# Monitoring report form (Version 03.2)

## Monitoring report

| | |
|---|---|
| **Title of the project activity** | BT Geradora de Energia Elétrica S.A. – Ferradura Small Hydro Power Plant – Small Scale CDM Project |
| **Reference number of the project activity** | 0229 |
| **Version number of the monitoring report** | 01 |
| **Completion date of the monitoring report** | 28/03/2014 |
| **Registration date of the project activity** | 22/04/2006 |
| **Monitoring period number and duration of this monitoring period** | 1st monitoring period (second crediting period): 01/01/2011 – 28/02/2014 |
| **Project participant(s)** | • BT Geradora de Energia Elétrica S.A.<br>• Ecopart Assessoria em Negócios Empresariais Ltda. |
| **Host Party(ies)** | Brazil |
| **Sectoral scope(s) and applied methodology(ies)** | 1: Energy industries (renewable -/ non-renewable sources)<br>AMS-I.D. – Grid connected renewable electricity generation (version 17) |
| **Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD** | 22,661 $tCO_2e$ |
| **Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period** | 20,971 $tCO_2e$ |
| **Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)** | 11,989 $tCO_2e$ |
| **Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).** | 8,981 $tCO_2e$ |

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

The primary objective of BT Geradora de Energia Elétrica S.A. – Ferradura Small Hydro Power Plant – Small Scale CDM Project (hereafter referred to simply as "BGEE") 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 project activity consists of a small hydro power plant located in the city of Erval Seco, state of Rio Grande do Sul (South of Brazil) with 10.1 MW[1] of total installed capacity and reservoir area of 0.5335 km². It improves the supply of electricity with clean, renewable hydroelectric power while contributing to the regional/local economic development.

BGEE, a greenhouse gas (GHG) free power generation project, result in GHG emissions reductions as a consequence of the displacement of generation from fossil-fuel thermal plants that would have otherwise delivered electricity to the interconnected grid in the absence of the project activity. The technology and equipment used in the project was developed and manufactured locally and consists of two turbines (Double Francis) and two generators (SPA 900) that utilize water from the Guarita River to generate electricity. There is also a smaller turbine of 0.2 MW. This is a submerged turbine located on the bottom of the dam, synchrounous, and manufactured by Rischbieter Engenharia e Comércio and WEG.

Relevant dates for the project activity are as follows:

- *Start of the construction phase: January 2003;*
- *Commissioning phase2:17 December 2003;*
- *Commercial operation phase3: 31 December 2003.*

This monitoring report corresponds to the **first** verification (second crediting period) of project activity and the amount of emissions reductions equals to 20,971 $tCO_2e$.

### A.2. Location of project activity

The project is located in the Guarita River, in the municipality of Erval Seco, state of Rio Grande do Sul, South of Brazil (Host Party), at geographic coordinates 27º33'35'' South Latitude and 53º34'36'' West Longitude[4].

### A.3. Parties and project participant(s)

| **Party involved**<br>**((host) indicates a host Party)** | **Private and/or public entity(ies) project participants (as applicable)** | **Indicate if the Party involved wishes to be considered as project participant (Yes/No)** |
|---|---|---|
| Brazil (host) | BT Geradora de Energia Elétrica S.A.<br>(Private entity) | No |
| United Kingdom of Great Britain and Northern Ireland | Ecopart Assessoria em Negócios Empresariais Ltda.<br>(Private entity) | No |

### A.4. Reference of applied methodology

The methodology applied to the project activity is AMS-I.D. "Grid connected renewable electricity

[1] As per paragraph 4a of EB59, Annex 9, the determination of the rated/installed capacity was based on the installed/rated capacity of generator.
[2] As per ANEEL Ordinance #981, dated 16/12/2003. Available at: <http://www.aneel.gov.br/cedoc/dsp2003981.pdf>.
[3] As per ANEEL Ordinance #1032, dated 30/12/2003. Available at: <http://www.aneel.gov.br/cedoc/dsp20031032.pdf>.
[4] ANEEL Ordinance nr. 180 issued on June 01st, 2000. Available at: <http://www.aneel.gov.br/cedoc/RES2000180.PDF>.

generation" (version 17)[5].

