




## Validation report form for CDM project activities

(Version 01.0)

Complete this form in accordance with the "Attachment: Instructions for filling out the validation report form for CDM project activities" at the end of this form.

## VALIDATION REPORT

<b>Title of the project activity</b>	Small Hydro Power Plant Ernestina CEEE
<b>Version number of the validation report</b>	5.5
<b>Completion date of the validation report</b>	09 June 2016
<b>Version number of PDD to which this report applies</b>	5.2
<b>Date when PDD was uploaded for global stakeholder consultation</b>	23 June 2012
<b>Project participant(s)</b>	CEEE-GT (Companhia Estadual de Geração e Transmissão de Energia Elétrica) and Lumina Engenharia e Consultoria Ltda
<b>Host Party</b>	Brazil
<b>Estimated annual average GHG emission reductions or net removals in the crediting period (tCO<sub>2</sub>e)</b>	8,992
<b>Sectoral scope(s) and selected methodology(ies)</b>	Sectorial Scope: Energy Industries (Renewable / Non-renewable Sources - 01 ACM0002 - Grid-connected electricity generation from renewable sources. Version 17.0 (EB 89, Annex 1) Valid from 13 May 2016
<b>Name of DOE</b>	Perry Johnson Registrars Carbon Emissions Services, INC
<b>Name, position and signature of the approver of the validation report</b>	Bilal Anwar – Final Approver 

**SECTION A. Executive summary**

Lumina Engenharia e Consultoria Ltda. has commissioned PJRCES, Inc to perform the validation of the project: Small Hydro Power Plant Ernestina CEEE. The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against CDM Validation and Verification Standard (version 09.0), Kyoto Protocol requirements and UNFCCC rules.

**SECTION B. Validation team, technical reviewer and approver****B.1. Validation team member**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader	IR	Costa	Ricardo	PJR CES	X			X
2.	Validator	IR	Georg Zenk	Georg Zenk	PJR CES	X	X	X	X
3.	Technical Expert	IR	Cardoso	Luiz	Independent resource		X	X	X
4.	Financial Expert	IR	Mahesh	Anu	PJR CES		X	X	X

**B.2. Technical reviewer and approver of the validation report**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Kumar	Sathis	PJR CES
2.	Approver	IR	Anwar	Bilal	PJR CES

**SECTION C. Means of validation****C.1. Desk review**

The desktop review includes:

- ↳ A review of the PDD (including annexes) and the relevant supporting documents. The detailed list of documents reviewed throughout the validation process, are included in the section 7, under references.
- ↳ Preparation of project specific validation checklist in line with the requirements of the §37 of the CDM M&Ps, the applicability conditions of the selected methodology and guidance issued by the Board VVSv9.0.
- ↳ Reporting of validation findings taking into account the public comments received on UNFCCC website.

In order to ensure that no relevant information has been omitted, PJRCES, Inc has performed following follow-up actions:

- ↳ Interviews with relevant stakeholders in the host country, personnel with knowledge of the project design and implementation;
- ↳ Cross checks between information provided by interviewed personnel (i.e. by checking sources or other interviews).
- ↳ Background investigation and follow-up interviews with personnel of the project participant, the CDM project consultant, legal authorities and other stakeholders.

**C.2. On-site inspection**

Duration of on-site inspection: 09 August 2012				
No.	Activity performed on-site	Site location	Date	Team member
1.	Review of documentation related to: - Letters of Approval - Project boundaries - Technical description - Applicability of selected methodology - Baseline determination - Additionality/ investment Analysis - Emission reduction calculation - Monitoring plan - Environmental aspects and permits - Stakeholder process (local and global)	PP Office and project location	09 August 2012	Georg Zenk Luiz Cardoso
2.	Installations, equipment, project design and technical documentation related to the project activity	PP Office and project location	09 August 2012	Georg Zenk Luiz Cardoso

**C.3. Interviews**

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Mello	Marcos	CEEE GT	09 August 2012	Monitoring & metering arrangements, Calibration Frequency, Local stakeholder consultation, Technology, O&M Practice	Georg Zenk Luiz Cardoso
2.	Badaro	Clovis	Lumina	09 August 2012	Project development	Georg Zenk Luiz Cardoso
3.	Moss	Ursula Vettori	Lumina	09 August 2012	Local stakeholder consultation, Technology, O&M Practice	Georg Zenk Luiz Cardoso

**C.4. Sampling approach**

Not applicable as project does not have sampling approach.

**C.5. Clarification requests, corrective action requests and forward action requests raised**

During the validation of a project activity, where PJRCES, Inc identified issues that required further elaboration, research or expansion in order to determine whether the project activity meets the relevant CDM requirements, and can achieve credible emission reductions, PJRCES, Inc ensured that these issues are accurately identified, formulated, discussed and concluded in the validation report in form of following different types of findings.

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

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR)**. A CAR is issued, where:

- I. The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- II. The CDM requirements have not been met;
- III. There is a risk that emission reductions cannot be monitored or calculated.

The validation process may be cut short until this information has been made available to the validation team's satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

Additionally, a **Forward Action Request (FAR)** may be raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. The FARs so identified however, shall not relate to the CDM requirements for registration.

The validation protocol serves the following purposes:

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

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Global stakeholder consultation			
Approval		1	
Authorization			
Contribution to sustainable development			
Modalities of communication		1	
Project design document			
Description of project activity		2	
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline	1	2	
- Deviation from methodology			
- Clarification on applicability of methodology, tool and/or standardized baseline			
- Project boundary		1	
- Establishment and description of baseline scenario			
- Demonstration of additionality	3	13	
- Emission reductions		14	
- Monitoring plan		1	
Duration and crediting period			
Environmental impacts	1		
Local stakeholder consultation			
Others (please specify)			
<b>Total</b>	<b>5</b>	<b>35</b>	<b>0</b>

## SECTION D. Validation findings

### D.1. Global stakeholder consultation

In accordance with sub-paragraphs 40 (b) and (c) of the CDM modalities and procedures, the project design document of a proposed CDM project activity shall be made publicly available and the DOE shall invite comments on the validation requirements from Parties, stakeholders and UNFCCC accredited non-governmental organizations and make them publicly available. This chapter describes this process for this project.

The Project Design Document Version 1 dated 06 June 2012 for this project was made available on <http://cdm.unfccc.int/Projects/Validation/DB/U3UUEKMPQ3IIU9S2A32XGNIYQEJG87/view.html> and was open for comments for Parties, Stakeholders and Accredited NGO's for a period of 30 days starting from 23 June 2012 until 22 Jul 2012.

One stakeholder has submitted comments to the DOE.

The comments mainly referred to additionality demonstration.

A description of how the Validation Team has taken due account of the comment received.

The comments received from Lasith addresses a total of 29 issues divided in 2 parts. All comments were answered by PP and provided to the validation team as well as included in the PDD version 5.2. The validation team has thoroughly evaluated all the comments and responses received from the PP.

Comments by Lasith #1	PP's responses	Evaluation of validation team
1) The project is claimed to be run of river hydro project. So the calculation of reservoir is wrong. The criterion 3 is applicable only to pumped storage or accumulation hydro projects. What does reservoir refer to as per PP?	The SHPP Ernestina first started its operations in 1957 exploring the renewable hydrological potential of the Jacuí River. The installed capacity of the original power plant is 4.80 MW, with a reservoir of 38.02 km <sup>2</sup> . The proposed capacity addition project activity will add 9.60 MW in the SHPP Ernestina without any modification on its existent reservoir. Since there will be no increase in the area of the existing reservoirs, there is no project emissions of CH <sub>4</sub> from the reservoir. The only GHG emission considered are baseline CO <sub>2</sub> emissions from electricity generation in fossil fuel fired power plants in the grid that are displaced due to the project activity.	Project is the capacity addition to an existent plant which operates a run-of-river since 1957. As per operation licences /19//20/ and basic project design /10/, which were assessed by the validation team concluded the plant includes a run-of-river. Validation team has reviewed the calculation which also was calculated in accordance with the methodology and tools.
2) The justification of opting out alternative 3 and alternative 4 is not justified adequately. It should be based on latest published data and figures. Refer B.4. Pls. clarify.	<p>The project activity is a capacity addition and according to the latest version of the methodology ACM0002 (Version 17.0), if the project activity is a capacity addition to existing grid-connected renewable power plant/unit, the baseline scenario is the following:</p> <p>In the absence of the CDM project activity, the existing facility would continue to supply electricity to the grid at historical levels, until the time at which the generation facility would likely be replaced or retrofitted (DATEBaselineRetrofit). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.</p>	PP has correctly applied the ACM0002 and calculated the emission reductions applying the correct emission factor which is published by Brazilian DNA. All justifications were duly presented by the PPs

	<p>According to ACM0002, the baseline emissions include only CO<sub>2</sub> emissions from electricity generation in fossil fuel fired plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.</p> <p>The emission factor was calculated as per option (a) in a transparent and conservative manner as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system"</p> <p>The combined margin emission factor of the Brazilian grid is calculated according to the "Tool to calculate the emission factor for an electricity system" by the National Science and Technology Ministry. The CO<sub>2</sub> emission factors for electricity generation on the grid, necessary for the CM calculation, are calculated based on the generation record of plants centrally dispatched by the National System Operator - ONS. Therefore, the CM emission factor for the grid will be used to calculate the emission reductions of the project.</p>	
3) The bilateral agreements, PPA with India are the documents, DOE to check thoroughly	The project's energy price was defined by the most recent Energy Auction Price prior to the investment decision date in Brazil that contracted hydroelectricity for a price of R\$67.31/MWh (dated on 17/Dec/2010). Please see Section B.5 of the PDD for more information.	Such documentation does not exist since project is in Brazil. However, validation team concluded the energy price used in the investment analysis was correctly applied since the price is the most updated prior to the investment decision date. The price is from the electricity auction of 17 December 2010.

<p>4) Date of investment decision should be at the time of DPR preparation. So, the basis of the cost escalation factors at a later date for CDM consideration is not valid. Pls. clarify. Refer B5. Step 3a. (Investment barrier).</p>	<p>As explained in Section B.5 of the PDD, according to the Glossary of CDM Terms, the starting date of a project activity is “the earliest date at which either the implementation or construction or real action of a project activity begins” which is commonly the date when PPs commits to significant expenses related to the effective implementation or construction of the project activity.</p> <p>Considering that SHPP Ernestina project activity still hasn't acquired its new equipment since CEEE's will first publish a Bidding Announcement for contracting a company to sign an EPC contract. Thus, the signature of this contract will be the project's starting date since it will be the point with no return for developing the project activity. The Bidding Announcement is due to 01/Dec/2013 and the EPC contract signature is estimated to 01/Mar/2014, which will be the project's starting date.</p>	<p>Investment date was reviewed by the validation team and it is considered to be in accordance with the CDM Glossary of Terms.</p>
<p>5) How the CDM benefit will alleviate the technical barriers. As per additionality tool, if the barriers are not alleviated by CDM, then the project is not additional.</p>	<p>As per the “Tool for the demonstration and assessment of additionality”, project participants may choose to proceed with Step 2: Investment analysis or Step 3: Barrier analysis.</p> <p>PP decided to use an investment analysis to demonstrate and assess SHPP Ernestina's additionality and no barrier analysis was described in this PDD.</p>	<p>The comment does not apply to the project activity as the approach of demonstration and assessment of additionality is investment analysis.</p>
<p>6) Emission factor for state is not calculated.it should be made available to DOE to clearly validate this value. Emission factor for India is not as per “Tool for emission factor for the system”.</p>	<p>According to ACM0002, the baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.</p>	<p>In Brazil, the Brazilian DNA regularly publishes the emission factors which were correctly applied by the PPs.</p>

	<p>The emission factor was calculated as per option (a) in a transparent and conservative manner as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system"</p> <p>The combined margin emission factor of the Brazilian grid is calculated according to the "Tool to calculate the emission factor for an electricity system" by the National Science and Technology Ministry. The CO<sub>2</sub> emission factors for electricity generation on the grid, necessary for the CM calculation, are calculated based on the generation record of plants centrally dispatched by the National System Operator - ONS. Therefore, the CM emission factor for the grid will be used to calculate the emission reductions of the project.</p>	
7) Electricity generated by the project, auxiliary consumption, transmission losses, transformer losses, net electricity exported to India, net electricity exported to the grid. These parameters to be monitored continuously and to be cross checked with sale receipts.	The project is located in Brazil, not India. All monitoring parameters determined by the applied methodology and tool will be monitored continuously. Please see section B.7 for more information.	All parameters to be monitored for the proposed project activity by the PPs are in accordance as per monitoring methodology of ACM0002.
<p>8) The Meth mentions that if investment analysis option is used, apply the following:</p> <p>a. Apply an investment comparison analysis, as per Step 3 of the Combined tool to identify the baseline scenario and demonstrate additionality., if more than one alternative is remaining after Step 2 and if the remaining alternatives include scenarios P1 and P3;</p> <p>b. Apply a benchmark analysis, as per Step 2b of the Tool for the demonstration and assessment of additionality. If more than one alternative is remaining after Step 2 and if the</p>	<p>The project activity applies the "Tool for the demonstration and assessment of additionality" and not the "Combined tool". Please see Section B.5 of the PDD for more information.</p> <p>Also, the project's PLF was defined by a third party contracted by PPs. As stated in Section A.3, the proposed capacity addition project activity will add 9.60 MW in the SHPP Ernestina with three Francis-type turbines and three synchronous generators, with an estimated load factor of 54.16%, based in an assured energy of 5.20 MW average, which was calculated by a third party contracted by project participants. The company Magna Engenharia</p>	<p>PP has correctly applied the tool and investment analysis was fully reviewed by the validation team and concluded it is correctly applied.</p> <p>PLF was calculated by a third party which is in accordance with the guidelines.</p>



<p>remaining alternatives include scenarios P1 and P2.</p> <p>But PP failed to apply like this. Pls. clarify.</p> <p>PLF should be based on EB48 Annex 11 guideline which says The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval; (b) The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company); But PDD doesn't demonstrate how PLF has been arrived at.</p>	<p>was responsible for the elaboration of the project's Basic Design and was made available to the DOE.</p>	
<p>9) Whether PLF includes machine shutdown, machine availability. Whether grid availability is accounted for in the calculation of gross generation. To my surprise, critical parameter like PLF is missing from the PDD. How DOE has allowed this.</p>	<p>As stated in Section A.3, the proposed capacity addition project activity will add 9.60 MW in the SHPP Ernestina with three Francis-type turbines and three synchronous generators, with an estimated load factor of 54.16%, based in an assured energy of 5.20 MW average, which was calculated by a third party contracted by project participants. The company Magna Engenharia was responsible for the elaboration of the project's Basic Design and was made available to the DOE.</p>	<p>The comment does not apply to the proposed project activity as PLF is a parameter presented and calculated by an independent third party which was reviewed by the validation team who concluded the PLF calculation is correct.</p>
<p>10) Common practice analysis should be based on EB 39 Annex 10 (Additionality tool). Each step of common practice analysis should be fulfilled as per tool.</p>	<p>The common practice analysis was done as per the "Guidelines on Common Practice", version 02, EB69, Annex 8. All steps were fulfilled as per the tool. Please see Section B.5 for more details.</p>	<p>PP has correctly applied the most recent guidelines on Common Practice which is version 02, from EB69, Annex 8. Steps were fully reviewed by the validation team and concluded it is correct.</p>
<p>11) Emission reduction calculation should be based on EB 50 Annex 14 "Tool for emission factor for the electricity system.</p>	<p>Project's emission reductions were calculated as per EB70/Annex 22 - "Tool to calculate Emission Factor for an electricity system" (version 03.0.1).</p>	<p>PP has correctly applied the most recent tool to calculate Emission Factor for an electricity system which is version 03.0.1, from EB70, Annex 22. Values applied were reviewed by the validation team and concluded they are correct.</p>
<p>12) Whether only one set of main meter, check meter set is</p>	<p>As stated in section B.7.3, the measurement of the electricity</p>	<p>According to basic project design two meters will be part of the</p>

enough for three projects. The monitoring parameters need to be checked by DOE.	generated and delivered to the grid will be done by two three-phases four wire electronic redundant meters which will send data to the grid through a gateway.	proposed project activity and are included in the monitoring plan which in accordance with the monitoring methodology of ACM0002
13) The main meter and check meter technical parameters like accuracy level, make, etc. needs to be mentioned in the PDD.	All technical parameters regarding the project's main and back up meter are described in section B.7 of the PDD.	All parameters of the proposed project activity and are included in the monitoring plan which in accordance with the monitoring methodology of ACM0002
14) Layout of power transmission lines from the generation to the consumer with the metering system is not shown. It should include the distance of transmission lines. DOE has to check the meters are installed to monitor electricity generated, net electricity used in Bhutan, net electricity exported to India. Pls. clarify.	Please see Figure 8 in Section B.7.3. Further, the project is located in Brazil and not India.	According to basic project design two meters will be part of the proposed project activity and are included in the monitoring plan which in accordance with the monitoring methodology of ACM0002.
15) The status of the construction & commission of the project is not stated in the PDD.	As stated in Section B.5, SHPP Ernestina project activity still hasn't acquired its new equipment since CEEE's will first publish a Bidding Announcement for contracting a company to sign an EPC contract. Thus, the signature of this contract will be the project's starting date since it will be the point with no return for developing the project activity. The Bidding Announcement is due to 01/Dec/2013 and the EPC contract signature is estimated to 01/Mar/2014, which will be the project's starting date.	PP has duly explained in the PDD the status of the project which is considered to be in accordance with methodology, tools and guidelines.
16) What is the basis of calculation for transmission loss, auxiliary consumption and transformer losses? What is the length of transmission line?	The methodology and tools applied by the project activity doesn't state anything regarding transmission and transformer losses. Please see Section B.7 for more details on the project's monitoring system.	Comment does not apply to the proposed project activity as all parameters of the proposed project activity and are included in the monitoring plan which in accordance with the monitoring methodology of ACM0002.
<b>Comments by Lasith #2</b>	<b>PP's responses</b>	<b>Evaluation of validation team</b>
1) DOE to ensure that the PDD values are consistent and ensure that the CDM project is a genuine project.	All values used on the PDD were evidenced with technical documentation elaborated by third parties to the project activity.	The validation process is meant to assess those issues. The FVR summarizes the validation process including evidences and references with validation opinions by the DOE.
2) DoE to check the Detailed Project Report and Feasibility	All documentation presented as evidence to the DOE is official and	The validation process is meant to assess those issues. The FVR

