CLEAN DEVELOPMENT MECHANISM
MONITORING REPORT

Fourth Verification of

ARAPUtanga **C**entrais **EL**étricas S. A. - **ARAPUCEL** - Small Hydroelectric Power Plants Project

(CDM Registration Reference Number 0530)

Monitored Period: 01 January 2009 to 31 August 2009
Crediting Period: 01 September 2002 to 31 August 2009

-- TABLE OF CONTENTS –

Section A. General description of project activity

A.1. Title of the project activity

ARAPUtanga **C**entrais **EL**étricas S. A. - **ARAPUCEL** - Small Hydroelectric Power Plants Project (hereafter referred to as "Arapucel Project").

Document version number: 01, 4 May 2010.

Monitoring Report based on the PDD Version Number: 05, from 01 June 2006.

A.2. Description of the project activity

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

The Latin America and the Caribbean region countries have expressed their commitment towards achieving a target of 10% renewable energy of the total energy use in the region. Through an initiative of the Ministers of the Environment in 2002 (UNEP-LAC, 2002), a preliminary meeting of the World Summit for Sustainable Development (WSSD) was held in Johannesburg in 1992. In the WSSD final Plan of Implementation no specific targets or timeframes were stated, however, their importance was recognized for achieving sustainability in accordance with the Millennium Development Goals[1].

The privatization process initiated in 1995 arrived with an expectation of adequate tariffs (fewer subsidies) and better prices for generators. It drew the attention of investors to possible alternatives not available in the centrally planned electricity market. At the end of the 1990's a strong increase in demand in contrast with a less-than-average increase in installed capacity caused the supply crisis/rationing from 2001/2002. One of the solutions the government provided was flexible legislation favoring small independent energy producers. Furthermore the possible eligibility under the Clean Development Mechanism of the Kyoto Protocol drew the attention of investors in small hydropower projects.

In this scenario, *Brennand Energia Group* began to consider investing in small renewable energy power projects (thermo and hydro) in Brazil. One of the main ventures of the Group, the Arapucel Project – through Araputanga Centrais Elétricas S.A., Arapucel Indiavaí S.A. and Arapucel Ombreiras S.A. companies – , started to be developed in 2001, exploring the

1 WSSD Plan of Implementation, Paragraph 19 (e): "Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, hydro included, and their transfer to developing countries on concessional terms as mutually agreed. With a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognizing the role of national and voluntary regional targets as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing countries' efforts to eradicate poverty, and regularly evaluate available data to review progress to this end."

hydropower potential in three locations of the Jaurú River, near the cities of Araputanga and Jaurú, in the State of Mato Grosso, Midwest of Brazil.

The project consists of three small hydroelectric power plants ("PCH", from the Portuguese, *Pequena Central Hidrelétrica*), PCH Alto Jauru (21.96 MW), PCH Indiavaí (28.0 MW)[2] and PCH Ombreiras (26.0 MW)[3], totalizing 75.96 MW installed capacity. The project was developed in three phases with the operations starting of the three PCHs.

Although the registered PDD presents an installed capacity of 20 MW to PCH Alto Jauru, Project Participants call attention to the fact that the inaccuracy does not change anything in the assessment and demonstration of additionality in the PDD, as demonstrated at the time of the submission of the response to the request for review, dated 23rd August, 2007. For details on how they affected the proposed project activity please refer to section B.4.

According to the Forward Action Request (FAR) raised during the third verification of the project[4], Project Participants is going to submit the necessary documentation following the "Procedures for notifying and requesting approval of changes from the project activity as described in the registered Project Design Document" (Annex 66, EB 48) before the request for issuance of this fourth verification.

It is also worth mentioning that the name of PCH Alto Jauru was altered to PCH Antonio Brennand. This modification was approved by ANEEL through its Resolution nr. 618 issued on November 25th, 2003. Despite this alteration this small hydropower plant will continue to be referred to as PCH Alto Jauru once it is the way it is referred to in the registered PDD.

This indigenous and cleaner source of electricity has an important contribution to environmental sustainability by reducing carbon dioxide emissions that would have occurred otherwise in the absence of the project. The project activity reduces emissions of greenhouse gas (GHG) by avoiding electricity generation from fossil fuel sources (and CO_2 emissions), which would be generated (and emitted) in the absence of the project.

