



VERIFICATION REPORT PESQUEIRO ENERGIA S.A.

VERIFICATION OF THE Pesqueiro Energia Small Hydroelectric Project (PESHP)

BUREAU VERITAS CERTIFICATION
REPORT No.BVC/BRAZIL-VR/1253110/2014
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VERIFICATION REPORT

Date of first issue: 20/03/2014	Organizational unit: Bureau Veritas Certification Holding SAS
Client: Pesqueiro Energia S.A.	Client ref.: Mr. Rosmir César de Oliveira

Summary:

Bureau Veritas Certification has conducted the 1st periodic verification of the 2nd Crediting Period of project activity "Pesqueiro Energia Small Hydroelectric Project (PESHP)", CDM Registration Reference Number 0242, owned by Pesqueiro Energia S.A., which is located in Jaguariaíva river, in the city of Jaguariaíva, state of Paraná, southern region of Brazil, and applying the methodology AMS-I.D version 17, on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM rules and modalities and the subsequent decisions by the CDM Executive Board, as well as the host country criteria.

The verification scope is defined as an independent and objective review and ex-post determination of the monitored GHG emission reductions, and consisted of the following three phases: i) desk review of the project design, the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In summary, Bureau Veritas Certification confirms that the project is implemented as planned and described in the registered project design document for the 2nd Crediting Period. Installed equipments being essential for generating emission reduction run reliably and are calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions. The GHG emission reductions are calculated without material misstatements, and the emission reductions verified totalize 68,415 tons of CO₂e for the monitoring period.

Our opinion relates to the projects' GHG emissions and resulting GHG emission reductions reported and related to the valid and registered project baseline, approved monitoring plan and its associated documents.

Reporting period:	27/01/2010 to 30/09/2013
Baseline emissions:	68,415 t CO ₂ equivalents.
Project emissions:	0 t CO ₂ equivalents.
Leakage emissions:	0 t CO ₂ equivalents.
Emission Reductions:	68,415 t CO ₂ equivalents.
	<ul style="list-style-type: none"> • 50,486 tCO₂ equivalents from 27/01/2010 to 31/12/2012 • 17,929 tCO₂ equivalents from 01/01/2013 to 30/09/2013.

Report No.: BVC-Brazil/1253110/2014	Subject Group: CDM
Project title: Pesqueiro Energia Small Hydroelectric Project (PESHP)	
Work carried out by: Felipe Barbirato - Team Leader	
Internal Technical Review carried out by: Karina Polido Cláudia Freitas (specialist supporting ITR)	
Date of this revision: 31/03/2014	Rev. No.: 02
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Indexing terms

Work approved by:

Matthieu Martini

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Abbreviations

ANEEL	National Agency for Electrical Energy
CAR	Corrective Action Request
CCEE	Commercialization Chamber for Electrical Energy
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CL	Clarification Request
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DRR	Daily Reading Record
ETN	Electricity Transaction Note
FAR	Forward Action Request
GHG	Green House Gas(es)
MoV	Means of Verification
MP	Monitoring Plan
MR	Monitoring Report
MRR	Monthly Reading Record
ONS	System National Operator
PDD	Project Design Document
PLF	Plant Load Factor
PP	Project Participant
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard



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1. INTRODUCTION

Pesqueiro Energia S.A. has commissioned Bureau Veritas Certification to verify the emissions reductions of its CDM project “Pesqueiro Energia Small Hydroelectric Project (PESHP)” (hereafter called “**the Project**”) located at Jaguariaíva river, in the city of Jaguariaíva, state of Paraná, southern region of Brazil.

This report summarizes the findings of the verification of the Project, performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1. Objective

The objective of CDM verification is to conduct a thorough, independent assessment of the registered project activities.

In carrying out its verification work, the DOE shall ensure that the project activity complies with the requirements of paragraph 62 of the CDM modalities and procedures. In particular, this assessment shall:

- (a) Ensure that the project activity has been implemented and operated as per the registered PDD or any approved revised PDD, and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- (b) Ensure that the monitoring report and other supporting documents provided are complete in accordance with latest applicable version of the completeness checklist for requests for issuance of CERs, verifiable, and in accordance with applicable CDM requirements;
- (c) Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan or any revised approved monitoring plan, and the approved methodology including applicable tool(s);
- (d) Evaluate the data recorded and stored as per the monitoring methodology including applicable tool(s).

1.2. Scope

The verification scope is defined as an independent and objective review and ex-post determination of the monitored GHG emission reductions. The verification is based on the validated and registered project design document, the monitoring report, emission reduction calculation spreadsheet, and supporting documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

The verification is not meant to provide any consulting service towards the PPs. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project monitoring towards reductions in the GHG emissions.



1.3. GHG Project Description

The project utilizes water from the Jaguariaíva river to generate electricity. The total installed capacity is 12.44MW (two Francis type turbines 6.22MW each; two SPA 1250 generators 6.8 MVA each). The facility contains a small dam (reservoir area = 0.33km², power density = 37.70W/m²) which stores water in order to generate electricity for short periods of time. The annual electricity exported to the grid per year in this monitoring period were verified as:

- 2010: 78,972 MWh
- 2011: 76,735 MWh
- 2012: 78,341 MWh
- 2013 (until 30/09/2013): 69,520 MWh

The corresponding ERs achieved in this monitoring period were verified as:

- 2010: 18,037 tCO₂e
- 2011: 14,202 tCO₂e
- 2012: 18,247 tCO₂e
- 2013 (until 30/09/2013): 17,929 tCO₂e

Project title:	Pesqueiro Energia Small Hydroelectric Project (PESHP)
UNFCCC ref number:	0242
Registration Date:	16/08/2012 (2 nd Crediting Period)
Crediting Period:	27/01/2010 to 26/01/2017 (renewable)
Monitoring Period:	27/01/2010 to 30/09/2013
Project Participants:	<ul style="list-style-type: none"> - Pesqueiro Energia S.A (Brazil) - Trading Emissions PLC (Switzerland) - CM Capital Markets Holding S.A. (Switzerland) - Ecopart Assessoria em Negocios Empresariais Ltda. (United Kingdom of Great Britain and Northern Ireland)
Methodologies used	AMS-I.D version 17
Location of the Project:	Jaguariaíva river, in the city of Jaguariaíva, state of Paraná, southern region of Brazil.
Geo coordinates:	Longitude: 49°38'09" W, Latitude: 24°07'58" S
UNFCCC view page:	http://cdm.unfccc.int/Projects/DB/DNV-CUK1137160660.09/view

**[Post Registration Changes]**

No post registration changes have been requested.

1.4. Verification Team

The assessment team and internal technical reviewer team consist of the following personnel:

FUNCTION	NAME	TA 1.2	TASK PERFORMED*
Team Leader	Felipe Barbirato	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> DR <input checked="" type="checkbox"/> SV <input checked="" type="checkbox"/> RI <input type="checkbox"/> TR
Internal Technical Reviewer (ITR)	Karina Polido	<input type="checkbox"/>	<input type="checkbox"/> DR <input type="checkbox"/> SV <input type="checkbox"/> RI <input checked="" type="checkbox"/> TR
Specialist supporting ITR	Cláudia Freitas	<input checked="" type="checkbox"/>	<input type="checkbox"/> DR <input type="checkbox"/> SV <input type="checkbox"/> RI <input checked="" type="checkbox"/> TR

*DR = Document Review; SV = Site Visit; RI = Report issuance; TR = Internal Technical Review

2. METHODOLOGY

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In order to ensure transparency, a verification protocol was customized for the project, according to the version 05.0 of the Clean Development Mechanism Validation and Verification Standard, issued by CDM Executive Board after its 75th meeting on 04/10/2013 /10/. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from verifying the identified criteria. The verification protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been verified and the result of the verification.

The completed verification protocol is enclosed in Appendix A to this report.

2.1. Review of Documents

The assessment of the project documentation provided by the project participant is based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the monitoring report (MR) version 4 dated 31/03/2014 /22/ and emission reduction calculation spreadsheet version 02 dated 17/02/2014 /8/. Qualitative information comprises information on internal management controls, calculation procedures, procedures for transfer of data, frequency of emissions reports, and review and internal audit of calculations.

The monitoring report version 1.3 submitted by the project participant was web hosted on the UNFCCC-CDM web site on 02/12/2013 and thus, was available in the public domain.

In addition to the monitoring documentation provided by the project participants, the DOE reviews:

- (a) The registered PDD (2nd Crediting Period) and the monitoring plan /1/
- (b) The Validation Report /2/
- (c) The Monitoring Report for this monitoring period /4/ /5/ /6/ /22/;
- (d) Previous Verification Report /3/;
- (e) The applied monitoring methodology/9/;
- (f) Other information and references relevant to the project activity's resulting emission reductions (e.g. IPCC reports, laboratory analysis or national regulations) /15/.

2.2. Follow-up Interviews

On 21/01/2014 (visit to Pesqueiro Energia S.A. local office in Castrolanda) and 22/01/2014 (visit to power plant), Bureau Veritas Certification performed a site visit and interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Pesqueiro Energia S.A. and Ecopart (CDM consultant) were interviewed (see References). The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organization	Interview topics
Pesqueiro Energia S.A. (Project Owner)	<ul style="list-style-type: none"> ➤ Project Design and implementation ➤ Technical equipment, calibration and operation ➤ Monitoring Plan and management procedures ➤ Monitoring data ➤ Data uncertainty and residual risks (QA/QC) ➤ GHG Calculations ➤ Environmental Impacts ➤ Compliance with National Laws and Regulations
Ecopart Assessoria em Negócios Empresarias Ltda. (Consultant)	<ul style="list-style-type: none"> ➤ Project Design and implementation ➤ Technical equipment, calibration and operation ➤ Monitoring Plan ➤ Monitored data and Monitoring Report ➤ GHG Calculations

2.3. Resolution of Clarification, Corrective and Forward Action Requests

The objective of this phase of the verification is to resolve issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions prior to Bureau Veritas Certification's positive conclusion on the GHG emission reduction calculation.



Findings established during the verification can either be seen as a non-fulfillment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

A Corrective Action Request (CAR) is raised, if one of the following situations occurs:

- (a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- (b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- (c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- (d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

A Clarification Request (CL) is raised, if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A Forward Action Request (FAR) is raised, for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

To guarantee the transparency of the verification process, the concerns raised are documented in more detail in the verification protocol in Appendix A.

2.4. Internal Technical Review

The verification report underwent an Internal Technical Review (ITR) before requesting issuance of CERs for the project activity.

The ITR is an independent process performed to examine thoroughly that the process of verification has been carried out in conformance with the requirements of the verification scheme as well as internal Bureau Veritas Certification procedures.

The Team Leader provides a copy of the verification report to the reviewer, including any necessary verification documentation. The reviewer reviews the submitted documentation for conformance with the verification scheme. This will be a comprehensive review of all documentation generated during the verification process.

When performing an Internal Technical Review, the reviewer ensures that:

- The verification activity has been performed by the team by exercising utmost diligence and complete adherence to the CDM rules and requirements.
- The review encompasses all aspects related to the project which includes project design, baseline, additionality, monitoring plans and emission reduction calculations, internal quality assurance systems of the project participant as well as the project activity, review of the



stakeholder comments and responses, closure of CARs, CLs and FARs during the verification exercise, review of sample documents.