Report which is submitted to the other agencies and Banks by Project owner and ensure that the values match with the DPR/FR submitted to DOE also.	is the same presented to agencies and banks.	summarizes the validation process including evidences and references with validation opinions by the DOE.
3) Careful study must be done so that the DPR/FR is not in different versions made and submitted with different purposes to different agencies, which is totally unacceptable, illegal and unethical.	All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.	As reported in this FVR the DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.
4) Project owner should show some undertaking letter from bank manager to DoE stating that both DPR's are same. These kinds of letters should not be accepted and entertained by DoE at face value, but must be checked independently. While collecting the DPR/FR from banks and other agencies, all DPR/FR pages should be counter signed by Banks and other agencies so that the real DPR/FR given to other parties by the PP/Consultant is same as the one submitted to DOE.	All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.	As reported in this FVR the DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.
5) DPR/FR values must be probed fully. DOE must take a written undertaking from the PP/Consultant about the list of parties to whom this DPR/FR is submitted and for what purposes. Then DOE should cross check with all the parties and confirm that the same DPR/FR is submitted to all the parties correctly without any changes. DOE must not accept any reports and undertakings from PP/Consultant. DOE must make independent evaluation and use totally different parties without informing the PP or Consultant to cross check the facts.	All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.	As reported in this FVR the DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.
6) DOE to write to the party who prepared the DPR/FR which is submitted to the banks and other agencies and the same is verified against the one submitted to the DOE by PP/Consultant.	All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.	As reported in this FVR the DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.
7) DOE must not entertain this project any more if found the	All documentation presented as evidence to the DOE is official and	As reported in this FVR the DOE evaluated thoroughly the

<p>DPR/FR is tampered with at any point in time. PP cannot give different DPR's and FR's. They must submit only the one given to Banks and other agencies while obtaining loans and decision making time.</p>	<p>is the same presented to agencies and banks.</p>	<p>evidences provided by the PP and provides its conclusion in this FVR.</p>
<p>8) Has the PP considered the CDM revenues while envisaging the project? Without CDM the project was not viable, is it right? This project is having a debt component? Then how bankers or lenders gave the loan? Have the bankers or lenders considered the CDM revenues while agreeing to give loan to these projects? If not this project should be rejected right away by DOE by terminating the contract forthwith. If yes, where is the proof? What is the date of the evidence document from bank? Is this document printed now a day or earlier? DOE to independently check the same. If the document is available from Bank it must be checked from all angles so that it is genuine and not forged and date changed by putting back dated. This is normally done, DOE to be aware of this please. Please check the communication the PP had during that time with banks, emails and postal receipts and the weights and dates mentioned on the receipts. Do not believe in courier bills and receipts since these can be cooked up easily. Insist on government owned postal service receipts only. If the project is fully equity project then on what basis the PP has invested full equity in to the project while considering the CDM revenue? DOE to check the same in detail and bring out the facts. Is there any past record of this PP to invest or not to invest at returns what he is talking about in this project? Proper evidences must be reviewed and investigated by the DOE and take decision on the project based on established facts. Do not ask</p>	<p>All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.</p> <p>The project activity is not feasible without CDM support as evidenced and justified in Section B.5 of the PDD. As justified in this section, the project's IRR is 2.70%, by far lower than the selected benchmark WACC of 10.20%.</p> <p>Also, a sensitivity analysis was performed to evidence that even with a variation of the project's financial values; it would still need CDM support. As explained in this analysis, even with a variation of at least -59.90% in the overall investment, +87.40 in the Energy Price and +141.50% in the electricity generated to become feasible. All these scenarios were justified in Section B.5 and it was confirmed that such variations are not likely to happen. As for the project's O&amp;M costs, even with a variation of -100% the project's IRR would still be lower than the selected benchmark.</p>	<p>As reported in this FVR the DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.</p> <p>The investment analysis and sensitivity analysis was evaluated according the VVS standard and guidelines. The response by the PP could be confirmed. For details see chapter 4.6 of this report.</p>

documents from PP, DOE to collect the same from different sources to do independent evaluation.		
9) Is the project equipment purchased second hand equipment or sourced from cheap foreign sources? If yes, the issue must be probed by DOE since invoices will invariably be inflated and forged. Total project costs mentioned by PP will not be the same as originals. Hence no additionality. These facts must be probed in full by DOE by checking all documents and money transactions along with bank statements and certified accounts by a legally acceptable financial analyst.	As explained in Section A.4.3 of the PDD, The project activity comprises national equipment and, thus, there is no technology or know-how transference to the Host Party for the application of the project.	As reported in this FVR the DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.
10) From DOE side which auditor has done marketing and business development for acquiring this business of validating this project? With whom he or she was coordinating at PP or CER buyer? The same person who has done the marketing and business development to acquire the business do validation or participate in any manner what so ever in the validation process? One cannot do like that. It is against the accreditation rules and norms followed since ages. DOE should send auditors from different offices or countries to do this validation audit. DOE must take care of impartiality and accreditation rules. Due to the targets set by the DOE managements auditors are doing marketing and meeting clients and giving promises that the project will be taken care. Is it acceptable and fair? This must be stopped. No auditor should do marketing. Only non-auditing staff should do marketing. DOE to ensure the same please.	Not applicable.	None of the validation team members as listed in chapter 1.3 of this report has been involved in the acquisition of this project. The Lead Auditor is based in Germany and travelled to Brazil for auditing purposes only.
11) If applicable only: Is these machines, equipment was a part of any bundle of CDM activity envisaged and developed earlier.	Not applicable.	The contract between the PP and the DOE includes those issues raised by Lasith.

<p>DOE to check the same through independent sources also. Once some bundles are non-additional and getting negative validation from a DOE, PP is rolling out the same project as an individual project, which is not a CDM project at all. DOE to verify the same from independent sources and take undertaking in the form of an affidavit from the PP's that any misrepresentation or false statements with respect this would attract strict legal action from UNFCCC and DOE. Furthermore, the registered project must be de-registered in case of any future findings contradicting the submissions made by the project owner.</p>		
<p>12) DOE to be more careful so that this is a genuine CDM project. What is the exact project cost? The project cost is covering what? Each value considered must be validated with proof. The machinery is second hand purchased or fresh and new from an OEM? In either case DOE to check all the quotations, proposals, purchase orders, invoices, way bills, transport bills, proof of payments like bank statements. DOE to check with banks by way of written confirmation the amount transacted, to whom the money is paid, when the money is paid, is the party paid is the correct party as shown in the purchase orders. It may so happen that the values, party names, dates are fabricated and misrepresented in this project. DOE should terminate their contract for this project immediately. This is the only way out to protect the value of CDM process. If the PP is purchasing second hand or second quality equipment and inflating the purchase order values and invoices, this must be probed thoroughly and real values to taken for additionality calculation.</p>	<p>All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.</p> <p>As explained in Section A.4.3 of the PDD, the project activity comprises national equipment and, thus, there is no technology or know-how transference to the Host Party for the application of the project.</p> <p>Also, as justified in Section B.5, the project's total investment is R\$38,803,000.00 as per the Eletrobrás Standard Budget Sheet, which was made available to the DOE.</p>	<p>DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.</p>

Then I'm sure the additionality is not there at all in such a situation.		
13) How is the base line defined in this project? Is Base line hypothetically defined with no proper evidences and proper justification? In such case, DOE cannot take the base line as suggested by the PDD. Please check that there are real emission reductions beyond the real and factual base line. It may so happen that this project qualifies for no CER's. DOE cannot assume values and things as giving by this PP. Whatever values are considered throughout the project in all documents including the real DPR (not the one prepared for CDM, the one given to the banks and others), they must be validated, verified and double checked. Do not ask PP for DPR. Ask the parties who have been given DPR by the PP. Get directly from the bank and others by each page of the DPR and Feasibility report signed. Such document can be considered as a real DPR or FR. UNFCCC CDM process cannot be degraded by fabricating and misinterpreting the project base line and additionality.	<p>As explained in Section B.4, the project's baseline scenario was defined with reference in the approved methodology ACM0002, Version 17.0 and since the project is a capacity addition to existing grid-connected renewable power plant/unit, the baseline scenario is the following:</p> <p>In the absence of the CDM project activity, the existing facility would continue to supply electricity to the grid at historical levels, until the time at which the generation facility would likely be replaced or retrofitted (DATEBaselineRetrofit). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.</p> <p>Also, all emission reductions by the project activity were calculated according to ACM0002 and are all evidenced and justified in Section B.6 of the PDD.</p> <p>All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.</p>	DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.

## D.2. Approval

The referred LoA/46/ has been received directly from the project participant and its authenticity has been confirmed by visiting a web link given by the Party [http://www.mct.gov.br/index.php/content/view/57965/Atividades\\_de\\_Projetos\\_MDL\\_submetidos\\_a\\_Comissao\\_Interministerial\\_no\\_ambito\\_do\\_Mecanismo\\_de\\_Desenvolvimento\\_Limpo.html](http://www.mct.gov.br/index.php/content/view/57965/Atividades_de_Projetos_MDL_submetidos_a_Comissao_Interministerial_no_ambito_do_Mecanismo_de_Desenvolvimento_Limpo.html) and comparing with other letters issued by the Brazilian DNA for other registered CDM projects<sup>1</sup>.

<b>Means of validation</b>	Validated from LoA review.
<b>Findings</b>	CAR04
<b>Conclusion</b>	In the opinion of the validation team the LoA/46/ is meeting the requirements stipulated in the §38 §44 for approval and §50 §52 for contribution to sustainable development of VVSv9.0. It has been determined that the LoA is unconditional with respect to §39 (a-d). It has also, been confirmed from LoA that proposed CDM project activity assists Brazil in achieving the sustainable development.

<sup>1</sup> <http://maindb.unfccc.int/public/country.pl?country=BR>

### D.3. Authorization

The host Party for this project is Brazil and has ratified the Kyoto Protocol on 23 August 2002. This was checked from the UNFCCC website. The project participants listed in section A.4 and Appendix 1 of PDD /72/ are CEEE-GT (Companhia Estadual de Geração e Transmissão de Energia Elétrica) and Lumina Engenharia e Consultoria Ltda. The LoA issued from the Brazilian DNA approves the participation of CEEE-GT and Lumina Engenharia e Consultoria Ltda; therefore, the project participants are authorized by the Party to Kyoto Protocol. No Annex I Party has been identified in the PDD /72/ and therefore no further Letter of Approval was available. It is noted that the CDM EB has agreed that the registration of a CDM project activity can take place without an Annex I Party being involved at the stage of registration. It should also be noted that before CER can be transferred to an Annex 1 Party, a Letter of Approval from Annex 1 Party will need to be submitted.

#### Opinion:

In the opinion of the validation team, there are two project participant in the section A.4 and Appendix 1 of the PDD/2/ and their participation have been approved by DNA of Brazil, which is a Party to the Kyoto Protocol. The participation has been confirmed based on the Letter of Approval issued by the DNA of the host Party as referenced in the section 4.1 above.

### D.4. Contribution to sustainable development

It has been verified that Letter of Approval/46/ dated 20 February 2014 is issued from the Brazilian DNA is consistent with project activity title in the PDD/72/ and authorizes the project participants (CEEE-GT and Lumina Engenharia e Consultoria Ltda.) for the project activity. It further confirms that Brazil has ratified the Kyoto Protocol, and therefore a Party to it, on 23 August 2002; the project activity is voluntary and contributes to the sustainable development of Brazil.

#### Opinion:

In the opinion of the validation team the LoA<sup>/46/</sup> is meeting the requirements stipulated in the §38-§44 for approval and §50-§52 for contribution to sustainable development of VVSv9.0. It has been determined that the LoA is unconditional with respect to paragraph §39 (a-d). It has also been confirmed from the LoA that the proposed CDM project activity assists Brazil in achieving the sustainable development.

No findings were raised during the validation.

### D.5. Modalities of communication

The project participants listed in section A.4 and Appendix 1 of PDD /72/ are CEEE-GT and Lumina Engenharia e Consultoria Ltda. The MoC /32/ provided by the PP has been duly verified against the project title and information mentioned in Appendix 1 and found to be consistent.

The validation team has assessed the corporate identity of the project participant, focal point, including specimen signatures and employment status of their authorized signatories as listed in MoC statement by directly checking evidence as follows:

- The authorized personal identity of the focal point from the PPs was verified through the notarized letter of attorney appointing Mr Marcos Mello and Mr Sergio Augusto Weigert Ennes as the focal points for CDM communications from CEEE-GT (Companhia Estadual de Geração e Transmissão de Energia Elétrica) and Lumina Engenharia e Consultoria Ltda respectively. This information as well as the signature of the Board Member has been further cross-checked with the contract signed between Lumina Engenharia e Consultoria Ltda and PJRCES to perform the CDM validation services /44/ and with CEEE-GT Statement /33/ dated of 19 October 2011 and Lumina Letter Attorney /34/ dated of 13 July 2007.

PP has also used the latest F-CDM-MOC, version2.1 and information provided in the F-CDM-MOC and its annex 1 is complete and accurate. PJRCES also will check the consistency of information between the PDD /72/, Letter of Approval (LoA) /46/ and the Modalities of Communication (MoC) /32/.

<b>Means of validation</b>	Validated from MoC, power of Attorney letter and CEEE Statement review.
<b>Findings</b>	CAR03
<b>Conclusion</b>	In the opinion of the validation team, there are two project participants in the section A.4 and Appendix 1 of the PDD /72/ and the MoC /32/ provided by the PPs has been duly verified against the project title and information mentioned in the final version of the PDD/72/ and found to be consistent. Also, it is confirmed that the



	official signing and submitting of the MoC is authorized by the PP and is meeting the requirements stipulated for Modalities of communications in the §53-§61 of VVSv9.0.
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## D.6. Project design document

The proposed CDM project activity is a hydro power plant involving a capacity addition of 9.6 MW to an already existing 4.80 MW, resulting in a total installed capacity of 14.4 MW. The existing installed capacity has been verified from the generator plate/<sup>13/</sup> as physically witnessed during the site visit by the assessment team. The capacity addition got an installation license dated 12 July 2011/<sup>19/</sup>.

The proposed CDM project activity is located in the Tio Hugo municipality, State of Rio Grande do Sul in Brazil and the geographical coordinates latitude 28°33'21" S and longitude 52°32'44" W; and latitude 28°33'33" S and longitude 52°32'57" W, which have been verified by PJRCES with the Google Earth and physically witnessed during the site visit by the assessment team.

<b>Means of validation</b>	Validated from permission letter/ <sup>19/</sup> and the Basic Project Design/ <sup>10/</sup> review.
<b>Findings</b>	CAR1-2
<b>Conclusion</b>	In the opinion of the validation team the final PDD/ <sup>72/</sup> is complying with the relevant forms and guidance. Further, it is confirmed that the description of the project activity as contained in the final PDD/ <sup>72/</sup> is found consistent on ground and have been validated from the permission letter/ <sup>19/</sup> and the Basic Project Design/ <sup>10/</sup> and found to be accurate and complete.

## D.7. Description of project activity

As per Basic Project Design/<sup>10/</sup> the SHPP Ernestina substation will have its transformer (4.1/44 kV – 6 MVA) replaced by a new set of 4.1/44-69 kV – 15 MVA as the project activity will include three new turbo-generator sets which will add 10.65 MVA (3 x 3.55 MVA) to the current power, resulting in a total of 14.35 MVA.

The generated electricity will be supplied to the grid by the project participant CEEE, which is a mixed economy company belonging to the CEEE Group, a public service concessionaire of all electricity distribution in the South-East region of the State of Rio Grande do Sul.