The following tools, as per methodology mentioned above, are used:

- *"Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period" (version 03.0.1);*
- *"Procedures for renewal of the crediting period of a registered CDM project activity" (Version 06.0).*

According to approved methodology AMS-I.D, a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) shall be calculated in accordance with the procedures prescribed in the "Tool to calculate the emission factor for an electricity system" (version 2.2.1), which is also used.

Additionally, the procedures related to project emissions prescribed in the approved methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" where also taken into account as established in AMS-I.D.

### A.5. Crediting period of project activity

The project activity has opted for the renewable crediting period starting on January 01st, 2011. Therefore, the second crediting period lasts until December 31st, 2017.

## SECTION B. Implementation of project activity

### B.1. Description of implemented registered project activity

The Francis turbine used in the project activity is a type of hydraulic reaction turbine in which the flow exits the turbine blades in the radial direction. They 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 spiral tank and is directed onto the blades (Figure 1). The low momentum water then exits the turbine through a ducting known as suction tube. In the model, water flow is supplied by a variable speed centrifugal pump. A load is 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.

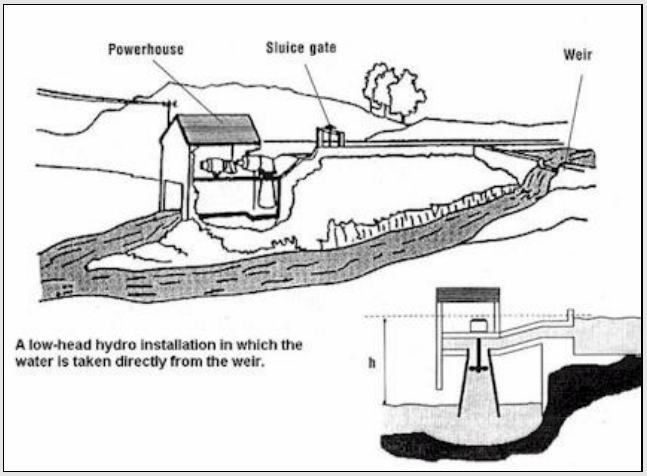


**Figure 1 - Schematic view of power plant**

The equipment and technology used in the project has been successfully applied to similar projects in Brazil and around the world. The main design characteristics of the project are shown below (Table 1):

[5] Available at: <http://cdm.unfccc.int/filestorage/V/9/L/V9LRSXKP24Q7YT6HZDUBO3C0ING8AJ.1/EB61_repan17_Revision_AMS-I.D_ver17.pdf?t=REV8bXd6a3JyfDBvNAIG4tk9Uo30-QiJTjl6>.

**Table 1 – Technical configuration of PCH Ferradura**

| | |
|---|---|
| ***Turbines*** | |
| Type | Double Francis |
| Quantity | 2 |
| RPM | 600 |
| Power (kW) | 4,669 |
| Nominal liquid head (m) | 39.1 |
| Manufactures | MOLLER |
| ***Generators*** | |
| Type | SPA 900 |
| Quantity | 2 |
| Frequency (Hz) | 60 |
| Power (kVA) | 5,500 |
| Nominal voltage (V) | 6,900 |
| Manufacturer | WEG |
| **Smaller Turbine** | |
| Quantity | 1 |
| Power (kW) | 200 |
| Nominal voltage (V) | 380 |
| Manufacturer | Rischbieter |

**B.2. Post registration changes**

**B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

Temporary deviations from registered monitoring plan or applied methodology is not applicable to this monitoring period.

**B.2.2. Corrections**

Corrections are not applicable to this monitoring period.

**B.2.3. Permanent changes from registered monitoring plan or applied methodology**

Permanent changes from registered monitoring plan or applied methodology are not applicable to this monitoring period.

**B.2.4. Changes to project design of registered project activity**

A notification of changes of the registered PDD was approved in December 02$^{nd}$, 2011. This notification consists of the revise in the installed capacity of the plant, regarding some inconsistencies when comparing information from the Section A.4 of the registered PDD with the equipment manufacture's specification plates of the installed equipment.

**B.2.5. Changes to start date of crediting period**

Changes to project design of the registered project activity are not applicable to this monitoring period.

**B.2.6. Types of changes specific to afforestation or reforestation project activity**

Not applicable.

