CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

>>

Cosipar Renewable Electricity Generation Project, Revision 5C[1], August 2006.

A.2. Description of the small-scale project activity:

>>

The project activity consists in the expansion of a 4 MW to 10 MW thermoelectric plant. Therefore, the project will claim for carbon credits correspondent to 6 MW of installed capacity. The new plant is fired by blast furnace gas to generate part of the electricity required by Cosipar Pig Iron Plant. The only fuel used by the plant will be the blast furnace gas. With the installation of this new thermoelectric, the old facility will only be used as stand-by plant, in case of any emergency. As a consequence of the construction of the plant there will be a reduced need for electricity supplied from the grid for the operation of the pig iron plant and in case of any surplus, this will be sold to the N/NE subsystem.

Currently, Cosipar purchases approximately 53,690 MWh/year from the Centrais Elétricas do Pará (CELPA), however, in the project scenario 42,768 MWh/year will be supplied by the project activity, thereby decreasing total demand from CELPA to 10,922 MWh/year. Cosipar Pig Iron Plant is located in the municipality of Marabá, in the State of Pará.

Use of the blast furnace gas to generate electricity will not generate additional greenhouse gas (GHG) emissions because in the absence of the project, the blast furnace gas would have continued to be flared (note that some blast furnace gas is used in the baseline scenario to generate 4MW of electricity, the additional gas is flared in the baseline). Since the waste gas would have been flared anyway in absence of project activity, the additional emissions from generation of power by combusting waste gases, in the project activity, is zero. Hence, the project activity is effecting GHG emission reduction by displacing power generation with GHG intensive fossil fuel with that of "zero GHG emission fuel". Therefore it is assumed that there will be no additional GHG emissions associated with the use of this gas to generate electricity.

Table 1 below summarises the baseline and project scenarios.

---

[1] Version 5C of the PDD was updated to reflect changes requested during a request for review process undertaken by the CDM Executive Board in July-September 2006.

Table 1: Summary of Cosipar Thermoelectric Plant Project Improvements

Baseline scenario	Project scenario
- Consumption of 53,690 MWh/year from CELPA. - Combustion of Gas (Thermoelectric 4MW + Flare)	- Generation of 42,768 MWh per year through the expansion of a renewable energy facility on site and the corresponding reduction in consumption of electricity from CELPA . - Combustion of Gas (Thermoelectric 10MW)

As a result of the project intervention, 42,768 MWh per year will be displaced from the grid, resulting in a yearly reduction of 16,466 tonnes of CO_2 equivalent (tCO_2e). Over the 21 year crediting period approximately 898,128 MWh will be displaced, and a total of 345,768 tCO_2e will be reduced.

The participants of the project recognize that Cosipar Renewable Electricity Generation Project is helping Brazil fulfil its goals of promoting sustainable development. Specifically, the project is in line with host-country specific CDM requirements because:

- It contributes to local environmental sustainability since it will decrease the purchase of fossil energy from the grid through the use of an alternative non fossil fuel, the blast furnace gas. Also, in the absence of this project, the gas would be flared and simply released to the atmosphere without any final use. Therefore, the project contributes to the better use of natural local resources. Besides, it uses clean and efficient technologies, and conserves natural resources, thus the project will be meeting the Agenda 21 and Sustainable Development Criteria of Brazil.
- Contributes for best work condition and increases employment opportunities in the area where the project is located according to Cosipar's recorded data;
- Contributes for revenue distribution since the use of a renewable fuel decreases dependence on fossil fuels; decreases the pollution and therefore the social costs related to this; diversifies the sources of electricity generation; and finally decentralizes the energy generation;
- Contributes for technological and capacity development – all technology, hand labour and technical maintenance will be provided inside Brazil. The whole system like boiler, turbines and generator presents high efficiency. This type of project will stimulate the Brazilian industry for innovative initiatives inside the energy sector. It acts as a clean technology demonstration project, encouraging development of modern and more efficient generation of electricity and thermal energy using biomass fuel throughout Brazil;
- Contributes for regional integration and connection with other sectors – the project facilitates the increase on blast furnace gas as a fuel in the region where it is located and therefore it integrates other similar companies that wants to replicate the experience of Cosipar. Also, it creates an

alternative market for this kind of energy generation, indirectly joining the Brazilian energy and environmental sectors.

A.3. Project participants:

>>

Table 2: Project participants.

Name of Party involved	Private and/or public entity (ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (Host Country)	Cosipar -Cia. Siderúrgica do Pará	No
United Kingdom	EcoSecurities Ltd	No

A.4. Technical description of the small-scale project activity:

>>

A.4.1. Location of the small-scale project activity:

>>

A.4.1.1. Host Party(ies):

>>
Brazil

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

>>
North region of Brazil, State of Pará

A.4.1.3. City/Town/Community etc:

>>
Marabá

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

>>
The project is located at Cosipar main industrial complex, in the city of Marabá, (Rodovia PA 150, s/n, km 422-Distrito Industrial. CEP 68501-535).

