CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

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>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

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

Martinuv Espigão Hydroelectric Project
Version 06
22/01/2007

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

The Martinuv Espigão Hydroelectric Project (hereafter, the Project) developed by Mauricio Martinuv Company together with Incomex – Indústria, Comércio e Exportação Ltda, as proponents and operators of the project, consists of a bundle of two small run-of-river hydroelectric projects:

- MARTINUV, located at Vilhena, in Pimenta Bueno River in Rondônia state with 2.4 MW installed capacity.
- ESPIGÃO, located at Espigão D'Oeste, in Preto River in Rondônia state with 1.5 MW installed capacity.

The units will be implemented in the following two phases:

- MARTINUV, phase 1 with 0.92 MW and phase 2 with 1.48 adding a total of 2.4 MW.
- ESPIGÃO, phase 1 with 0.90 MW and phase 2 with 0.60 adding a total of 1.5 MW.

The plants are connected to Rondônia-Acre isolated electricity systems, both located in Rondônia State, north region of Brazil. The Plants are located in very remote area, and bring electricity to develop these areas socially and economically, which has always been a difficult issue to be solved. Frequently, the solution for the electricity supply problem, in this remote area, has been the implementation of an isolated electricity system based on thermal power plants, fired by fossil fuels. This project will increase the supply of electricity to the grid, offsetting thermal generation with a renewable source of energy, reducing CO_2e emissions.

The participants of the project recognize that this Project activity 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.
- Contributes towards better working conditions and increases employment opportunities in the area where the project is located.
- Contributes towards better revenue distribution since the use of a renewable energy source decreases dependence on fossil fuels; decreases pollution and therefore the social costs related to this.
- Contributes to development of technological capacity because all technology, hand labour and technical maintenance will be provided inside Brazil. This type of project can stimulate further innovative initiatives inside the Brazilian energy sector and encourage the development of modern and more efficient renewable energy units throughout Brazil.

- Contributes to regional integration and connection with other sectors, the project facilitates the increase in small hydroelectricity as a generating source in the region and therefore may encourage other similar companies that want to replicate this experience.

A.3. Project participants:

Table 1 - Marinuv Espigão Hydroelectric Project participants

Name of Party involved ((host) indicates a host party)	**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)	• Private entity Incomex – Indústria, Comércio e Importação Ltda • Private entity Maurício Martinuv Company.	No
United Kingdom of Great Britain and Northern Ireland	EcoSecurities Group PLC.	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.:

Martinuv, located in North region, Rondônia State.
Espigão, located in North region, Rondônia State.

A.4.1.3. City/Town/Community etc:

Martinuv, located in the municipality of Vilhena.
Espigão, located in the municipality of Espigão D'Oeste.

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

1. Martinuv, located in the Pimenta Bueno river – 12 ^{o}49'18" S and 60 ^{o}17'45"W, in the State of Rondônia (RO), north region of Brazil.

2. Espigão, located in the Preto river - 11 °28’47”S and 60 °44’49”W, in the State of Rondônia (RO), north region of Brazil.

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

According to Annex A of the Kyoto Protocol, the project falls under sectoral scope (1), Energy industries (renewable - / non-renewable sources).

The project uses Small Scale Project Activity Type 1: Renewable energy projects, category I.D.: Renewable energy generation for a grid.

The project consists in a renewable electricity generation (run-of-river small hydro power plants) to supply electricity to Rondônia isolated System. The two hydro power plants have a total installed capacity of 3.9MW (below the eligibility threshold of 15 MW for small scale projects)

Table 2 – Technical description

	Martinuv 1st phase	Martinuv 2nd phase	Espigão 1st phase	Espigão 2nd phase
Installed Capacity(MW)	0,92	1,48	0,9	0,6
Turbine	1 Francis	1 Francis	1 Francis	1 Francis
Efficiency	92%	92%	92%	92%

By legal definition of the Brazilian Power Regulatory Agency (ANEEL – *Agência Nacional de Energia Elétrica*), resolution no 652, issued on December 9th, 2003, small hydro in Brazil must have installed capacity greater than 1MW but not more than 30MW and with reservoir area less than 3km^2. Also, run-of-river projects are defined as “the projects where the river’s dry season flow rate is the same or higher than the minimum required for the turbines” (Eletrobrás, 1999). Run-of-River schemes do not include significant water storage, and must therefore make complete use of the water flow. A typical run-of-river scheme involves a low-level diversion dam and is usually located on swift flowing streams. A low level diversion dam raises the water level of the river sufficiently to enable an intake structure to be located on the side of the river. The intake consists of a trash screen and a submerged opening with an intake gate. Water from the intake is normally taken through a pipe (called a penstock) downhill to a power station constructed downstream of the intake and at as low a level possible to gain the maximum head on the turbine.

Martinuv and Espigão small hydro units will use Brazilian Francis type turbines with a horizontal axis (Hydraulic reactor turbine in which the flow exits the turbine blades in a radial direction) and Brazilian generators. Francis turbines are common in power generation and are used in applications where high flow rates are available at medium hydraulic head. Water enters the turbine through a volute casing and is directed onto the blades by wicket gates. The low momentum water then exits the turbine through a draft tube.