**SECTION C. Description of monitoring system**

The monitoring plan of the emission reductions by the project activity is in accordance with the

procedures set by the methodology "*AMS-I.D. – Grid connected renewable electricity generation*".

It consist in using meter equipment projected to registry and verifies bidirectionally the energy generated by the facility. This energy measurement is fundamental to verify and monitor the GHG emissions reductions. The monitoring plan permits the calculation of GHG emissions generated by the project activity in a straightforward manner, applying the baseline emission factor.

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 Guarita Substation, are in accordance with what is established by CCEE. It's important to mention that there were no changes in meters since the start of the project.

The Table 2 present technical specifications of the meters (principal and back-up meter) used at Ferradura Small Hydropower Plant.

**Table 2 – Energy Meters at the Guarita Substation**

| ***Description*** | | ***Type / Model*** | ***Meter Serial*** | ***Precision class*** |
|---|---|---|---|---|
| Energy Meter | Principal | ELO/2180 SE | # 90001661 | 0.2[6] |
| | Back-up | ELO/2180 SE | # 90001696 | |

Electricity measured by the meters is accumulated at a five minutes interval. CCEE also has remote access to this information. The total energy generated in the month is informed by the RGE – Rio Grande Energia (a company responsible for energy distribution in the north-northeast of Rio Grande do Sul State) to the project owner and the commercialization agent – Electra Energy. The energy generated by the plant is informed by the project owner to CCEE (through the Electra Energy) 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, CCEE issues an official report named ME 001 that presents consolidated data indicating, per week, the dispatched energy during the specific month. This data was used to certify the energy generation reported by the Project Participant (PP).

Although Ferradura Small Hydropower Plants 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[7], *i.e.* calibration of energy meters every two years.

**Table 3 – Information regarding the calibration of the electricity meters**

| ***Meter serial #*** | ***Certificate #*** | ***Date of calibration*** |
|---|---|---|
| # 90001661 | CCL 049/10 | 25/03/2010 |
| | CCR 0188/14 | 24/02/2014 |
| # 90001696 | CCL 050/10 (A) | 25/03/2010 |
| | CCR 1028/12 | 06/12/2012 |
| | CCR 0189/14 | 24/02/2014 |

As it can be seen from data presented in the above table, the recalibration of the principal meter was delayed. Therefore, the provisions of paragraph 238(b) of the CDM Validation and Verification Standard had to be used when calculation the emission reductions by the CDM project activity, as follows:

[6] ELO's website. Available at: < http://www.elonet.com.br/produto.php?id=28>.

[7] Sub-módulo 12.3. Metering System Maintenance for Invoicing, in a free translation from the Portuguese *Manutenção do Sistema de Medição para Faturamento*. Available at: <http://www.ons.org.br/download/procedimentos/modulos/Modulo_12/Submodulo%2012.3_Rev_1.0.pdf>.

(a) Applying the maximum permissible error of the instrument to the measured valued taken during the period between the schedule date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error.

Not applicable.

(b) Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.

**Table 4 – Errors identified in certificates**

| Number | Certificate # | Error identified in the delayed calibration test |
|---|---|---|
| # 90001661 | CCR 0188/14 | 0.298% |
| # 90001696 | CCR 0189/14 | 0.111% |

As the error identified in the calibration test is bigger than the maximum permissible error (i.e. 0.2%), the error of 0.298% was applied in the energy generation on the period uncorvered by the meters calibration.

Considering the values presented in the Table 4 the provisions of paragraph 238(b) of the guidelines were applied. The results of the delayed calibration show that the error is beyond than the maximum permissible error. Therefore, the biggest error identified in the calibration test (*i.e.* 0.298%) was applied in the energy generation registered on March 2012 to February 2014[8].