The project is a capacity addition project activity, which is witnessed during the site visit and further from the Basic Project Design/<sup>10/</sup>. The project activity will displace the GHG emissions generated by the current generation energy mix in the connected electricity system SIN that is the Brazilian National Interconnected Power System as in the absence of the project activity the equal amount of electricity would have been procured from it.

Technical Parameter	Value
<b>Turbine</b>	
Type	Francis, horizontal axis
Number of units	3
Installed capacity	3.30 MW
Rotation	400 rpm
Reference Fall	30 m
Nominal Unit Flow	13.33 m <sup>3</sup> /s

Top Efficiency	91.10%
<b>Generator</b>	
Number of units	3
Unit Nominal Power	3.55 MVA
Synchronous Rotation	400 rpm
Nominal Tension	4.10 kV
Power Factor	0.9
Average Efficiency	96.90%

Based on the above discussion the accuracy and completeness of the project activity description was verified and found to be accurate.

In the opinion of the validation team the final PDD<sup>/72/</sup> is complying with the relevant forms and guidance. Further, it is confirmed that the description of the project activity as contained in the final PDD<sup>/72/</sup> is found consistent on ground and have been validated from the permission letter<sup>/19/</sup> and the Basic Project Design<sup>/10/</sup> and found to be accurate and complete.

#### **D.8. Application of selected baseline and monitoring methodology and selected standardized baseline**

##### **D.8.1. Applicability of methodology and standardized baseline**

The project activity correctly applies the indicative ACM0002 - Grid-connected electricity generation from renewable sources Version 17.0 (EB 89, Annex 1) Valid from 13 May 2016 onwards.

The validation of compliance of the project activity with the applicability conditions of the applied methodology by PJRCES has been undertaken as follows:

<b>Applicability of selected methodology “ACM0002 Version 17.0”</b>		
<b>Sl. No</b>	<b>Applicability condition</b>	<b>Validation team assessment</b>
01	This methodology is applicable to grid-connected electricity generation from renewable sources.	The project is electricity generation from hydro power and supplies the electricity to the grid. Therefore, the condition is fulfilled.
02	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project is a capacity addition of a hydro power plant with an accumulation reservoir. Therefore, the condition is fulfilled.
03	In the case of capacity additions, retrofits or replacements (except for wind or solar capacity additions): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical	The plant started operation in 1957. Since 1957 no capacity addition has been undertaken. Therefore, the condition is fulfilled.

	reference period and the implementation of the project activity.	
04	<p>In case of hydro power plants, one of the following conditions must apply:</p> <ul style="list-style-type: none"> <li>○ The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or</li> <li>○ The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>; or</li> <li>○ The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>.</li> </ul>	<p>The project will be implemented in an existing reservoir, with no change in the volume of reservoir.</p> <p>Therefore, the one of the conditions is fulfilled as required by the methodology.</p>
05	<p>In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m<sup>2</sup> all the following conditions must apply:</p> <ul style="list-style-type: none"> <li>• The power density calculated for the entire project activity using equation 5 is greater than 4 W/m<sup>2</sup>;</li> <li>• Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project<sup>1</sup> that collectively constitute the generation capacity of the combined power plant;</li> <li>• Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;</li> <li>• Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m<sup>2</sup>, is lower than 15 MW;</li> <li>• Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m<sup>2</sup>, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.</li> </ul>	<p>The project uses only one existing reservoir with no change in volume of reservoir. Therefore, the condition is not applicable.</p> <p>Reservoir of 38.02 km<sup>2</sup> Total installed capacity: 14.40 MW Power density: 3,79 x10<sup>-3</sup></p>
06	<p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> <li>• Biomass fired power plants;</li> </ul>	<p>The project is a hydro power plant. Therefore, the condition is fulfilled.</p>
07	<p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> <li>• Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;</li> </ul>	<p>The project is not a fuel switch project as at the site only hydro power is available for electricity generation. Therefore, the condition is fulfilled.</p>

08	Tool to calculate the emission factor for an electricity system, version 3.0.0 This methodological tool determines the CO <sub>2</sub> emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the combined margin emission factor (CM) of the electricity system.	The proposed project activity is the installation of a hydro power plant supplying electricity to the national grid SIN. Estimation of operating margin, build margin and combined margin has been calculated applying the steps of the tool.
09	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The grid is limited to the Brazilian National Interconnected System (SIN). Therefore, the condition is fulfilled.
10	In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance.	This condition is fulfilled as justified in chapter B.4 of the PDD.

<b>Means of validation</b>	It has been confirmed from the project design description and layout of the CDM project activity.
<b>Findings</b>	CL04 and CAR05/06
<b>Conclusion</b>	It has been concluded by the assessment team that the relevant applicability conditions in the context of the project activity are duly included in the PDD and critically validated. The choice of selected methodology ACM0002 Version 17.0 is justified and the applied methodology has been found to be the most suitable in the context of the proposed CDM project activity. The version used by PP is valid till date.

### D.8.2. Deviation from methodology

As confirmed in the section 4.5.1 above the proposed project activity meets all the applicability conditions of the applied methodology and no deviation has been proposed by PP or identified by validation team.

### D.8.3. Clarification on applicability of methodology, tool and/or standardized baseline

As confirmed in the section 4.5.1 above the proposed project activity meets all the applicability conditions of the applied methodology and no clarification request is required.

### D.8.4. Project boundary

As per the guidelines mentioned in the approved consolidated methodology ACM0002 Version 17.0 the project boundary is defined as

“The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.”

The proposed CDM project activity is connected to the national grid of Brazil. Therefore, the spatial extent of the project boundary is clearly defined as the site of the project and the Brazilian National Interconnected System (SIN), comprising all power plants connected physically to this grid. The project's system boundaries are clearly defined as the SIN, which is in line with the delineation of grid boundary as provided by the Brazilian DNA /39/. The emission sources included in the PDD are consistent with the applied methodology in the context of the project activity. The CO<sub>2</sub> emissions in the baseline are included and no GHG is included as project activity emissions. The selection of emission sources is correct in the context of the project activity and justified.

There are no GHG emissions occurring within the project activity boundary as a result of the implementation of the proposed project activity (as the project activity involves installation of project activity, which will harness Renewable energy to generate power). It has been confirmed that such emissions, if any, would not contribute more than 1% of overall expected average annual emission reductions.

<b>Means of validation</b>	It has been confirmed comparing and checking the revised PDD containing the correct geographical coordinates crosschecked on Google Earth,
<b>Findings</b>	CAR10
<b>Conclusion</b>	The project boundary included in the PDD is reviewed on ground during site visit and found to be consistent. The identified boundary and the selected sources and gases are justified for the proposed CDM project activity.

#### D.8.5. Establishment and description of baseline scenario

The baseline selection as required by the applied methodology ACM0002 Version 17.0 in the context of the proposed CDM project activity is described below. As per the applied methodology if the project activity is a capacity addition to existing grid-connected renewable power plant/unit, the baseline scenario is the following:

In the absence of the CDM project activity, the existing facility would continue to supply electricity to the grid at historical levels, until the time at which the generation facility would likely be replaced or retrofitted ( $DATE_{BaselineRetrofit}$ ). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.

It has been established based on licenses /06/-/09/ that the project activity is connected to the grid of Brazil and therefore electricity delivered to the grid would have otherwise been generated by the operation of the existing facility until the time at which the generation facility would likely be replaced. PP has estimated and described the estimate in the PDD. PJRCES technical expert considers the estimate to be accurate and correct. The estimate was based on the technical literature /73/ /74/ prepared by International Energy Agency (IEA)<sup>2</sup> about hydropower plants. According to the estimate, the year which the equipment shall be replaced in the absence of the project activity is year 2035.

The baseline selection for scenarios which are not relevant to the proposed CDM project activity are not discussed here viz., new grid-connected renewable power plant/unit and retrofit or replacement of existing grid-connected renewable power plant/unit(s) at the project site. It has already been mentioned that these situations are not relevant in the context of the proposed CDM project activity in the previous sections.

It has been confirmed that the data available to calculate emission factor for an electricity system is as per CO<sub>2</sub> emission factors for electricity generation in Brazil<sup>/35/</sup>, which is the latest available at the time of publication of the PDD for global stakeholder consultation process. The database is an official publication by the National Science and Technology Ministry of the matter of emission factor for an electricity in the host Party and therefore acceptable.

In the opinion of the validation team, it is confirmed that

- All the assumptions and data used by the project participants are listed in the PDD, including their references and sources;
- All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD;
- Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;
- Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;

The approved baseline methodology has been correctly applied to identify the most plausible baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed project activity.

<sup>2</sup> <http://www.iea.org/>

**D.8.6. Demonstration of additionality**

The additionality of the proposed CDM project activity has been demonstrated as per “Tool for the demonstration and assessment of additionality” (Version 7.0.0) as required by the applied methodology ACM0002 Version 17.0.

**(a) PRIOR CONSIDERATION OF THE CLEAN DEVELOPMENT MECHANISM**

The starting date of the project activity is 01 March 2014, which is an earliest real action towards the project activity and has been confirmed from the work schedule of the project /41/. In the opinion of the assessment team, the starting date is appropriate considering it confirms that project participant shall sign the EPC contract which is a strong commitment for the expenditure related to the implementation of the project activity which is in accordance with the definition contained in the glossary of terms ([http://cdm.unfccc.int/Reference/Guidclarif/glos\\_CDM.pdf](http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf)).

A summary of documented evidence (as per paragraph 6(b) of EB62 Annex13) along with date is mentioned below:

Date	Documented evidence	Gap with previous documented evidence	Validation remarks
01/Mar/2011	Lumina's and CEEE's agreement to develop CDM project activity for SHPP Ernestina	NA	Lumina's and CEEE's agreement to develop CDM project activity for SHPP Ernestina /45/ Investment decision date
10 November 2011	Brazilian DNA Communication	< 9 months	Email sent to Brazilian DNA /27/
06 February 2012	EB/CDM Communication	< 3 months	Communication can be found at: <a href="http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html">http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html</a>
07 February 2012	EB/CDM Receipt of PPs Communication	< 1 month	Communication can be found at: <a href="http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html">http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html</a>
21 May 2012	Lumina and PJRCES validation services contract	< 16 months	Lumina and PJRCES validation services contract signed on 21 May 2012 /44/
01 March 2014	Starting date of the project activity	<22 months	The dated defines the implementation of the project activity and is included as first real event.

In the opinion of the validation team, the start date of the project activity is validated as 01 March 2014 based on the work schedule of the project /41/.

A review of the evidences shows that the gap between activities and events undertaken by PP is validated to be less than 2 years. PJRCES therefore concludes that CDM was seriously considered in the decision to proceed with the project activity, and the continuing and real actions have been taken to secure the CDM status for the project activity.

In the opinion of PJRCES's validation team, the proposed CDM project activity is identified as the capacity addition to existing grid-connected renewable power plant, which complies with the applicable requirements as defined in the latest version (EB62 Annex13) of the “Guidelines on the demonstration and assessment of prior consideration of the CDM”.

## STEP 01: IDENTIFICATION OF ALTERNATIVES

The identification of baseline in accordance with the applied methodology, in the context of the capacity addition project activity, is as under:

If the project activity is a capacity addition to existing grid-connected renewable power plant/unit, the baseline scenario is the following:

In the absence of the CDM project activity, the existing facility would continue to supply electricity to the grid at historical levels, until the time at which the generation facility would likely be replaced or retrofitted (DATEBaselineRetrofit). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.

The project participant identified and discussed alternatives to the proposed CDM project in the PDD, which are as under;

**Alternative 1: The proposed project activity not undertaken as a CDM project activity.** This alternative is a realistic and credible alternative to the project activity if the project activity is financially feasible as the proposed project activity involves electricity generation from renewable energy. However, the project activity includes information in the section B.5 of the PDD that it is not financially attractive.

**Alternative 2: Continuation of current situation, i.e. no project activity and equivalent amount of energy would have been produced by the project grid electricity system.**

The electricity would continue to be generated by the present generators operating for the grid.

To use all power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance. The additional power generated under the project would be generated in the existing power plant in the electricity system. This alternative is a realistic and credible alternative to the project activity as PP have a choice of not to invest in the project at all if the CDM revenues are not materialized, which would mean the power would be generated in grid and emissions would occur associated with the power plants connected to Grid.

The above alternatives are consistent with current laws and regulations of Brazil and there are no legal and/or regulatory requirements that prevent the above alternatives from occurring. This has been validated by having discussion with the project proponent and also through the knowledge of local laws and regulation.

Opinion:

In the opinion of the validation team, the list of alternatives which includes the proposed project activity without being registered as proposed project activity, as identified in the PDD, which complies with the applicable current laws and regulations is found to be credible and complete.

## STEP 02: INVESTMENT ANALYSIS

PPs have chosen the investment analysis to demonstrate additionality of the project activity. According to sub-step 2a of the "Tool for the demonstration and assessment of additionality", version 7.0.0 /2/ an appropriate method for the investment analysis shall be determined.

The tool provides three options:

- Option I: simple cost analysis
- Option II: investment comparison analysis
- Option III: benchmark analysis

Since the proposed project generates financial and economic benefits other than CDM-related income through the sales of electricity, and also the baseline alternative does not involve an investment for the project participants, a benchmark analysis is justified for conducting the investment analysis.

**A. BENCHMARK ANALYSIS**

The economic and financial indicator of project internal rate of return (IRR) calculated after tax in the financial model of the project activity has been used to compare with the benchmark in the power sector in Brazil.

The benchmark was calculated applying the Weighted Average Cost of Capital (WACC) /75/ for the power generation sector in Brazil. Since investment in electricity generation to be dispatched to the SIN grid, CEEE-GT is the only possible project developer as CEEE-GT, which is a State company, owns the hydropower plant and Lumina is the PDD developer as per contracts /5/ /45/. Therefore, PP choose the internal company benchmark for WACC as applicable according to the tool as follows: *Internal company benchmarks/expected returns (including those used as the expected return on equity in the calculation of a weighted average cost of*

capital - WACC), should only be applied in cases where there is only one possible project developer and should be demonstrated to have been used for similar projects with similar risks, developed by the same company or, if the company is brand new, would have been used for similar projects in the same sector in the country/region.

The calculation of the benchmark took into consideration the cost of debt and the cost of equity for a typical investor in the sector of the project activity and was applied to the cash flow of the project as a discount rate when comparing its value to the Internal Rate of Return (IRR) of the project (in accordance with paragraph 12, Annex 5, EB 62) /48/. The WACC considers the projected risk of investing resources in a specific sector or industry in a particular country, hence, it is deemed to be appropriate.

It has been further confirmed that the WACC calculation was based on parameters that are standard in the market, considering the specific characteristics of the project type (Brazilian power sector), and is not linked to the subjective profitability expectation or risk profile of the PP.

Since the investment decision date is 01 March 2011 (when the contract between Lumina and CEEE-GT came into force), the benchmark was calculated based on the latest data available at the time of investment decision. The WACC of 10.20% was calculated through the formula below:

$$\text{WACC} = k_e * r_e + k_d * r_d * (1 - T)$$

Where:

WACC	Weighted Average Capital Cost
$k_e$	Weight of equity
$r_e$	Cost of Equity
$k_d$	Weight of debt
$r_d$	Cost of debt (Interest rate charged by lenders)
T	Taxes over project (income related taxes)

$r_d$  is the cost of debt observed in the market related to the project activity, and which already accounts for the tax benefits of contracting debts.  $r_d$  was calculated as per the following formula:

$$r_d = (a+b+c)$$

Where:

- rd: Cost of debt
- a: Financial costs
- b: BNDES Fee;
- c: Spread (credit risk rate)

The validated input values used to determine the cost of debt are presented and justified in the table below:

Parameter	Value	Justification / Means of Validation
a- Financial Cost	6.60%	Corresponds to a six -year average (of the Long Term Interest Rate (in a free translation from the Portuguese "Taxa de Juros de Longo Prazo") given by BNDES. The six-year average adopted to calculate the TJLP aims to reflect a conservative average of the long term interest rate, considering that it presents a large range of variation through the years. The validation team confirmed the calculation for Financial Cost of 5-year average (from 2006 to 2011) in the Cash Flow SHPP Ernestina /75/ is correct and applicable at the time of investment decision and cross-checked with the values provided quarterly in the BNDES website /76/. Hence PJRCES deem it conservative and appropriate for the project activity and the benchmark calculation context.
b- BNDES Spread	0.90%	The validation team confirmed the value provided in the Cash Flow SHPP Ernestina /75/ with the BNDES spread rate applied to non-fossil fuelled electricity generation projects by reviewing the BNDES website /76/. The value was valid at the time of investment decision. Hence PJRCES deem it conservative and appropriate for the project activity and the benchmark calculation context.



c- Credit Risk Rate	1.785%	The validation team confirmed in the BNDES website /76/ that the credit risk rate applied to non-fossil fuelled electricity generation projects ranges from 0% to 3.57%, and therefore PPs used the mean value (1.785%) of such range. PJRCES team considered the credit risk rate of 1.785% conservative and appropriate for the project activity and the benchmark calculation context.
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$$r_d = 6.60\% + 0.9\% + 1.785\%$$

$$r_d = 9.29\%$$

The cost of Equity (Re) using CAPM is defined as follows:

$$Re = Rf + \beta \times (Rm - Rf)$$

Where:

Rf: Risk free rate;

$\beta$ : Investment risk compared to the market;

(Rm – Rf): Market risk premium

The values used in the cost of equity calculation are presented and justified in the table below:

Parameter	Value	Justification / Means of Validation
(Rf) Risk-free rate	19.02%	Corresponds to five-year average of Brazilian National Treasury Notes – Series C (NTN-C) with a maturity in 2031 was used. The benchmark was calculated considering the NTN-C average from January 2006 to December 2010, which is a long term asset of a mature market.  The validation team confirmed that the calculation provided for the Risk free rate is correct and applicable at the time of investment decision and also cross-checked with the values provided by the of Brazilian National Treasury Notes web site <a href="http://www.tesouro.fazenda.gov.br">http://www.tesouro.fazenda.gov.br</a> . Given the operational lifetime of the project and a five-year period of 5 years bond rate prior to investment decision date to estimate risk free rate is deemed by PJR CES reasonable and appropriate for the project activity and the benchmark calculation context.
(Rm) Equity risk premium	6.20%	Risk free rate was calculated in real terms; the inflation rates of the country were subtracted from NTN-C bonds. The historic series of the annual inflation rates were verified in the following link: <a href="http://www.portalbrasil.net/igpm.htm">http://www.portalbrasil.net/igpm.htm</a> and the average values calculated between 2006 and 2010 are as follows. Therefore, PJR CES deem the determination of Equity risk premium by PPs correct and adequate for the project activity and the benchmark calculation context.
( $\beta$ ) Sectoral Risk	0.83	The investment risk compared to the market ( $\beta$ ) is a measure of a stock's price volatility regarding an overall market. For the project activity, $\beta$ was calculated as a 5-year average of the values published at <a href="http://pages.stern.nyu.edu/~adamodar/">http://pages.stern.nyu.edu/~adamodar/</a> . The calculation corresponds to an average of betas of electricity generation companies in Brazil.  The validation team confirmed that the calculation provided for the sectoral risk using an average value of 0.83 is usual for the industrial sector in Brazil and considered to be correct and applicable at the time of investment decision. The validation team also cross-checked the beta values with the values provided in the Damodaran website <a href="http://pages.stern.nyu.edu/~adamodar/">http://pages.stern.nyu.edu/~adamodar/</a> . Hence, PJRCES deem the determination of the Sectoral Risk by PPs as correct and adequate for the project activity and the benchmark calculation context.