The reviewer may raise Clarification Requests to the verification team and discusses these matters with Team Leader.

After the agreement of the responses on the Clarification Requests from the verification team as well as the PP(s), the finalized verification report is accepted for further processing such as uploading via the UNFCCC interface.

3. VERIFICATION CONCLUSIONS

In the following sections, the conclusions of the verification are stated.

The findings from the desk review of the original monitoring documents and the findings from interviews during the follow up visit are described in the Verification Protocol in Appendix A.

The Clarification, Corrective and Forward Action Requests are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Appendix A. The verification of the Project resulted in 14 CAR(s), 02 CL(s) and 00 FAR. The DOE has also verified that there was no remaining FAR from the previous Monitoring Period /3/.

The CARs and CLs were closed based on adequate responses from the Project Participant(s) which meet the applicable requirements. They have been reassessed before their formal acceptance and closure.

The number between brackets at the end of each section corresponds to the VVS paragraph.

3.1. Remaining issues from validation or previous verification (213)

All CARs and CLs raised were successfully closed during the validation stage and previous verification of the Project, no remaining issues were left. Also, there was no FAR(s) raised during the previous verification of this project activity /3/.

3.2. Compliance of the project implementation with the registered project design document (228)

Bureau Veritas Certification has performed a site visit and found that the Project has been put into operation as described in the registered PDD and the electricity generated is supplied to Brazilian Interconnected grid. Two units of Simple Francis turbines of 6.22 MW each and two SPA 1250 Generators 6.8 MVA each have been in operation during the monitoring period. The total installed capacity is 12.44 MW.

No changes to the project design have been identified during this verification. The implementation and operation of the project activity have been conducted in accordance with the description contained in the registered PDD /1/.

The plant construction started in May 2001 and was concluded in December 2002. The small hydropower plant started its commercial operations in 27th January 2003 /19/. During the site



visit (21/01/2014 and 22/01/2014), the DOE has confirmed that the project implementation is as per the description contained in the registered PDD /1/. The technology and equipment employed were verified by their respective nameplates capacities.

The difference observed between the emission reductions estimated in the registered PDD (2nd Crediting period) and verified during this monitored period, can be attributed to the increase of the monitored emission factor. The estimated CO₂ emission factor of the grid estimated in the registered PDD was 0.2215 tCO₂/MWh based on the values published by the Brazilian DNA for the year of 2008. This value is lower than the actual emission factor determined for years 2010, 2012 and 2013.

Secondly, it is important to mention that there was also a slight increase (2%) when comparing the electricity generated during the monitoring period (303,567MWh) against the electricity generation estimated in the registered PDD (297,824MWh). However, when annual electricity generation is considered, only for 2010 and 2013 the monitored electricity generation was above the estimated levels. Refer to Tables 5 and 6 in the MR for the details regarding the analysis.

[Power System]

As shown in the diagram of the power connection system, Figure 6 in the MR, the electricity generated by the Project is delivered to the local grid substation (Jaguariaíva) and then delivered to the Brazilian interconnected grid.

[Metering System]

There are two electricity meters (principal and backup) which continuously monitoring the electricity generated by the plant and delivered to the grid.

Both meters are calibrated every two years following the recommendations of the System National Operator (ONS) and registered PDD. Last calibrations of the equipment took place in 19/03/2010 (valid until 18/03/2012) and 15/05/2012 (valid until 14/05/2014) /13/.

Considering that the recalibration date of both meters (principal and backup) of the plant were delayed, the provisions of paragraph 238 of the VVS version 05 /10/ 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 in March, April and May 2012.

[Management and Operation]

The PP has operated the Project as per the registered PDD. The monitoring organization has been set up and all monitoring staff members have been trained. Meter reading records of all the meters are based on continuously measurement (5-minute interval) and monthly recorded by the PP. CCEE is responsible for the energy transaction contracts in Brazil (from Portuguese "Camãra de Comercialização de Energia Elétrica") and has remote access to the energy information. The energy generated by the plants 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, CCEE issues an official report



named "CB002" that presents a consolidated data indicating, per week, the dispatched energy during the specific month.

In October 2012 it was implemented a new system at CCEE for accounting called "CliqCCEE". During this period all data was migrated from "Sinercom" to "CliqCCEE". Hence, since September 2012, new reports (MRE001) present the information regarding net energy generation in the new system, replacing "CB002" reports. Therefore, during the current monitored period both "CB002" and "MRE001" are used to certify the energy generation reported by the PP. The mentioned documents and official reports were verified by the DOE /12/.

Corresponding to the paragraph 228 of VVS version 05.0, Bureau Veritas Certification can confirm that:

- The implementation of the Project is consistent with the registered PDD.
- The Project is operated by the project owner as per the registered PDD.

3.3. Compliance of the monitoring plan with the monitoring methodology including applicable tool(s) (232)

The verification team has verified the monitoring plan, including the data and parameters required to be monitored, measurement procedures, monitoring frequency and QC/QA procedures as described in the registered PDD.



Corresponding to the paragraph 232 of VVS version 05.0, Bureau Veritas Certification can confirm that the monitoring plan is in accordance with the approved methodology including applicable tool(s) applied by the Project.

3.4. Compliance of monitoring activities with the monitoring plan (235-236)

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.

[Parameters and information flow]

The parameters required by the monitoring plan and how Bureau Veritas Certification has verified the information flow (from data generation, aggregation, to recording, calculation and reporting) for these parameters including the values in the monitoring report are described below:

Parameters monitored:

- (1) $EG_{BL,y}$ - Quantity of net electricity (MWh) supplied to the grid as a result of the implementation of the CDM project activity in year y;

Year	$EG_{BL,y}$
2010	78,972
2011	76,735



2012	78,341
2013	69,520

The electricity delivered to the grid is monitored both by the project owner (seller) as well as by the energy buyer. A Brazilian government entity, CCEE (from Portuguese “Câmara de Comercialização 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 crosschecked with the reports issued by CCEE (records for sold electricity; “CB002” and “MRE001” reports) /12/. The referred parameter is hourly measured and monthly recorded by the project owner. The CCEE reports present this information consolidated on a weekly basis.

As described above, the meters have been installed in accordance with the registered PDD. The verification team has checked on-site the location of the meters against the diagram of power connection system and found them to be consistent. Additionally, as it can be seen from monitoring equipment data, the recalibration of the meters was delayed in 2012. Therefore, the provisions of paragraph 238 a) of the “Clean development mechanism validation & verification standard” were considered when calculating the emission reductions by the CDM project activity. The maximum permissible error of the equipment (0.2%) was considered during March, April and May 2012 (calibration results were verified by the DOE).

The readings of the meters are continuously monitored (every 5 minutes) and monthly recorded by the PP and the grid company. The DOE has verified the monthly values of the energy dispatched to the grid in the Monitoring Report and found them to be consistent with official data contained in the CCEE reports for the project /12/. The ERs calculation spreadsheet has also been checked by the DOE /8/.

The verification team has verified the values provided in the monitoring report and ER spreadsheet against the relevant documented evidences /12/ and found them to be consistent. The documents presented to the DOE cover the entire monitoring period, from 27/01/2010 to 30/09/2013.

(2) $EG_{PJ,h}$ - Electricity displaced by the project activity in hour h of the year y;

This parameter is used for the calculation of the OM grid EF. This parameter is equivalent to the parameter $EG_{BL,y}$ used to calculate the operating margin CO2 emission factor of the grid, as mentioned in the “Tool to calculate the emission factor for an electricity system” /20/.

(3) $EG_{PJ,h}$ - Electricity displaced by the project activity in hour h of the year y;

The electricity delivered to the grid is monitored by the project owner. Hourly aggregated information will be used to determine the operating margin CO2 emission factor. The DOE has verified the information presented in the spreadsheet (for each year: 2010, 2011, 2012 and 2013) and found it to be consistent with the CCEE reports and records /12/.

(4) $EF_{EL,DD,h}$ - CO2 emission factor for power units in the top of the dispatch order in hour h in year y;

The selected option to calculate the operating margin was the dispatch analysis. Therefore, this value is calculated annually applying the numbers published by the Brazilian DNA and following

the steps provided in the “Tool to calculate the emission factor for an electricity system”. The CO₂ emission factor hourly based on the dispatch data sourced from Brazilian DNA was verified by the DOE. The values applied in the CER spreadsheet (hourly values for OM grid EF (dispatch analysis) for each year: 2010, 2011, 2012 and 2013) are consistent with data found in the DNA website: <http://www.mct.gov.br/index.php/content/view/307492.html>

The calculation of the OM grid emission factor is based on the option “Dispatch data analysis” from the “Tool to calculate the emission factor for an electricity system” /20/. The DOE has also confirmed that the Brazilian DNA has published the Resolution #8 on May 26th 2008 /21/, which defines the Brazilian Interconnected Grid as a single system that covers all the five macro-geographical regions in the country, defining the borders of the electricity system. Source verified: http://www.mct.gov.br/upd_blob/0024/24562.pdf

As per the Tool /20/, Option (c) to calculate the OM grid EF (p. 12) states:

(c) Dispatch data analysis OM

The dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$) is determined based on the grid power units that are actually dispatched at the margin during each hour h where the project is displacing grid electricity. This approach is not applicable to historical data and, thus, requires annual monitoring of $EF_{grid,OM-DD,y}$.

The emission factor is calculated as follows:

$$EF_{grid,OM-DD,y} = \frac{\sum_h EG_{PI,h} \cdot EF_{EL,DD,h}}{EG_{PI,y}} \quad (10)$$

Where:

- $EF_{grid,OM-DD,y}$ = Dispatch data analysis operating margin CO₂ emission factor in year y (tCO₂/MWh)
- $EG_{PI,h}$ = Electricity displaced by the project activity in hour h of year y (MWh)
- $EF_{EL,DD,h}$ = CO₂ emission factor for grid power units in the top of the dispatch order in hour h in year y (tCO₂/MWh)
- $EG_{PI,y}$ = Total electricity displaced by the project activity in year y (MWh)
- h = Hours in year y in which the project activity is displacing grid electricity
- y = Year in which the project activity is displacing grid electricity

The Brazilian DNA presents the hourly values for “ $EF_{EL,DD,h}$ ” (“CO₂ emission factor for grid power units in the top of the dispatch order in hour h in year y ”) in the following official and public link: <http://www.mct.gov.br/index.php/content/view/307492.html>

For the monitoring period, the links are provided below:

- 2010: <http://www.mct.gov.br/index.php/content/view/327813.html#ancora>
- 2011: <http://www.mct.gov.br/index.php/content/view/333695.html#ancora>
- 2012: <http://www.mct.gov.br/index.php/content/view/338049.html#ancora>
- 2013: <http://www.mct.gov.br/index.php/content/view/346665.html#ancora>

In the spreadsheet for CERs calculation, worksheets “Emission Factor EG 2010”, “Emission Factor EG 2011”, “Emission Factor EG 2012” and “Emission Factor EG 2013”, the hourly values



for “EFEL,DD,h” sourced from the DNA website can be verified in columns “F”, “I”, “L”, “O”, “R”, “U”, “X”, “AA”, “AD”, “AG”, “AJ” and “AM”.