A.4.2. Type and category(ies) and technology of the small-scale project activity:

>>

According to the simplified modalities and procedures for small-scale CDM project activities, the Cosipar Renewable Electricity Generation Project falls under the Type/Category I.D. (Renewable Energy Projects / Renewable electricity generation for a grid). The project will be generating electricity from a carbon neutral source and displacing electricity generated by the grid.

The Project will be powered only by blast furnace gas, which is a carbon neutral fuel. The generation of the blast furnace gas is a consequence of the reaction carbon content of charcoal (or other reducing agents) with the oxygen of atmospheric air and of oxygen of Iron oxide, resulting in CO and CO_2. The carbon may also react with hydrogen from atmospheric air; resulting in CH_4.The main blast furnace gases that are used as fuel are CO and CH_4, however, the gases are not separated from the other gases, which do not have a workable calorific power.

It is worth noting here that the blast furnace gas is considered emission neutral as it would continue to be flared if the project did not go ahead. Therefore the blast furnace gas generated is a form of carbon neutral energy. To reinforce that position, the use of waste gas as a "zero GHG emission fuel" has been recently approved and consolidated by EB in ACM0004 "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation".

The technology to be used consists of a boiler, turbine and generator purchased from ABB and Koblitz. The new plant is expanding capacity from 4 to 10MW and it is expected to operate at a load factor of 84%. The project uses state of the art technology and it will not be substituted by other or more efficient technologies in the foreseen future.

For the production of 10 MW, around 25 Nm^3/h of gas is consumed. The boiler used by Cosipar consumes approximately 45 m^3/hour of water, from which 1.2 to 2 m^3 is obtained from evaporator and the remaining is originated from the condensate tank.. For the boiler operation, maintenance, inspection and supervision, the company has hired specialized employees and has elaborated a Fire Prevention Programme, which consists in an emergency programme specifically for boiler procedures, avoiding panic, dispersion and lost of control during risk situation.

The thermo unit consists of:
- Boiler: Acqua Tubular Equipalcool, model 35-V-2-S
- Turbine: Dresser Hand, with 10 MW of installed capacity; model Enseturb ET8.
- Generator: GE. Model 271R496. Installed capacity of 10 MW.
- Evaporator: Distillates from 1.2 to 2 m^3/h of water and generates mud and hot water, free from chemical products.

The technology and know-how being promoted by this project is environmentally safe and sound, and will further promote such activities in the future.

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

>>

The production of pig iron involves the consumption of a vast amount of energy and a series of heat transfer processes. At the pig iron production process is the blast furnace that has the function to chemically reduce iron oxides into liquid iron called "hot metal". Iron ore and the charcoal (or other reducing agents) are dumped into the top of the furnace and preheated air is blown into the bottom. The hot air blown into the bottom of the furnace ascends to the top after going through several chemical reactions.

Another product of the iron making process, in addition to molten iron and slag, is a hot dirty gas known as blast furnace gas. The gas exits the top of the blast furnace and proceeds through gas cleaning equipment where particulate matter is removed from the gas and the gas is cooled. This gas has a considerable energy value so a small amount is burned as a fuel in stoves which are used to preheat the air entering the blast furnace. Any of the gas not burned in the stoves can be used to generate steam.

In this project the remaining blast furnace gas, which is currently being flared, will be used as fuel for electricity generation expansion. Since the waste gas would have been flared anyway in absence of project activity, the additional emissions from generation of power by combusting waste gases, in the project activity, is zero. Hence, the project activity is effecting GHG emission reduction by displacing power generation with GHG intensive fossil fuel with that of "zero GHG emission fuel".

The only greenhouse gas that will be considered in the project calculations is CO_2. Methane (CH_4) emissions will not be modified by the project since blast furnace gas - which contains approximately 2% Methane - is combusted in both the baseline and project scenarios.