The energy meters described in Table 3 is located in the Guarita Substation according to diagram below:

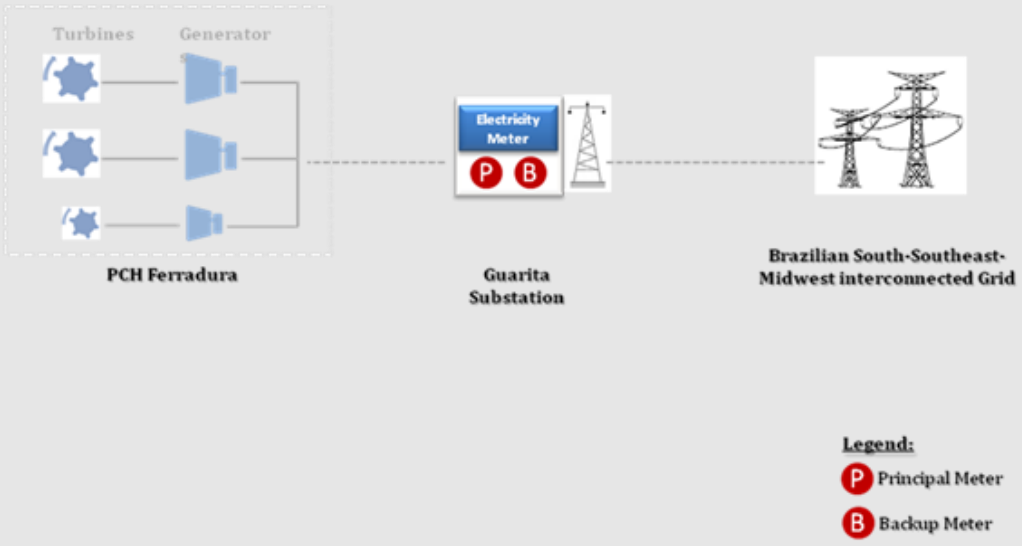


**Figure 2 – Meters diagram**

Credit owner and project operator, the special purpose company BGEE (listed under A.2. Project participants), is author and the responsible for all activities related to the project management, registration, monitoring, measurement and reporting. The procedures for the monitoring plan of the project activity are established in the internal procedure (BTCC02) developed by the project sponsor.

**SECTION D. Data and parameters**

[8] The error was applied to the entire months of March/12 and February/14, as a conservative approach.

**D.1. Data and parameters fixed ex ante or at renewal of crediting period**

| **Data / Parameter:** | **$Cap_{BL}$** |
|---|---|
| Unit: | W |
| Description: | Installed capacity of the hydro power plant before the implementation of the project activity. |
| Source of data: | Equipment tag – project site |
| Value(s) applied): | 0 |
| Purpose of data: | Calculation of project emissions or actual net GHG removals by sinks. |
| Additional comment: | According to the ACM0002 methodology for new hydro power plants, this value is zero. |

| **Data / Parameter:** | **$EG_{m,y}$ and $EG_{k,y}$** |
|---|---|
| Unit: | MWh |
| Description: | Net electricity generated by power plant/unit *m* or *k* in year *y* |
| Source of data: | Official publications. Data from the Electric System National Operator was used. |
| Value(s) applied): | Large amount of data. Please refer to the emission factor calculation spreadsheet which is attached to the PDD. |
| Purpose of data: | Calculation of baseline emissions or baseline net GHG removals by sinks. |
| Additional comment: | Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (*ex-ante* option). For methodological choices details, please refer to the section B.6.1 of the registered PDD. |

| **Data / Parameter:** | **$EF_{grid,OM-adj,y}$** |
|---|---|
| Unit: | $tCO_2/MWh$ |
| Description: | Simple adjusted operating margin $CO_2$ emission factor in year *y* |
| Source of data: | Official publications (data from ONS), IPCC default values and default values provided by the "*Tool to calculate the emission factor for an electricity system*" |
| Value(s) applied): | 0.2609 |
| Purpose of data: | Calculation of baseline emissions or baseline net GHG removals by sinks. |
| Additional comment: | The *ex-ante* calculation vintage of this parameter was chosen as per the procedures of the "*Tool to calculate the emission factor for an electricity system*". For methodological choices details, please refer to the section B.6.1 of the registered PDD. |

| **Data / Parameter:** | **$EF_{BM,2010}$** |
|---|---|
| Unit: | $tCO_2/MWh$ |

| | |
|---|---|
| Description: | Build margin $CO_2$ emission factor for the project electricity system in year *y* |
| Source of data: | Official publications (data from ONS), IPCC default values and default values provided by the "*Tool to calculate the emission factor for an electricity system*" |
| Value(s) applied): | 0.1166 |
| Purpose of data: | Calculation of baseline emissions or baseline net GHG removals by sinks. |
| Additional comment: | The *ex-ante* calculation vintage of this parameter was chosen as per the procedures of the "*Tool to calculate the emission factor for an electricity system*". For methodological choices details, please refer to the section B.6.1 of the registered PDD. |

