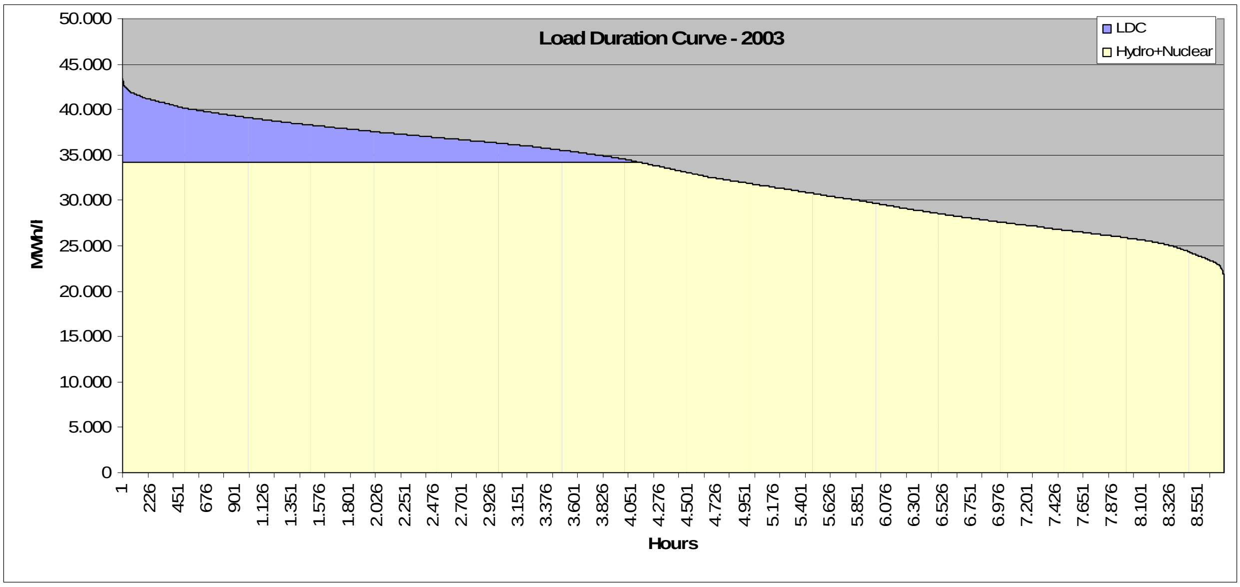


Figure 8. Load duration curve for the S-SE-CO sub system, 2004

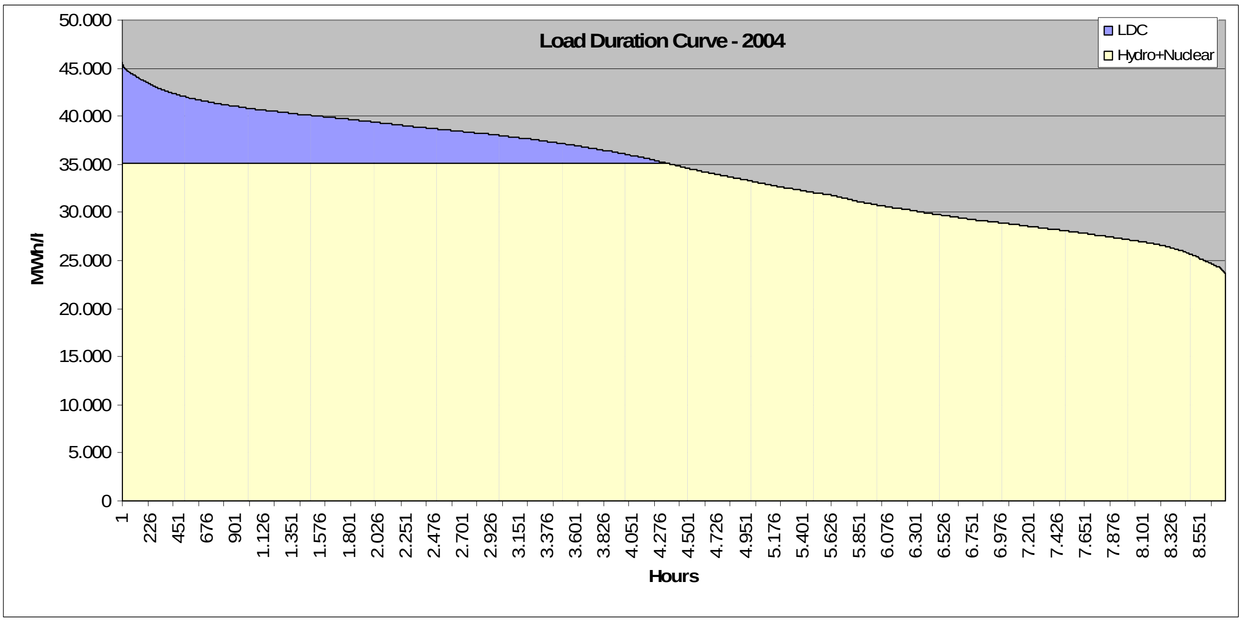


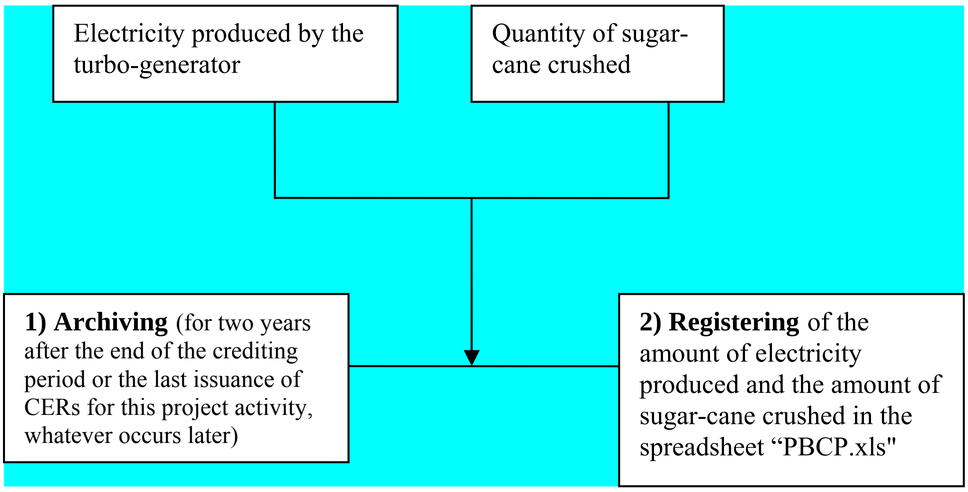
Table 6. Emission Reductions calculation data for the first crediting period

ACM0006 - Scenario 14	Pioneiros Bagasse Cogeneration Project (PBCP)												
	Item	Prior to the PBCP			1st Crediting Period for PBCP								Total CERs
		2003	2004	2005	nov-06	2007	2008	2009	2010	2011	2012	out-13	
	Electricity Produced (MWh)	17.480	18.861	20.804	24.286	170.000	170.000	170.000	170.000	170.000	170.000	145.714	
	Net efficiency of project plant (MWhel/MWh biomass)	0,024	0,024	0,024	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	
	EG_Y (MWh)				21.049	147.344	147.344	147.344	147.344	147.344	147.344	126.295	
	Emission Factor (tCO2e/MWh)				0,2636	0,2636	0,2636	0,2636	0,2636	0,2636	0,2636	0,2636	
	Total CO2 emissions reductions, tCO2e/year				**5.549**	**38.840**	**38.840**	**38.840**	**38.840**	**38.840**	**38.840**	**33.291**	**271.879**
	Data available from 2003 to 2005. Data from 2006 on are estimated												

Annex 4

MONITORING PLAN

According to the section D of this document, the variables that will be monitored in this project activity are the amount of sugar-cane crushed and the amount of electricity produced by the turbo-generators, from 2006 up to the end of the old equipments lifetime. Since no leakage nor any off-grid emissions change were identified in this project activity, there will be no need to monitor the variables for these cases. The monitoring will occur as follows:



The quantity of electricity produced will be monitored through the software that controls the operation of the turbo-generators and the monitoring of the amount of sugar-cane crushed will be made directly from the weighting station, at Destilaria Pioneiros S/A. The archiving will occur up to two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later. The amount of energy and the amount of bagasse will be registered in the spreadsheet "PBCP.xls", which shall be the instrument for the further Verification. Bagasse will be the same.

- - - - -