N_2O, HFCs, PFCs and SF_6 are not applicable to this project.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

>>

Table 3: Annual estimation of emission reductions over the chosen crediting period:

Years	**Annual estimation of emission reductions over the chosen crediting period**
Year 1	16,466
Year 2	16,466
Year 3	16,466
Year 4	16,466
Year 5	16,466
Year 6	16,466
Year 7	16,466
Total estimated reductions (tonnes of CO_2)	115,262
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2)	16,466

A.4.4. Public funding of the small-scale project activity:

>>

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

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

>>

Cosipar is developing two more CDM projects. The first of these is the Cosipar Forestry Project, which has not yet been presented due to uncertainties regarding reforestation modalities and procedures. The second project being developed by Cosipar is the "Cosipar Carbonisation Improvements" project, which reduces methane emission from carbonisation activities created from Cosipar carbonisation plants, through a new technology that burns the smoke released by carbonisation activities. This project is located on Cosipar forests, near to the industrial complex and it will start on January 2006. It has the capacity to generate approximately 2.4 million tonnes of CO_2 emission reduction equivalents over a 21-year timeframe, therefore it is a large scale project, that fits into the category # 10, from UNFCCC's list of sectoral scopes: "Fugitive emissions from fuels (solid, oil and gas)".

According to Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, the proposed project activity is not a fragmentation of a larger project if the analysis presented in Table 2 below results in an negative. The proposed project activity will be considered a debundled component of a larger if the project participants, project category, registration date and project boundary are the same for all projects. Table 2 below analyses the debundling issue of the proposed project activity and the other projects developed by Cosipar and concluded that proposed project activity in not a debundled component of a larger project.

Table 4: Debundling Occurrence Analysis.

Item \ Project	Cosipar Thermoelectric Plant	Cosipar Forestry Project	Cosipar Carbonisation Improvements	Occurrence of Debundling
Project Participants	Cosipar	Cosipar	Cosipar	Yes
Project category	Renewable electricity generation for a grid	Carbon Sequestration	Methane Emissions Reduction	No
Registration	To be registered soon	To be registered soon	To be registered soon	Possible
Boundary	Cosipar Pig Iron production plant	Cosipar Forests	Cosipar carbonisation plants	No
Result (the project will be a debundling of a larger project if the four items above occur):				**NO**

SECTION B. Application of a baseline methodology:

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

>>

Project Activity 1.D. - Renewable electricity generation for a grid.
Version 8

B.2 Project category applicable to the small-scale project activity:

>>

According to the sectoral scope list presented by UNFCCC (http://cdm.unfccc.int/), the project is related with the sectoral scope 1 Energy industries (renewable - / non-renewable sources).

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 small-scale CDM project activity:

>>

According to Attachment A of Appendix B of the simplified modalities and procedures for CDM small-scale project activities, evidence to why the proposed project is additional can be done by conducting an analysis of the following: (a) investment barriers, (b) technological barriers, and (c) prevailing practice. The result is a matrix that summarises the analyses, providing an indication of the barriers faced by each scenario. The most plausible scenario will be the one with the fewest barriers.

The first step in the process is to list the likely future scenarios. Two scenarios were considered:

- Scenario 1 - The continuation of current activities – This scenario represents the continuation of current practices, which is the electricity being supplied from the grid.

- Scenario 2 - The construction of the new renewable energy plant – In this scenario, a new source of low carbon emissions electricity will be available and will displace the higher carbon intensity electricity prevailing in the baseline scenario.

The barriers are as follows:

- Financial/economical – This barrier evaluates the viability, attractiveness and financial and economic risks associated with each scenario, considering the overall economics of the project and/or economical conditions in the country.

- Technical/technological – This barrier evaluates whether the technology is currently available, if there are indigenous skills to operate it, if the application of the technology is a regional, national or global standard, and generally if there are technological risks associated with the particular project outcome being evaluated.

- Prevailing business practice – This barrier evaluates whether the project activity represents prevailing business practice in the industry. In other words, this barrier assesses whether in the absence of regulations it is a standard practice in the industry, if there is experience to apply the technology and if there tends to be high-level management priority for such activities.

With respect to **financial/economical** barriers:

The non-existence of a local long-term market results not from a lack of financial investment opportunities, but from the reluctance of creditors and savers to lengthen the horizon of their placements. It has made savers look for the most liquid form and place their money in short-term government bonds instead of investing in long-term opportunities that could finance infrastructure projects.

The most liquid government bond is the LFT (floating rate bonds based on the daily Central Bank reference rate). As of January 2004, 51.1% of the domestic federal debt was in LFTs that has duration of one day. This bond rate is almost the same as the CDI - Interbank Deposit Certificate rate that is influenced by the SELIC rate, defined by the Monetary Policy Committee COPOM.

The SELIC Rate has been oscillating since 1996 from a minimum of 15% p.a. in January 2001 to a maximum of 45% p.a. in March 1999.

In order to be conservative, discount rates very lower than SELIC rate has been chosen to the financial analysis. The project's IRR is also lower than SELIC rate even though it corresponds to a riskier investment compared to a Brazilian government bonds.

