MONITORING REPORT FORM (CDM-MR)*
Version 01 - in effect as of: 28/09/2010

CONTENTS

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 1, 06/05/2011

Rialma Companhia Energética S/A. – Santa Edwiges II Small Hydro Power Plant – Small Scale CDM Project
Reference number 0831
2º verification: 01/10/2008 -30/04/2011

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

The primary objective of Santa Edwiges II 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.

This indigenous and cleaner source of electricity will also have 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 by fossil fuel sources (and CO_2 emissions), which would be generating (and emitting) in the absence of the project.

The PCH[1] Santa Edwiges II is located in the Midwest of Brazil. The project consists of a small-hydro power plant (13 MW) with a small reservoir of 2.99 km². The technology installed in the plant is described in the table below. For a more detailed technical description of the equipment used in the plant, please refer to section A.4.

Table 1 – Technical description of the equipment

Turbine(s)		***Generator(s)***	
Quantity	2	Quantity	2
Capacity (MW)	6.238	Capacity (MVA)	6.75

Relevant dates for the project activity are as follows:

- Construction license issuance: 14 May 2004;
- Commissioning phase[2]: 03 December 2005;
- Commercial operation phase[3]: 09 January 2006.

[1] PCH from the Portuguese "Pequena Central Hidrelétrica", small hydro facility.

[2] As per ANEEL Ordinance # 2,013, dated 02/12/2005, available at: <http://www.aneel.gov.br/cedoc/dsp20052013.pdf>.

[3] As per ANEEL Ordinance #18, dated 06/01/2006, available at: <http://www.aneel.gov.br/cedoc/dsp2006018.pdf>.

The GHG emission reductions during the period from 1st October 2008 to 30th April 2011 were achieved through the dispatched electricity generated by PCH Santa Edwiges II which displaced a mix of electricity generation in the Brazilian South-Southeast-Midwest interconnected grid. This monitoring report presents information related to the **second** verification of project activity which covers the period from October 1st, 2008 to April 30th, 2011. The total emission reductions by the project activity over the monitored period are **31,312** tCO_2e.

A.2. Project Participants

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the Party involved whishes to be considered as project participant (Yes/No)
Brazil (host)	Rialma Companhia Energética S.A	No
	Ecopart Assessoria em Negócios Empresariais Ltda.	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.3. Location of the project activity:

The project is located in the Buritis River, between the municipalities of Mambaí and Buritinópolis, state of Goiás, Midwestern region of Brazil, between the geographic coordinates 14º21'20,4'' South Latitude and 46º11'34,6'' West Longitude.

A.4. Technical description of the project

PCH Santa Edwiges II is a run-of-the-river small-hydro plant with 13 MW of installed capacity and a reservoir area of 2.99 km². This small dam stores water in order to generate electricity. A low-level diversion dam raises the water level in 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 as possible to gain the maximum head on the turbine.

Inside the power house system comprising one turbine and generator is installed. The type of turbine installed is the Francis. Francis turbines are the most widely used among water turbines. This turbine is a type of hydraulic reactor turbine in which the flow exits the turbine blades in the radial direction. 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. In the model, water flow is supplied by a variable speed centrifugal pump. A load applied to the turbine by means of a magnetic brake, and torque is measured by observing the deflection of

calibrated springs. The performance is calculated by comparing the output energy to the energy supplied (Figure 1).

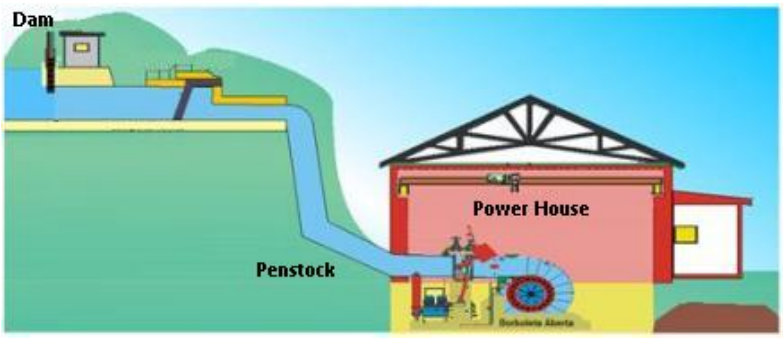

Figure 1 - Schematic diagram of a small hydropower plant

Source: Portal PCH[4]

The turbine system possesses 2 units of 6.238 MW, and the generators 6.75 MVA, 60 Hz at 6.9 kV. The main design characteristics of PCH Santa Edwiges II are shown below:

PCH Santa Edwiges II	
Power	13 MW
Capacity Factor	83%
Power Output	94,520 MWh
Reservoir	2.99 km²

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

The SSC methodology applied to the project activity is AMS-I.D. "Grid connected renewable electricity generation" (version 9).