The net electricity generation presented in the CERs calculation spreadsheet (hourly basis), was crosschecked against the CCEE records issued to the company. The CCEE hourly registry system represents the official readings from the meters (and invoices of electricity exported) and was presented to the verification team during the site visit.

The total of electricity exported to the grid (i.e. $EG_{PJ,h}$ = electricity displaced by the project activity in hour h of year y (MWh) as per the Tool), for each month in 2010, 2011, 2012 and 2013 is presented in the worksheet “CERs”. The DOE has confirmed those values, which correctly represent the monitored values for the purpose of electricity displaced by the project activity and ERs calculation.

Cell E24 in the each worksheet (“Emission Factor EG 2010”, “Emission Factor EG 2011”, “Emission Factor EG 2012” and “Emission Factor EG 2013”) presents the calculation, as per the Tool’s equation 10 mentioned above, for the grid OM grid EF in each year. Cells I14 in the referred worksheets (for each year) present the CM grid EF calculation. The weights applied for “wOM” and “wBM” are 0.25 and 0.75 respectively, in line with the requirements for the 2nd Crediting Period and considering the type of project activity.

The worksheet “CERs” in the spreadsheet presents a summary (consolidation) of the data discussed above.

Given the additional explanation presented above, the DOE confirms that it has verified the calculation of the grid EF, including the OM grid EF calculation for 2010, 2011, 2012 and 2013, in line with the “Tool to calculate the emission factor for an electricity system” and CDM requirements. The data which is not sourced directly from the project operation is based on official DNA data which can be verified in the websites mentioned above. The calculation of the Brazilian DNA is also based on the Tool, as mentioned in its official website: <http://www.mct.gov.br/index.php/content/view/74689.html>

(5) Cap_{pj} – Installed capacity of the hydropower plant after the implementation of the project activity;

12,440,000 W. Sourced from ANEEL Resolution nr. 410 dated June 29th, 2001 available at <http://www.aneel.gov.br/cedoc/dsp2001410.pdf>

Also confirmed during the site visit.

(6) A_{PJ} – 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;

330,000 m². ANEEL’s Geo-referenced Information Systems of the Electric Sector and Environmental Audit Report prepared to state authority /18/

Parameters determined ex-ante:

(1) $EF_{grid,BM,y}$



The Build margin CO₂ emission factor in year 2008 of the Project has been determined *ex-ante* in the registered PDD at the renewal of crediting period. The emission factor used in the monitoring report is consistent with the value determined *ex-ante* in the registered PDD /1/. Value of 0.1458 tCO₂/MWh (sourced from Brazilian DNA): <http://www.mct.gov.br/index.php/content/view/317399.html#ancora>

(2) Cap_{BL}

Installed capacity of the hydro power plant before the implementation of the project activity. The value for new hydropower plants is zero (W).

(3) A_{BL}

Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full. Value of zero (m²) (new hydropower plant).

Corresponding to the paragraph 235 and 236 of VVS version 05.0, Bureau Veritas Certification can confirm that:

- The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.
- All parameters required by the monitoring plan have been sufficiently monitored and correctly listed. The monitored data for required parameters have been verified by checking the whole information flow.

3.5. Compliance with the calibration frequency requirements for measuring instruments (243)

The registered monitoring plan requires that meters (0.2s) shall be calibrated every two years

During this monitoring period, the installed measuring instruments have been operating well however there was a delay in the calibration in the months of March, April and May 2012. Last calibrations of the equipment took place in 19/03/2010 (valid until 18/03/2012) and 15/05/2012 (valid until 14/05/2014) /13/. Considering that the recalibration dates of both meters (principal and backup) of the plant were delayed (from 18/03/2012 to 15/05/2012), the provisions of paragraph 238 of the VVS version 05 /10/ 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 in March, April and May 2012.

The maximum permissible error of the meter (i.e. 0.2%) was discounted from energy generation from March 01st, 2012 to May 31st, 2012. This is conservative, as the discount was done for the whole period between March and May 2012.

The calibration records are shown in Table 2 below.

Table 2 – Meters and calibration details



Meter ID	Serial number	Accuracy	Calibration dates	Validity	Calibration entity
Main	SAGA 1000 – 1681D 226377	0.2s	19/03/2010 15/05/2012	Two years	LACTEC (Institute of Technology for Environment; Metrology Laboratory)
Back-up	SAGA 1000 – 1681D 226378	0.2s	19/03/2010 15/05/2012	Two years	LACTEC (Institute of Technology for Environment; Metrology Laboratory)

[Instrument accuracy]

The verification team has verified the calibration records performed by LACTEC /13/. Both meters meet the rated accuracy level (0.2s) as described in the monitoring plan and registered PDD.

[Calibration frequency]

The calibration frequency fulfills the requirement as described in the monitoring plan and is in compliance with the recommendations from ONS (interconnected grid operator).

It is identified that the calibration has been delayed during the monitoring period between 18/03/2012 and 15/05/2012. As explained above, a conservative approach is adopted in the calculation of emission reductions as follows: considering that the recalibration dates of both meters (principal and backup) of the plant were delayed (from 18/03/2012 to 15/05/2012), the provisions of paragraph 238 of the VVS version 05 /10/ 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 in March, April and May 2012.

The maximum permissible error of the meter (i.e. 0.2%) was discounted from energy generation from March 01st 2012 to May 31th 2012. This is conservative, as the discount was done for the whole period between March and May 2012.



Corresponding to the paragraph 243 of VVS version 05.0, Bureau Veritas Certification can confirm that:

- The calibration is conducted at the frequency as specified by the methodology and the monitoring plan contained in the registered PDD.
- For calibration that has been delayed, which is the case of the project activity for this monitoring period, the conservative approach is adopted in the calculation of emission reductions and deemed as appropriate.



3.6. Assessment of data and calculation of emission reductions (246)

A complete set of data for the specified monitoring period is available.

The critical parameters used for the determination of the Emission Reductions are the net electricity supplied to the grid by the Project and the grid EF. The data pertaining to the above parameter are maintained in the identified records. All the data are in compliance with that stated in the Monitoring Report.

As per the methodology AMS-I.D version 17 and the registered PDD, the emission reductions for the project are calculated as the baseline emissions minus the project emissions and leakage. Hence the emission reduction is determined by the following formula:

$$ER_y = BE_y - PE_y - L_y$$

Where,

ER_y: Emission reductions

BE_y: Baseline emissions

PE_y: Project emissions

L_y: Emissions due to leakage

[Baseline emissions]

The baseline emissions are the baseline emission factor times the net electricity supplied to the grid. Therefore,

$$BE_y = EF_y * EG_y$$

EF_y: GHG emission factor of the Brazilian interconnected grid, calculated and monitored *ex-post* (based on parameter "**EF_{EL,DD,h}**")

- EF_{grid,CM,2010} = 0.2285 tCO₂e/MWh
- EF_{grid,CM,2011} = 0.1852 tCO₂e/MWh
- EF_{grid,CM,2012} = 0.2330 tCO₂e/MWh
- EF_{grid,CM,2013} = 0.2580 tCO₂e/MWh

EG_y: Net electricity supplied to the grid

The verification team has crosschecked the values from the Monthly Reading Records of the Project ("CB002" and "MRE001" records from CCEE) /12/ for the period from 27/01/2010 to 30/09/2013. The conservative values are used for emission reductions calculation. The verified values are shown tables 3 and 4 below:

Table 3 – Net Energy and ERs in 2010 and 2011:



Month	2010		2011	
	Net Energy (MWh)	Baseline (tCO ₂ e)	Net Energy (MWh)	Baseline (tCO ₂ e)
January	1,112	254	5,892	1,090
February	7,215	1,648	4,040	748
March	8,656	1,977	4,479	829
April	8,462	1,933	6,061	1,122
May	8,504	1,942	6,073	1,124
June	7,048	1,610	6,219	1,151
July	6,432	1,469	7,475	1,383
August	6,193	1,415	8,432	1,561
September	4,746	1,084	5,516	1,021
October	7,600	1,736	7,870	1,457
November	5,431	1,240	8,052	1,490
December	7,572	1,729	6,624	1,226
Total	78,972	18,037	76,735	14,202

Table 4 – Net Energy and ERs in 2012 and 2013:

Month	2012		2013	
	Net Energy (MWh)	Baseline (tCO ₂ e)	Net Energy (MWh)	Baseline (tCO ₂ e)
January	8,018	1,868	6,224	1,605
February	7,883	1,836	7,332	1,891
March	* 6,601	1,537	8,383	2,162
April	* 6,238	1,453	7,922	2,043
May	* 7,359	1,714	6,904	1,780
June	8,266	1,925	8,406	2,168
July	8,896	2,072	8,754	2,258
August	7,194	1,676	8,327	2,147
September	4,005	933	7,269	1,875
October	4,675	1,089	0	0
November	4,749	1,106	0	0
December	4,456	1,038	0	0
Total	78,341	18,247	69,520	17,929

* Delayed calibration. Adjusted values considering the maximum permissible error (0.2%) of meters.

The baseline emissions of the Project are calculated as:

For 2010:

$$BE = 78,972 \text{ MWh} * 0.2285 \text{ tCO}_2\text{e/MWh} = 18,037 \text{ tCO}_2\text{e}$$

For 2011:

$$BE = 76,735 \text{ MWh} * 0.1852 \text{ tCO}_2\text{e/MWh} = 14,202 \text{ tCO}_2\text{e}$$

For 2012:

$$BE = 78,341 \text{ MWh} * 0.2330 \text{ tCO}_2\text{e/MWh} = 18,247 \text{ tCO}_2\text{e}$$

For 2013:

$$BE = 69,520 \text{ MWh} * 0.2580 \text{ tCO}_2\text{e/MWh} = 17,929 \text{ tCO}_2\text{e}$$

[Project emissions]

In line with the applied methodology and ACM0002 provisions, project emissions are considered as zero. The reservoir area as established in the environmental license of the plant is equal to 330,000 m². The installed capacity is 12,440,000 MW. Hence, the power density of the plant is 37.70 W/m². Therefore option b) is applicable and no project emissions are to be calculated, PE_y = 0.

[Leakage emissions]

Estimation of leakage emissions is not required because the energy generating equipment wasn't transferred from another activity nor the existing equipment was transferred to another activity.

No leakage needs to be considered according to ACM0002 provisions.

[Emission reductions]

The emission reductions during the monitoring period from 27/01/2010 to 30/09/2013 are calculated as:

$$ER_y = BE_y - PE_y - L_y = 68,415 \text{ tCO}_2\text{e}$$

For 2010:

$$ER_y = 18,037 \text{ tCO}_2\text{e} - 0 - 0$$

For 2011:

$$ER_y = 14,202 \text{ tCO}_2\text{e} - 0 - 0$$

For 2012:

$$ER_y = 18,247 \text{ tCO}_2\text{e} - 0 - 0$$

For 2013:

$$ER_y = 17,929 \text{ tCO}_2\text{e} - 0 - 0$$

[Comparison of ERs]

The annual estimated emission reductions are 17,927 tCO₂e as per the registered PDD. The monitoring period consists of more than three years of monitoring (i.e. from January 2010 to September 2013). The corresponding estimates for the monitoring period are 65,968 tCO₂e. The actual emission reductions are 3.7% higher (68,415 tCO₂e) than the estimated value in the PDD.