A.3. Arapucel Monitoring Report

The Monitoring Report is based on the electricity delivered to the grid by Arapucel project. The GHG emissions reduction during the period from January 01st, 2009 to August 31st, 2009 was achieved through the dispatched electricity generated by PCH Alto Jauru (21.96 MW), PCH Indiavaí (28.0 MW) and PCH Ombreiras (26.0 MW), that displaced a mix of electricity generation in the Brazilian South-Southeast-Midwest Interconnected Electric System

[2] According to technical characteristics of the project, the power capacity of Indiavaí is 28.008 MW. Since the difference is not significant, as demonstrated through ANEEL Resolution nr. 559, dated December 17th, 2001, the installed capacity of 28 MW is considered in this Monitoring Report and in the renewal of the second crediting period, which is currently under validation. This 0.008 MW did not change the energy assured of the project.

[3] According to the technical characteristics of the project, the installed capacity of Ombreiras is 26.1 MW. Since the difference is not significant, as demonstrated through ANEEL Resolution nr. 182, dated April 9th, 2003, the installed capacity of 26 MW is considered in this Monitoring Report and in the renewal of the second crediting period, which is currently under validation. This 0.1MW did not change the energy assured of the project.

[4] See Verification Report of the 3rd verification of the project available at UNFCCC's website: <http://cdm.unfccc.int/Projects/DB/TUEV-SUED1152891235.76/iProcess/RWTUV1232106837.71/view>.

grid. Therefore, the small hydropower plants of the project were operational during this monitoring period.

The monitoring methodology shall be used in conjunction with the approved baseline methodology ACM0002 ("Consolidated baseline methodology for grid-connected electricity generation from renewable sources"), applicable to electricity capacity additions from run-of-river hydro power plants, as it is the case of Arapucel project.

The project monitoring consists in using meter equipment projected to registry and verifying bi-directionally the energy generated by the facility. This energy measurement is fundamental to verify and monitor the GHG emission reductions. The Monitoring Plan permits the calculation of GHG emissions generated by the project activity in a straightforward manner, applying the baseline emission factor. Detailed information is presented in section C.

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

Period of the monitoring report: 01 January 2009 – 31 August 2009

Amount of monitored emissions reductions: **107,609 tCO_2**

Total crediting period of the project: 01 September 2002 – 31 August 2009

A.6. Personnel Responsible

Executive President – Mozart Siqueira (Grupo Brennand Energia)

Project Monitoring – Ricardo Rêgo (Grupo Brennand Energia)

Monitoring Report – Ricardo Esparta (Ecopart Assessoria em Negócios Empresariais Ltda.)

Section B. Monitoring methodology and plan

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

ACM0002 - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 5).

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

The chosen methodology is applicable to grid-connected renewable power generation projects, under the condition of electricity capacity additions from run-of-river hydro power plants, as is the case with the Arapucel Project.

During a period of restructuring the entire electricity market, as is the current Brazilian situation, investment uncertainty is the main barrier for small renewable energy power projects. In this scenario these projects compete with existing plants (operating margin) and with new projects (build margin), which usually attract the attention of financial investors.

According to the selected approved methodology (ACM0002), the baseline emission factor is calculated as (EF_y) is calculated as a combined margin (*CM*), consisting of the combination of operating margin (OM) and build margin (BM) factors. For the purpose of determining the build margin and the operating margin emission factors, a project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. Similarly a connected electricity system is defined as an electricity system that is connected by transmission lines to the project electricity system and in which power plants can be dispatched without significant transmission constraints.

Although the dispatching information is considered strategic to power agents, the national dispatch center, through the Independent System Operator – ISO, ("ONS", from the Portuguese *Operador Nacional do Sistema*) – will make it available for grid emission factor calculation. The data from ONS and CCEE - Chamber of Electric Energy Commercialization (from the Portuguese *Câmara de Comercialização de Energia Elétrica)* - or Distribution Companies will be collected every year and the project participants through CDM consultants will calculate the emission factor.