The investment analysis considers all savings and expenses associated to the project such as the revenues from costs reduction with electricity and fuel purchases and the costs associated to the installation and operation of new plant. Values used in the financial analysis are presented in the Annex 4. The carbon revenues increase the returns of the project to an acceptable level compared to other investments in Brazil.

Table 5: Financial Results for project scenario.

	with carbon	**without C**
Net Present Value ($)	361.961	(170.688)
IRR	13%	11%
Discount rate	12%	
Present Value of carbon sold (21 years) $	**662.234**	

Find below a sensitivity analysis conducted by a cross-analysis of NPV when both discount rate and electricity tariff are altered. This parameters were selected as being the most likely to fluctuate over time and the most influent in project attractiveness.

As it can be seen, the project NPV remains lower (negative) than its alternative even increasing electricity tariff by 10%.

NPV Sensibility Analysis			
Discount	14%	16%	18%

Rate / Electricity tariff			
Increase of 5% in electricity tariff	-370.457	-781.872	-1.111.479
Increase of 10% in electricity tariff	-91.291	-534.385	-890.091

Values for discount rate below 12% have not been included in this analysis as it would not correspond to Brazilian reality. In 2003, year when the decision for the project activity has been taken, the Selic rate has oscillated between 16, 94% and 26, 32% (Brazil Central Bank, http://www.bcb.gov.br/?english). In order to be conservative, 16% has been taken as reference to the sensitive analysis.

- The continuation of current practices (Scenario 1) does not pose any financial/economical barrier to the project developer, and requires no further financing.

- The construction of a renewable energy plant (Scenario 2) faces specific financial/economic barriers due to the fact that technical/technological innovations carry with them risk premiums in terms of financing. The capital costs involved in the project pose a barrier, especially considering the high interest rates prevalent in developing countries. It is worth noting that there are no direct subsidies or promotional support for the implementation of independent renewable energy plants. The financial/economical barrier to the project activity is demonstrated through a cash flow financial analysis. Comparing the project results with and without carbon, it is clearly demonstrated that the project would not occur without carbon revenues.

With respect to the **technical/technological** barrier:

- In the case of Scenario 1 (continuation), there are no technical/technological issues as this simply represents a continuation of current practices and does not involve any new technology or innovation. Indeed, in this scenario there are no technical/technological implications as the scenario calls for continued use of electricity from the grid.

- In the case of Scenario 2, there are no significant technical/technological barriers. All the technologies involved in this scenario are available in the market, and have been used effectively in Brazil.

With respect to the analysis of **prevailing business practice**:

- The continuation of current practices (Scenario 1) presents no particular obstacles. This practice has been used effectively in the past with good results, and the continued operation of existing facilities and actual practices presents no real barriers.

- The construction of the extension to the energy plant (Scenario 2) does not represent a deviation from the company's core business.

Table 4 below summarises the results of the analysis regarding the barriers faced by each of the plausible scenarios. As the table indicates, Scenario 1 faces no barriers, whereas Scenario 2 faces one important barrier – the financial/economic barrier.

With respect to the analysis of **other barriers**:

- The continuation of current practices (Scenario 1) presents no other barriers.

- The construction of the extension to the energy plant (Scenario 2) does not present other barriers.

Table 6: Summary of Barriers Analysis

Barrier Evaluated		Scenario 1	Scenario 2
		Continuation of current activities	Construction of a new plant
1.	Financial / Economical	No	Yes
2.	Technical / Technological	No	No
3.	Prevailing Business Practice	No	No
4	Other Barriers	No	No

To conclude, the barrier analysis above has shown that the most plausible scenario is the continuation of current practices (continuation of use of electricity from the grid). Therefore, the project scenario is not the same as the baseline scenario, and these are defined as follows:

- The **Baseline Scenario** is represented by the continued use of electricity from the grid.

- The **Project Scenario** is represented by the construction of a new renewable energy plant. The new plant will displace electricity imported from a more carbon-intensive source, thus resulting in significant GHG emission reductions.

The Project Scenario is environmentally additional in comparison to the baseline scenario, and therefore eligible to receive Certified Emissions Reductions (CERs) under the CDM.

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

>>
The project boundary is defined as the national margin around a project within which the project's impact (in terms of carbon emission reductions) will be assessed. As referred to in Appendix B for small-scale project activities, the project boundary for a small scale renewable energy project that provides electricity to a grid encompasses the physical, geographical site of the renewable generation source. For the Project this includes emissions from activities that occur at the project location.

B.5. Details of the baseline and its development:

>>

The Project uses baseline Type 1.D with option (a) of paragraph 9 of Appendix B, related to the generation and supply of renewable energy to the grid.

All data used to calculate the Operating, Combined and Build Margins were based on ANEEL (The National Electricity Agency) and ONS (The National System Operator) database. The whole references are presented on calculation sheets.