Both Martinuv and Espigão are run-of-river plants and have minimum diversion dams, which store water to generate electricity for short periods of time, Martinuv has no reservoir area and the Espigão’s reservoir area is 0,37km². Both small hydros will be implemented in two phases adding two groups of turbine-generator of each small hydro.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

	Annual estimation of emission reductions in tonnes of CO2e
2007 (since June)	6.874
2008	13.611
2009	17.394
2010	19.113
2011	19.113
2012	19.113
2013	19.113
2014	19.113
2015	19.113
2016	19.113
2017 (until May)	7.964
Total estimated reductions (tonnes of CO2e)	179.634
Total number of Crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	17.963

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 large scale project activity:

Incomex – Indústria, Comércio e Exportação Ltda is developing one more CDM project, named "Incomex Hydroelectric Project". 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 the Table below results in a negative result. 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. The following analysis of debundling, for the proposed project activity and the project developed by Incomex, concluded that proposed project activity in not a debundled component of a larger project. See the next table.

Table 3 - Debundling Occurrence Analysis

Item \ Project	Martinuv Espigão hydroeletric project	Incomex hydroelectric project	Occurrence of Debundling
Project Participants	Mauricio Martinuv and Incomex	Incomex & Grupo Cassol Energia	No
Project category	Renewable electricity generation for a grid	Renewable electricity generation for a grid	Yes
Registration	To be registered	To be registered	Possible
Boundary	Vilhena and Espigão d'Oeste cities	Alta Floresta d'Oeste and Comodoro cities	No
Result (the project will be a debundling of a larger project if the four items above occur): Not debundling			

In addition to the boundary analysis, all "Incomex hydroelectric project" plants are more than 1 km far from "Martinuv Espigão hydroelectric project" plants. The smallest distance is approximately 28 km, between plant Cabixi II and plant Martinuv, moreover these plants have different owners, Grupo Cassol and Mauricio Martinuv Company respectively.

SECTION B. Application of a baseline and monitoring methodology

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

The proposed project activity falls under Type/Category I.D. - Gird connected renewable electricity generation - I.D/Version 10, scope 1, 23 December 2006.

The grid emission factor calculation was performed according to the consolidated methodology ACM0002 - "Consolidated methodology for grid-connected electricity generation from renewable sources", Version 06 in effect as of 19 May 2006

B.2 Justification of the choice of the project category:

According to the sectoral scope list presented by UNFCCC (http://cdm.unfccc.int/), the project is related to sectoral scope 1: Energy industries (renewable - / non-renewable sources) and is applicable to small scale project type 1 (Renewable Energy), methodology I.D. –renewable electricity generation for a grid.

The total installed capacity of the project activity is 3.9MW which is below the eligibility limit of 15 MW for small scale projects.

The baseline scenario is the continuation of the current situation of electricity supplied predominantly by thermal-power stations.

Martinuv and Espigão project comprises renewable energy generation units because it is a bundle of two small run-of-river hydro that will supply electricity to an electricity distribution system, supplied by at least one fossil fuel generating unit. Martinuv Espigão Hydroelectric project will supply electricity to Rondônia Isolated System.

According to the approved baseline methodology I.D/Version 09, scope 1, 28 July 2006, the following two options are offered for preparing the baseline scenario: (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002; and (b) The weighted average emissions (in $kgCO_2/kWh$) of the current generation mix. Option (a) was selected.

The following table shows the key information and data used to determine the baseline scenario:

Table 4 - Key information and data used to determine the baseline scenario

Variable	Data Source
Operating Margin Emissions Factor (EF_OM_y, in tCO_2/MWh)	ANEEL, Eletrobras SA and CERON
Build Margin Emissions Factor	ANEEL, Eletrobras SA,

(EF_BM_y, in tCO_2/MWh)	ELETRONORTE and CERON
Baseline Emissions factor (EF_y)	ANEEL, Eletrobras SA, ELETRONORTE and CERON
Electricity generated by the project (EG, in MWh)	ANEEL, Eletrobras SA, ELETRONORTE and CERON
Baseline Emissions (BE, in tCO_2)	ANEEL, Eletrobras SA, ELETRONORTE and CERON
Project emissions (PE, in tCO_2)	ANEEL, Eletrobras SA, ELETRONORTE and CERON

B.3. Description of the project boundary:

The boundary for the baseline is defined as the electricity grid that previously provided electricity to the municipalities of Vilhena and Espigão D'Oeste, which are isolated from the national grid, and will include all the direct emissions related to the electricity produced by these generators that will be displaced by the Project.

Conforming to the guidelines and rules for small-scale project activities, the emissions related to production, transport and distribution of the fuel used in the power plants in the baseline are not included in the project boundary, as these do not occur at the physical and geographical site of the project. For the same reason the emissions related to the transport and distribution of electricity are also excluded from the project boundary.

B.4. Description of baseline and its development:

The baseline for the project was established with reference to the methodology applicable to the project activity category I.D for grid connected renewable energy generation. All assumptions and rationale of the baseline development as well as all data used to determine the baseline emissions are described in this section.

The project consists in a new electricity generation facility that will supply electricity to the grid. As stated in the methodology, for project activities that do not modify or retrofit an existing electricity generation facility.

Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations in section B.6.1.

Table 4 provides the key information and data used to determine the baseline scenario.

Table 4 - key information and data used to determine the baseline scenario

Variable	Value/Unit	Data Source
Operating Margin Emissions Factor [EF_OM_y]	0.8682 tCO_2/MWh	ANEEL, Eletrobras S.A, ELETRONORTE and CERON
Build Margin Emissions Factor [EF_BM_y]	1.0160tCO_2/MWh	ANEEL, Eletrobras S.A, ELETRONORTE and CERON
Baseline Emission Factor [EF_y]	0.9421 tCO_2/MWh	Calculated
Generation of the Project in Year Y [EG_y]	20288 MWh	Calculated according to Project developer data

The technology employed in the baseline is the technology already used in the grid. Electricity generation in the grid is predominantly based in diesel fueled thermoelectric plants with internal combustion technology or fuel oil fueled thermoelectric plant with one combined cycle. Also, a small share of the electricity is generated by small power hydroelectric plants.