Thus, the cost of equity (Re) is:

$$Re = R_f + \beta \times (R_m - R_f)$$

$$Re = 12.82\% + 0.83\% \times 8.29\%$$

$$Re = 12.82\% + 6.88\%$$

$$Re = 19.70\%$$

and  $k_e$  and  $k_d$  are respectively 30% and 70% as defined by BNDES. Validation team has checked the information at BNDES website [http://www.bndes.gov.br/SiteBNDES/bndes/bndes\\_pt/Institucional/Apoio\\_Financeiro/Produtos/FINEM/energia\\_eletrica\\_geracao.html](http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Produtos/FINEM/energia_eletrica_geracao.html) and values are considered to be independent and correct applied.

#### **Opinion:**

Based on the information above, PJR CES confirms that the calculation of this benchmark is accurate and reasonable for the proposed project activity.

### **B. INPUT PARAMETERS**

As mentioned above, the financial indicator chosen by PPs is the Internal Rate of Return (IRR) of the Project after tax. The Project IRR is compared with the WACC detailed above.

The validation of key input parameters determined for the financial analysis by PJRCES as the most updated information available previous to the investment decision (01 March 2011 /45/) are presented below:

Parameter	Value	Justification / Means of Validation
Additional Capacity	9.60 MW	The validation team confirmed the review of ANEEL, who regulates and controls the state electricity generator companies, Public available evidences from ANEEL (Brazilian National Electricity Agency) /4/, ANEEL Concession Contract authorizing CEEE-GT to generate energy #25-2000, 12 April 2000 /5/, ANEEL Ordinance #278-1999, 11 August 1999 /6/, ANEEL Resolution #169-2001, 03 May 2001 /7/, ANEEL Dispatch #291-2002, 20 May 2002 /8/, and Project's Basic Design, page 13 /10/. The assessment team further cross-checked the information with the ANEEL website for the regulation and installation licenses /19/. Therefore, PJR CES deem the Installed Capacity of the proposed project is reliable and well applied.
Additional Annual On-grid Supply (MWh)	45,552	Calculated based on additional energy of 3.3 MWavg and defined plant load factor calculated by a third party as MKE's basic project design /10/. PJR CES deem the PLF of the proposed project is reliable and well applied.
Project lifetime (years)	23 years (until 07/Jul/2035)	ANEEL Concession Contract #25/2000 /5/
Auction Price (R\$/MWh)	67.31	The project's financial spreadsheet was consolidated in 19/03/2012 ("Cash Flow SHPP Bugres.xls"), the most recent Public Brazilian Energy Action was held in 17 December 2010/25/, therefore PP applied to the project's financial analysis the PPA price of R\$67.31/MWh available at <a href="http://www.epe.gov.br/imprensa/PressReleases/20101217_1.pdf">http://www.epe.gov.br/imprensa/PressReleases/20101217_1.pdf</a> . Public Brazilian Energy Auction of 17 December 2010. PJRCES checked the Brazilian Public document which is available at Brazilian government website <a href="http://www.epe.gov.br">www.epe.gov.br</a> and cross-checked with the full 2010 Management Report of the Research Energy Company-EPE, which contains auction prices and studies to expansion of auctions for electricity generation available at

		<a href="http://www.epe.gov.br/acessoainformacao/Documents/Institucional/Relat%C3%B3rios%20de%20Administra%C3%A7%C3%A3o/Relat%C3%B3rio%20da%20Administra%C3%A7%C3%A3o%20EPE%20-%202010.pdf">http://www.epe.gov.br/acessoainformacao/Documents/Institucional/Relat%C3%B3rios%20de%20Administra%C3%A7%C3%A3o/Relat%C3%B3rio%20da%20Administra%C3%A7%C3%A3o%20EPE%20-%202010.pdf</a> /80
Total investment (R\$)	38,803,000.00	CEEE's Assessment Report /78/. PJRCES has cross-checked the investment with OPE Eletrobrás – December 2011 /24/ who determines typical investments on the sector. Eletrobrás was created by Brazilian government to support electricity generators companies and National and local governments on electricity issue such investments for public companies. PJRCES deem value applied is largely conservative and valid.
O&M Costs (R\$/MWh)	24.84	SHPP Ernestina O&M historic average cost sourced from CEEE's information /49/. PJRCES cross-checked with other power plants from CEEE /49/ and PJRCES technical expert and find it valid.
Insurance	0.30%	Energy and Mines Ministry Public Hearing on Proinfa, July 2003, p. 8 <sup>3</sup>
IRR (%)	2.70	Cash Flow Spreadsheet /75/. Spreadsheet was assessed and formulae and inputs applied are considered to be in accordance.

In conclusion, PJRCES confirms the project IRR calculations were provided in a spreadsheet /75/ in a transparent and replicable way. The calculations were verified and found to be correct and the assumptions used in the calculations were deemed by PJRCES to be consistent and applicable at the time of investment decision (01 March 2011 Contract between Lumina and CEEE-GT) /45/.

Based on PJRCES's local and sectoral knowledge, PJRCES is able to confirm that the input parameters used in the financial analysis are reasonable, consistent and adequately represent the economic situation of the project.

The project IRR without CDM revenues is 2.70%, which confirms that the project in the absence of CDM benefits and compared to the benchmark (10.20%) is not financially attractive.

#### **C. CALCULATION AND COMPARISON OF FINANCIAL INDICATORS (ONLY APPLICABLE TO INVESTMENT COMPARISON ANALYSIS / BENCHMARK ANALYSIS)**

The benchmark (WACC) and IRR calculations were provided in a spreadsheet /75/. The calculations were verified and found to be corrected by PJRCES. The assumptions used in the calculations were deemed to be correct by PJRCES. The project-IRR without CDM revenues is 2.70%, which confirms that the project in the absence of CDM benefits and compared to the benchmark (10.20%) is not financially attractive.

#### **D. SENSITIVITY ANALYSIS – BENCHMARK ANALYSIS**

The sensitivity analysis has been carried out for parameters that most likely to fluctuate over time and contributing for more than 20% to project costs or total revenues as per the Guidelines on the assessment of investment analysis /48/. Hence, variations were done by altering the following parameters:

- Reducing investment expenses (investment costs).
- Increasing project's revenues (electricity tariff);
- Increasing energy generation by the plant (power generation);
- Reducing cost of operational (total operating costs)

Key indicators	IRR with 10% variation	Variation to reach the Benchmark of 10.20%
Original Value	2.70% (no variation)	n.a
Investment costs	-10% would be 3.60%	-59.90%
Electricity Price	+10% would be 4.08%	+87.40%
Power Generation	+10% would be 3.57%	+141.50%

<sup>3</sup> Available at [http://www.inee.org.br/down\\_loads/forum/Parecer%20INEE%20Proinfa.pdf](http://www.inee.org.br/down_loads/forum/Parecer%20INEE%20Proinfa.pdf)

Total Operating costs	-10% would be 3.43%	>-100.00%
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As per the sensitivity analysis presented above it is demonstrated that project IRR remains lower than the benchmark in all reasonably evaluated scenarios.

### **CAPEX**

The project IRR will reach the benchmark of 10.20% if the total investments decrease by 59.90%. However, such a decrease is not realistic to the actual project scenario, since CAPEX is BRL 30.7 million.

From the above information PRJCES confirm that a reduction of 59.90% in the project activity investment expenses is very unlikely to happen.

### **Electricity Tariff**

The project IRR will reach the benchmark of 10.20% if the total revenues from the electricity sales increase by 87.40%. Since the project's financial spreadsheet was consolidated in 19/03/2012 ("Cash Flow SHPP Bugres.xls"), the most recent Public Brazilian Energy Action was held in 17/Dec/2010, therefore PP modified the project's financial analysis with the PPA price of R\$67.31/MWh (available at [http://www.epe.gov.br/imprensa/PressReleases/20101217\\_1.pdf](http://www.epe.gov.br/imprensa/PressReleases/20101217_1.pdf)).

There is an increase on the number of power plants in Brazil in the last 10 years which shall results in lower energy prices. Also, Brazilian political scenario indicates government seeks lower prices to energy in the auctions.

Although the fluctuation of prices which is indicated in the PDD and in the reports from Brazilian government, PJRCES confirms that it might be possible for the total revenues from the electricity sales to increase by 87.40%.

### **Power generation**

The project IRR will reach the 10.20% benchmark if there would be an increase of 141.50% in the power generation. It is unlikely such increase occur once the project assured energy is 3.50MW /10/.

Based on the information, PRJ CES confirms that a consistent increase of 141.50% in the long-term average annual power supplied to the grid is definitely not a likely scenario.

### **Total Operating costs**

The results of the sensitivity analysis show that if the Project incurred a reduction higher than 100% of the operating costs the IRR of the Project would reach the 10.20% benchmark, i.e. even if the total operation cost are zeroed, the project would still not reach the benchmark.

Obviously, this is not a plausible scenario, in particular if considered that more over 90% of the operating costs are due to fees or tariffs already established by ANEEL resolutions or annually calculated by the national entities, in which the annual values have constantly increased along the years.

Therefore, PJR CES confirms that no significant decrease of the O&M costs can be reasonably expected.

### **E. CONCLUSION**

The analysis above clearly shows that under very realistic circumstances it would be impossible for the Project IRR to reach the benchmark. PJR CES concludes that the IRR is lower than the benchmark for a realistic range of assumptions for the key input parameters and therefore, that the Project is not financially attractive.

### **STEP03: BARRIER ANALYSIS (§124-§127)**

According to the "Tool for the demonstration and assessment of additionality" /2/ if after the sensitivity analysis it is concluded that the proposed CDM project activity is unlikely to be the most financially/economically attractive, then PPs shall proceed to Step 4 (Common practice analysis). Therefore, no barrier analysis is required to this project activity.

### **STEP04: COMMON PRACTICE ANALYSIS (§128-§130)**

PPs have undertaken the common practice analysis of the project applying the Guidelines on Common Practice (version 02.0, EB69, Annex 8) /65/ which is in accordance with the Tool for the demonstration and assessment of additionality, version 7.0.0 /2/. The Guidelines on Common Practice indicates that the proposed CDM Project Activity matches option (b) of paragraph 2, since it consists of a switch from grid electricity to electricity generation from hydropower plant. A complete analysis was checked /66/ by PJRCES.

Therefore, PP has applied the 4 steps of the guidelines on Common Practice /65/ which determines that a proposed project activity is considered common practice in a sector in the applicable geographical area if both conditions apply:

- the factor F ( $F = 1 - N_{diff}/N_{all}$ ) is greater than 0.2; and
- $N_{all} - N_{diff}$  is greater than 3.

The four steps of the guidance are applied as follows:

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

Considering that HPP Ernestina will have an addition of 9.6 MW to the existing facility of 4.8 MW and applying the output range of +/-50%, only plants with installed capacity between 4.8 MW and 14.4 MW were considered in the analysis.

ANEEL database: <http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp> indicates Brazil had in January 2013 2,746 power plants operating in Brazil, as follows:

OPERATING POWER PLANTS			
Type	Quantity	Total capacity (MW)	%
<a href="#">CGH</a>	400	239.25	0.2
<a href="#">EOL</a>	85	1,888.28	1.56
<a href="#">PCH</a>	436	4,305.30	3.52
<a href="#">UFV</a>	11	11.58	0.01
<a href="#">UHE</a>	204	82,486.84	65.99
<a href="#">UTE</a>	1,608	34,680.32	27.07
<a href="#">UTN</a>	2	1,990.00	1.66
<b>Total</b>	<b>2,746</b>	<b>125,601.66</b>	<b>100</b>

OUTCOME OF STEP 1: only 214 are in the applicable range of +/- 50% of the project's installed capacity.

Step 2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

- a) The projects are located in the applicable geographical area, and;
- b) The projects apply the same measure as the proposed project activity;

The applicable geographical area is the host country (Brazil) and the boundary is the power plants connected to the national grid (SIN).

In the applicable geographical area from the 214 power plants identified in Table, only 94 are hydro power plants such as the project activity; 12 of those are wind; and 106 are thermal power plants.

Also, PP has identified that by the time the analysis was undertaken; three plants had commercial operation after the project PDD publication date. The list matches the original data from ANEEL /50/.

OUTCOME OF STEP 2: 94 are eligible according to the criteria described in STEP 2.

Step 3: Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number  $N_{all}$ .

OUTCOME OF STEP 3: PP has identified 48 projects registered, requesting registration or under validation process from the 94, therefore  $N_{all} = 46$ .

Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number  $N_{diff}$ .

PPs identified that the plants identified in Step 3 differ from the proposed project activity with respect to item (c) Size of installation: (iii) Large; (d) Investment climate on the date of the investment decision: (ii) Subsidies or other financial flows and (iv) Legal regulation.

Based on the regional and sectoral expertise, PJRCES is able to confirm that with respect to the investment climate in the date of the investment decision, more specifically to the regulatory framework, until the beginning of the 1990's, the energy sector was composed almost exclusively by state-owned companies. From 1995 onwards, due to the increase in international interest rates and the lack of state investment capacity, the government started the privatization process. However, by the end of 2000 results were still modest. Although further initiatives, aiming to improve electric generation in the country, were taken between the 1990's and 2003, they did not attract enough new investments to the sector.

It was only after the implementation of the new model for the Brazilian Electricity Market sustained by Laws n°10.847 and 10.848 /51//52/ of 15 March 2004 and Decree n°5.163 /53/ of 30 July 2004, that a more competitive electricity market began. This new model defined the creation of:

- A new institution responsible for the long term planning of the energy sector (Energy Research Company – EPE);
- An institution to evaluate continuously the electric energy supply (Electric Sector Monitoring Committee - CMSE) and;
- An institution to continue performing the activities that were taking care by the Wholesale Electric Energy Market (MAE) related to the commercialization of the interconnected electric energy system.

Taking into account this new regulatory framework, it is clear that the investment climate was drastically different before the new model, hence it is reasonable to only consider projects for which the decision making process happened after March of 2004 to be similar to HPP Ernestina.

Therefore, considering the explanations provided above, there was 1 similar power plants identified, hence  $N_{diff} = 45$ .

From the results discussed above, F was calculated as follows:

$$F = 1 - N_{diff} / N_{all} = 1 - 45/46 = 0.0218$$

$$N_{all} - N_{diff} = 1$$

The factor F is smaller than 0.2 and  $N_{all} - N_{diff}$  is smaller than 3, therefore the condition of the tool /2/ that the project is not common practice is fulfilled.

#### Opinion:

<b>Means of validation</b>	It has been confirmed comparing and checking the revised PDD containing the financial analysis and considered inputs with the financial Brazilian government information and project description design.
<b>Findings</b>	CL01/03/05 – CAR01/07/15/26/27/28/29/30/31/32/33/34/35
<b>Conclusion</b>	Based on the above information and on its local and sectoral knowledge, PJRCES confirms that the proposed project activity is not a common practice. In conclusion, it is sufficiently demonstrated that the project is not a likely baseline scenario and thus project is additional.