Advisors in charge of baseline development are:

Flavia Resende

EcoSecurities do Brasil S.A

Rua Lauro Muller 116 /4303

CEP: 22290160

Phone: +55 (21) 2279 3651

e-mail: flavia@ecosecurities.com

Rodrigo Braga Bezerra

EcoSecurities do Brasil S.A

Rua Lauro Muller 116 /4303

CEP: 22290160

Phone: +55 (21) 2279 3651

e-mail: rodrigo.braga@ecosecurities.com

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

>>

C.1.1. Starting date of the small-scale project activity:

>>

01/07/2003

C.1.2. Expected operational lifetime of the small-scale project activity:

>>

30 years

C.2. Choice of crediting period and related information:

>>

C.2.1. Renewable crediting period:

>>

C.2.1.1. Starting date of the first crediting period:

>>

01/10/2003

C.2.1.2. Length of the first crediting period:

>>

7y – 0m

C.2.2. Fixed crediting period:

>>

Not applicable

C.2.2.1. Starting date:

>>

Not applicable

C.2.2.2. Length:

>>

Not applicable

SECTION D. Application of a monitoring methodology and plan:

>>

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

>>

Monitoring methodology described in paragraph 13 of Appendix 3 of the Simplified Modalities and Procedures for Small Scale CDM project activities, Baseline Type 1.D.

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

>>

As the project is eligible for using the methodologies listed in Appendix B of the Simplified Modalities and Procedures for Small Scale CDM project activities, it was felt that it should use the monitoring methodologies proposed for this project type.

D.3 Data to be monitored:

>>

Table 7: Data to be collected in order to monitor emissions from the project activity, and how this data will be archived

ID n°	Data type	Data variable	Data unit	Measured (m), calculated (c) indicated (I) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D.3.1	Electricity	Electricity produced by Project	MWh	M	Continuous	100%	Electronic and paper	During the whole crediting period + 2 years	This item will be monitored by meters and through the statements of the distribution company

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Table: Quality Control (QC) and quality assurance (QA) procedures being undertaken for data monitored

Data	Uncertainty level of data: (high, medium, low)	Explain QA/QC procedures planed for these data, or why such procedures are not necessary
D.3.1	Low	Measuring instruments will be maintained regularly.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

All data to be monitored will be collected and cross checked by the Quality Assurance management sector.

D.6. Name of person/entity determining the monitoring methodology:

>>

EcoSecurities Ltd. is the entity determining the monitoring plan and participating in the project as the Carbon Advisor. Advisors in charge of its development are:

Flavia Resende

EcoSecurities do Brasil S.A

Rua Lauro Muller 116 /4303

CEP: 22290160

Phone: +55 (21) 2279 3651

e-mail: flavia@ecosecurities.com

Rodrigo Braga Bezerra

EcoSecurities do Brasil S.A

Rua Lauro Muller 116 /4303

CEP: 22290160

Phone: +55 (21) 2279 3651

e-mail: rodrigo.braga@ecosecurities.com

.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>>

No formula is provided to quantify emission reduction of electricity generation in the Baseline Type 1.D.

E.1.2 Description of formulae when not provided in appendix B:

>>

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

No formula is needed. Emissions by sources are nil since renewable energy is either a zero CO_2 or CO_2 neutral source of energy.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>>

The methodology applied to the project does not require the calculation of transport emissions. There is no leakage emission.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

Zero emissions (0 tCO_2).

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

The baseline emissions (BE_y) resulting from the electricity supplied and/or not consumed from the grid is calculated as follows, where EG_y is the annual net electricity generated from the Project.

$$BE_y = EG_y * EF_y$$

For simplification, EG has been calculated considering an incremental installed capacity of 6MW (i.e. it is assumed 4MW of electricity generated from waste gas occurs in the baseline scenario, and therefore we only claim the additional 6MW of electricity for emission reductions).

For verification, EG will be calculate as the difference between the total electricity generation from the project activity and the historical generation from the old 4MW boiler.

The baseline emissions factor (EF_y) is a weighted average of the EF_OM_y and EF_BM_y:

$$EF_y = (\omega_{OM} * EF\_OM_y) + (\omega_{BM} * EF\_BM_y)$$

where the weights ω_{OM} and ω_{BM} are by default 0.5.

The Operating Margin emission factor (EF_OM_y) is calculated using the following equation:

$$EF\_OM_y (tCO_2 / MWh) = \frac{\sum_{i,j} F_{i,j,y} * COEF_{i,j}}{\sum_j GEN_{j.y}]}$$

Where:
$F_{i,j,y}$ is the amount of fuel i (in GJ) consumed by power source j in year y;
j is the set of plants delivering electricity to the grid, not including low-cost or must-run plants and carbon financed plants;
$COEF_{i,j,y}$ is the carbon coefficient of fuel i (tCO_2/GJ);
$GEN_{j.y}$ is the electricity (MWh) delivered to the grid by source j.