The baseline is defined as the Rondônia-Acre isolated system, it consists in 9 thermoelectric plants, adding 681.55 MW of installed capacity and 13 hydroelectric plants adding 259.50 MW of installed capacity. The electricity generation in the grid is about 55% thermoelectric, in average. The components of the grid, and thus of the baseline, are provided in the table below. For more details please see Annex 3.

Table 5 - Baseline components

Units	Type	Installed Capacity (MW)
Rio Branco	Hydro	6.90
Cabixi II	Hydro	2.80
Termonorte II	Thermal	349.95
Monte Belo	Hydro	4.80
PCH Altoe	Hydro	1.10
Alta F. D'Oeste	Hydro	5.00
PCH ST. Luzia	Hydro	3.00
Termonorte I	Thermal	68.00
PCH Cachoeira	Hydro	11.12
PCHs Castaman 2	Hydro	0.50
PCH Cabixi 1	Hydro	2.70
Rio Acre	Thermal	45.80
PCHs Castaman 3	Hydro	1.48
Rio Branco II	Thermal	32.40
PCHs Castaman 1	Hydro	1.50
Samuel	Hydro	216.00
PCH Rio Vermelho	Hydro	2.60
UTE Colorado	Thermal	10.95
UTE Vilhena	Thermal	23.75

Rio Madeira	Thermal	83.00
Rio Branco I	Thermal	18.10
Barro Vermelho	Thermal	49.60

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

According to Attachment A to Appendix B of the simplified modalities and procedures for CDM small-scale project activities, evidence to why the proposed project is additional is offered under the following categories of barriers: (a) investment, (b) technological, (c) prevailing practice and (d) other barrier.

The result is a matrix that summarizes the analyses, providing an indication of the barriers faced by each scenario; the most plausible scenario will be the one with the fewest barriers.

For this analysis, the following two scenarios were considered:

- Scenario 1 - The continuation of current activities – This scenario represents the continuation of current practices, which is electricity generation with significant participation of fossil fuel units on Rondônia-Acre isolated system.

- Scenario 2 - The construction of the new renewable energy plant – This scenario represents the use of a new renewable source, small hydro generation plant, considered neutral in terms of GHG emissions.

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 economic 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 of regional, national or global standard, and generally if there are technological risks associated with the particular project outcome being evaluated.

- Prevailing business practice – This evaluates whether the project activity represents prevailing business practice in the industry. In other words, it 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.

- Other barriers - This barrier evaluates whether without the project activity emissions would have been higher, for any other reason identified, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies.

General Context

According to the audit report elaborated from Brazilian Court of Audit (2004), the Brazilian Electricity System mainly consists in an interconnected system that includes South, Southeast, Middle-West, Northeast and part of the North Regions. The North Region is predominantly supplied by isolated systems, which are diesel fuelled. In 1993 in order to promote the development of the North Region, the Brazilian Government come up with a law - 8631/93 - that obliged all energy concessionaires to divide proportionally the fuel consumption costs done by the isolated systems. Therefore the electricity would be available in the North Region, with a reasonable price. This obligation is called CCC ("Conta Consumo de Combustíveis"), which means Fuel Consumption Account.

Besides CCC, the government also created the CCC Subrogation (law no. 9648/98). This policy was implemented because CCC only applies to electricity generation from thermal units fired by fossil fuels. The CCC subrogation now says that renewable energy can also apply for the subsidy. Therefore, the subrogation of CCC resources facilitates the replacement of fossil fuel consumption by other alternative and renewable sources, as for example, hydro energy (Tolmasquim, 2004).

CCC Subrogation represents an attractive alternative: according to ANEEL (National Electricity Agency), for the implementation of new generation unit the construction can be subsided from 50% to 75% and the internal rate of return for those investments can increase considerably. However, there are still two main obstacles involved in the CCC Subrogation that will be better described in the financial barriers items below, specifically considered in this project.

According to "ANEEL CCC + CCC subrogation utilization guide" it should be created other legal devices to help changing the source of energy from fossil to renewable, in which the Kyoto Protocol is suggested as an alternative.

Even though, the project would face economical and prevailing practice barriers better detailed on items below.

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

- The continuation of current practices (Scenario 1) does not pose any financial/economical barrier to the project developer, and requires no further financing. The greater part of the energy supplied to the isolated system being considered by this project comes from diesel fuel units. From a total of 862 MW of installed capacity in the Rondônia-Acre system, 761 MW comes from thermal units.

- The construction of a renewable energy plant (Scenario 2) faces specific financial/economic barriers due to the fact that even receiving the subsidies from the CCC Subrogation, the project faces two important obstacles, quoted from the Brazilian Court of Audit (2004). As explained above, the CCC initiative subsidises the use of fossil fuel fired thermal units in the isolated system, while the CCC Subrogation subsidises renewable sources of energy, and Espigão and Martinuv are subscribed under that clause. Although, Espigão and Martinuv will receive subsidies from CCC Subrogation to support the equipment purchasing, this will only occur in the second phase because both plants are under 1MW in the first phase.

One of the two main obstacles is: **lack of long-term financing available for medium investors**. (Quoted from the Brazilian Court of Audit, 2004, paragraph 115). Besides all the investment barriers that are normally involved in Brazilian financial activities, there is the uncertainty from resource suppliers due to the lack of guarantees in selling the energy. It is known that the North region concessionaires experience a precarious economical situation, which brings insecurity for the investors in energy sector.