B.3. Data to be monitored:

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (Electronic/ paper)	Comment
1. EG_y	*Electricity generation of the Project delivered to grid*	*Energy metering connected to the grid and Receipt of Sales*	*MWh*	*M*	*15-minutes-measurement and Monthly recording*	*100%*	*Electronic and Paper*	The electricity delivered to the grid is monitored both by the powers plants and by CEMAT - Centrais Elétricas do Estado do Mato Grosso, the power utility. A Brazilian government entity, CCEE – *Câmara Comercializadora de Energia Elétrica* - controls and monitors the electricity available on the national interconnected grid. The amount of electricity delivered to the grid by the project activity is available on CCEE's web-site and CEMAT's report.
2. EF_y	*CO_2 emission factor of the grid*	*Calculated*	*tCO_2/MWh*	*C*	*Every year*	*100%*	*Electronic and Paper*	*Data will be collected every year during the crediting period according the approved methodology – ACM0002.*
3. $EF_{OM,y}$	*CO_2 Operating Margin emission factor of the grid*	*Data provided by ONS (National dispatch center). Calculated according the approved methodology – ACM0002*	*tCO_2/MWh*	*C*	*Every year*	*100%*	*Electronic and Paper*	*Data will be collected every year during the crediting period according the approved methodology – ACM0002*
4. $EF_{BM,y}$	*CO_2 Build Margin emission factor of the grid*	*Data provided by ONS. Calculated according the approved*	*tCO_2/MWh*	*C*	*Every year*	*100%.*	*Electronic and Paper*	*Data will be collected every year during the crediting period according the approved methodology – ACM0002*

		methodology – ACM0002						
5. λ_y	*Fraction of time during which low-cost/must-run sources are on the margin*	*Data provided by ONS. Calculated according the approved methodology – ACM0002*		*C*	*Every year*	*100%*	*Electronic and Paper*	*Data will be collected every year during the crediting period according the approved methodology – ACM0002*

B.4. Differences from the registered PDD

The following clarifications are extracted from the clarifications on issues associated with issuance request for review of the Project Activity's first monitoring period (CERs issued on 22 Oct 2007), and clarifications provided in the second monitoring period (CERs issued on 19 Nov 2008).

Currently, Project Participants are notifying and requesting approval of changes from the registered PDD following the Annex 66 (EB 48), and will only request the issuance of this fourth verification after the receipt of approval of these changes by the CDM Secretariat.

(i) Increase of the installed capacity of PCH Alto Jauru

PCH Alto Jauru is the first hydropower plant built in the Jauru River. Due to the lack of detailed and long-term hydrological record of the Jauru River, the hydropower potential of PCH Alto Jauru was calculated extrapolating data from nearby rivers of the Paraguay basin (according to a methodology accepted by the Brazilian Electricity Agency - ANEEL).

After operation start it became clear that the assumed potential was too conservative. For that reason the PPs decided to check with the equipment suppliers and to request from ANEEL the possibility to increase the operational capacity of the existing power plant with the existing equipments.

In the first quarter of April 2003 the equipment suppliers confirmed the possibility to increase the operational capacity from 20,020 kW to 21,960 kW simply with the utilization of the existing hydraulic turbine service factor and existing generator capability curve. In 17 April 2003, ANEEL authorized the increase of the operational capacity[5]. Since May 2003 PCH Alto Jauru operates with 21,960 kW installed capacity.

It's important to mention that the fact the inaccuracy in the documentation of the project activity does not change anything in the assessment and demonstration of additionality in the PDD (all assumptions made before operation start of the project). In the same direction the small modification in the installed capacity of the plant has no impact in the estimates of the emission reductions for the proposed activity because assumed future generation of the PCH Alto Jauru was based on actual generated electricity in 2005 and not on the installed capacity.

(ii) Differences between the technical descriptions in the registered PDD

During the second verification of the proposed project activity it was noted that the technical description of the equipment installed at the plants was different from what was observed during the site visit (according to CAR 1 in the Final Verification Report[6]). Below follows an explanation of these misstatements related to each one of the Small Hydropower Plants.

[5] ANEEL Dispatch nr. 223, dated April 17th, 2003. Available at: http://www.aneel.gov.br/cedoc/dsp2003223.pdf
[6] Available at <http://cdm.unfccc.int/UserManagement/FileStorage/WIM9V4GP53RZJ2H7OLYXBEFCTNUAKS>

PCH Ombreiras

The installed capacity mentioned in the PDD refers to the total capacity of the plant instead of the capacity of the turbines. The capacity of the plant is given by the capacity of the generators.

According to below pictures the nominal power of the generators is 14500kVA. Aplying the capacity factor of 0.9 we have the capacity equal to 13050 kW. There are two generators units installed at the plant. Both sum an installed capacity of 26100 kW.

This can also be evidenced by all the official documents issued by ANEEL refering to the plant. The ANEEL Resolutions #834 (issued on 13/07/2005), #896 (issued on 25/07/2005) and #928 (issued on 29/07/2005), mention the installed capacity of the generators. These documents deliberate about the begining of the operational tests and autorizes the commercial generation of the first and second units, respectively.