#### **D.8.7. Emission reductions**

The emission reductions (ER<sub>y</sub>) by the project activity during the crediting period is the difference between baseline emissions (BE<sub>y</sub>), project emissions (PE<sub>y</sub>) and emissions due to leakage (Ly), as follows:

**a) Baseline emissions:** Baseline emissions (BE<sub>y</sub> in tCO<sub>2</sub>) are the product of the grid emission factor (EF<sub>grid,CM,y</sub> in tCO<sub>2</sub>/MWh) times the electricity that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr).

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

$BE_y$  = Baseline emissions in year  $y$  (tCO<sub>2</sub>/yr)

$EG_{PJ,y}$  = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year  $y$  (MWh/yr)

$EF_{grid,CM,y}$  = Combined margin CO<sub>2</sub> emissions factor in year  $y$  (tCO<sub>2</sub>/MWh)

ACM0002 Version 17.0 requires in case of capacity addition, PPs shall use the approach applied to retrofits and replacements set out in section (b) of the methodology.

Given the project activity is the capacity addition of a grid-connected hydropower plant at a site where a renewable power plant has operated prior to the implementation of the project activity, PPs have properly chosen the conservative manner to calculate the baseline electricity generation as per the ACM0002, Version 17.0.

PPs have correctly applied the methodology, which addresses the use of historical years to establish the baseline electricity generation uncertainty by adjusting the historical electricity generation by its standard deviation. PPs have applied the calculation in accordance to the ACM0002 version 17 as it follows:

$$EG_{PJ,y} = EG_{facility,y} - (EG_{historical} + \sigma_{historical}); \text{ until } DATE_{BaselineRetrofit}$$

And;

$$EG_{PJ,y} = 0; \text{ on/after } DATE_{BaselineRetrofit}$$

Where:

$EG_{facility,y}$  = Quantity of net electricity generation supplied by the project plant to the grid in year  $y$  (MWh/yr).

$EG_{PJ,y}$  = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year  $y$  (MWh)

$EG_{facility,y}$  = Quantity of net electricity generation supplied by the project plant/unit to the grid in year  $y$  (MWh)

$EG_{historical}$  = Annual average historical net electricity generation delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh)

$\sigma_{historical}$  = Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh)

$DATE_{BaselineRetrofit}$  = Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)

$EG_{historical}$  is the annual average of historical net electricity generation, delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity.

To determine  $EG_{historical}$ , PPs have chosen the five last calendar years prior to the implementation of the project activity.

#### Determination of $EF_{grid,CM,y}$

The project activity is connected to the Brazilian National Interconnected System (SIN). By means of the Resolution number 8 /39/ the Interministerial Commission on Global Climate Change (CIMGC), the Brazilian DNA, delineated the electricity system as the Brazilian National Interconnected System (SIN), for CDM purposes. It covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest).

The Brazilian DNA provides /47/ every year, updated information about the emission factor of operating margin and build margin, which is calculated according to the "Tool to calculate the emission factor for an electricity system", considering only grid power plants (option I of Step 1).

The Operating margin ( $EF_{grid,OM,y}$ ) is calculated as per the dispatch data analysis OM from Option (c) of Step 3, therefore, shall be determined ex post.



With respect to the Build margin ( $EF_{grid,BM,y}$ ), PPs have calculated it in accordance with the tool /3/, determining for estimates BM *ex ante* based on the most recent information available at the time of submission of the PDD for validation (base year 2011) with information available at the Brazilian DNA /38/.

For the first crediting period, the grid emission factor shall be updated annually or determined *ex post* as a combined margin, consisting of a weighted average of the operating margin ( $EF_{grid,OM,y}$ ) and the build margin ( $EF_{grid,BM,y}$ ), as per equation below:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$$

Where:

$EF_{grid,BM,y}$  = Build margin CO2 emission factor in year y (tCO2/MWh)

$EF_{grid,OM,y}$  = Operating margin CO2 emission factor in year y (tCO2/MWh)

$w_{OM}$  = Weighting of operating margin emissions factor (%)

$w_{BM}$  = Weighting of build margin emissions factor (%)

According to the tool /3/, for hydropower plants  $w_{OM} = 0.5$  and  $w_{BM} = 0.5$  shall be used to obtain the  $EF_{grid,CM,y}$ . The Brazilian DNA website provides for 2011,  $EF_{grid,OM,y} = 0.2919$  tCO<sub>2</sub>e/MWh and  $EF_{grid,BM,y} = 0.1056$  tCO<sub>2</sub>e/MWh.

Therefore,  $EF_{grid,CM,y}$  resulted in 0.1987 tCO<sub>2</sub>e/MWh.

PJRCES confirms that the PDD was submitted for global stakeholder consultation on 02 June 2012 and the data used for calculation of the grid emission factor is the most recent available at the commencement of validation. The data used in the Emission Factor calculation /40/ is in accordance with the data published by CIMGC in 2011 /47/.

**b) Project emissions:** ACM0002 Version 17.0 establishes that project emissions of hydropower plants are accounted only for  $PE_{HP,y}$  (Project emissions from water reservoirs of hydro power plants in year y). As the capacity addition does not involve any change in the volume of reservoir there are no project emissions to account for /10/.

In conclusion,  $PE_y$  of this project activity is 0 tCO<sub>2</sub>/year.

**c) Leakage:** as per the requirements of the applied baseline methodology, no leakage has to be considered for the project activity.

Based on the above mentioned emission factor and net power generation of approximately 45,552 MWh, annual estimated emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

$$PE_y = 0 \text{ tCO}_2/\text{year}$$

$$LE_y = 0 \text{ tCO}_2/\text{year}$$

$$BE_y = EG_{PJ,y} * EF_{Grid,CM,y}$$

$$BE_y = 45,552 \text{ MWh} * 0.1987 \text{ tCO}_2/\text{MWh} = 8,992 \text{ tCO}_2\text{e}/\text{year}$$

$$ER_y = 8,992 \text{ tCO}_2\text{e}/\text{year}$$

<b>Means of validation</b>	It has been confirmed comparing and checking the revised PDD containing the financial analysis and considered inputs with the financial Brazilian government information and project description design.
<b>Findings</b>	CAR06/08/09/19/20/21/22/23/24/25/26/27/28/29/
<b>Conclusion</b>	In the opinion of the validation team, it is confirmed that <ol style="list-style-type: none"> <li>All assumptions and data used by the project participants are listed in the PDD, including their references and sources;</li> <li>All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD;</li> <li>All values used in the PDD are considered reasonable in the context of the proposed project activity;</li> </ol>



	<p>d. The baseline methodology and corresponding tool(s) have been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;</p> <p>e. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.</p>
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### D.8.8. Monitoring plan

The Applicability conditions of the selected methodology ACM0002 Version 17.0 are illustrated below:

Applicability of selected methodology ACM0002 Version 17.0		
Sl. №	Applicability condition	Validation team assessment
01	This methodology is applicable to grid-connected electricity generation from renewable sources.	The project is electricity generation from hydro power and supplies the electricity to the grid. Therefore, the condition is fulfilled.
02	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project is a capacity addition of a hydro power plant with an accumulation reservoir. Therefore, the condition is fulfilled.
03	In the case of capacity additions, retrofits or replacements (except for wind or solar capacity additions): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The plant started operation in 1957. Since 1957 no capacity addition has been undertaken. Therefore, the condition is fulfilled.
04	In case of hydro power plants, one of the following conditions must apply: <ul style="list-style-type: none"> <li>○ The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or</li> <li>○ The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>; or</li> <li>○ The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>.</li> </ul>	The project will be implemented in an existing reservoir, with no change in the volume of reservoir. Therefore, the one of the conditions is fulfilled as required by the methodology.
05	In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower	The project uses only one existing reservoir with no change in volume of reservoir. Therefore, the condition is not applicable.

	<p>than 4 W/m<sup>2</sup> all the following conditions must apply:</p> <ul style="list-style-type: none"> <li>• The power density calculated for the entire project activity using equation 5 is greater than 4 W/m<sup>2</sup>;</li> <li>• Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project<sup>1</sup> that collectively constitute the generation capacity of the combined power plant;</li> <li>• Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;</li> <li>• Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m<sup>2</sup>, is lower than 15 MW;</li> <li>• Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m<sup>2</sup>, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.</li> </ul>	<p>Reservoir of 38.02 km<sup>2</sup>  Total installed capacity: 14.40 MW  Power density: 3,79 x10<sup>-3</sup></p>
06	<p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> <li>• Biomass fired power plants;</li> </ul>	<p>The project is a hydro power plant. Therefore, the condition is fulfilled.</p>
07	<p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> <li>• Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;</li> </ul>	<p>The project is not a fuel switch project as at the site only hydro power is available for electricity generation. Therefore, the condition is fulfilled.</p>
08	<p>Tool to calculate the emission factor for an electricity system, version 3.0.0  This methodological tool determines the CO<sub>2</sub> emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the combined margin emission factor (CM) of the electricity system.</p>	<p>The proposed project activity is the installation of a hydro power plant supplying electricity to the national grid SIN.  Estimation of operating margin, build margin and combined margin has been calculated applying the steps of the tool.</p>
09	<p>In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.</p>	<p>The grid is limited to the Brazilian National Interconnected System (SIN). Therefore, the condition is fulfilled.</p>
10	<p>In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance.</p>	<p>This condition is fulfilled as justified in chapter B.4 of the PDD.</p>

**Opinion:**

<b>Means of validation</b>	It has been confirmed the revised PDD is in accordance with the project design description.
<b>Findings</b>	CAR17
<b>Conclusion</b>	It has been concluded by the assessment team that the relevant applicability conditions in the context of the project activity are duly included in the PDD and critically validated. The choice of selected methodology ACM0002 Version 17.0 is justified and the applied methodology has been found to be the most suitable in the context of the proposed CDM project activity. The version used by PP is valid till date.

### D.9. Duration and crediting period

PP has decided the project will have three periods of seven years. The expected operational lifetime of project activity is 23 years and zero months from start of operation.

The crediting period starting date is 01/06/2015 and it is related to the implementation and construction of the project activity.

### D.10. Environmental impacts

According to the Brazilian Environmental Regulation, hydropower projects shall elaborate an environmental impact study (EIA from Portuguese “Estudo de Impacto Ambiental”) and a corresponding Environmental Impact Report (RIMA from Portuguese “Relatório de Impacto Ambiental”) and make them publically available before using natural resources and starting construction of the project.

The approval of this study comes with the issuance of the environmental licenses (Preliminary License – LP; Installation license – LI and Operation License – LO), which for this project is in charge of the State Foundation of Environmental Protection Henrique Luiz Roessler - RS (Fundação Estadual de Proteção Ambiental Henrique Luiz Roessler - RS).

The SHPP Ernestina has been granted with the Preliminary License #757-2011-DL /19/ dated of 12 July 2011, valid until 11 July 2013 and on 26 July 2012 have requested to the local Environmental Agency the renewal of the operation licence /20/ indicating the new size of the dam which was crosschecked with the basic design /10/

In addition, PPs provided to the validation team the Environmental Impact Assessment (EIA) /58/ developed by the project owner and submitted to FEPAM, which details the environmental impacts of the hydropower plant.

<b>Means of validation</b>	PJR CES has assessed the license /19/, protocol requesting the environmental license renewal /20/ and EIA /58/ during the onsite visit and cross-checked through FEPAM web-hosted database and can confirm that the project activity fully complies with the Brazilian environmental regulations.
<b>Findings</b>	CL02
<b>Conclusion</b>	It is further confirmed that appropriate measures were undertaken up to now to address the identified environmental impacts.

### D.11. Local stakeholder consultation

As per Brazilian DNA Resolution # 7 of 5 March 2008 local stakeholders shall be informed about the project activity by letters. Also, a PDD in Portuguese language shall be available in the internet for consultation and a declaration stating how the project contributes to the sustainable development of the country must be made available to these stakeholders at least 15 days previous to the starting of the Global Stakeholder Process (GSP).

For SHPP Ernestina CEEE, the referred resolution defined the following as required local stakeholders:

- Federal Public Attorney (*Ministério Público Federal*);
- Brazilian Forum of ONGs and Social Movements for the Development and Environment (*Fórum Brasileiro de ONGs e Movimentos Sociais paragraph o Meio Ambiente e Desenvolvimento – FBOMS*);
- Rio Grande do Sul State Public Attorney (*Ministério Público Estadual do Rio Grande do Sul*);

- Rio Grande do Sul State Environmental Agency (*Secretaria de Estado do Meio Ambiente do Rio Grande do Sul*);
- Tio Hugo's City Hall (*Prefeitura Municipal de Canela – RS*);
- Tio Hugo's City Council (*Câmara dos Vereadores de Canela – RS*);
- Tio Hugo's Environmental Agency (*Secretaria de Meio Ambiente de Canela - RS*);
- Tio Hugo's Commercial Industrial Association (*Associação Comercial Industrial de Canela – RS*).

Validation team checked during the onsite visit that letters and acceptance receipt /27/ were sent out on 16 November 2011 and receipts were obtained between 02 December 2011 and 06 December 2011. The PDD has been published on 14 March 2012 in the PP's webpage [http://luminaenergia.com.br/v2/carbono/projetos\\_cdm](http://luminaenergia.com.br/v2/carbono/projetos_cdm) in Portuguese. This could be confirmed by the validation team.

Both (invitation letters and website with Portuguese version of the PDD version 1 of 14 March 2012) have met the required deadline of 15 days previous to the starting of the global stakeholder process.

Regarding local stakeholder process, no comments were received.

PJR CES has reviewed the invitation letters and considers that the local stakeholder consultation was carried out adequately and followed the local requirements.

### **SECTION E. Internal quality control**

Following the completion of the assessment process and a recommendation by the validation team, all documentation will be forwarded to an Independent Technical Reviewer. The task of the Independent Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Independent Technical Reviewer may either accept or reject the recommendation made by the validation team. Findings can be raised at this stage and PP must address the same within agreed timeline.

**SECTION F. Validation opinion**

Perry Johnson Registrars Carbon Emissions Services, Inc (PJRCES) has performed a validation of the “Small Hydro Power Plant Ernestina CEEE”. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DOE with sufficient evidence to determine the fulfilment of stated criteria.

The host country is Brazil and no Annex I country is identified. The host country fulfils the participation criteria and shall approve the project and authorize the project participants after validation process. The DNA from Brazil shall confirm that the project assists in achieving sustainable development.

The project correctly applies approved baseline and monitoring methodology “ACM0002 – “Grid-connected electricity generation from renewable sources” (Version 17.0), EB89/Annex 1”. The project involves renewable energy generation by hydropower generation. The project results in reductions of CO<sub>2</sub> emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 8,992 tCO<sub>2</sub>e per year over the selected 7-year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

Adequate training and monitoring procedures have been implemented.

In summary, it is in PJRCES’s opinion that the “Small Hydro Power Plant Ernestina CEEE”, as described in the PDD version 5.2 of “16 May 2016”, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0002 – “Grid-connected electricity generation from renewable sources” (Version 17.0), EB81/Annex 9 thus requests the registration of the project as a CDM project activity.