The other barrier is: **lack of interest from energy concessionaires**. The energy companies prefer not losing the guaranteed CCC subsidies to support generation investments based on renewable fuel sources. This is enforced by the fact that energy producers must have a pre-set selling contract with the buyer or an official document that assures that the energy produced will be sold in order to access the subsidy. The producer can only apply for the subsidy once the unit is fully operating and producing the same amount of energy as was agreed in the contract. Thus thermal units are preferable than hydro units.

At last, the implementation costs for those units in the North Region are considerably higher than in other regions. Camargo, quoted in Tolmasquim (2004), verified that the implementation costs for hydros until 10 MW in isolated systems is considerably higher than in the other regions (see Table below). This is due to difficulties better detailed on the prevailing practice barrier, related to logistics, transportation etc. Based on the same author, even with the CCC Subrogation benefits, the average energy cost for this region is still high.

Table 5 - **Small hydro units construction costs in different Brazilian regions – R$/kW.***

	North/Isolated	Northeast	Middle-West	Southeast	South
Small plants (1-10 MW)	4.000	3.500	3.500	2.800	2.800
Other plants (10-30 MW)	4.000	3.500	3.500	3.000	2.800

*Elaborated based on Camargo, 2004.

Furthermore, the subsidy for the construction is not fully paid when the subrogation is conceded. This is amortized every month for the maximum of 5 years and the amount paid is related with the energy produced. Consequently if the energy producer produces less energy than he assured in the contract, the subsidy would be paid proportionally to that value and the rest would be postponed to the following months.

In conclusion, although both renewable and non-renewable plants may receive a subsidy, it is easier, faster and cheaper for thermal plants to be put into operation and to receive the subsidy, and also there are few other complications involved in the operation of conventional thermal plants (better detailed under ‘prevailing practice’).

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

- In the case of Scenario 1 (continuation of current practices), there are no technical/technological barriers as this simply represents a continuation of current electricity generation practices which have been shown to work, and does not involve implementation of any new technology or innovation.

- 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 the Host Country.

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

- The continuation of current practices (Scenario 1) presents no particular obstacles. This is by definition prevailing practice in the region.

- In the case of Scenario 2, there are barriers that would have to be overcome. According to Brazilian Court of Audit, 2004, until the end of 2004, only 12 plants were approved for CCC Subrogation and only 6 are operating. The lack of interest from the local concessionaires in subscribing for this program is mainly due to financial reasons. However, many other specific reasons related to the prevailing practices can be appointed.

  Concerning the Rondônia isolated system, predominantly thermal (according to official Operational Plans from 2001 until 2005). The isolated systems considered by the documents cited above were authorized by the Energy National Agency (ANEEL).

  Below, a brief explanation of the electricity generation operational activities in Rondônia:

  Isolated Systems in Rondônia:

  ELETRONORTE is the concessionaire responsible for generation and transmission activities inside Porto Velho System, the main electricity system in Rondônia .Originally, the Porto Velho system comprised 1 hydro unit (UHE Samuel) and 8 thermal units (Rio Branco I, TEU Colorado, TEU Vilhena, Rio Branco II, Rio Acre, Rio Madeira, Termonorte I and Termonorte II) (Operational Plan from 2001). According to this plan, all thermal units were part of the "Thermoelectric Priority Program", which focused on increasing the electricity supply for this state. The main reason to this initiative was due to water level instability of Samuel's hydro reservoir. Besides Eletronorte, CERON is the concessionaire responsible for distribution and transmission activities for the interior of Rondônia. According to the same Plan, in 2001, there were 41 isolated systems in Rondônia, from which 39 were fuelled by diesel oil.

  From 2001 until 2005, thermal generation inside the isolated system has only increased. According to Operational Plan (2003), forecasted hydro generation corresponded to 2,048 GWh, while thermal generation corresponded to 6,991 GWh. Furthermore, according to this same plan, thermal generation was projected to increase by 9% and hydro generation to decrease by 5%. Still, in the Operational Plans for 2004 and 2005, a comparison between thermal and hydro generations always indicates a clear predominance of thermal generation. This can be better visualized on the tables below, taken directly from the Operational Plan for 2005 (the most representative plan). According to Table 6, the number of thermal generation units in Rondônia corresponds to 160 (148 + 12), while on Table 7, the number of hydro generation units in Rondônia corresponds to 28 (5 + 23).

Table 6 – Number of units and installed power in 2005 - Thermal units

Estado	Concessionária	Nº de Unidades		Potência Nominal (kW)	
		2004	2005	2004	2005
ACRE	ELETRONORTE	24	24	94.400	94.407
	ELETROACRE	66	66	35.484	32.572
AMAPÁ	ELETRONORTE	7	30	122.800	145.800
	CEA	17	15	23.320	18.045
AMAZONAS	MANAUS ENERGIA	66	116	822.700	900.200
	CEAM	368	426	211.021	325.363
PARÁ	CELPA	180	155	97.992	95.614
	JARI CELULOSE	11	11	70.570	69.865
RONDÔNIA	ELETRONORTE	12	12	549.900	549.900
	CERON	154	148	90.333	101.060
RORAIMA	BOA VISTA ENERGIA	3	3	62.000	62.000
	CER	97	114	25.430	23.670
BAHIA	COELBA	5	5	1.578	1.578
MARANHÃO	CEMAR	3	3	872	872
MATO GROSSO	CEMAT	208	206	109.092	105.039
MATO G. DO SUL	ENERSUL	3	3	4.500	4.500
PERNAMBUCO	CELPE	10	3	4.934	2.730
TOTAL PARQUE TÉRMICO		1234	1340	2.326.926	2.533.215

Table 7 – Number of units and installed power in 2005 – Hydro units

Estado	Concessionária	Nº de Unidades		Potência Nominal (kW)	
		UHE	PCH	UHE	PCH
AMAZONAS	MANAUS ENERGIA	5	-	250.000	-
RONDÔNIA	ELETRONORTE	5	-	216.000	-
	CERON	-	23	-	57.404
RORAIMA	CER	-	2	-	5.000
AMAPÁ	ELETRONORTE	3	-	75.000 (1)	-
MATO GROSSO	CEMAT	-	25		32.975
TOTAL PARQUE HIDRÁULICO		13	50	541.000	95.379

Nota: (1) Prevista repotenciação da 2ª unidade geradora da UHE Coaracy Nunes para maio de 2005.