The variation is mainly caused by the increase in the grid emission factor. The estimated grid emission factor in the registered PDD was 0.2215 tCO₂/MWh, based on the values published by the Brazilian DNA for the year of 2008. This value is lower than the actual grid emission factor for years 2010 (0.2285 tCO₂/MWh), 2012 (0.2330 tCO₂/MWh) and 2013 (0.258 tCO₂/MWh). Only in 2011 (0.1852 tCO₂/MWh) the grid EF was actually lower than estimated. Refer to Table 5 below.

Table 5 - Estimated and monitored CO₂ emission factor of the grid

Year	Estimated	Monitored	Difference
2010	0.2215	0.2285	3.15%
2011	0.2215	0.1852	-16.41%
2012	0.2215	0.2330	5.15%
2013	0.2215	0.2580	16.46%

Secondly, it is important to mention that there was also a slight increase (2%) when comparing the in the electricity generated during the monitoring period (303,567MWh) against the electricity generation estimated in the registered PDD (297,824MWh). However, when annual electricity generation is considered, only for 2010 and 2013 the monitored electricity generation was above the estimated levels. Refer to Table 6 below.

Table 6 - Estimated and monitored electricity generation (MWh) by the plant

Year	Estimated	Monitored
------	-----------	-----------



2010	75,177	78,972
2011	80,942	76,735
2012	81,164	78,341
2013	60,540	69,520

In summary, there was a significantly increase in the CO2 emission factor of the grid and an unexpected increase in the river flow during the monitored period when compared to the estimated value (Figure 7 in the MR presents river flow monitored data). Therefore, this increase undeniable impacted the emission reductions generated by the project activity. The DOE considers the increase in verified ERs reasonable considering the factors presented above.



Corresponding to the paragraph 246 of VVS version 05.0, Bureau Veritas Certification can confirm that:

- Data used for the determination of the emission reductions are available and monitored in accordance with the monitoring plan contained in the registered PDD.
- Information and data provided in the monitoring report have been cross-checked with other sources such as plant logbooks, inventories, purchase records, laboratory analysis.
- Appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed.
- Assumptions, emission factors and default values that were applied in the calculations have been justified.



4. VERIFICATION OPINION

Bureau Veritas Certification has performed the 1st periodic verification of the 2nd Crediting Period of “Pesqueiro Energia Small Hydroelectric Project (PESHP)”, CDM Registration Reference Number 0242, which is located in Jaguariaíva river, in the city of Jaguariaíva, state of Paraná, southern region of Brazil, and applying the methodology AMS-I.D version 17. The verification was performed based on the requirements set by the CDM and relevant guidance provided by CMP and the CDM Executive Board.

The verification consisted of the following three phases: i) desk review of the project design, the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion.

The management of Pesqueiro Energia S.A. is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions of the project on the basis set out within the monitoring plan contained in the registered PDD. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project, is the responsibility of the management of the project.

Bureau Veritas Certification has verified the project Monitoring Report version 04 dated 31/03/2014 for the reporting period as indicated below. Bureau Veritas Certification confirms that the project is implemented as described in the validated and registered project design documents for the 2nd Crediting Period. Installed equipments being essential for generating emission reductions run reliably and are calibrated appropriately. The monitoring system is in place and the Project is generating GHG emission reductions as a CDM project.

Bureau Veritas Certification can confirm that the GHG emission reductions are calculated without material misstatements. Our opinion relates to the projects' GHG emissions and resulting GHG emission reductions reported and related to the validated and registered project baseline, approved monitoring plan and its associated documents. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, Bureau Veritas Certification confirms the following statement:



Reporting period: 27/01/2010 to 30/09/2013

Baseline emissions: 68,415 t CO₂ equivalents

Project emissions: 0 t CO₂ equivalents

Leakage emissions: 0 t CO₂ equivalents

Emission Reductions: 68,415 t CO₂ equivalents

- 50,486 tCO₂ equivalents from 27/01/2010 to 31/12/2012
- 17,929 tCO₂ equivalents from 01/01/2013 to 30/09/2013

Karina Polido and
Cláudia Freitas (specialist supporting ITR)

Felipe Barbirato

Internal Technical Reviewer

Team Leader

31/03/2014

31/03/2014



REFERENCES

Documents reviewed:

- /1/ Registered PDD for the 2nd Crediting Period, version 6 dated 07/03/2012, UNFCCC ref no.0242
- /2/ Validation Opinion on the Crediting Period Renewal, version 0.1, dated 13/06/2012
- /3/ Verification Report for the last monitoring period in the 1st Crediting Period, version 2, dated 27/04/2010
- /4/ Monitoring Report version 1.3, dated 27/11/2013
- /5/ Monitoring Report version 2, dated 17/02/2014
- /6/ Monitoring Report version 3, dated 19/03/2014
- /7/ ER Calculation Spreadsheet version 1 ("Pesqueiro_CERs_2013.11.08_v.01.xls"), dated 08/11/2013
- /8/ ER Calculation Spreadsheet version 2 ("Pesqueiro_CERs_2014.02.17_v.02.xls"), dated 17/02/2014
- /9/ AMS-I.D version 17.0 dated 03/06/2011
- /10/ Validation and Verification Standard Version 05.0 dated 04/10/2013
- /11/ Diagram of power connection system of the Project
- /12/ Monthly Reading Records of the Project ("CB002" and "MRE001" records from CCEE)
- /13/ Calibration Records/Certificates conducted by LACTEC (Institute of Technology for Environment; Metrology Laboratory) (dated 19/03/2010 and 15/05/2012).
<http://lactec.org.br/en/?page=instituto>
- /14/ ANEEL Resolution nr. 410 dated 29/06/2001; available at
<http://www.aneel.gov.br/cedoc/dsp2001410.pdf>
- /15/ Intergovernmental Panel on Climate Change. Revised 1996 Guidelines for National Greenhouse Gas Inventories.
- /16/ Environmental and Operation License (LO) Nr. 17892, Protocol #74098800 (dated 05/02/2009); valid until 05/02/2013; issued by "Secretaria do Estado do Meio Ambiente e Recursos Hídricos" and "Instituto Ambiental do Paraná" (relevant state authorities)
- /17/ Environmental and Operation License (LO) Nr. 17892, Protocol #117436861 (dated 06/03/2013); valid until 06/03/2018; issued by "Secretaria do Estado do Meio Ambiente e Recursos Hídricos" and "Instituto Ambiental do Paraná" (relevant state authorities)
- /18/ "Compulsory Environmental Audit" for the project. October 2012. Prepared by A. Müller Environmental Consultancy, required to renew the Operation License
- /19/ Connection Contract for Distribution System (CCD – "Contrato Conexão ao sistema de Distribuição") signed with Paraná state distribution company (COPEL). 01/06/2013. Contract Nr.2013842248258
- /20/ Tool to calculate the emission factor of an electricity system, version 02.2.1, 29/09/2011
- /21/ Brazilian DNA Resolution #8, 26/05/2008;
http://www.mct.gov.br/upd_blob/0024/24562.pdf
- /22/ Monitoring Report version 4, dated 31/03/2014



Persons interviewed:

Pesqueiro Energia S.A.

- /1/ Luiz Strickert (Coordinator)
- /2/ Eder Fiuza de Lima (O&M Manager)

Ecopart Assessoria em Negócios Empresariais Ltda.

- /3/ Ana Paula Veiga (project analyst/consultant)



5. CURRICULA VITAE OF THE DOE'S VERIFICATION TEAM MEMBERS

Mr. Felipe Barbirato (Team leader)	Bureau Veritas Certification, Brazil	Team Leader, Climate Change Lead Verifier, Graduated in Economics and post-graduate/specialist in Environmental Analysis and Evaluation, with five years of work experience in the financial market. Started working in the environmental area in 2007, as an independent consultant for the origination and development of CDM project activities. Worked as an Associate Programme Officer in the "Registration & Issuance Team" in the SDM programme within the UNFCCC secretariat (Germany) from 2008 to 2011, providing technical support in different areas of work to the CDM Executive Board and its supporting panels, with focus on CDM project assessment. Works as lead GHG verifier and validator since 2012.
Mrs. Karina Polido (ITR)	Bureau Veritas Certification, Brazil	Technical Reviewer, Climate Change Lead Verifier. Graduated in Civil Engineering and post graduated in Environmental Planning and Management. She is ISO 9001:2008 and ISO 14001:2004 Lead Auditor with 5 years of experience in management system audits. She is also qualified as GHG - Greenhouse Lead Verifier.
Mrs. Cláudia Freitas (specialist supporting ITR)	Bureau Veritas Certification, Brazil	Technical Reviewer, Climate Change Lead Verifier. Graduated in Chemical Engineering and post graduate in Environmental Management System and in MBA Management with experience in environmental management, energy and Clean Development Mechanism projects. She is ISO 14001:2004 Lead Auditor and qualified as lead verifier GHG – Greenhouse Gases. She has validated/verified several CDM projects in Latin America and Asia. She also has worked as external expert for Brazilian DNA and UNFCCC.



APPENDIX A: CDM PROJECT VERIFICATION PROTOCOL (Rev 08)

Table 1 Verification requirements based on VVS version 5 (EB 75 Annex 4), PS version 5 (EB 75 Annex 5), PCP version 5 (EB 75 Annex 6), and Guidelines for completing the Monitoring Report Form version 5 (EB 75 Annex 7)

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
Part I Cover Page					
(a) Is the title of the project activity provided?	MR		Yes, "Pesqueiro Energia Small Hydroelectric Project (PESHP)".	OK	OK
(b) Is the reference number of the project activity provided?	MR		Yes, reference number (UNFCCC #) is "0242.	OK	OK
(c) Is the version number of the monitoring report indicated?	MR		Yes, version 1.3.	OK	OK
(d) Is the completion date of the monitoring report provided in DD/MM/YYYY format?	MR		Yes, 27/11/2013.	OK	OK
(e) Is the registration date of the project activity provided in DD/MM/YYYY format?	MR		Yes, the 2 nd Crediting Period was approved on 16/08/2012.	OK	OK
(f) Are the monitoring period number and duration of this monitoring period (first and last days included in DD/MM/YYYY format) provided?	MR		Yes. First Monitoring Period of the second crediting period (27/01/2010 – 30/09/2013).	OK	OK
(g) Are project participants indicated?	MR		Yes. <input type="checkbox"/> Pesqueiro Energia S.A <input type="checkbox"/> Trading Emissions PLC <input type="checkbox"/> CM Capital Markets Holding S.A.	CAR 01	OK

VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			<input type="checkbox"/> Ecopart Assessoria em Negocios Empresariais Ltda. CAR 01: There is an inconsistency between the list of project participants in Section A.3 in the MR and the cover page. The Private entity "The Chugoku Electric Power Co. Inc." from Japan is mentioned as a project participant in the table in Section 3 but this entity is not cited in the cover page of the MR.		
(h) Is the host party(ies) indicated?	MR		Yes, Brazil.	OK	OK
(i) Are the sectoral scope(s) and applied methodology(ies) indicated?	MR		Yes, Sectoral scope 1 : Energy industries (renewable - / non-renewable sources) AMS-I.D. ver. 17 - Grid connected renewable electricity generation	OK	OK
(j) Is the estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD indicated?	MR		Yes. 65,968 tCO ₂ e.	OK	OK
(k) Are the actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period indicated?	MR		Yes. 68,415 tCO ₂ e.	OK	OK
(l) Are the actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012 indicated (if applicable)?	MR		Yes, indicated in section E.7 in the MR.	OK	OK

VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(m) Are the actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards indicated (if applicable)?	MR		Yes, indicated in section E.7 in the MR.	OK	OK
Part II Monitoring Report					
A. Description of project activity					
A.1 Purpose and general description of project activity					
A.1.1 Is the description of the project activity provided? Is the implementation status of the project activity provided? Present in this section a brief summary of the detailed description given in the section B.1	MR		<p>Yes.</p> <p>The project activity is located in the southern region of Brazil, in the city of Jaguariaíva, state of Paraná.</p> <p>The Pesqueiro project utilizes water from the Jaguariaíva river to generate electricity (installed power = 12.44MW). The facility contains a small dam (reservoir area = 0.33km², power density = 37.70W/m²) which stores water in order to generate electricity for short periods of time. Run-of-River schemes do not include significant water storage, and must therefore make complete use of the water flow.</p> <p>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</p>	OK	OK



CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			<p>constructed downstream of the intake and at as low a level as possible to gain the maximum head on the turbine.</p> <p>The technology employed at Pesqueiro project is established in the industry. The Francis 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. The river 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 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.</p> <p><u>Specifications of the equipment used:</u></p> <ul style="list-style-type: none"> Turbines <p>Type: Simple Francis</p> <p>Quantity: 2</p> <p>RPM: 514,3</p> <p>Power (MW): 6.22</p> 		

VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			<p>Nominal Liquid Head (m): 86</p> <ul style="list-style-type: none"> Generators <p>Type: SPA 1250</p> <p>Quantity: 2</p> <p>Frequency (HZ): 60</p> <p>Power (MVA): 6.8</p> <p>Nominal Voltage (kW) 6.9</p> <p>Crosschecked with:</p> <ul style="list-style-type: none"> ANEEL Ordinance nr. 410 issued on June 29th 2001. Available at: http://www.aneel.gov.br/cedoc/dsp2001410.pdf Registered PDD (2nd Crediting Period) 		
A.1.2 Does this description include:					
A.1.2.1 Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks?	MR		<p>Yes. According to section A.1 in the MR, the primary objective of the project activity 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</p>	OK	OK

VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			Brazilian (and the Latin America and the Caribbean region's) electricity consumption.		
A.1.2.2 Brief description of the installed technology and equipments?	MR		The description of the installed equipments and technology applied are correctly mentioned. Refer to A.1.1 above.	OK	OK
A.1.2.3 Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)?	MR		Refer to A.1.1 above. CAR 02: The relevant dates for the project activity (e.g. construction, commissioning, continued operation periods) are not provided in the MR.	CAR 02	OK
A.1.2.4 Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period?	MR		Yes. 68,415 tCO ₂ e.	OK	OK
A.2 Location of project activity					
A.2.1 Is the information on the location of the project activity provided, including Host Party(ies), Region/State/Province, City/Town/Community, Physical/Geographical location etc.?	MR		Yes, information is provided in the MR sections A.2 and A.3, which was verified by the DOE. The project is located in the Southern region of Brazil, state of Paraná, city of Jaguariaíva (latitude 24°07'58" South and longitude 49°38'09" West) and uses the hydro potential of the Jaguariaíva River, which is part of the Paraná River basin.	OK	OK

VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
A.3 Parties and project participant(s)					
A.3.1 Is the Party(ies) and project participant(s) involved in the project activity listed in the provided table?	MR		Yes. However, refer to CAR 01.	CAR 01	OK
A.4 Reference of applied methodology					
A.4.1 Is the exact reference (number, title, version) of the methodology(ies) indicated?	MR		Yes. AMS-I.D – “Grid connected renewable electricity generation” (version 17).	OK	OK
A.4.2 Is the exact reference (number, title, version) of any tools and other methodologies to which the applied methodology(ies) refers indicated?	MR		Yes. In addition to the methodology, the following methodology/tools are used: <input type="checkbox"/> “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (version 12.2.0) – used with the purpose of estimating possible emissions from the reservoir. <input type="checkbox"/> “Tool to calculate the emission factor for an electricity system” (version 2.2.1)	OK	OK
A.5 Crediting period of project activity					
A.5.1 Are the type, start date and length of the crediting period corresponding to this monitoring period provided?	MR		Yes, the project activity opted for the renewable crediting period. This is the first monitoring period in the 2 nd Crediting Period. The project activity received the Renewal of Crediting Period on 16/08/2012. This monitoring period covers the period from	OK	OK

VERIFICATION REPORT

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			27/01/2010 to 30/09/2013.		
B. Implementation of project activity					
B.1 Description of implemented registered project activity					
B.1.1 Is the description of the installed technology, technical processes and equipments provided, include diagrams where appropriate?	MR PS	191(a)	Yes, Section B.1 is complete and accurate in the MR.	OK	OK
B.1.2 Is the information on the implementation and actual operation of the project activity, including relevant dates (e.g. construction, commissioning, continued operation periods, etc.) provided?	PS	191(b)	Yes, the information is provided in the MR. Refer to section A.1.1 above.	OK	OK
B.1.3 Is the description of: (i) the events or situations that occurred during the monitoring period that may impact the applicability of the methodology (ii) how the issues resulting from these events or situations have been addressed provided?	PS	191(c)	No. Refer to CAR 02.	CAR 02	OK
B.1.4 Have the project participants addressed the FARs identified during validation or previous verification(s)?	VVS	213	No FAR was raised in the previous Validation and Verification Reports.	OK	OK
B.1.5 Have the implementation and operation of the project activity been conducted in accordance with the description contained	VVS	226	Yes. According to the registered PDD, Pesqueiro Energia	OK	OK



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in the registered PDD?			<p>Small Hydroelectric Project (PESHP) is located in the southern region of Brazil, in the city of Jaguariaíva, state of Paraná, and utilizes water from the Jaguariaíva river to generate electricity (installed power = 12.44MW).</p> <p>The facility contains a small dam (reservoir area = 0.33km², power density = 37.70W/m²) which stores water in order to generate electricity for short periods of time.</p> <p>By means of a site visit, the physical features of the project activity were observed and examined and are in accordance with the PDD renewed on 16/08/2012.</p> <p>The operating permit/license was issued by the state environmental institute, IAP (Instituto Ambiental do Paraná), on February 05th, 2009. L.O. nº 17892, valid until February 05th, 2013. This was renewed on March 6th 2013, valid until March 6th 2018.</p> <p>The documents were verified by the DOE.</p>		
B.1.6 Are all physical features of the project activity in the registered PDD in place?	VVS	227	Yes, confirmed through document review and onsite visit.	OK	OK
B.1.7 Have the project participants operated the project activity as per the registered PDD or any approved revised PDD?	VVS	227	Refer to CAR 02.	CAR 02	OK
B.1.8 Was an on-site visit conducted?	VVS	227	Yes, the site visit was conducted on 21/01/2014 and	OK	OK



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			22/01/2014.		
B.1.9 If an on-site visit is not conducted, is the rationale of the decision justified?	VVS	227	Not applicable.	OK	OK
B.2 Post registration changes					
B.2.1 Temporary deviations from registered monitoring plan or applied methodology					
B.2.1.1 Is it indicated whether any temporary deviations have been applied during this monitoring period?	MR		Yes. Not applicable to this monitoring period.	OK	OK
B.2.1.2 Is a description of the deviation(s) in accordance with applicable provisions in the Project standard provided?	MR		Not applicable.	OK	OK
B.2.1.3 Are the reasons for the deviation(s), how it deviates from the monitoring plan and/or applied methodology(ies), the duration for which the deviation(s) is(are) applicable and justification on the conservativeness of the approach included in the description?	MR		Not applicable.	OK	OK
B.2.1.4 For deviation(s) that require prior approval by the Board, are the date of approval and reference number included in the description?	MR		Not applicable.	OK	OK
B.2.2 Corrections					

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B.2.2.1 Is it indicated whether any corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report?	MR		Yes. Not applicable to this monitoring period.	OK	OK
B.2.2.2 In cases where the correction(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval date and reference number provided? Otherwise, are the version number and the completion date of the revised PDD provided?	MR		Not applicable.	OK	OK
B.2.3 Permanent changes from registered monitoring plan or applied methodology					
B.2.3.1 Is it indicated whether any permanent changes from the registered monitoring plan or applied methodologies have been approved during this monitoring period or submitted with this monitoring report?	MR		Yes. Not applicable to this monitoring period.	OK	OK
B.2.3.2 In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval date and reference number provided? Otherwise, are the version number and	MR		Not applicable.	OK	OK



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the completion date of the revised PDD provided?					
B.2.4 Changes to project design of registered project activity					
B.2.4.1 Is it indicated whether any changes to the project design of the project activity have been approved during this monitoring period or submitted with this monitoring report?	MR		Yes. Not applicable to this monitoring period.	OK	OK
B.2.4.2 In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval date and reference number provided? Otherwise, are the version number and the completion date of the revised PDD provided?	MR		Not applicable.	OK	OK
B.2.5 Changes to start date of crediting period					
B.2.5.1 Is it indicated whether any changes to the start date of the crediting period have been approved during this monitoring period?	MR		Yes. Not applicable to this monitoring period.	OK	OK
B.2.5.2 In cases where the changes and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, are the approval	MR		Not applicable.	OK	OK

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date and reference number provided?					
B.2.6 Types of changes specific to afforestation or reforestation project activity					
B.2.6.1 Is it indicated whether any changes specific to afforestation or reforestation project activities have been applied during this monitoring period based on applicable provisions in the Project standard that do not require prior approval by the Board?	MR		Not applicable.	OK	OK
B.2.6.2 If changes were applied, are the version number and the completion date of the revised PDD provided?	MR		Not applicable.	OK	OK
C. Description of monitoring system					
C.1 General requirements					
C.1.1 Have project participants described the monitoring system and provided line diagrams (graphical schemes) showing all relevant monitoring points?	MR PS	193	<p>A description of the monitoring system is provided in section C in the MR.</p> <p><i>"There are two energy meters (principal and backup) model SAGA 1000, used for electricity measurement, which are in accordance with the specifications of the regulatory agencies of the country and are located at the COPEL Substation. Meters are bidirectional. The measurement is redundant, so that, in case the first meter fails, the second automatically replaces it. These</i></p>	CAR 03 CAR 04	OK