Turbines	Generators
	
	

Moreover the discrepancy of the Nominal water head stated in the PDD and in the equipments of the plant should not be considered a major issue because it does not influence the energy generation.

The SHPP could not generate more energy with an inferior water head and as mentioned before the installed capacity of the plant is fixed, related to the capacity of the generators and authorized by ANEEL.

PCH Indiavaí

The justification for the discrepancy of information related to PCH Indiavaí is the same as PCH Ombreiras. The installed capacity mentioned in the PDD refers to the total capacity of the plant instead of the capacity of the turbines. The capacity of the plant is given by the capacity of the generators.

According to below pictures the nominal power of the generators is 7.78 MVA. Applying the capacity factor of 0.9 we have the capacity equal to 7 MW. There are four generators units installed at the plant, totalizing an installed capacity of 28 MW.

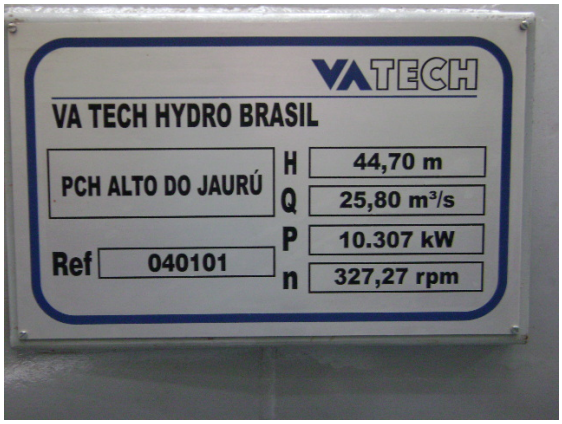
The plant also has the regulatory permits issued by ANEEL. The latest resolution published (ANEEL Resolution #502 issued on 06/08/2003) related to the plant indicate its installed capacity of 28 MW as mentioned in the PDD.

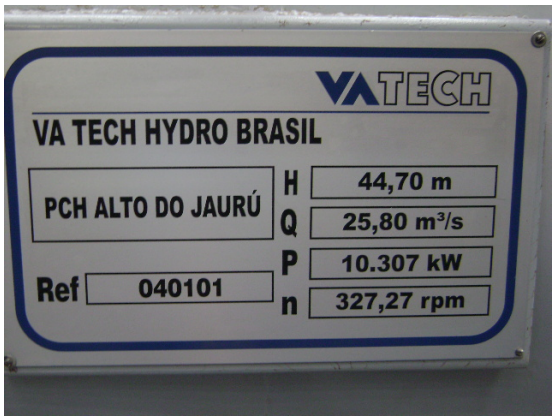
In connection with the rotation of the turbines, it was probably a typing error and it also has to be considered that the installed capacity of the plant is fixed, related to the capacity of the generators and authorized by ANEEL.

Turbines	Generators
	
	

PCH Alto Jauru (Antônio Brennand)

The discrepancy related to the rotation of the turbines described in the PDD between the one veirifcated during the site visit was probably due to a typing error. Moreover it has to be considered that the installed capacity of the plant is fixed, related to the capacity of the generators and authorized by ANEEL (ANEEL Resolution #501 issued on 05/08/2003).

Turbines	Generators
	



As explained in section A.2, Project Participants is going to submit the necessary documentation following the "Procedures for notifying and requesting approval of changes from the project activity as described in the registered Project Design Document" (Annex 66, EB 48) before the request for issuance of this fourth verification according to the Forward Action Request (FAR) raised during the third verification of the project[7].

[7] See Verification Report of the 3rd verification of the project available at UNFCCC's website: <http://cdm.unfccc.int/Projects/DB/TUEV-SUED1152891235.76/iProcess/RWTUV1232106837.71/view>.

Section C. Monitored data

As the project is neither associated with leakage effects nor with new emissions of pollutants and all other pertinent data is necessary to be analyzed and presented only at the validation phase of the project, data that has to be monitored during the project crediting period according to the registered PDD are (a) the electricity supplied to the grid by the project (EG_y) and (b) the emission factor, given that the parameters chosen for the calculation of emission reductions were ex-post.