Therefore, based on these data, it is clearly demonstrated that the prevailing practice in terms of energy generation in Rondônia is predominantly thermal and consequently, the trend in that region is the construction of units using fossil fuels, instead of hydro units.

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

- Both scenarios present no other barriers.

Table below summarises the results of the analysis regarding the barriers faced by each of the plausible scenarios. Scenario 1 faces no barriers, whereas Scenario 2 faces financial/economic barriers and is against prevailing practice.

Table 8 - 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	**Yes**
4.	Other Barriers	No	No

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

- The **Baseline Scenario** is the continued use of electricity from the Rondônia-Acre Isolated System, based mainly on diesel consumption.
- **The Project Scenario** is the construction of 2 new hydroelectric plants of 3.9 MW in total. The new plants will displace grid electricity from a more carbon-intensive source, resulting in significant GHG emission reductions. The Project Scenario is additional in comparison to the baseline scenario, and therefore eligible to receive Certified Emissions Reductions (CERs) under the CDM.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

AMS I.D offers the following choices for preparing the baseline calculation for this type of project activity:

(a) A Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered.

OR

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

Considering the available guidelines and the project activity, the Rondônia-Acre isolated system has been chosen for baseline analysis using method (a) for the baseline calculations.

the **baseline emissions** (BE_y) resulting from the electricity supplied and/or not consumed from the grid is calculated as follows:

$$BE_y = EG_y * EF_y \quad (1)$$

Where:

EG_y is the annual net electricity generated from the Project

EF_y is the baseline emission factor.

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

$$EF_y = (\omega_{OM} * EF\_OM_y) + (\omega_{BM} * EF\_BM_y) \quad (2)$$

Where:

EF_OM_y is the operating margin carbon emissions factor

EF_BM_y is the build margin carbon emissions factor

and 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:

$$EF\_OM_y (tCO_2 / MWh) = \frac{\sum_{i,j} F_{i,j,y} * COEF_{i,j}}{\sum_j GEN_{j.y}]} \quad (3)$$

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 simple OM method was used since the system is predominantly thermal.

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:

$$EF\_BM_y (tCO_2 / MWh) = \frac{[\sum_{i,m} F_{i,m,y} * COEF_{i,m}]}{[\sum_m GEN_{m.y}]} \quad (4)$$

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

For this project, EcoSecurities calculated a unique combined margin, according to Rondônia isolated system data. See Annex 3 for more details.

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

Data / Parameter:	**EF_{OM}**
Data unit:	tCO_2/MWh
Description:	Grid Operating Margin
Source of data used:	ELETROBRAS S.A., ANEEL, ELETRONORTE, CERON and IPCC, 2006
Value applied:	0.8682
Justification of the choice of data or description of measurement methods and procedures actually applied :	OM is calculated according to option (a) Simple OM method of methodology ACM0002. For further information please refer to Annex 3.
Any comment:	

Data / Parameter:	**w_{OM}**
Data unit:	Fraction
Description:	Weighting
Source of data used:	ACM0002
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default weighting value for Operating Margin taken from ACM0002
Any comment:	

Data / Parameter:	**EF_{BM}**
Data unit:	tCO_2/MWh
Description:	Grid Build Margin
Source of data used:	ELETROBRAS S.A., ANEEL, ELETRONORTE, CERON and IPCC
Value applied:	1.0160
Justification of the choice of data or description of measurement methods and procedures actually applied :	BM is calculated according to methodology ACM0002. For further information please refer to Annex 3.
Any comment:	

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

Data / Parameter:	EF_y
Data unit:	tCO_2/MWh
Description:	Grid emission factor. Is the CO_2 emissions intensity of the electricity displaced in the grid
Source of data used:	ELETROBRAS S.A., ANEEL, ELETRONORTE, CERON and IPCC, 2006
Value applied:	0.9421
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Baseline Emission Factor calculation consists of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Detailed information is attached in Annex 3.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

The ex-ante emission reductions values and calculations are as follows:

Parameter	Formula	Value	Unit
EF_BM	provided in section B.6.1	1.0160	tCO_2/MHh
wBM	-	0.5	-
EF_OM	provided in section B.6.1	0.8682	tCO_2/MHh
wOM	-	0.5	-
EF	provided in section B.6.1	0.9421	tCO_2/MHh
Total Installed capacity	-	3.90	MW
Total Auxiliary consumption	-	0.04	MW
load_factor	-	60%	%
EGy	=(Installed_capacity - Auxiliary_consumption) * load_factor * 8760	20288	MWh

BE	= EG * EF	19113	tCO_2
PE	-	0	tCO_2
ER	= BE - PE	19113	tCO_2

$PE_y = 0$, as emissions by sources are zero since hydroelectric power is a zero CO_2 emissions source of energy.

According to AMS I.D Version 10, leakage calculation is only needed if the renewable energy technology equipment is transferred from another activity or to another activity. This is not the case with the project activity. Therefore Leakage emissions were not accounted.