A.6. Registration date of the project activity:

This CDM project activity was registered on April 02nd, 2007.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

The project activity has opted for the renewable crediting period starting on April 02nd, 2007. Therefore, the first crediting period lasts until April 01st, 2014.

A.8. Name of responsible person(s)/entity(ies):

Name of person/entity responsible for completing the monitoring report form (CDM-MR):

Company: Ecopart Assessoria em Negócios Empresariais Ltda.
Address: Rua Padre João Manoel, 222

[4] Available at: <http://www.portalpch.com.br/index.php?option=com_content&view=article&id=96&Itemid=187>.

Zip code: 01411-000
City address: São Paulo, SP
Country: Brazil
Telephone number: +55 (11) 3063-9068
Fax number: +55 (11) 3063-9069
Contact person: Ms. Renata O. Freitas
E-mail: renata.freitas@eqao.com.br

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

PCH Santa Edwiges II was implemented and is currently operational accordingly to what was stated in the registered PDD, *i.e*. no modifications took place since the CDM project activity was registered. The plant is operational since January 2006[3].

No special events - such as overhaul times, downtimes of equipment, exchange of equipment – occurred during the monitored period. Therefore, there were no events or situations that could have impacted the applicability of the methodology.

B.2. Revision of the monitoring plan

This section has been left blank on purpose. A revision of the monitoring plan is not applicable to this monitoring period.

B.3. Request for deviation applied to this monitoring period

This section has been left blank on purpose. A request for deviation revision of the monitoring plan is not applicable to this monitoring period.

B.4. Notification or request of approval of changes

This section has been left blank on purpose. A request for approval of changes is not applicable to this monitoring period.

SECTION C. Description of the monitoring system

The Monitoring Report is based on the electricity delivered to the grid by PCH Santa Edwiges II. The amount of energy delivered is monitored by the energy producer, Rialma Companhia Energética S.A., as well as by CCEE – *Câmara de Comercialização de Energia Elétrica*, that controls all electricity delivered to the grid and assures, for the buyer, that the electricity generated is delivered to the grid.

From what is established in the relevant regulation of the energy sector in Brazil, all the plants dispatching electricity to the grid have to implement a *Billing Commensuration System (from the Portuguese, Sistema de Medição e Faturamento - SMF)* in accordance with the specifications set by the Chamber of Electrical Energy Commercialization (from the Portuguese *Câmara de Comercialização de Energia Elétrica* - CCEE). Model and type of energy meters installed at the plant and substation are in accordance with what is established by CCEE.

There are four meters in the project: two at the power plant and two at the substation. Meters located at the power plant collect the total energy produced by Santa Edwiges II (gross energy) and meters located at the substation collect the energy dispatched to the grid (net energy). Meters are calibrated each 2 years following the National Electric System Operator (Operador Nacional do Sistema Elétrico – ONS) recommendation (sub.mod. 12.3).

The table below presents technical specifications of the meters used at PCH Santa Edwiges II.Figure 2 below is a diagram which presents the relevant monitoring points.

Table 2 - Energy Meters of Santa Edwiges II SHPP and Alvorada do Norte substation

Description		***Manufacturer***	***Type / Model***	***Number***
SHPP Santa Edwiges II	Principal	Power Measurement	ION 8600	PT-0609A211-01
	Back-up	Power Measurement	ION 8600	PT-0609A213-01
Alvorada do Norte substation	Principal	Power Measurement	ION 8300	PS-0510A013-01
		Schneider	ION 8600	PT-0905A133-01
	Back-up	Power Measurement	ION 8300	PS-0410A148-01
		Power Measurement	ION 8600C	PT-0804A390-01
		Schneider	ION 8600	PT-0905A314-01