The Build Margin emission factor (EF_BM_y) is the weighted average emission factor of a sample of power 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). The equation for the build margin emission factor is:

$$EF\_BM_y (tCO_2 / MWh) = \frac{[\sum_{i,m} F_{i,m,y} * COEF_{i,m}]}{[\sum_m GEN_{m.y}]}$$

where $F_{i.m,y}$, $COEF_{i,m}$ *and* GEN_m are analogous to the *OM* calculation above.

For this project, data for combined margin calculation have been based on ONS – Operador Nacional do Sistema.

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 is increasingly showing that integration is to happen in the future. In 1998, the Brazilian government was announcing the first leg of the interconnection line between S-SECO 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 had been established, technical papers still divided the Brazilian system in two (Bosi, 2000)[2]:

"… 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 has also to be considered 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 91,3 GW of installed capacity, in a total of 1,420 electricity generation enterprises. From those, nearly 70% are hydropower plants, around 10% are natural gas-fired power plants, 5.3% are diesel and fuel oil plants, 3.1% are biomass sources

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

(sugarcane bagasse, black liquor, wood, rice straw and biogas), 2% are nuclear plants, 1.4% are coal plants, and there are also 8,1 GW of installed capacity in neighboring countries (Argentina, Uruguay, Venezuela and Paraguay) that may dispatch electricity to the Brazilian grid. (http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.asp). This latter capacity is in fact comprised by mainly 6,3 GW of the Paraguayan part of *Itaipu Binacional*, a hydropower plant operated by both Brazil and Paraguay, but whose energy almost entirely is sent to the Brazilian grid.

Approved methodology AM0015 and 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.

In fact, information on such generating sources is not publicly available in Brazil. The national dispatch center, ONS – *Operador Nacional do Sistema* – 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 contacted, in order to let participants know until which degree of detail information could be provided. After several months of talks, plants' daily dispatch information was made available for years 2002, 2003 and 2004.

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 (http://www.aneel.gov.br/arquivos/PDF/Resumo_Gráficos_mai_2005.pdf), 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. 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.

IEA/ONS Merged Data Build Margin (tCO_2/MWh)	**ONS Data Build Margin (tCO_2/MWh)**
0,205	0,1045

Therefore, considering all the rationale explained, project developers decided for the database considering 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.

Efficiency data on fossil fuel plants were taken from IEA document. This was made after considering that there was no more detailed information on efficiency, from public, renowned, and reliable sources.

From the reference as mentioned, the efficiency of conversion (%) of fossil fuels to thermo electrical plants fed with fossil fuel was calculated based on the installed capacity of each plant and on the power effectively produced. For most thermo electrical plants under construction, a constant value of 30% was used to estimate its fossil fuel conversion efficiency.

This value was based on data as available in the literature and on observation of real conditions of this kind of plants operating in Brazil. It was assumed that the only 02 natural gas-combined cycle plants (amounting to 648 MW) have higher efficiency rate, i.e. 45%.

Also, only data relative to plants under construction in 2002 (starting operation in 2003) were estimated. All other efficiencies were calculated. As far as it is know, there has been no upgrade of the older thermo electrical plants as analyzed in the period (2002 to 2004).

Therefore project participants have concluded that the best option available was to use such numbers, although they are not well consolidated.

All this information was directed to the current CDM project validators and thoroughly discussed with them, with the purpose to clarify every item and every possible doubt.

The table below summarizes conclusions of the analysis, with the calculation of the emission factor as presented.

SSC Emission factors for the Brazilian North-Northeast interconnected grid

Small-scale baseline (without imports)	OM (tCO_2e/MWh)	Total generation (MWh)
2002	0,7869	68.779.390
2003	0,7549	68.630.265
2004	0,5979	77.553.416
	Weighted average OM (2002-2004, tCO_2e/MWh)	Total = 214.963.071
		BM 2004 (tCO_2e/MWh)
	0,7133	0,0568
	OM*0.5+BM*0.5 (tCO_2e/MWh)	
	0,3850	

Project participants has calculated the OM emission factor using the ex-ante approach, which uses the full generation-weighted average for the most recent 3 years for which data are available

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>

The total emission reductions ER_y of the project activity during any given year y is the difference between the baseline emissions (BE_y in tCO_2) and leakage:

$$ER_y = BE_y - PEy - Leakage$$

However, in the case of small scale baselines Type 1.D Leakage is assumed to be nil.