Data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

C.1. Electricity dispatched to the grid (*EG_y*)

The main data to be considered in determining the emissions reductions is the electricity exported to the grid. The emissions reduction is reached by applying an emission factor through the electricity dispatched to the grid, that is verified and monitored by the power plant that sells the electricity and by CEMAT.

The project sponsor proceeded with the necessary measures for the power control and monitoring. From 2005 onwards, Brennand Energia Group assumes the PCHs maintenance and operation, which were made before by Alstom. Together with the information produced by ANEEL (National Agency of Electric Energy), ONS and Regional Distribution Companies, it was possible to monitor the power generation of the project and the grid power mix. Beyond that, information about power generation and energy supplied to the grid are controlled by CCEE and the Distribution Companies that make feasible and regulate the electricity energy commercialization and are responsible for monitors monthly the energy delivered to the grid.

The energy meters are specified by the energy distribution company and approved by ONS and CCEE. Each PCH utilizes a pair of SL7000 meter, manufactured by Actaris Metering Systems. These meters are calibrated by CEMAT, according to CCEE. Measurements are controlled in real time by the PCH through a Digital System and by the Electric Energy Operational Center (COG – *Centro de Operação de Geração de Energia*) located at Cuiabá through satellites. Besides, there is one more meter at every PCH, so that any problems can be detected (like water shortage, materials inside the turbines, meter inaccuracy, etc). In case of any problem, plant personnel will be put in action.

All the energy from Alto Jauru, Indiavaí and Ombreiras PCHs goes to CEMAT central meter. The quantity of energy generation considered to be invoiced to the PCHs is from CEMAT meters. At the end of every month, CEMAT sends an Energy Generation Report to Brennand Energia Group (Araputanga Centrais Elétricas S.A., Arapucel Indiavaí S.A. and Arapucel Ombreiras S.A. controller) and Brennand Energia Group compares the CEMAT's Report with its own Report for controlling. It is important to mention that CEMAT's invoice is

based on the energy established in the project's PPA and, as mentioned above, the energy exported to the grid of Arapucel project can be checked through CCEE's website and CEMAT's report.

C.2. CO_2 emission factor of the grid (EF_y)

According to the registered PDD, the CO_2 emission factor of the grid shall be calculated yearly. Therefore, the CO_2 emission factor of the year of 2009 was calculated by Ecopart Assessoria em Negócios Empresariais Ltda. and Econergy Brasil Ltda. through data provided by the Brazilian Power Regulatory Agency (Agência Nacional de Energia Elétrica – ANEEL) and National Operator of the Electricity System (Operador Nacional do Sistema – ONS).

The spreadsheet with the calculation of the CO_2 emission factor of the Brazilian South-Southeast-Midwest grid is available with the Project Participants and will be presented to the DOE during the project verification.

Table 1 – 2009 emission factor for the Brazilian South-Southeast-Midwest grid

Baseline 2009	EF_{OM} [tCO_2/MWh] 1.0131	(1-λ) 0.5718	**EF[tCO_2/MWh]** all other projects **0.3138**
	$EF_{OM,simple\text{-}adjusted}$ [tCO_2/MWh] 0.5793	EF_{BM} [tCO_2/MWh] 0.0484	
	wind/solar projects w_{OM} = 0.75 w_{BM} = 0.25	all other projects w_{OM} = 0.50 w_{BM} = 0.50	wind/solar projects **0.4465**

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

According to ACM0002 (version 5), only GHG emissions from geothermal project activities shall be considered. Therefore, project emissions involved in Arapucel project are zero.

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

(i) Electricity dispatched to the grid (EG_y)

Table 1 - Electricity generation (MWh) delivered to grid by PCH Alto Jauru, Indiavaí and Ombreiras monthly of the 2009 year

Months / Power plant	Alto Jauru	Indiavaí	Ombreiras
January	14,636	15,265	13,289
February	13,101	15,161	13,202
March	14,461	18,228	15,565
April	14,013	16,924	14,672
May	14,516	15,508	13,533
June	14,140	14,076	12,355
July	14,444	14,016	12,340
August	14,507	13,144	11,825
September	-	-	-
October	-	-	-
November	-	-	-
December	-	-	-
TOTAL	**113,818**	**122,322**	**106,781**

Sources: Araputanga Centrais Elétricas S. A., Arapucel Indiavaí S.A. and Arapucel Ombreiras S.A.