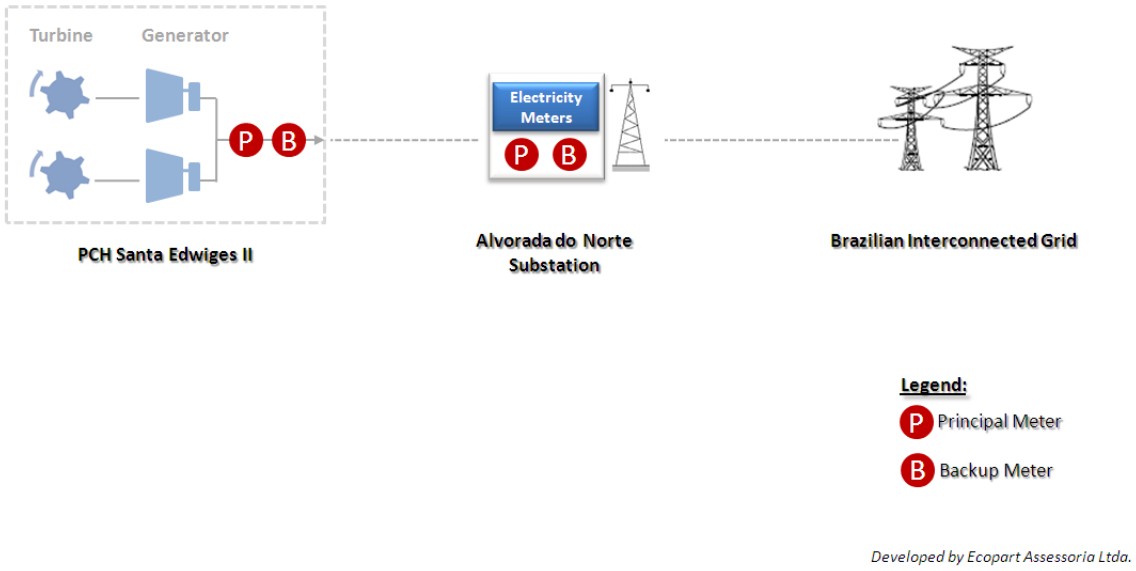

Figure 2 – Diagram of the relevant monitoring points

Energy is continuously measured by the meters and accumulated every five minutes, *i.e.* more frequent than what was established in the monitoring plan. CCEE has remote access to energy information. Energy generated by the plant is informed by the project owner to CCEE in an hourly frequency. CCEE verifies the consistency of information and accounts for all the energy generated and dispatched to the system as well as consumed. After the adjustments due to energy losses occurring in the transmission system are made, CCEE issues an official report named CB 0002 – which was used to certify the energy generation reported by the Project Participant (PP).

Although PCH Santa Edwiges II isn't obliged to follow the Grid Procedures as established by the Electric System National Operator (from the Portuguese *Operador Nacional do Sistema Elétrico* - ONS) the plant operator is committed to follow the procedures of calibration established by ONS, *i.e.* calibration of energy meters every two years.

The table below presents the dates in which the meters mentioned above were last calibrated as well as the correspondent calibration certificates number. All of the meters possess a precision class of 0.2%. Both Alvorada do Norte Substation energy meters were replaced by new ones (with the following series numbers: PT-0905A133-01 and PT-0905A314-01) calibrated before the expiration calibration date of the former equipments, respecting the two year maximum limit established by ONS – the Brazilian Electric System National Operator.

Table 3 – Calibration dates of the plant energy meters

Description		***Number***	***Last Calibration Certificate # - Date***	***Re-calibration Certification # - Date***
SHPP Santa Edwiges II	Principal	PT-0609A211-01	17/09/2006	0012/09 - 14/10/2009
	Back-up	PT-0609A213-01	17/09/2006	0011/09 – 14/10/2009
Alvorada do Norte Substation	Principal	PS-0510A013-01[5]	DC SLM 0177/07 - 08/10/2007	Substituted on 09/09/2009
		PT-0905A133-01	Operational from 09/09/2009 on	DC-SLM-0160/09 - 08/09/2009
	Back-up	PS-0410A148-01	DC SLM 0184/07 – 25/09/2007	Substituted on 14/10/2008
		PT-0804A390-01	Operational from 14/10/2008 0077/08 – 14/10/2008	Substituted on 09/09/2009
		PT-0905A314-01	Operational from 09/09/2009 on	DC-SLM-0161/09 – 08/09/2009

As it can be seen from data presented in the Table 3, the recalibrations of the both SHHP Santa Edwiges II meters were delayed. Therefore, the "*Guidelines for assessing compliance with the calibration frequency requirements*" was to be used when calculating the emission reductions by the CDM project activity.