**D.2. Data and parameters monitored**

| **Data / Parameter:** | **$EG_{facility,y}$** |
|---|---|
| Unit: | MWh/y |
| Description: | Quantity of net electricity supplied to the grid in year *y* |
| Measured/ Calculated / Default: | Measured. |
| Source of data: | Project activity site. |
| Value(s) of monitored parameter: | 2011 = 44,595<br>2012 = 33,946<br>2013 = 53,052<br>2014 = 5,785 |
| Monitoring equipment: | The accuracy class of the meters specifies above equals to 0.2 and is in accordance with the procedures established by ONS. This information can be also checked in the site of the manufacturer. For more detail about the energy meters in the section C.<br>As mentioned in the section C, the plant operator follows the procedures of calibration established by ONS, *i.e.* calibration of energy meters every two years and is valid for the same period. The last calibration was made in February 24$^{th}$, 2014.<br>Considering that the recalibration date of principal meter was delayed the provisions of paragraph 238(b) of the Validation and Verification Standard were applied. As conservative approach and for simplicity the biggest error identified in the delayed calibration test (*i.e.* 0.298%) was discounted from energy generation registered on March 2012 to February 2014. More details about the discount applied in the energy generation please refer to the CERs spreadsheet calculation. |
| Measuring/ Reading/ Recording frequency: | Continuously measurement and monthly recording. |
| Calculation method (if applicable): | Not applicable. |

| | |
|---|---|
| QA/QC procedures: | The electricity delivered to the grid is monitored such by the project owner (seller) as well as by the energy buyer. 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 shall be cross-checked with the Reports issued by CCEE (records for sold electricity). |
| Purpose of data: | Calculation of baseline emissions or baseline net GHG removals by sinks. |
| Additional comment: | - |

| **Data / Parameter:** | **$Cap_{PJ}$** |
|---|---|
| Unit: | W |
| Description: | Installed capacity of the hydro power plant after the implementation of the project activity. |
| Measured/ Calculated / Default: | Measured. |
| Source of data: | Project site and official documents. The installed capacity was considered based on the paragraph 4a of the EB59, Annex 9, where the determination of the rated/installed capacity was based on the installed/rated capacity of the generator. |
| Value(s) of monitored parameter: | 10,1000,000 |
| Monitoring equipment: | Modifications of the installed capacity of the plant are to be made by the manufacturer of the equipment and if this is done the description of the equipment's tag will be up-dated. |
| Measuring/ Reading/ Recording frequency: | Any new authorization to increase the installed capacity oh the plant will be monitored, on a yearly basis. |
| Calculation method (if applicable): | Not applicable. |
| QA/QC procedures: | In Brazil the installed capacity of hydropower plant is determined and authorized by the competent regulatory agency. In addition, any modification also has to be authorized and be public available. Hence, on a yearly basis, any new authorization to increase the installed capacity of the plant will be monitored. |
| Purpose of data: | Calculation of project emissions or actual net GHG removals by sinks. |
| Additional comment: | - |

| **Data / Parameter:** | **$A_{PJ}$** |
|---|---|
| Unit: | $m^2$ |
| Description: | Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full. |

| | |
|---|---|
| Measured/ Calculated / Default: | Measured. |
| Source of data: | Project site. |
| Value(s) of monitored parameter: | 533,500 $m^2$ |
| Monitoring equipment: | Official data source. The area of the reservoir was considered based on the Operation License nr. 3194/2009-DL[9]. |
| Measuring/ Reading/ Recording frequency: | Any new authorization related to a modification in the reservoir area will be tracked, on a yearly basis. |
| Calculation method (if applicable): | Not applicable. |
| QA/QC procedures: | In Brazil, every modification at hydropower plants has to be authorized and be publicly available by the competent regulatory agency. Hence, on a yearly basis, any new authorization related to a modification in the reservoir area will be tracked. |
| Purpose of data: | Calculation of project emissions or actual net GHG removals by sinks. |
| Additional comment: | - |

**D.3. Implementation of sampling plan**

Not applicable.