Total Emission Reductions achieved by this project is equivalent to 16,466 tCO_2/year.

As said before, this emission reduction has been calculated considering an incremental installed capacity of 6MW. For verification, emission reduction will be calculate based on the net quantity of increased electricity generation as a result of the project. This is defined as the difference between the total electricity generation from the project activity and the historical generation from the old 4MW boiler.

E.2 Table providing values obtained when applying formulae above:

>>

Table 8: Electricity generation emission reductions in project scenario.

Electricity generation emission reductions	**Per year**	**Total (crediting period)**
Operating Margin Emissions Factor ($EF\_OM_{y,}$ in tCO_2/MWh)	0,7133	n/a
Build Margin Emissions Factor ($EF\_BM_{y,}$ in tCO_2/MWh)	0,0568	n/a
Baseline Emissions factor (EF_y)	0,3850	n/a
Electricity generated by the project (EG, in MWh)	42.768	299.376
Baseline Emissions (BE, in tCO_2)	16,466	115,262
Project emissions (PE, in tCO_2)	0	0
Emission reductions from electricity generation (tCO_2)	16,466	115,262

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

For the Cosipar small-scale renewable energy project the local environmental body required no specific environmental assessment. However, an ANEEL license was required for the Project activity. This has been completed, concluding that the Project adheres to the requirements.

Considering that all the blast furnace gas would be flared if it is not used to generate electricity, the additional activity is very small, including just the expansion of an existing plant to increase the electricity production. Thus, the environmental impacts are not significant.

There are some environmental and social positive impacts from the project. For example, there will be generation of new employment. Also, the use of blast furnace gas as fuel to generate electricity is avoiding the simple flare, making good use of the calorific energy contained in this gas. The increase in electricity generation will displace energy imported from grid. Moreover, the generation of energy inside the pig iron plant will avoid impacts of transmissions line expansions to supply the Cosipar plant.

The project does not expect to create any negative social or environmental impacts. In any case, the company will engage in the process of independent verification of their carbon and is prepared to address any issue that may arise from these audits.

SECTION G. Stakeholders' comments:

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

>>
According to the Resolution #1 dated on December 2nd, 2003, from the Brazilian Inter-Ministerial Commission of Climate Change (Comissão Interministerial de Mudança Global do Clima - CIMGC), decreed on July 7th, 1999[3], any CDM projects must send a letter with 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 Marabá;
- Chamber of Marabá;
- Environmental agencies from the State and Local Authorities;
- Brazilian Forum of NGOs;
- 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) and;
- Local communities associations;
- Others.

Local stakeholders were invited to raise their concerns and provide comments on the project activity through www.cosipar.com.br, for a period of 30 days after receiving the letter of invitation. Cosipar was also available to answer any clarifications and doubts through Lúcia Cardoso Paixão, responsible for this project at the company.

G.2. Summary of the comments received:

>>
No comments were made during 30 days (from August 2nd until September 2nd on 2004).

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

>>
Not applicable since no comments were made during the period available for comments.

3 Source: http://www.mct.gov.br/clima/comunic/pdf/Resolução01p.pdf

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project sponsor:

Organization:	Companhia Siderúrgica do Pará - Cosipar
Street/P.O.Box:	Rodovia PA 150, s/n, km 422 Distrito Industrial
Building:	
City:	Marabá
State/Region:	Pará - PA
Postfix/ZIP:	68501-535
Country:	Brazil
Telephone:	(94) 312 5000
FAX:	(94) 312-5006
E-Mail:	Cosipar .rio@Cosipar .com.br
URL:	http://www.Cosipar .com.br
Represented by:	
Title:	Business Development Director
Salutation:	Mr.
Last Name:	Monteiro
Middle Name:	Guilherme
First Name:	Luis
Mobile:	55 21 8128-5279
Direct FAX:	55 21 2105-6001
Direct tel:	55 21 2105-6019
Personal E-Mail:	guilherme.monteiro@Cosipar .com.br

Project Carbon advisors and Project Annex 1 sponsor:

Organization:	EcoSecurities Ltd, UK
Street/P.O.Box:	40/41 Park End Street
Building:	-
City:	Oxford
State/Region:	Oxfordshire
Postfix/ZIP:	OX1 1JD
Country:	United Kingdom
Telephone:	44 1865 202 635
FAX:	44 1865 251 438
E-Mail:	uk@ecosecurities.com
URL:	www.ecosecurities.com.br
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Moura Costa
Middle Name:	
First Name:	Pedro
Mobile:	
Direct FAX:	44 1865 792 682
Direct tel:	44 1865 202 635
Personal E-Mail:	pedro@ecosecurities.com

<u>Annex 2</u>

INFORMATION REGARDING PUBLIC FUNDING

This project will not receive any public funds.