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			<p><i>meter's recalibration are scheduled to occur every two years, the recalibration procedures will be executed by a specialized metrology company that will be hired to this specific purpose.</i></p> <p><i>Energy measured by the meters is accumulated in five minutes interval. CCEE has remote access to energy information. The energy generated by the plants 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, CCEE issues an official report named CB02 that presents a consolidated data indicating, per week, the dispatched energy during the specific month.</i></p> <p><i>It's important to mention that in October 2012 was implemented a new system at CCEE for accounting called "CliqCCEE". During this period all data was migrated from Sinercom to CliqCCEE. Hence, since September 2012, new reports (MRE001) present the information regarding net energy generation in the new system, replacing CB002 report. Therefore, during the current monitored period both CB002 and MRE001 are used to certify the energy generation reported by the Project Participant (PP).</i></p> <p><i>Pesqueiro Energia S.A. is also be responsible for the maintenance of the monitoring equipment located at the plant (the ones located in the substation, that are under the local concessionary responsibility), for dealing with</i></p>		

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			<p><i>possible monitoring data adjustments and uncertainties, for review of reported results/data, for internal audits of GHG project compliance with operational requirements and for corrective actions. Yet, it is also responsible for the project management, as well as for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques.</i></p> <p>However, it does not present line diagrams showing the relevant monitoring points in the overall monitoring system.</p> <p>CAR 03: The MR does not present line diagrams showing the relevant monitoring points in the monitoring system.</p> <p>CAR 04: Section C does not present the specification details of the monitoring equipment (i.e. electricity meters)</p>		
C.1.2 Does this description where appropriate include data collection procedures (information flow including data generation, aggregation, recording, calculations and reporting), organizational structure, roles and responsibilities of personnel, and emergency procedures for the monitoring system?	MR PS	193	<p>Meters details and calibration dates are provided in the MR. However:</p> <p>CAR 05: The description of the monitoring system in the MR does not include the organizational structure, roles and responsibilities of personnel (including emergency procedures) for the monitoring of the system.</p>	CAR 05	OK
C.1.3 Is the monitoring plan of the project activity in accordance with the applied methodology	VVS	229	According to the applicable methodology, the monitoring shall consist of metering the electricity generated by the	CAR 04 CAR	OK

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including applicable tool(s)?			renewable technology. The monitoring plan submitted for verification complies with such requirement by establishing the monitoring of "Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y". However, refer to CAR 04 and CAR 05.	05	
C.1.4 For monitoring aspects that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency), are there any issues which may enhance the level of accuracy and completeness of the monitoring plan and should bring to the attention of the Board?	VVS	231	No further issue with respect to the project activity and methodology application was identified by the DOE.	OK	OK
C.1.5 Has the monitoring plan been properly implemented and followed by the project participants?	VVS	234(a)	The monitoring plan consists of the following parameters: <ul style="list-style-type: none"> - EGBL,y (Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y) - EGPJ,h (Electricity displaced by the project activity in hour h of the year y) - EFEL,DD,h (CO2 emission factor for power units in the top of the dispatch order in hour h in year y) - CapPJ (Installed capacity of the hydro power 	CAR 04 CAR 05	OK

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			plant after the implementation of the project activity) - APJ (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) Refer to CAR 04 and CAR 05.		
C.1.6 Have all parameters stated in the monitoring plan and relevant Board decisions been monitored and updated as applicable, including:	VVS	234(b)		-	-
C.1.6.1 Project emission parameters?	VVS	234(b)	The reservoir area as established in the environmental license of the plant is equal to 330,000 m ² . The installed capacity is 12,440,000 MW. Hence, the power density of the plant is 37.70 W/m ² . Therefore, no project emissions are to be calculated, PE _y = 0.	OK	OK
C.1.6.2 Baseline emission parameters?	VVS	234(b)	Yes, according to the monitoring plan and the applied methodology, the baseline emissions are calculated by multiplying the grid emission factor by the amount of electricity generated and delivered to the grid (MWh). As mentioned in the renewed PDD and MR, the BM grid emission factor of the grid is fixed ex-ante (2008 value; calculated by the DNA; latest available at the start of the 2 nd Crediting Period) The OM grid emission factor for 2010, 2011, 2012 and	CAR 12	OK

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			<p>2013 were calculated by Ecopart and Econergy through daily reports of the National Electricity Grid Operations – from January 1st, 2010 to October 31st, 2013 – published by ONS (the interconnected grid operator) and found in the DNA's website.</p> <p>The Brazilian DNA made available the operating margin emission factor calculated using "option c – Dispatch data analysis OM". Detailed information on the methods and data applied can be obtained in the DNA's website (http://www.mct.gov.br/index.php/content/view/317399.html#ancora). In accordance with the tool, for the dispatch data analysis, the emission factor shall be up-dated annually, i.e. the ex-post data vintage is chosen.</p> <p>According to the CER excel spreadsheet "Pesqueiro_CERs_2013.11.08_v.01.xls", the OM and CM grid emission factors calculated for the years 2010, 2011, 2012 and 2013 are as follows:</p> <p>2010 – OM grid EF = 0.4765 tCO₂/MWh 2011 – OM grid EF = 0.3032 tCO₂/MWh 2012 – OM grid EF = 0.4945 tCO₂/MWh 2013 – OM grid EF = 0.5944 tCO₂/MWh</p> <p>2010 – CM grid EF = 0.2285 tCO₂/MWh</p>		

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			<p>2011 – CM grid EF = 0.1852 tCO₂/MWh</p> <p>2012 – CM grid EF = 0.2330 tCO₂/MWh</p> <p>2013 – CM grid EF = 0.2580 tCO₂/MWh</p> <p>The weights applied in the CM grid EF calculation are in line with the requirements.</p> <p>w OM = 0.25</p> <p>w BM = 0.75</p> <p><u>Baseline emissions calculations:</u></p> <p>According to the methodology, baseline emissions are the product of the baseline emissions factor (EF_y) times the electricity supplied by the project activity to the grid (EG_y).</p> <p>The electricity supplied to the grid during the monitoring period is mentioned in the MR in Table 2. The DOE has crosschecked the information presented against official CCEE reports and measured data.</p> <p>In the months where a discrepancy was found (March, April and May 2012), this was due to the delay in calibration. The CERs calculation spreadsheet takes into account a lower amount of energy actually exported to the grid). This is in line with the requirements and conservative.</p> <p><u>For 2010:</u></p> <p>BE = 78,972 * 0.2285 = 18,037tCO₂e/MWh</p>		

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			<p><u>For 2011:</u> $BE = 76,735 * 0.1852 = 14,202\text{tCO}_2\text{e/MWh}$</p> <p><u>For 2012:</u> $BE = 78,341 * 0.2330 = 18,247\text{tCO}_2\text{e/MWh}$</p> <p><u>For 2013:</u> $BE = 69,520 * 0.2580 = 17,929\text{tCO}_2\text{e/MWh}$</p> <p>Spreadsheets verified by the DOE:</p> <ul style="list-style-type: none"> - "Pesqueiro_CERs_2013.11.08_v.01.xls" - "Energia Injetada 27.01.10 a 30.09.13.xls" - "Fator emissão grid_CIMGC.xls" <p>CAR 12: In the CER excel spreadsheet, "EFgrid,OM,2012" is mentioned in the worksheets for grid EF calculation in 2010., 2011 and 2013 (cells "D24").</p>		
C.1.6.3 Leakage parameters?	VVS	234(b)	No source of leakage was identified. The equipment was not transferred from another activity nor the existing equipment was transferred to another activity.	OK	OK
C.1.6.4 Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring	VVS	234(b)	Refer to CAR 04 and CAR 05.	CAR 04 CAR 05	OK

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plan?					
D. Data and parameters					
D.1 Data and parameters fixed ex ante or at renewal of crediting period					
D.1.1 For "Purpose of data", is one of the following options chose: (a) Calculation of baseline emissions or baseline net GHG removals by sinks; (b) Calculation of project emissions or actual net GHG removals by sinks; (c) Calculation of leakage?	MR		<p>Calculation of baseline and project emissions.</p> <p>Following parameters are listed in Section D.1:</p> <ul style="list-style-type: none"> - Build margin CO2 emission factor in year 2008 = 0.1458 tCO2/MWh. The value is sourced from Brazilian DNA and is the latest available at the time the 1st Crediting Period expired. - Installed capacity of the hydro power plant before the implementation of the project activity = 0 - Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full <p>Source of BM grid EF, DNA website: http://www.mct.gov.br/index.php/content/view/317399.html#ancora</p>	OK	OK
D.1.2 For "Value(s) applied", if applicable, is one table used to report multiple values referring to the same data and parameter? If necessary, are reference(s) to electronic	MR		Refer to D.1.1 above.	OK	OK

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spreadsheets used?					
D.1.3 Is the source of data provide and/or identified?	PS	195(d)	CAR 06: The source of data for parameter “EFgrid,BM,y” is not shown in the table in section D.1 in the MR.	CAR 06	OK
D.1.4 Is information about appropriate emission factors, IPCC default values and any other reference values that have been used in the calculation of GHG emission reductions or net GHG removals provided?	PS	195(g)	Refer to CAR 06.	CAR 06	OK
D.2 Data and parameters monitored					
D.2.1 For “Purpose of data”, is one of the following options chose: (a) Calculation of baseline emissions or baseline net GHG removals by sinks; (b) Calculation of project emissions or actual net GHG removals by sinks; (c) Calculation of leakage?	MR		The tables presented in section D.2 in the MR are complete and correct with respect to the “purpose of data” field.	OK	OK
D.2.2 For “Value(s) of monitored parameter”, if applicable, is one table used to report multiple values referring to the same data and parameter? If necessary, are reference(s) to electronic spreadsheets used?	MR		CAR 07: Provide the values for “EGBL,y” in Section D.2 in a table with yearly values. CAR 08: Section D.2 shall refer to the precise name of the CER spreadsheet used in the calculations. CAR 09: The “ <i>Guidelines for assessing compliance with the calibration frequency requirements</i> ” (EB 52, Annex 60) mentioned in different sections in the MR is no longer applicable. Refer to the latest VVS version.	CAR 07 CAR 08 CAR 09	OK

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D.2.3 Are the values of the monitored parameter for the purpose of calculating GHG emission reductions or net GHG removals provided? Where data are measured continuously, are they presented using an appropriate time interval? For default values (such as an IPCC value), where it is ex post confirmed, is the most recent value applied?	PS	195(a)	<p>All sources of data and values are correctly mentioned.</p> <ul style="list-style-type: none"> - Data related to “EF_{EL,DD,h}” for the years of 2010, 2011, 2012 and 2013 was provided by ONS (National Dispatch Center) and is presented in the CER spreadsheet; - Electricity generated by the project activity is based on internal records of the company (meters and spreadsheet): 303,567 MWh - Installed capacity of the hydro power plant after the implementation of the project activity: 12,440,000 W - 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: 330,00 m2 <p>Spreadsheets verified:</p> <ul style="list-style-type: none"> - “Pesqueiro_CERs_2013.11.08_v.01.xls” - “Energia Injetada 27.01.10 a 30.09.13.xls” - “Fator emissão grid_CIMGC.xls” <p>CAR 10: The following spreadsheets are not in English: “Energia Injetada 27.01.10 a 30.09.13.xls” and “Fator emissão grid_CIMGC.xls”</p>	CAR 10	OK
D.2.4 Is the equipment used to monitor each parameter described, including details on accuracy class, and calibration information (frequency, date of calibration and validity),	PS	195(b)	<p>Yes. There are two energy meters (principal and backup) model SAGA 1000, used for electricity measurement, which are in accordance with the specifications of the</p>	CAR 09	OK