**SECTION E. Calculation of emission reductions or GHG removals by sinks**

**E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

Baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ (in MWh) of electricity produced by the renewable generating unit multiplied by the CO2 emission factor, calculated as follows:

$$BE_y = EG_{BL,y} \cdot EF_{CO2,grid,y} \qquad \textbf{Equation 1}$$

Where,

| | | |
|---|---|---|
| $BE_y$ | = | Baseline emissions in year *y* ($tCO_2$); |
| $EG_{BL,y}$ | = | Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh); |
| $EF_{CO2,grid,y}$ | = | $CO_2$ emission factor of the grid in year y ($tCO_2$/MWh). |

The baseline emission factor of the grid ($EF_{CO2,grid,y}$) was calculated as per the methodology AMS-I.D. (version 17) – option (a) – a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "*Tool to calculate the emission factor for an electricity system*".

According to the tool "*the simple adjusted OM emission factor ($EF_{grid,OM\text{-}adj,y}$) is a variation of the simple OM, where the power plants/units (including imports) are separated in low-cost/must-run power sources (k) and other power sources (m)*".

The simple adjusted OM was calculated based on the net electricity generation and a $CO_2$ emission

[9] Operation License under renewal.

factor for each power unit – *i.e.* similarly to Option A of the simple OM method – as follows:

$$EF_{grid,OM-adj,y} = (1-\lambda_y)\cdot\frac{\sum_m EG_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \cdot \frac{\sum_k EG_{k,y}\times EF_{EL,k,y}}{\sum_k EG_{k,y}} \qquad \textbf{Equation 2}$$

Where,

| | | |
|---|---|---|
| $EF_{grid,OM-adj,y}$ | = | Simple adjusted operating margin CO2 emission factor in year y ($tCO_2$/MWh); |
| $\lambda_y$ | = | Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year *y*; |
| $EG_{m,y}$ | = | Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh); |
| $EG_{k,y}$ | = | Net quantity of electricity generated and delivered to the grid by power unit *k* in year *y* (MWh); |
| $EF_{EL,m,y}$ | = | CO2 emission factor of power unit *m* in year *y* ($tCO_2$/MWh); |
| $EF_{EL,k,y}$ | = | CO2 emission factor of power unit *k* in year *y* ($tCO_2$/MWh); |
| *m* | = | All grid power units serving the grid in year *y* except low-cost/must-run power units; |
| *k* | = | All low-cost/must-run grid power units serving the grid in year *y*; |
| *y* | = | The relevant year as per the data vintage chosen in Step 3. |

*Determination of $EG_{m,y}$*

Information used to determine this parameter was supplied by The Electric System National Operator (from the Portuguese *Operador Nacional do Sistema – ONS*), which is an official source, as recommended by the tool. ONS is an entity of private right, non-profitable, created on 26 August 1998, responsible for coordinating and controlling the operation of generation and transmission facilities in the National Interconnected Power System (NIPS) under supervision and regulation of the Electric Energy National Agency (ANEEL)[10].

In terms of vintage, **option 1** is chosen. In this sense, the build margin was calculated using the most recent information available on units already built for sample m at the time of CDM-PDD submission to the DOE, *i.e.* 2010.

The combined margin calculation is based in method a provided by the tool, as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y}\times\omega_{OM} + EF_{grid,BM,y}\times\omega_{BM} \qquad \textbf{Equation 3}$$

Where,

| | | |
|---|---|---|
| $EF_{grid,BM,y}$ | = | Build margin $CO_2$ emission factor in year y ($tCO_2$/MWh); |
| $EF_{grid,OM,y}$ | = | Operating margin $CO_2$ emission factor in year y ($tCO_2$/MWh); |
| $\omega_{OM}$ | = | Weighting of operating margin emissions factor (%); |
| $\omega_{BM}$ | = | Weighting of build margin emissions factor (%). |

According to the tool, for hydro power generation project activities, as is the case of the proposed project activity, the weights for the second crediting period are $\omega_{OM}$ = 0.25 and $\omega_{BM}$ = 0.75.