**Signed on Behalf of the Designated Operational Entity by Authorized Signatory**

Bilal Anwar



## Appendix 1. Abbreviations

Abbreviations	Full texts
ANEEL	Brazilian Electricity Regulatory Agency
BAU	Business as usual
BM	Building Margin
BNDES	Brazilian Development Bank
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CCEE	Electric Energy Commercialization Chamber (in Portuguese Câmara de Comercialização de Energia Elétrica)
CEEE-GT	PP - Companhia Estadual de Geração e Transmissão de Energia Elétrica
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CGH	Hydro Generating Central
CIMGC	Interministerial Commission on Global Climate Change (CIMGC from the Portuguese “Comissão Interministerial de Mudança Global do Clima”)
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
CM	Combined Margin
DNA	Designated National Authority
EOL	Eolic Generating Central
GEF	Grid Emission Factor
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
EB	Executive Board
EIA	Environmental Impact Assessment
EPE	Power Research Company (in Portuguese - “Empresa de Pesquisa Energética”)
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
FEPAM	State Foundation of Environmental Protection Henrique Luiz Roessler - RS
LoA	Letter of Approval
MCTI	Ministry of Science, Technology and innovation, Brazilian DNA
MME	Ministry of Mining and Energy
MP	Monitoring Plan
NGO	Non-governmental Organization
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OM	Operational Margin
ONS	Electric System National Operator
PAC	Growth Acceleration Program from Brazilian Government
PCH	Small Hydro Power Plant
PCP	Project Cycle Procedure
PPA	Power Purchase Agreement
PDD	Project Design Document
PS	Project Standard
SIN	Brazilian National Interconnected System
UFV	Photovoltaic Power Plant
UHE	Hydro Power Plant
UNFCCC	United Nations Framework Convention on Climate Change
UTE	Thermal Power Plant
UTN	Thermonuclear Power Plant
VVS	CDM Validation and Verification Standard

## Appendix 2. Competence of team members and technical reviewers

Team Member Name	Competency /Role	Experience
Ricardo Costa	Lead Validator	He is Environmental Engineer working in the environmental field since 1996. My more important experiences are in the management, construction and operation of wastewater treatment plants and landfill biogas recovery plants and its respective environmental licensing at competent agencies. He performed several activities controlling operational treatment processes; and instrumental, microbiological, physical and chemical analysis. Moreover, he has played important roles in international environmental monitoring during the past decade. He has experience regarding the implementation of ISO 9001, 14001 and OHSAS 18001 standards
Georg Zenk	Validator	PhD in Toxicology and Pharmacology. GHG Attestation, GHG Certificate, GHG Confirmation of Participation and GHG Certificate of Appointment. Successful validation of more than 20 projects. He has 2.5 years work experience as CDM-developer in projects under fuel switch for domestic use scope and Saving Energy as well as 1 year of experience in waste handling and disposal. In addition he worked for nine years as an external Environmental management representative for AGU GmbH & Co. Beratungsgesellschaft für Umwelt- und Qualitätsmanagement; where he was in charge of the life cycle analysis; resource conservation: analysis of material flow (energy, waste); implementation of management systems.
Luiz Cardoso	Technical Expert	He has a degree in Electrical Engineering and around 20 years of experience in operation and maintenance of hydroelectric power plants. For the past six years he is providing consultancy in the areas of electrical power transmission and distribution and also energy efficiency improvement.
Anu Mahesh	Financial Expert	She is a Commerce graduate and a Chartered Accountant. She is also an Information System Auditor (ISA). She has a work experience in: Statutory Audits; Test check, random verification of transactions, preparation of financial statements, and verification of compliance of various statutory requirements. Internal Audits: Detail verification of transactions, preparation of Bank Reconciliation Statement, Branch reconciliation. Handling internal, statutory and tax audits of 75 entities Income tax assessments. She handled income tax assessments and finalization of financial statements of individuals, firms and corporate (around 10 corporate and over 150 entities). She was involved in preparation of project reports (financials) for borrowings from financial institutions and verification of project reports with regard to the investment feasibility. She has worked on financial expert for around 30 CDM and 70 VCS projects."
Sathis Kumar	Technical reviewer	Mr Kumar has 4 years of GHG Auditing Experience in one of the leading DOE accredited by UNFCCC – SGS India Pvt Ltd supporting affiliate of SGS United Kingdom Ltd, Five years of experience in Energy Audit, energy efficiency and resource conservation studies in Energy Management Division of National Productivity Council, an autonomous organization under Ministry of Industry and Commerce, Government of India. Has Validated and

		verified more than 75 plus GHG projects comprising CDM, VCS, Gold Standard and registered 14 CDM projects with UNFCCC and more than 15 CDM issuances as Team Leader / Lead Assessor. Has done Technical Review of 8 validations and 17 verifications and successfully registered and issued respectively by UNFCCC.
Bilal Anwar	Final Approver	Bilal Anwar has over twelve years of experience in International Climate Change Policy, global regimes of greenhouse gas reduction projects and corporate sector greenhouse strategies. A significant part of his experience is in Clean Development Mechanism (CDM) in which he got involved from its inception. He worked in the United Nations Framework Convention on Climate Change Secretariat (UNFCCC). He was the team leader of CDM Accreditation Unit in the secretariat. Currently, Bilal is responsible for final approval of CDM reports in Perry Johnson Registrars Carbon Emission Services, Inc.

### Appendix 3. Documents reviewed or referenced

No	Author	Title	References to the document	Provider
/1/	UNFCCC	ACM0002 – “Grid-connected electricity generation from renewable sources” (17.0 13 May 2016 EB 89, Annex 1	<a href="https://cdm.unfccc.int/filestorage/D/5/Y/D5YFS9I3VKBT18MQNGX0LPZ6U7AWCO/ACM0002_%28v17%200%29_clean.pdf?t=bVN8bzg1cjNvfDDpBUWgLiUYcnSvDWHOIprM">https://cdm.unfccc.int/filestorage/D/5/Y/D5YFS9I3VKBT18MQNGX0LPZ6U7AWCO/ACM0002_%28v17%200%29_clean.pdf?t=bVN8bzg1cjNvfDDpBUWgLiUYcnSvDWHOIprM</a>	UNFCCC
/2/	UNFCCC	Tool for the demonstration and assessment of additionality, version 07.0.0, EB 70 annex 08	<a href="https://cdm.unfccc.int/Reference/tols/index.html">https://cdm.unfccc.int/Reference/tols/index.html</a>	UNFCCC
/3/	UNFCCC	Tool to calculate Emission Factor for an electricity system, version 05.0 27 November 2015 EB 87, Annex 9	<a href="https://cdm.unfccc.int/Reference/tols/index.html">https://cdm.unfccc.int/Reference/tols/index.html</a>	UNFCCC
/4/	ANEEL	ANEEL General Evidences	(Agência Nacional de Energia Elétrica – National Electricity Agency)	ANEEL
/5/	ANEEL	ANEEL Concession Contract #25-2000 ( <i>Extrato do Contrato de Concessão de Geração nº 25/2000-ANEEL</i> ), 12/04/2000	ANEEL Concession Contract.pdf	ANEEL
/6/	ANEEL	ANEEL Ordinance #278-1999 (Portaria nº 278, de 11 de agosto de 1999), 11/08/1999	<a href="http://www2.aneel.gov.br/cedoc/res2000278.pdf">http://www2.aneel.gov.br/cedoc/res2000278.pdf</a>	ANEEL
/7/	ANEEL	ANEEL Resolution #169-2001 (Resolução nº 169, de 3 de maio de 2001), 03/05/2001	<a href="http://www2.aneel.gov.br/cedoc/res2001169.pdf">http://www2.aneel.gov.br/cedoc/res2001169.pdf</a>	ANEEL
/8/	ANEEL	ANEEL Dispatch #3080-2009 (Despacho nº 3080, de 17 de agosto de 2009), 17/08/2009	<a href="http://www2.aneel.gov.br/biblioteca/pesquisas.cfm">http://www2.aneel.gov.br/biblioteca/pesquisas.cfm</a>	ANEEL
/9/	MEK	Basic Project Design ( <i>Projeto Básico MEK_UHE_Ernestina</i> ), September 2010	Basic Project Design.zip	Lumina
/10/	PUC - RS	13.01.2012 Backup Electricity Meter (backup Electricity meter calibration certificate: <i>Relatório de calibração de medidor de energia</i> ), 13 January 2012	backup Electricity meter calibration certificate.pdf	Lumina



/11/	Catholic University (PUC – RS)	13.01.2012 Main Electricity Meter (main Electricity meter calibration certificate: <i>Relatório de calibração de medidor de energia</i> ), 13 January 2012	Main Electricity meter calibration certificate.pdf	Lumina
/12/	PJRCS	Generator Plate – Ernestina (photograph of the generator equipment plate with technical information)	Generator Plate – Ernestina.jpg	PJRCS
/13/	CEEE	Historical Electricity Generation Records – Ernestina	Historical Electricity Generation Records – Ernestina.zip	Lumina
/14/	PUC - RS	Pattern_2011 (pattern meter calibration certificate: <i>Certificado de Calibração nº E1260/2011</i> ), 16 September 2011	pattern meter calibration certificate.pdf	Lumina
/15/	FEPAM - RS	Environmental Evidences (issued by the State Environmental Agency: Fundação Estadual de Proteção Ambiental – FEPAM)	Environmental Evidences FEPAM.zip	Lumina
/16/	FEPAM - RS	Preliminary License #757 / 2011-DL (Licença Preliminar LI nº 757 / 2011-DL), 11 July 2010, valid until 11 July 2013	Preliminary License.pdf	Lumina
/17/	FEPAM - RS	Operation License # 8910/2008-DL (Licença de Operação LO nº 8910/2008-DL), 03 December 2008 valid until 02 December 2012.	Operation License.pdf	Lumina
/18/	UNFCCC	Default Values for WACC CDM (Information Note Default values for the expected return on equity, Forty-ninth meeting, Report, Annex 14)	UNFCCC Report	UNFCCC
/19/	Brazilian Ministry of Mines and Energy	MME Public Hearing - Insurance rate (issued by the Ministry of Mines and Energy: <i>Audiência Pública MME sobre o Proinfa</i> ), July 2003	<a href="http://www.mme.gov.br/programas/proinfa">www.mme.gov.br/programas/proinfa</a>	Brazilian Ministry of Mines and Energy
/20/	CEEE	O&M Costs ( <i>Custos O&amp;M - Auditoria Crédito de Carbono</i> ), by Engineer Ricardo da Costa Effler and Engineer Luiz Vacilotto	O&M Costs.pdf	Lumina
/21/	Eletrobrás	OPE Eletrobras - Dec.11 (Eletrobrás Standard Budget - <i>Orçamento Padrão Eletrobrás</i> ), December 2011	OPE Eletrobras.pdf	Lumina
/22/	Brazilian Government	Auction price (Brazilian Alternative Energy Auction - <i>Leilões de Fontes Alternativas</i> ), 20/12/2010	<a href="http://www.epe.gov.br/leiloes/Paginas/default.aspx?CategoriaID=6976">http://www.epe.gov.br/leiloes/Paginas/default.aspx?CategoriaID=6976</a>	Brazilian Government
/23/	Lumina	Prior Consideration of the CDM Form - SHPP Ernestina CEEE, 06/02/2012	Prior Consideration of the CDM Form - SHPP Ernestina CEEE.pdf2/2012	Lumina
/24/	Several	Signed letters and ARs SHPP Ernestina (Brazilian DNA Letter and stakeholder letters, 16/11/2011 and receipts, 02/12/2011 to 06/12/2011)	Signed letters and ARs SHPP Ernestina.zip	Lumina
/25/	CEEE	Cash Flow SHPP Ernestina, 19/03/2012	Cash Flow SHPP Ernestina.xls	Lumina
/26/	CEEE	Diagrama unifilar Ernestina (unifilar diagram of SHPP Ernestina), 05/04/2010	Diagrama unifilar Ernestina.pdf	Lumina
/27/	CEEE	PDD_SHPP Ernestina, version 1, 06/Jun/2012	PDD_SHPP Ernestina, version 1, 06/Jun/2012.doc	Lumina
/28/	CEEE	PDD_SHPP Ernestina, version 2, 22/Feb/2012	PDD_SHPP Ernestina, version 2, 22/Feb/2012.doc	Lumina

/29/	Lumina	Modalities of Communication Statement (Version 02.1), 09/08/2012	Modalities of Communication Statement.pdf	Lumina
/30/	CEEE	CEEE-GT Statement, 19/10/2011	CEEE-GT Statement.pdf	Lumina
/31/	Lumina's attorney	Lumina Letter Attorney, 13/07/2007	Procuracao.pdf	Lumina
/32/	Brazilian DNA	Emission Factor for an electricity published by Brazilian DNA	<a href="http://www.mct.gov.br/index.php/content/view/72764.html">http://www.mct.gov.br/index.php/content/view/72764.html</a>	Brazilian DNA
/33/	Brazilian Government	National System Operator (ONS)	<a href="http://www.ons.org.br/institucional/oque_e_o_ons.aspx">http://www.ons.org.br/institucional/oque_e_o_ons.aspx</a>	Brazilian Government
/34/	Lumina	PDD_SHPP Ernestina, version 3, 27/Mar/2012	PDD_SHPP Ernestina, version 3, 27/Mar/2012.doc	Lumina
/35/	Brazilian DNA	Brazilian DNA website for Grid Emission Factors:	<a href="http://www.mct.gov.br/index.php/content/view/74689.html">http://www.mct.gov.br/index.php/content/view/74689.html</a>	Brazilian DNA
/36/	Brazilian Government	Resolution N° 8, issued by CIMGC on 26 May 2008, delineated the electricity system as being only one: The Brazilian National Interconnected System (SIN), for CDM purposes (file: "Resolução de nº 8, de 26 de maio de 2008").	<a href="http://www.mct.gov.br">http://www.mct.gov.br</a>	Brazilian Government
/37/	Lumina	CER spreadsheet provided by PPs  CER spreadsheet provided of 25 June 2015	CERspreadsheet.xls	Lumina
/38/	CEEE	Ernestina Work Schedule provided by PPs dated of 24 August 2012	Cronograma Renaestina.xls	Lumina
/39/	Brazilian DNA	Emission factors for ex post calculation of CM	<a href="http://www.mct.gov.br/index.php/content/view/77650.html">http://www.mct.gov.br/index.php/content/view/77650.html</a>	Brazilian DNA
/40/	Brazilian Government	CIMGC - Resolution N° 7- Procedures for local stakeholder consultation process of CDM project activities, dated 5 March 2008.	Available at: <a href="http://www.mct.gov.br/index.php/content/view/336403/Resolucao_n_7_de_05_de_marco_de_2008.html">http://www.mct.gov.br/index.php/content/view/336403/Resolucao_n_7_de_05_de_marco_de_2008.html</a> . Retrieved October 2012	Lumina
/41/	PJRCES/Lumina	Contract between PJR and Lumina – 21 May 2012	Contract.pdf	PJRCES
/42/	Lumina/CEEE	Contract between Lumina and CEEE-GT – 01 March 2011	Contract.pdf	Lumina/CEEE
/43/	Brazilian DNA	LoA from Brazil – 20 February 2014	<a href="http://www.mct.gov.br">http://www.mct.gov.br</a>	Brazilian DNA
/44/	CEEE	CIMGC (Brazilian DNA) - CO2 emission factors for electricity generation in Brazil for the CDM. Base year 2010	<a href="http://www.mct.gov.br/index.php/content/view/307492.html">http://www.mct.gov.br/index.php/content/view/307492.html</a>	Brazilian DNA
/45/	UNFCCC	Guidelines on the Assessment of Investment Analysis - Version 05 - EB 62 Report Annex 5	<a href="http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf">http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf</a>	UNFCCC
/46/	CEEE	SHPP Ernestina O&M historic average cost sourced from CEEE's information	O_M.pdf	Lumina
/47/	Brazilian Government	ANEEL – Database of Electricity Generation plants (BIG – form Portuguese “Banco de Informações de geração”).	<a href="http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp">http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp</a> . Retrieved October 2012	Brazilian Government
/48/	Brazilian Government	Federal law No 10,847 – Creation of the Power Research Company, dated 15 March 2004. Retrieved October 2012.	<a href="http://www.leidireto.com.br/imprimir.php?fonte=lei/10847">http://www.leidireto.com.br/imprimir.php?fonte=lei/10847</a>	Brazilian Government
/49/	Brazilian Government	Federal law No 10,848 – Commercialization of electricity, dated 15 March 2004.	<a href="http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/l10.848.htm">http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/l10.848.htm</a>	Brazilian Government

		Retrieved October 2012.		
/50/	Brazilian Government	Decree No 5,163 – Regulation of the electricity market, dated 30 July 2004. Retrieved October 2012	<a href="http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/decreto/d5163.htm">http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/decreto/d5163.htm</a> . .	Brazilian Government
/51/	UNFCCC	Federal Republic of Brazil communication to UNFCCC- Letter including nationally appropriate mitigation actions (29 January 2010). Retrieved October 2012	<a href="http://unfccc.int/meetings/cop_15/copenhagen_accord/items/5262.php">http://unfccc.int/meetings/cop_15/copenhagen_accord/items/5262.php</a>	UNFCCC
/52/	Brazilian DNA	CIMC – National Committee of Climate Change - National Plan on Climate Change (PNMC), dated September 2008 (file: “CIMC-PNMC-v.2008.09”)		Brazilian DNA
/53/	Brazilian Government	ONS – Electric System National Operator. Grid procedure – Module 12: Invoice Metering: - Sub-module 12.2: Installation of the invoice metering system. - Sub-module 12.3: Maintenance of the invoice metering system.	<a href="http://www.ons.org.br/procedimentos/modulo_12.aspx">http://www.ons.org.br/procedimentos/modulo_12.aspx</a> . Retrieved October 2012	Brazilian Government
/54/	CEEE	Internal procedure for archiving CDM documentation.	Procedimentos de arquivamento.pdf	Lumina
/55/	CEEE	Environmental Impact Assessment (RELATÓRIO AMBIENTAL SIMPLIFICADO) May 2011	Simplified Environment Report – Ernestina.pdf	Lumina
/56/	Brazilian DNA	CIMGC – Manual for submission of CDM project Activities for LoA approval, version 02, dated 01 July 2008. Retrieved October 2012	<a href="http://www.mct.gov.br/index.php/content/view/37142.html">http://www.mct.gov.br/index.php/content/view/37142.html</a>	Brazilian DNA
/57/	UNFCCC	Guidelines for completing the Project Design Document form, version 01.0 – EB 66 Annex 8, dated 02 March 2012.	UNFCCC Guidelines	UNFCCC
/58/	UNFCCC	Clean Development Mechanism Validation and Verification Standard, Version 02.1 EB70 Annex02, dated 3 December 2012. Clean Development Mechanism Validation and Verification Standard 09.0 20 February 2015 EB82, Annex 14	UNFCCC Guidelines	UNFCCC
/59/	PJRCES	F-06 16 Opening and Closing Meeting_SHPP Ernestina_Closing (09Aug12)	PJRCES documents	PJRCES
/60/	PJRCES	F-06.17 Attendance Sheet_Small Hydro Power Plant Ernestina CEEE_Closing(09Aug12)	PJRCES documents	PJRCES
/61/	UNFCCC	Guidelines for the reporting and validation of plant load factors	UNFCCC Guidelines	UNFCCC
/62/	UNFCCC	Guidelines on Common Practice version (version 02.0, EB69, Annex 8)	UNFCCC Guidelines	UNFCCC
/63/	CEEE	Ernestina common practice analysis of 27 March 2013	ErnestinaCommonPractice.xls	Lumina
/64/	UNFCCC	Prior Consideration Brazilian DNA	UNFCCC Guidelines	UNFCCC
/65/	UNFCCC	EB70/Annex 22 - “Tool to calculate Emission Factor for an electricity system” (version 03.0.0);	UNFCCC Guidelines	UNFCCC