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if applicable as per monitoring plan?			<p>regulatory agencies of the country and are located at the COPEL Substation (17km distant from the power plant). The meters are calibrated every two years.</p> <p>The MR in section D.2 presents the following information:</p> <p><u>Principal meter:</u></p> <p>Type: SAGA 1000 – 1681 D</p> <p>Accuracy: 0.2%</p> <p>Class: D</p> <p>Serial number: 226377</p> <p>Calibration frequency: every two years</p> <p>Previous calibration on: 19/03/2010</p> <p>Validity of previous calibration: 18/03/2012</p> <p>Date of last calibration: 15/05/2012</p> <p>Validity of last calibration: 14/05/2014</p> <p><u>Back-up meter:</u></p> <p>Type: SAGA 1000 – 1681 D</p> <p>Accuracy: 0.2%</p>		



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			<p>Class: D</p> <p>Serial number: 226378</p> <p>Calibration frequency: every two years</p> <p>Previous calibration on: 19/03/2010</p> <p>Validity of previous calibration: 18/03/2012</p> <p>Date of last calibration: 15/05/2012</p> <p>Validity of last calibration: 14/05/2014</p> <p>Considering that the recalibration date of both meters (main and backup) of the plant was delayed (between March and May 2012), the provisions of paragraph 4(a) of the "Guidelines for assessing compliance with the calibration frequency requirements" were applied.</p> <p>As a conservative approach, the maximum permissible error of the meter (i.e. 0.2%) was discounted from energy generation registered for the entire months of March, April and May 2012.</p> <p>Electricity is measured continuously, 5-minutes-measurement and monthly recording.</p> <p>Meters calibration certificates (from 2010 and 2012) were verified by the DOE.</p> <p>Refer to CAR 09.</p>		

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D.2.5 Is the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per the manufacturer's specification?	VVS	234(c)	Refer to section D.2.4 above. Refer to CAR 09.	CAR 09	OK
D.2.6 Is the calibration of those measuring equipments that have an impact on the claimed emission reductions conducted by the project participants at a frequency specified in the applied monitoring methodology and/or the monitoring plan?	VVS	237	Refer to section D.2.4 above. Refer to CAR 09.	CAR 09	OK
D.2.7 If, during verification of a certain monitoring period, the calibration has been delayed and the calibration has been implemented after the monitoring period in consideration (i.e. the results of delayed calibration are available), is the following conservative approach adopted in the calculation of emission reductions:	VVS	238			
D.2.7.1 Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled 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	VVS	238(a)	Yes. Considering that the recalibration date of both meters (main and backup) of the plant was delayed (between March and May 2012), the provisions of paragraph 4(a) of the "Guidelines for assessing compliance with the calibration frequency requirements" were applied. As a conservative approach, the maximum permissible	CAR 09	OK



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the maximum permissible error?			error of the meter (i.e. 0.2%) was discounted from energy generation registered for the entire months of March, April and May 2012. Refer to CAR 09		
D.2.7.2 Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment?	VVS	238(b)	Not applicable.	OK	OK
D.2.8 Has the error has been applied:	VVS	239	-	-	-
D.2.8.1 In a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed emission reductions?	VVS	239(a)	Yes, the CERs calculation is conservative and correctly follows the requirements. Refer to D.2.7.1 above.	OK	OK
D.2.8.2 For all measured values taken during the period between the scheduled date of calibration and the actual date of calibration.	VVS	239(b)	Not applicable.	OK	OK
D.2.9 In cases where the results of the delayed calibration are not available, or the calibration has not been conducted at the time of verification, prior to finalizing verification, were the project participants requested to conduct the required calibration have the project participants calculated the emission reductions conservatively using the approach	VVS	240	Not applicable.	OK	OK



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mentioned in item "D.2.7" above?					
D.2.10 In cases where it is not possible for the project participants to conduct the calibration at a frequency specified by either the applied methodology, guidance provided by the Board, and/or the registered monitoring plan due to reasons beyond the control of PPs, are the requirements for post registration changes, in section 9.5 of the VVS, followed?	VVS	241	Not applicable.	OK	OK
D.2.11 In cases where neither the monitoring methodology nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, are the equipments calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer's specification? If neither local/national standards nor the manufacturer's specification are available, were international standards used?	VVS	242	Not applicable.	OK	OK
D.2.12 Is it described how the parameters are measured/calculated and the measurement and recording frequency?	PS	195(c)	Yes. Electricity is measured continuously, 5-minutes-measurement and monthly recording.	OK	OK
D.2.13 Are monitoring results consistently recorded as per approved frequency?	VVS	234(d)	Yes. The monitoring results are consistently recorded every five minutes, in a higher frequency than the approved frequency in the registered PDD and totalized	OK	OK

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			on an hourly and monthly frequency.		
D.2.14 Is the source of data (e.g. logbooks, daily records, surveys, etc.) provide and/or identified?	PS	195(d)	<p>Yes. The DOE has verified in the monitoring report the monthly values of the energy dispatched to the grid.</p> <p>The monthly values in the reports "CB002" and "MRE001" ("<i>CliqCCEE</i>") are from an official source (CCEE reports and system) and represent the measured values at the meters.</p> <p>This is presented in section C in the MR.</p>	OK	OK
D.2.15 Where relevant is the calculation method of the parameter provided?	PS	195(e)	Yes.	OK	OK
D.2.16 Are the QA/QC procedures applied described (if applicable per monitoring plan)?	PS	195(f)	Refer to CAR 05.	CAR 05	OK
D.2.17 Have quality assurance and quality control procedures been applied in accordance with the monitoring plan or the revised monitoring plan?	VVS	234(e)	Refer to CAR 05.	CAR 05	OK
D.2.18 Is information about appropriate emission factors, IPCC default values and any other reference values that have been used in the calculation of GHG emission reductions or net GHG removals provided?	PS	195(g)	<p>Yes.</p> <p>Also in the excel spreadsheet "<i>Pesqueiro_CERs_2013.11.08_v.01.xls</i>"</p>	OK	OK
D.3 Implementation of sampling plan					

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D.3.1 Is a description provided on how project participants implemented the sampling efforts and surveys for those data and parameters according to the sampling plan, Include:	MR		Not applicable.	OK	OK
D.3.1.1 Description of implemented sampling design?	MR		Not applicable.	OK	OK
D.3.1.2 Collected data (electronic spreadsheets may be attached and referenced)?	MR		Not applicable.	OK	OK
D.3.1.3 Analysis of the collected data?	MR		Not applicable.	OK	OK
D.3.1.4 Demonstration on whether the required confidence/precision has been met?	MR		Not applicable.	OK	OK
E. Calculation of emission reductions or GHG removals by sinks					
E.1 Calculation of baseline emissions or baseline net GHG removals by sinks					
E.1.1 Are the sample calculations for all formulae used and calculation of baseline emissions or baseline net GHG removals by sinks provided, applying actual values?	MR PS	197(a)	Yes, sections E.1 and E.2 in the MR were verified by the DOE and are correct.	OK	OK
E.1.2 Are the electronic spreadsheets to present full calculations in the monitoring report attached?	MR		Yes, spreadsheets verified: <ul style="list-style-type: none"> - "Pesqueiro_CERs_2013.11.08_v.01.xls" - "Energia Injetada 27.01.10 a 30.09.13.xls" - "Fator emissão grid_CIMGC.xls" 	OK	OK

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CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
E.2 Calculation of project emissions or actual net GHG removals by sinks					
E.2.1 Are the sample calculations for all formulae used and calculation of project emissions or actual net GHG removals by sinks provided, applying actual values?	MR PS	197(b)	Yes, sections E.1 and E.2 in the MR were verified by the DOE and are correct.	OK	OK
E.2.2 Are the electronic spreadsheets to present full calculations in the monitoring report attached?	MR		Yes, excel spreadsheet named "Pesqueiro_CERs_2013.11.08_v.01.xls"	OK	OK
E.3 Calculation of leakage					
E.3.1 Are the sample calculations for all formulae used and calculation of leakage provided, applying actual values?	MR PS	197(c)	Not applicable.	OK	OK
E.3.2 Are the electronic spreadsheets to present full calculations in the monitoring report attached?	MR		Not applicable.	OK	OK
E.4 Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks					
E.4.1 Are the results of above sections summarized and GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period presented,	MR PS	197(d)	Yes, the table is complete in the MR in section E.4.	OK	OK

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CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
using the provided table?					
E.4.2 Is a complete set of data for the specified monitoring period is available?	VVS	245(a)	Yes.	OK	OK
E.4.3 Has information provided in the monitoring report been crosschecked with other sources such as plant log books, inventories, purchase records, laboratory analysis?	VVS	245(b)	<p>The DOE has crosschecked the values presented in the CERs spreadsheet against official reports issued by CCEE. However, copies of sales invoices (e.g. transaction notes, receipts, etc) are not provided in the documents presented to the lead verifier.</p> <p>CL 01: Provide copies of sales invoices for electricity dispatched to the grid in the monitoring period.</p>	CL 01	OK
E.4.4 Have calculations of baseline emissions, and project activity emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?	VVS	245(c)	<p>Yes, verified by the DOE. However:</p> <p>CAR 13: In the MR, page 14, after Table 4, the baseline emissions for each year should be presented as “tCO₂e” and not “tCO₂e/MWh”.</p>	CAR 13	OK
E.4.5 Have any assumptions used in emission calculations been justified?	VVS	245(d)	Not applicable.	OK	OK
E.4.6 Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	VVS	245(e)	Yes.	OK	OK

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CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
E.5 Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD					
E.5.1 Is a comparison of actual GHG emission reductions or net anthropogenic GHG removal of the project activity achieved during this monitoring period with the estimates in the registered PDD provided?	MR PS	198	Yes. Value estimated: 65,968 tCO ₂ e. Actual/monitored value: 68,145 tCO ₂ e.	OK	OK
E.6 Remarks on difference from estimated value in registered PDD					
E.6.1 For any registered CDM project activity, except A/R project activities, have project participants explained the cause of any increase in the actual GHG emission reductions achieved during the current monitoring period (e.g. higher water availability, higher plant load factor, etc.), including all information (i.e. data and/or parameters) that is different from that stated in the registered PDD?	MR PS	199	As explained in the MR, a total difference of 3.6% is noted when comparing the total emission reductions claimed during the monitored period (68,415 tCO ₂ e) against the total emission reductions estimated in the registered PDD (65,968 tCO ₂ e). The difference observed between the emission reductions calculated in the registered PDD and verified during the monitored period, can be attributed to increase of the monitored emission factor. The estimated CO ₂ emission factor of the grid considered for estimative proposes in the registered PDD was 0.2215tCO ₂ /MWh based on the values published by the Brazilian DNA for the year of 2008. This value is lower than the emission factor determined for years 2010, 2012 and 2013. The MR also explains that there was also a slight	CL 02 CAR 11 CAR 14	OK