Considering that the recalibration date of both energy meters of the plant were delayed the provisions of paragraph 4.(a) of the guidelines were applied. The results of the delayed calibration show that the error is smaller than the maximum permissible error. Therefore, the maximum permissible error of the meter (*i.e.* 0.2%) was discounted from energy generation on October 2008 to October 2009.

SECTION D. Data and parameters

Parameters used to calculate baseline, project, and leakage emissions as well as other relevant parameters required by the approved methodology and the monitoring plan; and specific information on how data and parameters have been monitored during the monitoring period are presented in this section.

Data determined only once for the crediting period which were used after registration of the project activity were included under section D.1.

[5] This meter is operational since 29/05/2008 when substituted the energy meter PS-0410A145-01.

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	EF_y
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the grid
Source of data used:	The national dispatch Center (*Operador Nacional do Sistema Elétrico – ONS, Centro Nacional de Operação do Sistema, Acompanhamento Diário da Operação do Sistema Interligado Nacional*, daily reports from Jan. 1, 2002 to Dec. 31, 2004.
Value(s) :	0.2647
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This parameter is used to calculate the baseline emissions.
Additional comment:	ONS supplied the raw dispatch data for the whole Brazilian interconnected grid, Other relevant sources of information used were: *i.* For the amount of fuel consumed by relevant fossil-fuel-fired plants, a research made by the International Energy Agency (Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. Road testing baselines for greenhouse gas mitigation projects in the electric power sector. OECD and IEA information paper, October 2002) was used. The emission coefficients of each fuel are the ones indicated by the IPCC (Intergovernmental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories).

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 operating margin emission factor of the grid
Source of data used:	The national dispatch Center (*Operador Nacional do Sistema Elétrico – ONS, Centro Nacional de Operação do Sistema, Acompanhamento Diário da Operação do Sistema Interligado Nacional*, daily reports from Jan. 1, 2002 to Dec. 31, 2004.
Value(s) :	0.4332
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This parameter is used to determine the combined margin emission factor of the grid which is used calculate baseline emissions.
Additional comment:	ONS supplied the raw dispatch data for the whole Brazilian interconnected grid, Other relevant sources of information used were: *ii.* For the amount of fuel consumed by relevant fossil-fuel-fired plants, a research made by the International Energy Agency (Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. Road testing baselines for greenhouse gas mitigation projects in the electric power sector. OECD and IEA information paper, October 2002) was used. The emission coefficients of each fuel are the ones indicated by the IPCC (Intergovernmental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories).

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2MWh

Description:	CO_2 build margin emission factor of the grid
Source of data used:	The national dispatch Center (*Operador Nacional do Sistema Elétrico – ONS, Centro Nacional de Operação do Sistema, Acompanhamento Diário da Operação do Sistema Interligado Nacional*, daily reports from Jan. 1, 2002 to Dec. 31, 2004.
Value(s) :	0.0962
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This parameter is used to determine the combined margin emission factor of the grid which is used calculate baseline emissions.
Additional comment:	ONS supplied the raw dispatch data for the whole Brazilian interconnected grid, Other relevant sources of information used were: *iii.* For the amount of fuel consumed by relevant fossil-fuel-fired plants, a research made by the International Energy Agency (Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba. Road testing baselines for greenhouse gas mitigation projects in the electric power sector. OECD and IEA information paper, October 2002) was used. The emission coefficients of each fuel are the ones indicated by the IPCC (Intergovernmental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories).

D.2. Data and parameters monitored

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.

Data / Parameter:	**EGy**
Data unit:	**MWh**
Description:	Electricity generation of the Project delivered to grid
Measured /Calculated /Default:	Measured
Source of data:	Internal records of the company|
Value(s) of monitored parameter:	For the monthly monitored values please refer to section E.1. below.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This information is used to calculate baseline emissions.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	There are four electricity meters (principal and back-up) - two located at the plant and two located at the substation - which continuously monitor the electricity generated by the plant and delivered to the grid. Their specification is detailed above in section C. As per the information presented above, they are calibrated every two years following the recommendations of the System National Operator. Last calibration of the equipment took place in 2009. In this sense, the calibration is still valid and is due in 2011. Considering that the recalibration date of both meters (principal and backup) of the plant were delayed the provisions of paragraph 4(a) of the guidelines were applied. As conservative approach and for simplicity the maximum permissible error of the meter (*i.e.* 0.2%) was discounted from energy generation registered on October 2008 to October 2009. More details about the discount applied in the energy generation please refer to the spreadsheet "SEII_CERs_2011.05.06_v.01.xls".