/66/	UNFCCC	"Guidance on the Demonstration and Assessment of Prior Consideration of the CDM", version 4, EB62;	UNFCCC Guidelines	UNFCCC
/67/	UNFCCC	PDD_SHPP Ernestina, version 4, 27 June 2013	PDD_SHPP Ernestina, version 4, 27 June 2013.doc	Lumina
/68/	UNFCCC	PDD_SHPP Ernestina, version 5, 10 January 2014	PDD_SHPP Ernestina, version 5, 10 January 2014.doc	Lumina
/69/	UNFCCC	PDD_SHPP Ernestina, version 5.1.2, 22 June 2015	PDD_SHPP Ernestina, version 5.1.2, 22 June 2015.doc	Lumina
		PDD_SHPP Ernestina, version 5.2, 16 May 2016	PDD_SHPP Ernestina, version 5.2, 16 May 2016.doc	
/70/	Brazilian Government	Hydropower plants highlights - 12 May 2010	Hydropower plants highlights - 12 May 2010.pdf	Brazilian Government
/71/	Brazilian Government	Renewable Energy Essentials: Hydropower – 17 November 2010	Renewable Energy Essentials: Hydropower – 17 November 2010	Brazilian Government
/72/	UNFCCC	Cash Flow SHPP Ernestina	CAR35 - Cash Flow SHPP Ernestina_v2_27.03.13.xls	Lumina
/73/	Brazilian Government	Financial cost according to the bank's official rate and established quarterly according to the inflation expectation for a given period provided by BNDES:	<a href="http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financieiro/Custos_Financeiros/Taxa_de_Juros_de_Longo_Prazo_TJLP/index.html">www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financieiro/Custos_Financeiros/Taxa_de_Juros_de_Longo_Prazo_TJLP/index.html</a>	Brazilian Government
/74/	UNFCCC	U.S. Federal Reserve - 30-year US Treasury Yield; 10-year T. Notes; 10-year TIPS. Available at:	<a href="http://www.federalreserve.gov/econresdata/researchdata.htm">http://www.federalreserve.gov/econresdata/researchdata.htm</a>	Lumina
/75/	UNFCCC	CEEE CDM Assessment Report for the power plant ()	CAR32 - CEEE CDM Assessment Report.pdf	Lumina
/76/	UNFCCC	F-CDM-PDD - Project Design Document form – Version 6	<a href="http://cdm.unfccc.int/Reference/PDDs_Forms/index.html#reg">http://cdm.unfccc.int/Reference/PDDs_Forms/index.html#reg</a>	Lumina
/80/	Brazilian Government	2010 Management Report of the Research Energy Company-EPE, which contains auction prices and studies to expansion of auctions for electricity generation.	<a href="http://www.epe.gov.br/acessoainformacao/Documents/Institucional/Relatorio%20de%20Administracao%20da%20Administracao%20EPE%20-%202010.pdf">http://www.epe.gov.br/acessoainformacao/Documents/Institucional/Relatorio%20de%20Administracao%20da%20Administracao%20EPE%20-%202010.pdf</a>	Brazilian Government

## Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. CL from this validation

CL ID	01	Section no.	B.5	Date:	24 September 2012
<b>Description of CL</b>					
(i) IRR has to be revised according to revised capacity addition.					
(ii) Please revise O&M costs to 13.56 according to reference.					
<b>Project participant response</b>				<b>Date:</b> 29 October 2012	

(i) ANEEL granted an assured energy of 5.20 MWavg to SHPP Ernestina as can be verified in ANEEL's technical spreadsheet in the project's Basic Project Design (page 223).

This modification had a direct impact in the project's IRR, which was modified from 2.46% to 6.38%.

Section B.5 of the PDD and the IRR calculation spreadsheet were both modified accordingly.

(ii) The O&M costs were revised as per CCEE's historical values presented in "Annex 8 – O&M Costs.pdf", which presents that the average historic value for all CEEE's power plants is R\$13.56/MWh.

However, project participants decided to use the specific historical average O&M cost of SHPP Ernestina, in a more conservative manner, which can be verified as R\$24.84/MWh. Consequently, the project's IRR was modified to 6.38%.

Section B.5 of the PDD and the cash flow spreadsheet were both revised accordingly.

#### Documentation provided by project participant

PDD; Annex 8 – O&M Costs.pdf

#### DOE assessment

Date: 21 December 2012

The reference has been provided to the DOE. It has been revised in version 2 of the PDD, therefore the **CL#01 was closed**.

CL ID

02

Section no.

Section D.

Date: 24 September 2012

#### Description of CL

Please add reference for licensing reference term and clarify threshold for EIA

#### Project participant response

Date: 29 October 2012

Please, see "Annex 9 - form\_PCH.pdf" for the SHPP's Licensing Reference Term.

#### Documentation provided by project participant

PDD; Annex 9 - form\_PCH.pdf

#### DOE assessment

Date: 21 December 2012

The reference has been provided to the DOE. It has been revised in version 2 of the PDD. Therefore, **CL#02 was closed**.

CL ID

03

Section no.

B.5.

Date: 24 September 2012

#### Description of CL

Please revise the O&M costs.

#### Project participant response

Date: 29 October 2012

The O&M costs were revised as per CCEE's historical values presented in "Annex 8 – O&M Costs.pdf", which presents that the average historic value for all CEEE's power plants is R\$13.56/MWh.

However, project participants decided to use the specific historical average O&M cost of SHPP Ernestina, in a more conservative manner, which can be verified as R\$24.84/MWh. Consequently, the project's IRR was modified to 6.38%.

Section B.5 of the PDD and the cash flow spreadsheet were both revised accordingly.

#### Documentation provided by project participant

PDD; investment analysis spreadsheet; Annex 8 – O&M Costs.pdf

#### DOE assessment

Date: 21 December 2012

The PDD v.5.1 was revised and The reference has been provided to the DOE. It has been revised in version 2 of the PDD. Information provided by PP was analysed and Therefore, **CL#03 was closed**.

CL ID

04

Section no.

B.4.

Date: 24 September 2012

#### Description of CL

PP is requested to clarify in the section B.4. Establishment and description of baseline scenario of the PDD the description of the weighted average emissions

#### Project participant response

Date: 29 October 2012

The Emission Factor is calculated in a transparent and conservative manner as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system".

The PDD was revised accordingly.

#### Documentation provided by project participant

PDD; CERs spreadsheet

#### DOE assessment

Date: 21 December 2012

PP has used emission factors published by the Brazilian DNA which are considered to be correct and can be checked at <a href="http://www.mct.gov.br/index.php/content/view/74689.html">http://www.mct.gov.br/index.php/content/view/74689.html</a> . The Tool to calculate the Emission Factor for an electricity system was correctly applied.				
<b><u>CL#04 was closed.</u></b>				
<b>CL ID</b>	05	<b>Section no.</b>	C.1.1	<b>Date: 24 September 2012</b>
<b>Description of CL</b>				
PP is requested to clarify the 5 parameters mentioned in the Sub-step 2d: Sensitivity analysis of the PDD.				
<b>Project participant response</b>				<b>Date: 29 October 2012</b>
The text in Sub-step 2d mistakenly said five parameters, when there are actually only four parameters considered in the sensitivity analysis. The PDD was revised accordingly.				
<b>Documentation provided by project participant</b>				
<i>PDD</i>				
<b>DOE assessment</b>				<b>Date: 21 December 2012</b>
PP has corrected the text in accordance. Therefore, the <b><u>CL#05 was closed.</u></b>				

Table 2. CAR from this validation

<b>CAR ID</b>	01	<b>Section no.</b>	A.1, A.3, B.5 (table 6), B.6.3, B.6.4 and B.7.1	<b>Date: 24 September 2012</b>
<b>Description of CAR</b>				
The capacity of existing power plant and has to be changed according to the data of the plate at the generator.				
<b>Project participant response</b>				<b>Date: 29 October 2012</b>
The project's current installed capacity is 4.80 MW and the project activity will install three new turbo-generators sets with an overall generating capacity of 9.60 MW. Thus, the SHPP Ernestina's total installed capacity will be 14.4 MW and not 9.60 MW as previously stated in the PDD. This modification also interfered in the project's CER estimation, which were modified from 2,966 tCO <sub>2</sub> e to 8,992 tCO <sub>2</sub> e and the project's IRR which was modified from 2.46% to 6.38%. Sections A.1, A.3, B.5 (table 6), B.6.3, B.6.4 and B.7.1 of the PDD, the CER calculation spreadsheet ("CERs Ernestina.xls") and the IRR calculation spreadsheet ("Cash Flow HPP Ernestina.xls") were all modified accordingly.				
<b>Documentation provided by project participant</b>				
<i>PDD; CER calculation spreadsheet; IRR calculation spreadsheet</i>				
<b>DOE assessment</b>				<b>Date: 21 December 2012</b>
The sections were revised correctly in version 2 of the PDD and the <b><u>CAR#01 was closed</u></b>				
<b>CAR ID</b>	02	<b>Section no.</b>	A.1, A.3, B.5 (table 6), B.6.3, B.6.4 and B.7.1	<b>Date: 24 September 2012</b>
<b>Description of CAR</b>				
The capacity is based on the ensured capacity not on the specified capacity of the manufacturer of the equipment. The ensured capacity uses correction factors provided by the government. The parameters have to be revised.				
<b>Project participant response</b>				<b>Date: 29 October 2012</b>

The project's additional generating capacity will be 9.60 MW based in three turbo-generator sets that will be installed by the project activity with the following specifications:

- Turbines: 3.30 MW per unit
- Generators: 3.55 MVA per unit x capacity factor of 0.9

In Brazil, the assured energy designed for SHPPs is defined by the Brazilian Electricity Regulatory Agency – ANEEL (<http://www.aneel.gov.br>), which is an autarchy under special conditions linked to the Brazilian Mines and Energy Ministry. ANEEL's main responsibility is regulating and supervising electricity generation, transmission and distribution in the country.

Regarding the project activity, ANEEL granted an assured energy of 5.20 MWavg to SHPP Ernestina as can be verified in ANEEL's technical spreadsheet in the project's Basic Project Design (page 223).

This modification also interfered in the project's CER estimation, which were modified from 2,966 tCO<sub>2</sub>e to 8,992 tCO<sub>2</sub>e and the project's IRR which was modified from 2.46% to 6.38%.

Sections A.1, A.3, B.5 (table 6), B.6.3, B.6.4 and B.7.1 of the PDD, the CER calculation spreadsheet and the IRR calculation spreadsheet were all modified accordingly.

#### Documentation provided by project participant

PDD; CER calculation spreadsheet; IRR calculation spreadsheet

#### DOE assessment

Date: 21 December 2012

The sections were revised correctly in version 2 of the PDD and the **CAR#02 was closed**.

#### CAR ID

03

#### Section no.

A.5.

Date: 24 September 2012

#### Description of CAR

Provide MoC to confirm details of the PPs.

#### Project participant response

Date: 29 October 2012

Please see "Annex 1 - MoC Ernestina.pdf" with the participation statement of all project participants.

Also, please see Annex 2 – CEEE Statement.pdf and "Annex 3 – Lumina Letter Attorney.pdf" which provide evidence for Mr. Marcos and Mr. Clóvis positions in CEEE and Lumina Energia, respectively, as stated in the project's MoC.

#### Documentation provided by project participant

PDD; MoC; Power of Attorney

#### DOE assessment

Date: 21 December 2012

The MoC has been provided with the correct CDM form applied and correctly fulfilled, therefore the **CAR#03 was closed**.

#### CAR ID

04

#### Section no.

A.2. and A.3.

Date: 24 September 2012

#### Description of CAR

The LoA of the host country is pending.

#### Project participant response

Date: 29 October 2012

The project activity doesn't have participation from any Party from Annex 1 countries. Therefore, the only Party involved in the proposed project activity is the Host Country (in the project's case, Brazil).

In order to obtain the Letter of Approval (LoA), the PPs must submit the Final Validation Report to the Brazilian DNA ("CIMGC" from the Portuguese "Comissão Interministerial de Mudança Global do Clima").

The procedures established by the Brazilian DNA in order to obtain the LoA are determined in the Resolution #1, from 11/Sep/2003. Further information related to the methods and procedures for the issuance of the Brazilian LoA can be obtained in the "Manual for submission of project activities under CDM" (from the Portuguese "Manual para submissão de atividades de projeto no âmbito do MDL"), available at: [http://www.mct.gov.br/upd\\_blob/0025/25268.pdf](http://www.mct.gov.br/upd_blob/0025/25268.pdf)

#### Documentation provided by project participant

PDD

#### DOE assessment

Date: 21 December 2012

The final Letter of Approval (LoA) of the Host Party has not been received; since the approval process of the Brazilian DNA requires that the project activity has been validated, pending only on the confirmation of the LoA. The request for registration of this project activity will not be submitted until it has been received. It is regular procedure in Brazil. After having the positive validation opinion from DOE, Brazilian DNA issues LoA and having this host country LoA the Annex I country will issue its LoA.

Prior to the submission of the Project Design Document and the validation report to the CDM Executive Board, the Project must obtain the written approval of voluntary participation from the DNA of Brazil, including the project contributes to the country in achieving sustainable development.

<b>CAR ID</b>	05	<b>Section no.</b>	B.6.	<b>Date:</b> 24 September 2012
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#### Description of CAR

There is no evidence that the documentation presented for records are in accordance since the basic design has not been accepted by ANEEL.

**Project participant response** **Date:** 29 October 2012

In Brazil, ANEEL is also responsible for approving the Basic Project Design for SHPP projects. As explained in CAR 01, ANEEL is an autarchy under special conditions linked to the Brazilian Mines and Energy Ministry responsible for regulating and supervising electricity generation, transmission and distribution in the country, among others.

The SHPP Ernestina requested ANEEL for the authorization of its Basic Project Design in 18/Oct/2010 (please see "Annex 4 – SHPP Ernestina ANEEL Protocol.pdf" for CEEE's authorization request), which was received by ANEEL in 18/Oct/2010 as can be verified in ANEEL's receipt protocol stamp in Annex 4.

The project's Basic Project Design approval by ANEEL is still pending. Still, this documentation was used on the PDD since it was the official evidence available at the time of validation.

#### Documentation provided by project participant

PDD and ANEEL supporting documentation

**DOE assessment** **Date:** 21 December 2012

The explanation by the PP indicates that ANEEL's authorization to implement the project activity involves the approval of the Basic Project Design. The reference has been provided to the DOE. Therefore, the CAR#05 was closed.

<b>CAR ID</b>	06	<b>Section no.</b>	A.1, A.3, B.5 (table 6), B.6. and B.7.	<b>Date:</b> 24 September 2012
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#### Description of CAR

The data presented regarding the power plant should be reviewed. The total power is 14 MW and 9.6 MW not as stated in the PDD.

**Project participant response** **Date:** 29 October 2012

The project's current installed capacity is 4.80 MW and the project activity will install three new turbo-generators sets with an overall generating capacity of 9.60 MW.

Thus, the SHPP Ernestina's total installed capacity will be 14.4 MW and not 9.60 MW as previously stated in the PDD.

This modification also interfered in the project's CER estimation, which were modified from 2,966 tCO<sub>2</sub>e to 8,992 tCO<sub>2</sub>e and the project's IRR which was modified from 2.46% to 6.38%.

Sections A.1, A.3, B.5 (table 6), B.6.3, B.6.4 and B.7.1 of the PDD, the CER calculation spreadsheet and the IRR calculation spreadsheet were all modified accordingly.

#### Documentation provided by project participant

PDD; CER calculation spreadsheet; IRR calculation spreadsheet

**DOE assessment** **Date:** 21 December 2012

The PDD was corrected revised and the CAR#06 was closed.

<b>CAR ID</b>	07	<b>Section no.</b>	B.10	<b>Date:</b> 24 September 2012
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#### Description of CAR

The commercialisation agency keeps records of the power delivered. A sample record of one historical year should be provided.

The generation history and the meters calibration reports are sufficient to prove it.