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CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			<p>increase (2%) when comparing the in the electricity generated during the monitoring period (303,567MWh) against the electricity generation estimated in the registered PDD (297,824MWh).</p> <p>CL 02: It is not clear the reason why the electricity generated during the monitoring period was higher than previously estimated in the Registered PDD.</p> <p>CAR 11: The “Guidelines on Completeness Check of Requests for Issuance” (EB 48, Annex 68) is no longer applicable. Refer to the latest VVS version.</p> <p>CAR 14: The increase in ERs is actually 3.8%, and not 3.6% mentioned in the MR.</p>		
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					
E.7.1 If the monitoring period starts before 31 December 2012 and ends anytime thereafter, are actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved for the following two periods provided respectively? (a) Up to 31 December 2012 (1st commitment period); (b) From 1 January 2013 onwards.	MR		<p>Yes. Actual GHG emission reductions are provided for both (a) and (b), in separate tables. Section E.7 in the MR.</p> <p>Up to 31 December 2012: 50,486 tCO₂e</p> <p>From 1 January 2013 onwards: 17,929 tCO₂e</p>	OK	OK



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CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
E.7.2 Is it ensured that the achieved GHG emission reductions or net anthropogenic GHG removals by sinks are calculated proportionally for each period? In cases where annual caps were applied in the calculations, is it ensured that the annual caps are pro-rated to each period?	MR		Yes.	OK	OK

**Table 2 Resolution of Corrective Action /Clarification / Forward Action Requests**

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
CAR 01: There is an inconsistency between the list of project participants in Section A.3 in the MR and the cover page. The Private entity "The Chugoku Electric Power Co. Inc." from Japan is mentioned as a project participant in the table in Section 3 but this entity is not cited in the cover page of the MR.	Cover page (g)	Project Participant "The Chugoku Electric Power Co. Inc." has been withdrawn. The table in Section A.3 of the Monitoring Report was revised accordingly. Please refer to the second version of the MR, dated 17/02/2014.	The MR (table 3) was revised and Project Participant "The Chugoku Electric Power Co. Inc." is no longer shown in the MR. <u>CAR 01 is closed.</u>

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
CAR 02: The relevant dates for the project activity (e.g. construction, commissioning, continued operation periods) are not provided in the MR.	A.1.2.3	The requested information was included in Section A.1. of the revised version of the MR (version 2), dated 17/02/2014.	<p>The following text was included in the revised MR:</p> <p><i>"The plant construction started in May 2001 and was concluded in December 2002. The small hydropower plant started its commercial operations in January 2003."</i></p> <p><u>CAR 02 is closed.</u></p>
CAR 03: The MR does not present line diagrams showing the relevant monitoring points in the monitoring system.	C.1.1	A diagram was included in Section C of the revised version of the MR, dated 17/02/2014 (version 2).	<p>Figure 6 was included in the revised MR, which now presents the diagram with the relevant monitoring points in the monitoring system.</p> <p><u>CAR 03 is closed.</u></p>
CAR 04: Section C does not present the specification details of the monitoring equipment (i.e. electricity meters)	C.1.1	The requested information was included in Section C of the revised version of the MR, dated 17/02/2014 (version 2).	<p>Table 2 was included in the revised MR and now presents the specification details of the monitoring equipment (meters) as follows:</p>



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Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
			<p><u>Principal:</u></p> <p>LANDIS + GYR SAGA 1000 – 1681 D 226377</p> <p><u>Back-up:</u></p> <p>LANDIS + GYR SAGA 1000 – 1681 D 226378</p> <p><u>CAR 04 is closed.</u></p>
<p>CAR 05: The description of the monitoring system in the MR does not include the organizational structure, roles and responsibilities of personnel (including emergency procedures) for the monitoring of the system.</p>	<p>C.1.2</p>	<p>The requested information was included in Section C. of the revised version of the MR (version 2), dated 17/02/2014.</p>	<p>The following information was included in the revised MR:</p> <p><i>“In summary, the responsibilities of project participants regarding monitoring and reporting activities during the current monitored period are described below.</i></p> <ul style="list-style-type: none"> <i>• Pesqueiro Energia S.A.: To supervise, calibrate, operate, verify the metering and recording.</i> <i>• Pesqueiro Energia S.A.: Collection of any additional data</i>



Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
			<p><i>deemed necessary;</i></p> <ul style="list-style-type: none"> <i>Pesqueiro Energia S.A.: Train the personal involved;</i> <i>CDM Consultancy: Provide the calculation template, continuous advice the staff on a need basis and prepare monitoring report</i> <i>Pesqueiro Energia S.A. / CDM Consultancy: Archive the monitoring data, in accordance with internal procedures"</i> <p><u>CAR 05 is closed.</u></p>
CAR 06: The source of data for parameter "EFgrid,BM,y" is not shown in the table in section D.1 in the MR.	D.1.3	The build margin CO ₂ emission factor was determined at validation. The source of data is the Brazilian DNA. This information was included in the table presented in Section D.1. of the MR. Please refer to the revised version of the document (version 2) dated 17/02/2014.	<p>Source of data is Brazilian DNA. The information was included in the revised MR.</p> <p><u>CAR 06 is closed.</u></p>

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Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
CAR 07: Provide the values for “EGBL,y” in Section D.2 in a table with yearly values.	D.2.2	The requested information was included in Section D.2. of the MR (version 2), dated 17/02/2014.	<p>The yearly values were included in Section D.2 in the revised MR.</p> <p>Year EGBL,y (MWh)</p> <p>2010: 78,972</p> <p>2011: 76,735</p> <p>2012: 78,341</p> <p>2013: 69,520</p> <p><u>CAR 07 is closed.</u></p>
CAR 08: Section D.2 shall refer to the precise name of the CER spreadsheet used in the calculations.	D.2.2	Whenever applicable, Section D.2. of the MR was revised to present the precise name of the file of the Excel spreadsheet used in the CERs calculations. Please refer to the revised version of the MR (version 2), dated 17/02/2014.	<p>References to the CERs spreadsheet were corrected in the revised MR.</p> <p><u>CAR 08 is closed.</u></p>
CAR 09: The “Guidelines for assessing compliance with the calibration frequency requirements” (EB 52, Annex 60) mentioned in different sections in the MR is no longer applicable. Refer to the latest VVS version.	D.2.2	The requested information was corrected in the revised version of the MR (version 2), dated 17/02/2014, which now refers to the VVS.	<p>The reference to calibration requirements was corrected to VVS v5, paragraph 238.</p> <p><u>CAR 09 is closed.</u></p>

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Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
CAR 10: The following spreadsheets are not in English: "Energia Injetada 27.01.10 a 30.09.13.xls" and "Fator emissão grid_CIMGC.xls"	D.2.3	<p>Please see attached copies of the requested spreadsheets translated into English.</p> <p><u>Answer 25/02/2014</u></p> <p>The name of the files were translated into English as requested.</p>	<p>The spreadsheets were revised to English. However, the names are still in Portuguese.</p> <p><u>CAR 10 is not closed.</u></p> <p><u>Second Analysis:</u> The files were translated to English.</p> <p><u>CAR 10 is closed.</u></p>
CAR 11: The "Guidelines on Completeness Check of Requests for Issuance" (EB 48, Annex 68) is no longer applicable. Refer to the latest VVS version.	E.6.1	<p>Reference to the mentioned Guidelines (EB48, Annex 68) was excluded). The comparison between actual GHG emission reductions and the value estimated in the registered PDD is done in accordance with the provisions of the "Project Standard" as per the recommendation of the "Guidelines: Completing the Monitoring Report form". Please refer to the revised version of the MR (version 2), dated 17/02/2014.</p>	<p>The reference was corrected to the latest Project Standard (EB 65, Annex 05).</p> <p>The MR was revised.</p> <p><u>CAR 11 is closed.</u></p>
CAR 12: In the CER excel spreadsheet, "EFgrid,OM,2012" is mentioned in the worksheets for grid EF calculation in 2010.,	C.1.6.2	<p>The requested information was corrected. Please refer to the revised version of the CER calculation spreadsheet attached to this</p>	<p>The spreadsheet was revised and the references corrected.</p>



Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
2011 and 2013 (cells "D24").		protocol.	<u>CAR 12 is closed.</u>
CAR 13: In the MR, page 14, after Table 4, the baseline emissions for each year should be presented as "tCO ₂ e" and not "tCO ₂ e/MWh".	E.4.4	<u>Answer 19/03/2014</u> The information was corrected. Please refer to the third version of the Monitoring Report, dated 19/03/2014.	The information was corrected in the revised MR. <u>CAR 13 is closed.</u>
CAR 14: The increase in ERs is actually 3.8%, and not 3.6% mentioned in the MR.	E.6.1	<u>Answer 19/03/2014</u> In fact, the proportional estimative of CERs considering the monitoring period was revised. The increase was equal to 3.7% as demonstrated in the second version of the CERs spreadsheet, previously forwarded to the DOE. Section E.6. of the Monitoring Report was revised considering this information.	Revision and response accepted by the DOE. The MR was revised. <u>CAR 14 is closed.</u>
CL 01: Provide copies of sales invoices for electricity dispatched to the grid in the monitoring period.	E.4.3	Due to the particularities of the electricity commercialization process in Brazil, sales invoices are not used to confirm the electricity dispatched to the grid by the plant. Please refer to the registered PDD for details regarding the measurement methods for parameter $EG_{BL,y}$. <u>Answer 25/02/2014</u> The reports ME001 issued by CCEE are used	Clarification provided was accepted. However, since the MR mentions that " <i>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)</i> ", clarify, in the



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Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
		to cross-check electricity generation by the plant during the monitored period as reported by the PP. The name of the files corresponds to the month and year information refers to.	<p>documents provided during site visit, the names/reference to the relevant files (i.e. CCEE records for sold electricity).</p> <p><u>CL 01 is not closed.</u></p> <p><u>Second Analysis:</u></p> <p>The response was accepted by the DOE. The reports were verified.</p> <p><u>CL 01 is closed.</u></p>



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Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
CL 02: It is not clear the reason why the electricity generated during the monitoring period was higher than previously estimated in the Registered PDD.	E.6.1	<p>In fact, the total monitored electricity generation over the considered period is higher than the total estimated in the PDD. However, if the years are considered separately, this is not true.</p> <p>The electricity generation is estimated considering the assured energy of the plant, which is determined by the regulatory agency based on historic values of river flow from the region the plant is located.</p> <p>Section E.5. of the Monitoring Report was revised to include a better justification for the difference between the expected and actual emission reductions by the Project. Please refer to the revised version of the MR (version 2), dated 17/02/2014.</p>	<p>Section E.6 in the MR was revised. Table 6 and Figure 7 were also included.</p> <p>The additional information provided was accepted by the validation team. In summary, when annual electricity generation is considered, only in 2010 and 2013 the monitored electricity generation was above the estimated levels (due to increased river flows during those years).</p> <p><u>CL 02 is closed.</u></p>