Measuring/ Reading/ Recording frequency:	Electricity is measured continuously, read and recorded every 5 minutes and reported on a monthly basis.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	Information reported by the company is confirmed using the reports issued by CCEE verifies the consistency of information and accounts for all the energy generated and dispatched to the whole Brazilian system.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

According to the methodology, baseline emissions are determined as the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh). Electricity produced by the plant during the monitored period is presented in Table 4.

The baseline emission factor was calculated as the average of the "approximate operating margin" and the "build margin", where:

(a) The average of the "approximate operating margin" and the "build margin", where:

(i) The "approximate operating margin" emission factor ($EF_{OM,y}$) is the weighted average emissions (in kg CO_2e/MWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. Using the notation from approved methodology,

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad \textbf{Equation 1}$$

Where,

$\sum_{i,j} F_{i,j,y}$ = Amount of fuel *i* (in mass or volume unit) consumed by relevant power sources *j* in year(s) *y*,

$COEF_{i,j}$ = CO_2e coefficient of fuel *i* (tCO_2e/mass or volume unit of the fuel), taking into account the carbon dioxide equivalent emission potential of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in year(s) *y* and,

$\sum_{j} GEN_{j,}$ = Electricity (MWh) delivered to the grid by source *j*,

The CO_2e coefficient $COEF_i$ is obtained as,

$$COEF_{i,j} = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad \textbf{Equation 2}$$

Where,

NCV_i = Net calorific value (energy content) per mass or volume unit of fuel *i*;

$OXID_i$ = Oxidation factor of the fuel *i*;

$EF_{CO2,i}$ = CO_2e emission factor per unit of energy of the fuel *i*.

(ii) The "build margin" emission factor ($EF_{BM,y}$) is the weighted average emissions (in kg CO_2e/MWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants,

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}} \quad \textbf{Equation 3}$$

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described above for the operating margin for plants *m* (sample group *m* defined in (ii)), based on the most recent information available on plants already built.

The baseline emission factor EF_y is the average of the operating margin factor ($EF_{OM,y}$) and the build margin factor ($EF_{BM,y}$),

$$EF_y = 0.5 \cdot EF_{OM,y} + 0.5 \cdot EF_{BM,y} \quad \textbf{Equation 4}$$

Dispatch data for the whole Brazilian interconnected grid from the national dispatch center (*Operador Nacional do Sistema Elétrico, Centro Nacional de Operação do Sistema, Acompanhamento Diário da Operação do Sistema Interligado Nacional*, daily reports from Jan. 1, 2002 to Dec. 31, 2004) was used to calculate the emission factor of the grid. *Ex-ante* data vintage was used. Please refer to the registered PDD for details. The value used to determined baseline emissions is 0.2647 tCO_2e/MWh. The results of baseline emissions are presented in Table 5.

Table 4 - Electricity exported to the grid by the plant over the monitored period[6]

Month	***2008***	***2009***	***2010***	***2011***
January	-	4,173	7,132	6,988
February	-	5,382	5,748	5,839
March	-	4,867	6,892	7,350
April	-	5,891	6,465	6,184[7]
May	-	5,035	6,137	-
June	-	4,354	5,625	-
July	-	4,282	5,783	-
August	-	4,100	5,708	-
September	-	4,488	5,327	-
October	5,723	4,829	4,980	-
November	6,496	5,680	7,226	-
December	8,192	5,573	6,854	-
TOTAL	**20,412**	**58,654**	**73,876**	**26,360**

Source: Câmara de Comercialização de Energia Elétrica (CCEE) and Rialma Companhia Energética S.A

[6] Following the provisions of EB 52, Annex 60, a discount was applied to the energy generated by the plant from October 2008 to October 2009. The maximum permissible error in the calibration test was applied (paragraph 4a of the guidelines) in the PCH Santa Edwiges II energy generation. The final energy generation (*i.e.* already considering the discount as per the guidelines) is presented in Table 3. The original energy generation was: 5,734 MWh (Oct/08), 6,509 MWh (Nov/08), 8,209 MWh (Dec/08), 4,182 MWh (Jan/09), 5,393 MWh (Feb/09), 4,877 MWh (Mar/09), 5,903 MWh (Apr/09), 5,045 MWh (May/09), 4,363 MWh (Jun/09), 4,291 MWh (Jul/09), 4,108 MWh (Aug/09), 4,497 MWh (Sep/09) and 4,838 MWh (Oct/09). For details about the calibration delays and discounts applied please refer to section B.3.