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

Years	Estimation of project activity emission reductions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
2007 (since June)	0	6874	0	6874,00
2008	0	13611	0	13611,00
2009	0	17394	0	17394,00
2010	0	19113	0	19113,00
2011	0	19113	0	19113,00
2012	0	19113	0	19113,00
2013	0	19113	0	19113,00
2014	0	19113	0	19113,00
2015	0	19113	0	19113,00
2016	0	19113	0	19113,00
2017 (until May)	0	7964	0	7964,00
Total (tonnes of CO_2e)	**0**	**179634**	**0**	**179634,00**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity delivered to the grid
Source of data to be used:	Project developer and CERON
Value of data applied for the purpose of	20288

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	To be obtained from one meter which will be read off by the project developer as well as the grid operator.
QA/QC procedures to be applied:	Equipment will be subject to a regular maintenance, calibration and testing regime to ensure accuracy. Data collected by the project developer will be cross checked with the electricity sales receipts obtained from the grid operator.
Any comment:	

B.7.2 Description of the monitoring plan:

The monitoring of this type of project consists of metering the electricity generated by the renewable technology. Bellow you find the description of monitoring procedures for data measurement, quality assurance and quality control.

<u>Metering of Electricity Supplied to the Grid</u>

The main electricity meter for establishing the electricity delivered to the grid will be installed at the input end of the transmission line. This electricity meter will be the revenue meter that measures the quantity of electricity that the project will be paid for. As this meter provides the main CDM measurement, it will be the key part of the verification process.

Data will be measured continuously and at the end of each month the monitoring data will be filed electronically and a back-up will be made regularly. The project developer needs to keep electricity sale and purchase invoices. Data will be archived electronically and on paper and will be kept for at least two years after the end of the crediting period.

The electricity meter should meet relevant local standards at the time of installation. The meter will be installed by either the project developer or the grid company in accordance with Brazilian standards. Records of the meter (type, model and calibration documentation) will be retained in the quality control system.

<u>Quality Control and Quality Assurance</u>

Quality control and quality assurance procedures will guarantee the quality of data collected. The electricity meter(s) will undergo maintenance subject to industry standards. Moreover, meter(s) are calibrated by the distribution concessionaire CERON - which signs a long term PPA with the plants - in accordance with national standards established by INMETRO *("Instituto Nacional de Metrologia, Normalização e Qualidade Industrial"*- entity responsible for calibration standards) and recalibrated according to manufacturer specifications, but at least once every 3 years.

To guarantee the consistency and accuracy of the data collected from the meter(s), data will be cross-checked with the sale receipts which will show the amount of energy supplied to the grid.

Before the crediting period starts, the organisation of the monitoring team will be established and clear roles and responsibilities will be assigned to all staff involved in the CDM project.

Data will be read off the meter and energy sales receipts will be collected from the small hydro by the plant operation personnel. This information will be transferred to EcoSecurities on a monthly basis in order to monitor emission reductions.

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

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

The baseline and monitoring plan were concluded on 22/01/2007. The entity determining the monitoring plan as the Carbon Advisor is EcoSecurities Group PLC. For further detail on contact:

Leandro Noel and Rodrigo Braga
Rua Lauro Müller, 116, room 4303
Rio de Janeiro- RJ
Brazil 22290-160

Telephone. 55 (21) 2275 9570
Email rodrigo.braga@ecosecurities.com or leandro.noel@ecosecurities.com
Website www.ecosecurities.com

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

01/06/2006

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

30y-00m

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:

Not applicable.

C.2.1.2. Length of the first crediting period:

Not applicable.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/06/2007

C.2.2.2. Length:

10 y – 0 m

SECTION D. Environmental impacts

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

The Martinuv and Espigão small Hydropower projects generate no emissions of greenhouse gases and no emissions of toxic waste, and have limited, controlled and reversible effects on the environment because the projects are run of river and use water directly from the river, with a small storage area designed only to allow the water intake to operate. The projects have easy integration in the landscape and compatibility with the protection of water, fauna and flora.

As for the regulatory permits, both Martinuv and Espigão have the authorization issued by ANEEL (ANEEL Resolution nº 251, issued on 27/jun/2005) to operate as an independent power producer, which gives the plants the right to operate. Moreover, both units have dispatch authorization, including production and commercialization permits, issued by ANEEL (Dispach nº395, for Martinuv and Dispach nº157, for Espigão).

As for environmental permits, the project has the necessary environmental licenses. The licenses were issued by the state environmental agency, NUCOF/SEDAM, Operation License number 0002255 issued on 20/07/2006, valid until 20/01/2007, (The renewal of the license has already been requested). For Espigão, Previous Licence protocol dated 13 October 2004. All documents related to operational and environmental licensing are public and can be obtained at the state environmental agency.

Table 9 -Environmental impacts

IMPACT	PREVENTION
Slope instability and erosion	Slope conservation by planting vegetation, covering by grass and native forest species, during construction.
Water and soil pollution, Sedimentation of water courses	Fully preventable, following good practice. Small excavations should not carry any suspension material to the river. Among the measures to be taken in transporting excavation material are irrigation to avoid formation of dust, and covering truck's to avoid loss of the transported material. Removal vegetal coverage and superficial soil layer, with high content of organic matter, will be carried out to avoid the holding pond's eutrofication. The area of the low-level diversion dam will be restricted to the construction of a 3m high threshold, with the construction lasting a maximum time of 20 days.
Job opportunities	Positive impact. No need for prevention.
Drowned forest	No flooded area. No need for prevention.
Increase of the need for goods and services and of the local income and public levy.	Positive impact. Temporarily increase of the local economy (opening of bars and small restaurants) improving formal and informal job opportunities, mainly nearby the site. No need for prevention.
Loss of fish habitat and spawning areas	Absence of migratory species, according to environmental study. This area is only for fish passage and is not a headspring. No need for prevention.
Loss of agricultural land, flooding of farms and dwellings.	Due to high declivity, there is no utilization of land for agricultural use. Thus, no agricultural land will be lost. No need for prevention.
Alteration of terrestrial habitats and fauna's habits	Elaboration of degraded area recuperation programs, with production of native species and reforestation.
Loss of habitat in dried up channels.	River habitat around falls and rapids often unproductive, no mitigation required (or compensation water release) since the project is a run of river facility.