Annex 3

Monitoring Plan

This section details the steps taken to monitor on a regular basis the GHG emissions reductions from the Cosipar Renewable Electricity Generation Project in Brazil. The main components covered within the monitoring plan are:

- Parameters to be monitored, and how the data will be collected
- The equipment to be used in order to carry out monitoring
- Operational procedures and quality assurance responsibilities

The requirements of this MP are in line with the kind of information routinely collected by companies in the pig iron industry, so internalising the procedures should be simple and straightforward. If necessary, the MP can be updated and adjusted to meet operational requirements, provided that such modifications are approved by a Designated Operational Entity during the process of verification.

The monitoring plan details the actions necessary to record all the variables and factors required by the small-scale methodology AMS I.-D. Version 8 as detailed in section D of the PDD. All data will be archived electronically, and data will be kept for the full crediting period, plus two years.

Table 9: Data to be collected or used to monitor emissions reductions from the project activity.

ID Number	Data Variable	Data Unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be Monitored	Responsible Parties For Monitoring	Comments
D.3.1	Electricity produced by Project	MWh	m	Continuous	100%		This item will be monitored by meters and through the statements of the distribution company

Table 10: Equipment used to monitor emissions reductions from the project activity

Variables Monitored	Equipment	Calibration procedures	Maintenance procedures	Procedure in case of failure
Electricity produced by Project	Electricity meter	Equipment will be calibrated regularly in line with manufacturer's requirements.	Equipment will be maintained in line with manufacturer's requirements.	If the meter on site fails, the invoices/receipts can be used to establish the amount of electricity produced. In any case though, necessary repairs will be carried out. If repair is not possible, equipment will be replaced by equivalent item. Failure events will be recorded in the site events log book.

Table 4c Operational procedures and responsibilities for monitoring and quality assurance of emissions reductions from the project activity

E = Responsible for executing data collection
R = Responsible for overseeing and assuring quality
I = To be informed

Task	On-site technician	Quality manager	Head of Maintenance / External company	Project developer	EcoSecurities
Collect Data	E	R	N/A	N/A	N/A
Enter data into Spreadsheet	I	E	N/A	R	N/A
Make monthly and annual reports	I	E	N/A	R	I
Archive data & reports	I	E	N/A	I	N/A
Calibration/Maintenance; Rectify faults	I	R	E	I	I

1. Parameter to be monitored, and how the data will be collected

Parameters to be monitored, and how data will be collected are described in Section D above.

Daily readings of all field meters will be registered in either electronic form or on paper worksheets. Data collected will be entered in electronic worksheets and stored.

CER quantity calculations will be carried out by worksheet, and a hard copy backup of the data may be printed. Backup of the data electronically may be conducted on a daily basis, and hard copy data may be printed weekly or monthly.

All data will be kept for the full crediting period, plus two years.

2. The equipment to be used in order to carry out monitoring;

All meters and sensors will be subject to regular maintenance and testing regime according to the technical specifications from the manufacturers to ensure accuracy and good performance.

Periodic controls of the field monitoring records will be carried out to check any deviation.

3. Operational procedures and quality assurance responsibilities.

As mentioned previously, Cosipar will designate a QA/QC technical body, which will be responsible for the activities related to implementation of all procedures required to allow an accurate assessment of the reductions resulting from the project.

Cosipar will also conduct regular training and quality control programs to ensure that good management practices are ensured and implemented by all project operating personnel in terms of record-keeping, equipment calibration, overall maintenance, and procedures for corrective action. An operations manual will be developed for operating personnel. The procedures for filling data and calculations to be performed by the operator will be included in a daily log to be placed in the main control room.

Internal audits will be carried out and recommendations on system and procedures improvements will be presented. Periodic reports to evaluate performance and assist with performance management will be elaborated.

Appendix 1 – References

Bosi, M. et al. 2002. Road-Testing Baselines for Greenhouse Gas Mitigation Projects in the Electric Power Sector (OECD and IEA Information Paper COM/ENV/EPOC/IEA/SLT - 2002 6). Paris:OECD. Available at: http://www.oecd.org/env/cc (20 Apr 2004)

Appendix 2 – Values Used in Financial Analysis

FINANCIAL ANALYSIS PARAMETERS	
I) Electricity generation	
Tariff (U$/MWh)	39,50
VAT	25%
Price of carbon (U$/tCO2)	6,00
Pre-operational Costs	50.000
Investment	5.048.426
Eletricity Plant - Operating Costs ($/MWh)	7,93
Carbon Offset Monitoring and verification	20.000
Insurance	2%
Contingencies	5%
Depreciation	10%
Income tax	33%
Discount rate	12%

- - - - -