[7] This value will be updated during the verification.

Table 5 - Baseline emissions by the project over the monitored period

Month	*2008*	*2009*	*2010*	*2011*
January	-	1,105	1,888	1,850
February	-	1,425	1,521	1,546
March	-	1,288	1,824	1,945
April	-	1,559	1,711	1,637
May	-	1,333	1,624	-
June	-	1,152	1,489	-
July	-	1,133	1,531	-
August	-	1,085	1,511	-
September	-	1,188	1,410	-
October	1,515	1,278	1,318	-
November	1,720	1,504	1,913	-
December	2,169	1,475	1,814	-
TOTAL	**5,403**	**15,526**	**19,555**	**6,978**

E.2. Project emissions calculation

According to the "Thresholds and criteria for the elegibility for the hydroelectric power plants with reservoirs as CDM project activity"[8], emissions from reservoirs, if there is any, shall be estimated considering the power density (W/m2) of the plant.

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \qquad \textbf{Equation 5}$$

Where,

PD = Power density of the project activity, in W/m^2;

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W);

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero;

A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2);

A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

Considering that Santa Edwiges II has an installed capacity of 13 MW and a small reservoir of 2.99 km², its power density is 4.35 W/m^2. Therefore, project emissions are calculated according to the equation below:

$$PE_y = \frac{EF_{Res} * EG_y}{1000} \qquad \textbf{Equation 6}$$

[8] EB 23 Report, Annex 5

Where,

PE_y = Emission from reservoir expressed as tCO_2e/year;

EF_{Res} = Default emission factor for emissions from reservoirs, and the default value as per EB23 is 90 Kg CO_2e/MWh;

EG_y = Electricity produced by the hydro electric power project in year y, in MWh.

Considering Equation 6 above and electricity exported to the grid by the project as presented section E.1, project emissions are presented in the table below:

Table 6 – Project emission by the project over the monitored period[9]

Month	*2008*	*2009*	*2010*	*2011*
January	-	376	642	629
February	-	485	517	525
March	-	439	620	661
April	-	531	582	557
May	-	454	552	-
June	-	393	506	-
July	-	386	520	-
August	-	370	514	-
September	-	405	479	-
October	516	435	448	-
November	586	511	650	-
December	739	502	617	-
TOTAL	**1,841**	**5,287**	**6,649**	**2,372**

E.3. Leakage calculation

According to the applicable methodology, leakage emissions by the project activity are zero.

E.4. Emission reductions calculation / table

Emission reductions by the project activity (ER_y) during a given period of year *y* are the product of the baseline emissions factor (EF_y, in tCO_2e/MWh) multiplied by the electricity supplied by the project to the grid (EG_y, in MWh), minus the project emission (PE_y, in tCO_2e) as follows:

$$ER_y = (EF_y * EG_y) - PE_y \qquad \textbf{Equation 7}$$

Summarizing data discussed above, the total of the emission reductions achieved during the monitoring period are:

[9] For conservativeness reasons, the project emission calculation considered the energy exported by the plant (without the discount occurred by the delay in the energy meters calibrations)

- Total baseline emissions: 47,461 tCO_2e
- Total project emissions: 16,149 tCO_2e
- Total leakage: 0 tCO_2e
- Total emission reductions: 31,312 tCO_2e

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

Below table presents a comparison between the actual values of emission reductions achieved during the monitoring period and the estimations as per the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	42,616	31,312

E.6. Remarks on difference from estimated value in the PDD

As per information presented in the previous section, there is no increase in the actual emission reductions achieved during the current monitoring period when the comparison is done considering an equivalent period (from 01/10/2008 to 30/04/2011).

In fact the actual monitored value is inferior to the estimated one. However, considering that electricity generation is dependent on river flow, small variations such as this can be expected.

In addition, considering that the recalibration date of both energy meters of the plant were delayed the provisions of paragraph 4.(a) of the guidelines were applied. The maximum permissible error of the meter (*i.e.* 0.2%) was discounted from energy generation, totalizing 36 tCO_2e, on October 2008 to October 2009.

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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
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