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

The proposed project activity do not incur in significant environmental impacts.

SECTION E. Stakeholders' comments

>>

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

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

- City Hall of Vilhena ;
- Public ministry;
- Chamber of Deputy of Vilhena;
- City Hall of Espigão D'Oeste;
- SEDAM Porto Velho;

- Brazilian Fórum of NGOs
- Environmental Agency of Espigão d'Oeste
- Environmental Agency of Vilhena
- Chamber of Deputy of Espigão D'Oeste.

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

E.2. Summary of the comments received:

To date, no comments have been received.

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

To date, no comments have been received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Credit originator and project operator – Incomex:

Organization:	Incomex – Indústria, Comércio e Exportação Ltda.
Street/P.O.Box:	Rodovia BR 364, km 511
Building:	-
City:	Pimenta Bueno
State/Region:	Rondônia
Postcode/ZIP:	
Country:	Brasil
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	Superintendent
Salutation:	Mr.
Last Name:	Gomes
Middle Name:	-
First Name:	Antônio
Department:	Generation Supervision
Mobile:	69 8403 6277
Direct FAX:	
Direct tel:	69 3481 3241
Personal E-Mail:	ajgomes@terra.com.br

Mauricio Martinuv:

Organization:	Mauricio Martinuv
Street/P.O.Box:	lote 85 sector 12 linha 145 bairro Gleba Corumbiara
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State/Region:	Rondônia
Postcode/ZIP:	
Country:	Brasil
Telephone:	+55 69 3322-6549
FAX:	
E-Mail:	pchmartinuv@terra.com.br
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Martinuv
Middle Name:	-
First Name:	Mauricio
Department:	-
Phone/fax:	

Direct FAX:	
Direct tel:	-
Personal E-Mail:	-

Credit buyer and project advisor:

Organization:	EcoSecurities Group Plc.
Street/P.O.Box:	40 Dawson Street
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City:	Dublin
State/Region:	
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URL:	www.ecosecurities.com
Represented by:	
Title:	COO & President
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Direct tel:	+44 1865 202 635
Personal E-Mail:	pedro@ecosecurities.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Grid selection

According to Bosi (2000), the Brazilian Electricity System is divided in three separate subsystems:

(i) The South/South-east/Midwest Interconnected System;
(ii) The North/North-East Interconnected System; and
(iii) The Isolated System (which represents 300 locations that are electrically isolated from the interconnected systems.

The proposed project activity will be connected to the Rondônia-Acre isolated system (Figure 2), and according to the approved methodology ACM002, it is necessary to account all generating sources serving the system. As a result, the project proponent should research all power plants serving this system.