[10] http://www.ons.org.br/institucional/modelo_setorial.aspx?lang=en.

The monthly results of electricity generation and baseline emissions are presented in Table 5.

**Table 5 – Electricity dispatched to the grid by the plant and baseline emissions by the project over the monitored period[11]**

| Month | 2011 | | 2012 | | 2013 | | 2014 | |
|---|---|---|---|---|---|---|---|---|
| | Energy (MWh) | Baseline ($tCO_2e$) | Energy (MWh) | Baseline ($tCO_2e$) | Energy (MWh) | Baseline ($tCO_2e$) | Energy (MWh) | Baseline ($tCO_2e$) |
| January | 2,078 | 317 | 1,286 | 196 | 5,535 | 845 | 2,958[12] | 451 |
| February | 4,257 | 650 | 1,001 | 153 | 3,251 | 496 | 2,828[12] | 432 |
| March | 3,359 | 513 | 1,559 | 238 | 3,844 | 587 | - | - |
| April | 5,245 | 801 | 1,101 | 168 | 4,431 | 676 | - | - |
| May | 5,190 | 792 | 832 | 127 | 3,613 | 552 | - | - |
| June | 3,346 | 511 | 1,622 | 248 | 4,171 | 637 | - | - |
| July | 5,021 | 766 | 3,198 | 488 | 3,808 | 581 | - | - |
| August | 6,051 | 924 | 3,319 | 507 | 5,769 | 881 | - | - |
| September | 2,412 | 368 | 2,806 | 428 | 5,846 | 892 | - | - |
| October | 2,364 | 361 | 5,905 | 901 | 5,156 | 787 | - | - |
| November | 3,323 | 507 | 5,724 | 874 | 3,218 | 491 | - | - |
| December | 1,949 | 298 | 5,593 | 854 | 4,409[12] | 673 | - | - |
| **TOTAL** | **44,595** | **6,807** | **33,946** | **5,182** | **53,052** | **8,098** | **5,785** | **883** |

**E.2. Calculation of project emissions or actual net GHG removals by sinks**

GHG emissions by the project activity are zero.

**E.3. Calculation of leakage**

No leakage related to the project activity.

**E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks**

| Item | Baseline emissions or baseline net GHG removals by sinks (t $CO_2e$) | Project emissions or actual net GHG removals by sinks (t $CO_2e$) | Leakage (t $CO_2e$) | Emission reductions or net anthropogenic GHG removals by sinks (t $CO_2e$) |
|---|---|---|---|---|
| **Total** | 20,971 | 0 | 0 | 20,971 |

**E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD**

[11] Following the provisions of paragraph 238 of Clean Development Mechanism Validation and Verification Standard (version 05.0), a discount was applied to the energy generated by the plant from March 01st, 2012 to February 28th, 2014. The biggest error identified in the calibration test (*i.e.* 0.298%) was applied (paragraph 238(b) of the standard) in the project activity energy generation. The final energy generation (*i.e.* already considering the discount as per the guidelines) is presented in Table 4. The original values are described in the CERs calculation spreadsheet. For details about the calibration delays and discounts applied please refer to section C.

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

| Item | Values estimated in ex-ante calculation of registered PDD | Actual values achieved during this monitoring period |
|---|---|---|
| **Emission reductions or GHG removals by sinks (t $CO_2e$)** | 22,661 | 20,971 |

**E.6. Remarks on difference from estimated value in registered 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 01/01/2011 to 28/02/2014).

**E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards**

| Item | Actual values achieved up to 31 December 2012 | Actual values achieved from 1 January 2013 onwards |
|---|---|---|
| **Emission reductions or GHG removals by sinks (t $CO_2e$)** | 11,989 | 8,981 |

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## Document information

| *Version* | *Date* | *Description* |
|---|---|---|
| 03.2 | 5 November 2013 | Editorial revision to correct table in page 1. |
| 03.1 | 2 January 2013 | Editorial revision to correct table in section E.5. |
| 03.0 | 3 December 2012 | Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11). |
| 02.0 | 13 March 2012 | Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20). |
| 01 | 28 May 2010 | EB 54, Annex 34. Initial adoption. |

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