Table 2 - Electricity generation delivered to grid by Arapucel Project yearly

Power plant	2009
Alto Jauru	113,818
Indiavaí	122,322
Ombreiras	106,781
TOTAL	**342,922**

(ii) CO_2 emission factor of the grid (EF_y)

Considering the massive amount of data, the CO_2 emission factor of the South-Southeast-Midwest grid will be presented in a separated spreadsheet together with this Monitoring Report.

Section D. Calculation of emission reductions

As explained in section C, the emission reductions of the project (ER_y) are calculated by the electricity dispatched to the grid by Arapucel project (EG_y) multiplied by the CO_2 emission factor of the South-Southeast-Midwest of the grid (EF_y).

D.1. Describe the formulae used to calculate emissions reductions

According to ACM0002, emission reductions by the project activity (ER_y) during a given period of year *y* are calculated as follows:

$$ER_y = BE_y - PE_y - L_y \qquad \textbf{Equation 1}$$

Where:

ER_y is the emission reductions by the project activity during a given year y (tCO_2);

BE_y is the baseline emissions by the project activity during a given year y (tCO_2);

PE_y is the project emissions by the project activity during a given year y (tCO_2);

L_y is the leakage emissions by the project activity during a given year y (tCO_2).

The baseline emissions are calculated according equation 2 below:

$$BE_y = (EG_y - EG_{baseline}) \times EF_y \qquad \textbf{Equation 2}$$

Where:

BE_y is the baseline emissions by the project activity during a given year *y* (tCO_2);

EG_y is the electricity supplied by the project activity to the grid during a given year *y* (MWh);

$EG_{baseline}$ is the baseline electricity supplied to the grid in the case of modified or retrofitted facilities during a given year *y* (MWh);

EF_y is the baseline emission factor during a given year *y* (tCO_2).

Since Arapucel project activity is not a modified or retrofitted project, the baseline emissions of the project are calculated as:

$$BE_y = EG_y \times EF_y \qquad \textbf{Equation 3}$$

D.2.	Tables providing values obtained when applying formulae above

ARAPUtanga Centrais ELétricas S, A, - ARAPUCEL - Small Hydroelectric Power Plants Project			
Year	**Electricity Generation (MWh)**	**Baseline Emission Factor (tCO2e/MWh)**	**Emissions Reduction (tCO2e)**
2009			
01 Jan 2009 to 31 Aug 2009	342,922	0.3138	107,609

Total (tCO_2e)	**107,609**

Section E. Comparison of the estimated and actual emission reductions

According to the registered PDD, the average of estimated emission reductions is 132,544 tCO_2/year. Considering only the period from January to August, the quantity of estimated emission reductions is 88,242 tCO_2. Making a comparison with the quantity of emission reductions claimed in this fourth verification period, *i.e.* 107,609 tCO_2, there was an increase of approximately 22% in the actual emission reductions.

Considering the difference mentioned above, Project Participants clarify that the two *ex-post* variables involved in the project activity influence the emission reductions claimed:

(i) Electricity dispatched to the grid

As presented in section C.2, the project dispatched to the grid 342,922 MWh during this monitoring period, which resulted in 2.4% of electricity generation increase when compared to the registered PDD (334,757 MWh for the year of 2009). Since electricity generation from hydropower plant projects are subjected to the river flow regularity and climate conditions in the projects location, obviously energy generation varies from year to year.

(i) CO_2 emission factor of the grid

Since the CO_2 emission factor is an *ex-post* parameter, it can affect the emission reduction calculation. The emission factor used in the registered PDD was of 0.2636 tCO_2e/MWh and the emission factor calculated for 2009 year is of 0.3138 tCO2e/MWh (19.0% of increase in comparison to the EF used in the registered PDD).

Brazil possesses a large share of hydroelectricity and during the years when atypical short rainy season is observed, the generation of electricity by the thermal power plants fuelled with fossil fuels rises. This was observed, for instance, in the year 2009 when the emission factor is significantly higher when compared to the one of the latest years. Therefore, a significantly higher emission factor identified for 2009 is a result of the low precipitation.

More details about the calculation of the *ex-post* emission factor for the monitored period are available in the spreadsheet attached to this Monitoring Report.

Considering explanations mentioned above, differences between the estimated emission reductions presented in the registered PDD and actual CO_2 reductions verified for Arapucel project are related to the climate conditions for the 2009 year.

A significantly higher emission reductions in this monitoring period is mainly attributed to the CO_2 emission factor, which increased 19.0% for the monitored period (2009) in relation to the one estimated in the registered PDD (2004).