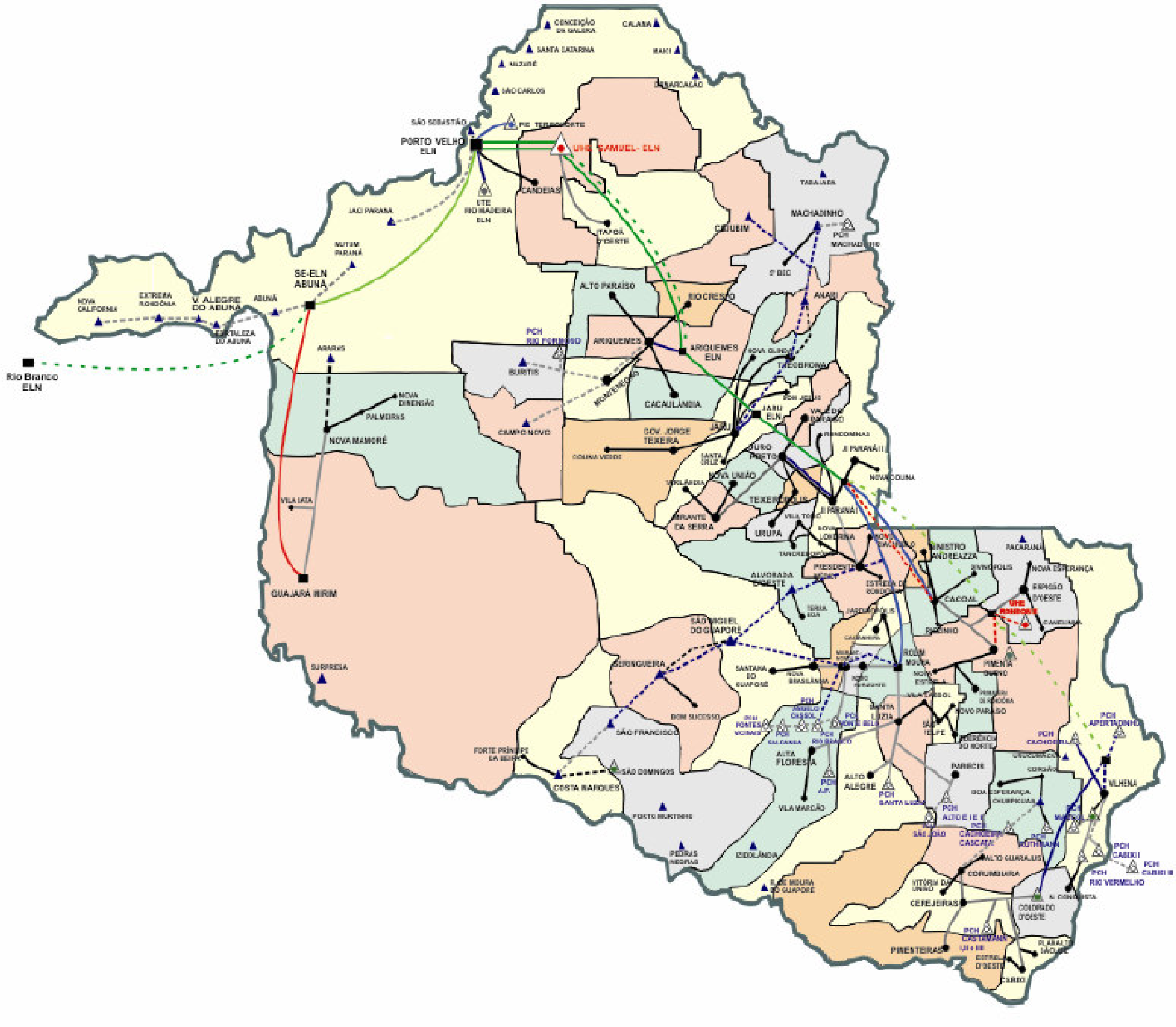

Figure 1 – Rondonia isolated systems (Source: Eletrobras, Annual Operational Plan 2003)

Grid Emission Factor Calculation

The grid emission factor calculation was performed in accordance with the latest version of ACM0002. Rondônia-Acre system is isolated from Brazilian interconnected systems S-SE-CO and N-NE. The grid is predominantly thermal thus the Simple OM method was selected.

All data used to calculate the Emission Factor are from the following sources:

1. Data obteined from CERON from report "RELATÓRIO MENSAL - ENERGIA SUPRIDA", years 2001 to 2005
2. Data from TERMONORTE report to CERON
3. Data obteined from CERON from report "RESUMO DE GERAÇÃO TÉRMICA", years 2001 to 2005
4. Data from Programa Mensais de operação para o ano de 2004, http://www.eletrobras.com.br/EM_Atuacao_SistIsolados/default.asp
5. personal comunication with CERON for 2004 data
6. Aneel BIG
7. Data from Programa Mensais de operação para o ano de 2005, http://www.eletrobras.com.br/EM_Atuacao_SistIsolados/default.asp
8. Data from Plano Anual de Operação 2005, pág. 9, item 3.3
9. Data obteined from ELETRONORTE from report "Mapa Oleo Diesel", years 2003 to 2005
10. Data obteined from ELETRONORTE from report "Relatório Integrado do Desempenho Empresarial" (RIDE), years 1994 to 2005

11. Data from GTON1 Brazilian Annual Operational Plan- 2002-2005 - ELETROBRAS;
12. Data from GTON Brazilian Monthly Operational reports-2002-2005 - ELETROBRAS;

A summary of the calculation is provided below.

[1] Grupo Técnico Operacional da Região Norte (Technical Group from Brazilian North Region).

Rondonia-Acre System

	EF_{OM} (tCO_2/MWh)	Load (MWh)	Lambda	
2003	0,8338	2.302.605	Not necessary	
2004	0,8325	2.458.762	Not necessary	
2005	0,9316	2.628.846	Not necessary	
	TOTAL	7.390.213		
	$EF_{OM,SIMPLE}$	0,8682	w_{OM}	0.5
	$EF_{BM, 2005}$	0,9889	w_{BM}	0.5
	EF_y($tCO2/MWh$)	0,9285		

	2001	2002	2003	2004	2005	Average
Thermal Generation	578,565	875,330	1,267,971	1,516,522	1,729,201	**1,193,518**
Hydro Generation	1,022,173	855,439	1,034,635	942,240	899,645	**950,826**
Predominance	Hydro	Thermal	Thermal	Thermal	Thermal	**Thermal**

Annex 4

MONITORING INFORMATION

REFERENCES

ANEEL, 1999. Guia para utilização de recursos da Conta Consumo de Combustíveis – CCC por empreendimentos de geração de energia elétrica a partir de fontes renováveis nos sistemas isolados.

AgroFlorestal Donadoni, 2005. Monitoramento Ambiental.

BOSI, M., Na Initial View on Methodologies for emissiond Baselines: Electricity Generation Case Study. Paris: International Energy Agency, 2000.

Conselho Regional de Engenharia, Arquitetura e Agronomia, 2002. Plano de Recuperação de Áreas Degradadas –PRAD. Pequena Central Hidrelétrica Cabixi.

Conselho Regional de Engenharia, Arquitetura e Agronomia, 2002. Plano de Recuperação de Áreas Degradadas –PRAD. Pequena Central Hidrelétrica Monte Belo.

Tribunal de Contas da União - TCU; Agência Nacional de Energia Elétrica - ANEEL e Centrais Elétricas Brasileiras S.A – Eletrobrás, 2004. Auditoria Operacional . Conta de Consumo de Combustíveis Fósseis dos sistemas isolados – CCC-isol.

Tolmasquim, M. T., 2004. Alternativas energéticas sustentáveis no Brasil. Rio de Janeiro: Relume Dumará: COPPE: CENERGIA.

Internet sources:

GTON Brazilian Annual Operational Plan-2004 - ELETROBRAS

Data from GTON Brazilian Monthly Operational reports-2004 - ELETROBRAS

Aneel BIG-Information Generation Base

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