**Project participant response** **Date:** 29 October 2012



<p>The Brazilian Electric Power Commercialization Chamber – CCEE is the official regulator of the electricity market in the country, acting as the registry for contracts and transactions.</p> <p>CCEE uses electricity generation data to bill the transmission services between generator and end-consumer, among other uses. Thus, CCEE also records the electricity generation history of all power plants connected to the national grid in Brazil. Such data is consolidated in monthly spreadsheets that can only be accessed through an exclusive password that is made available only to the project's owner.</p> <p>The CCEE electricity generation record of the project activity in 2009 can be verified in the spreadsheet in "Annex 5 - CCEE 2009 crosscheck ME001.xls" which is being made available for the DOE.</p> <p>It's important to highlight that the file in Annex 5 presents CCEE's data in a more polished way so that the specific data for SHPP Ernestina can be verified. CCEE's gross data can also be verified in the file "Annex 6 – 2009 ME001.rar" which is also being made available to the DOE.</p> <p>When crosschecking CCEE's data with the CER estimation spreadsheet, PP verified that two months presented mistaken electricity generation values (April and June), which were corrected according to CCEE's ME001 Report. This modification, however, had no effect in the overall CER estimation.</p>				
<b>Documentation provided by project participant</b>				
PDD, spreadsheet and supporting documentation				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
The reference has been provided to the DOE. Therefore, <b>CAR#07 was closed.</b>				
<b>CAR ID</b>	08	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
Authorisation of project design by ANEEL is pending.				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
<p>In Brazil, ANEEL is also responsible for approving the Basic Project Design for SHPP projects. As explained in CAR 01, ANEEL is an autarchy under special conditions linked to the Brazilian Mines and Energy Ministry responsible for regulating and supervising electricity generation, transmission and distribution in the country, among others.</p> <p>The SHPP Ernestina requested ANEEL for the authorization of its Basic Project Design in 18/Oct/2010 (please see "Annex 4 – SHPP Ernestina ANEEL Protocol.pdf" for CEEE's authorization request), which was received by ANEEL in 18/Oct/2010 as can be verified in ANEEL's receipt protocol stamp in Annex 4.</p> <p>The project's Basic Project Design approval by ANEEL is still pending. Still, this documentation was used on the PDD since it was the official evidence available at the time of validation.</p>				
<b>Documentation provided by project participant</b>				
PDD and supporting documentation				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
The explanation by the PP indicates that ANEEL's authorization to implement the project activity involves the approval of the Basic Project Design. The reference has been provided to the DOE. Therefore, the <b>CAR#08 was closed.</b>				
<b>CAR ID</b>	09	<b>Section no.</b>	B.8.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
The equations and parameters are correct except for the additional capacity that should be modified in the calculation.				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
<p>ANEEL granted an assured energy of 5.20 MWavg to SHPP Ernestina as can be verified in ANEEL's technical spreadsheet in the project's Basic Project Design (page 223)".</p> <p>Section B.6 of the PDD and the worksheet "Additional Electricity" (Colum A, line 4) of the CER calculation spreadsheet were modified accordingly.</p>				
<b>Documentation provided by project participant</b>				
PDD, Basic Project Design.				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
The evidences presented were checked. All the parameters were justified or included in the PDD. Therefore the <b>CAR#09 was closed.</b>				
<b>CAR ID</b>	10	<b>Section no.</b>	B.5.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				

Figure 6 contains a pin whereas there is only one coordinate given which fits to the pin at the powerhouse. The second pin points to the wrong dam. Please add the coordinates of the dam, which provides water to the new turbines.

<b>Project participant response</b>	<b>Date:</b> 29 October 2012
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PDD was updated with correct geographical coordinates as requested. Please refer to version 2 of the PDD.

**Documentation provided by project participant**

PDD

**DOE assessment**

**Date:** 21 December 2012

The revised PDD containing the correct geographical coordinates has been provided to the DOE and were crosschecked on Google Earth. The **CAR#10 was closed.**

<b>CAR ID</b>	11	<b>Section no.</b>	A.7.	<b>Date:</b> 24 September 2012
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**Description of CAR**

PP shall clear indicate the scale of the project.

<b>Project participant response</b>	<b>Date:</b> 29 October 2012
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The CDM considers small power plants – for Type I projects – those with a capacity output until 15 MW. Considering that the project activity will have a total installed capacity of 14.4 MW, the capacity addition project is considered of small scale.

This description was included in the PDD on Section A.3.

**Documentation provided by project participant**

PDD, Basic Project Design, Project drawings, descriptions and calculation memorials.

**DOE assessment**

**Date:** 21 December 2012

The PDD was updated and corrected, the **CAR#11 was closed.**

<b>CAR ID</b>	12	<b>Section no.</b>	B1.	<b>Date:</b> 24 September 2012
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**Description of CAR**

PP shall update the Guidelines for Common practice analysis

<b>Project participant response</b>	<b>Date:</b> 29 October 2012
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The applied guidelines were updated to “Guidelines on Common Practice” (version 02.0, EB69, Annex 8).

**Documentation provided by project participant**

PDD

**DOE assessment**

**Date:** 21 December 2012

PDD was updated and it is in accordance.

**CAR#12 was closed.**

<b>CAR ID</b>	13	<b>Section no.</b>	B.5. and C.2	<b>Date:</b> 24 September 2012
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**Description of CAR**

A justification of the start date should be added.

<b>Project participant response</b>	<b>Date:</b> 29 October 2012
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The project starting date is expected to be until 15/Jan/2013 since the project's bidding date is scheduled to happen in that date.

The schedule of the implantation of the SHPP Ernestina project activity can be verified in CEEE's schedule, which is being made available to the DOE in “Annex 7 - Ernestina Work Schedule”.

Sections B.5 and C.2.2 of the PDD were modified accordingly.

**Documentation provided by project participant**

PDD; Annex 7 - Ernestina Work Schedule

**DOE assessment**

**Date:** 21 December 2012

The reference has been provided to the DOE. It has been revised in version 2 of the PDD. Therefore, the **CAR#13 was closed.**

<b>CAR ID</b>	14	<b>Section no.</b>	B.11.	<b>Date:</b> 24 September 2012
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**Description of CAR**

The value of the PPA should be revised to reflect the most recent value referring to the Brazilian Energy Auction of December 2011.

<b>Project participant response</b>	<b>Date:</b> 29 October 2012
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PP originally used as reference in the project's financial analysis and in the PDD a PPA price of R\$141.93/MWh, which was referenced on the Brazilian Energy Auction of 26/Aug/2010 (available at <a href="http://www.epe.gov.br/imprensa/PressReleases/20100826_1.pdf">http://www.epe.gov.br/imprensa/PressReleases/20100826_1.pdf</a> ). Since the project's financial spreadsheet was consolidated in 19/03/2012 ("Cash Flow HPP Ernestina.xls"), the PPA price used is not the most recent value available. PP modified the project's financial analysis with the PPA price of R\$91.20/MWh with reference in the last Brazilian Energy Auction which was held in 20/Dec/2011 (available at <a href="http://www.epe.gov.br/imprensa/PressReleases/20111220_1.pdf">http://www.epe.gov.br/imprensa/PressReleases/20111220_1.pdf</a> ). Thus, section B.5 of the PDD and the financial analysis were both modified accordingly.				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
The reference has been provided to the DOE. It has been revised in version 2 of the PDD. Therefore, the <b>CAR#14 was closed.</b>				
<b>CAR ID</b>	15	<b>Section no.</b>	PDD	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall update PDD with latest tools and guidelines (additionality, emission factor, financial guidelines and common-practice guidelines)				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The applied tools and guidelines were all updated as follows: <ul style="list-style-type: none"> <li>- EB70/Annex 08 - "Tool for the demonstration and assessment of additionality" (version 07.0.0);</li> <li>- EB70/Annex 22 - "Tool to calculate Emission Factor for an electricity system" (version 03.0.0);</li> <li>- "Guidance on the Demonstration and Assessment of Prior Consideration of the CDM", version 4, EB62;</li> <li>- "Guidelines on the Assessment of Investment Analysis" (version 05, EB62, Annex 5);</li> <li>- "Guidelines on Common Practice" (version 02.0, EB69, Annex 8).</li> </ul> All relative sections of the PDD were updated accordingly.				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
The reference has been provided to the DOE. It has been revised in version 2 of the PDD. Therefore, the <b>CAR#15 was closed.</b>				
<b>CAR ID</b>	16	<b>Section no.</b>	B.9.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall update the start date of the project				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The project's starting date was modified to 01/Dec/2013 and the project's crediting period starting date was also modified to 01/Jan/2014. All relative sections of the PDD and the CERs calculation spreadsheet were updated accordingly.				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PDD was updated and it is in accordance. <b>CAR#16 was closed.</b>				
<b>CAR ID</b>	17	<b>Section no.</b>	B.7.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall clarify and correct the frequency of the monitoring parameter EG <sub>facility,y</sub>				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The frequency of the monitoring of parameter EG <sub>facility,y</sub> is annually and not every two years as previously stated on the PDD. The table on section B.7.1 was modified accordingly.				
<b>Documentation provided by project participant</b>				
PDD				

<b>DOE assessment</b>			<b>Date:</b> 21 December 2012	
PDD was updated and it is in accordance. <b>CAR#17 was closed.</b>				
<b>CAR ID</b>	18	<b>Section no.</b>	B.2.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall confirm that the existing power plant/units will continue to operate after the implementation of the project activity.				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
As justified during the site visit on SHPP Ernestina, CEEE confirmed that the existing power plant will continue to operate since the project activity consists in a capacity addition. Also, as can be verified in the Project Basic Design, all the study was done considering a capacity addition using the current power units to continue to generate electricity. Also, the final installed capacity of the project activity will be higher than the addition of the new turbo-generator set (9.6 MW). All environmental licenses (already given to the DOE) and ANEEL authorizations (also given to the DOE) states that the project is a capacity addition with an overall capacity higher than the capacity of the new turbo-generator set.				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>			<b>Date:</b> 21 December 2012	
Confirmation is consistent and documentation corroborates with the capacity addition. <b>CAR#18 was closed.</b>				
<b>CAR ID</b>	19	<b>Section no.</b>	B.8.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall confirm no capacity addition or retrofit of the plant has been undertaken between the start of the minimum historical reference period and the implementation of the project activity				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
As can be verified in the CER calculation spreadsheet, the historical electricity generation of SHPP Ernestina has always been constant, without any indication that would lead to the conclusion that the power plant was retrofitted or had a capacity addition.				
The applied guidelines were updated to "Guidelines on Common Practice" (version 02.0, EB69, Annex 8).				
<b>Documentation provided by project participant</b>				
PDD; Historical Electricity Generation				
<b>DOE assessment</b>			<b>Date:</b> 21 December 2012	
The Historical Electricity Generation /14/ indicates discrepancies among the years are not related to retrofit or capacity addition. Also, during the site visit it was confirmed by the PJR CES technical expert the generators and turbines were not replaced, retrofitted or received capacity addition. <b>CAR#19 was closed.</b>				
<b>CAR ID</b>	20	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
A letter sent to the UNFCCC on 06/Feb/2012 is not available in UNFCCC website under <a href="http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html">http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html</a> . PP is requested to explain				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The prior consideration of CDM communication was sent to CDM under the project's abbreviated name "SHPP Ernestina CEEE", as can be verified in UNFCCC's website <a href="http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html">http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html</a> .				
An explanation was included in Section B.5 of the PDD as follows:				
<i>It's important to notice that on the UNFCCC website the project is listed under the title "SHPP Ernestina CEEE", which was an abbreviation of the current project activity title "Small Hydro Power Plant Ernestina CEEE".</i>				
Please see "CAR21 - Prior Consideration of the CDM Form - SHPP Ernestina CEEE.pdf" to confirm the project's prior consideration of the CDM letter sent to UNFCCC to confirm that the project is indeed the project activity Small Hydro Power Plant Ernestina CEEE.				
<b>Documentation provided by project participant</b>				

PDD; CAR21 - Prior Consideration of the CDM Form - SHPP Ernestina CEEE.pdf				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
Clarification and documentation is considered to be correct and reliable. <b>CAR#20 was closed.</b>				
<b>CAR ID</b>	21	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall indicate the investment date in the PDD in accordance with the glossary of terms and EB 62 annex 5				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
<p>The investment decision date is 01/Mar/2011 when the contract between CEEE and Lumina for developing a CDM project activity for SHPP Ernestina was signed (Please see CAR22 – CEEE – Lumina contract.pdf). This date was included in Table 5 at Section B.5 of the PDD.</p> <p>The date on which the agreement for developing the CDM project activity was signed, however, is not to be mistaken with the project's starting date. According to the Glossary of CDM Terms, the starting date of a project activity is "the earliest date at which either the implementation or construction or real action of a project activity begins" which is commonly the date when PPs commits to significant expenses related to the effective implementation or construction of the project activity.</p> <p>Considering that SHPP Ernestina project activity still hasn't acquired its new equipment since CEEE's will first publish a Bidding Announcement for contracting a company to sign an EPC contract. Thus, the signature of this contract will be the project's starting date since it will be the point with no return for developing the project activity. The Bidding Announcement is due to 01/Dec/2013 and the EPC contract signature is estimated to 01/Mar/2014, as can be verified in CEEE's work schedule in "CAR22 – Ernestina Work Schedule.pdf".</p> <p>Considering that the work schedule estimates the commissioning only on June, 2015 the project's crediting period starting date was also modified accordingly.</p>				
<b>Documentation provided by project participant</b>				
PDD; CAR22 – CEEE – Lumina contract.pdf; CAR22 – Ernestina Work Schedule.pdf				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
<p>The contract between CEEE and Lumina is a strong indication that the on 01 March 2011 CEEE decided to proceed with the project activity. The contract includes a contractual clause where Lumina shall develop PDD.</p> <p><b>CAR#21 was closed.</b></p>				
<b>CAR ID</b>	22	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to clarify what is chosen to determine the parameter EG <sub>historical</sub>				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
<p>As stated in the PDD, Project participants may choose among the following two time spans of historical data to determine EG<sub>historical</sub>:</p> <ul style="list-style-type: none"> <li>a) The five last calendar years prior to the implementation of the project activity; or</li> <li>b) The time period from the calendar year following DATE<sub>hist</sub>, up to the last calendar year prior to the implementation of the project, as long as this time span includes at least five calendar years, where DATE<sub>hist</sub> is latest point in time between: <ul style="list-style-type: none"> <li>i. The commercial commissioning of the plant/unit;</li> <li>ii. If applicable: the last capacity addition to the plant/unit; or</li> <li>iii. If applicable: the last retrofit of the plant/unit.</li> </ul> </li> </ul> <p>Project participants chose method a) five last calendar years prior to the implementation of the project activity for calculating EG<sub>historical</sub>. This decision was documented as requested on the PDD in Section B.6.1.</p>				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
<p>PP has determined the parameter choosing the option a) five last calendar years prior to the implementation of the project activity for calculating EG<sub>historical</sub>.</p> <p>PP provided documentation including the history of electricity generation of the power plant.</p> <p><b>CAR#22 was closed.</b></p>				

<b>CAR ID</b>	23	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
The subsection Step 4. Common practice analysis of the PDD is not in accordance with EB69 annex 8. PP is correct it.				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The common practice analysis was revised as requested. Please see Step 4 on Section B.5 of the PDD. The spreadsheet with the complete analysis can be verified in "CAR23 – Common practice analysis.rar" along with all evidence documents.				
<b>Documentation provided by project participant</b>				
PDD; CAR23 – Common practice analysis.rar				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
Common practice analysis was revised in accordance with the latest guidelines. A spreadsheet including information about the analysis and sources was provided and considered to be correct. <b>CAR#12 was closed.</b>				
<b>CAR ID</b>	24	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to clarify what is the adopted for the parameter Datebaselineretrofit				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
As stated in the PDD, in order to estimate the point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity (DATE <sub>BaselineRetrofit</sub> ), project participants may take the following approaches into account: <ul style="list-style-type: none"> <li>a) The typical average technical lifetime of the type equipment may be determined and documented, taking into account common practices in the sector and country, e.g., based on industry surveys, statistics, technical literature, etc.;</li> <li>b) The common practices of the responsible company regarding replacement/retrofitting schedules may be evaluated and documented, e.g. based on historical replacement/retrofitting records for similar equipment.</li> </ul> PPs chose to define DATE <sub>Baseline,Retrofit</sub> according to option a) with technical literature. Please see Section B.6.1 for more information.				
<b>Documentation provided by project participant</b>				
PDD; supporting documentation				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PP has estimated and described the estimate in the PDD. PJRCES technical expert considers the estimate to be accurate and correct. The estimate was based on the technical literature /73/ /74/ prepared by International Energy Agency (IEA) <sup>4</sup> about hydropower plants. According to the estimate, the year which the equipment shall be replaced in the absence of the project activity is 2035, which is the end of concession. <b>CAR#24 was closed.</b>				
<b>CAR ID</b>	25	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to explain the end of concession period Indicated for the project activity and how this has been ascertained in the table 17 of the PDD				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The concession for the operation of hydro power plants in Brazil is granted to concessionaires by ANEEL. It consists in the authorization for a determined concessionaire to operate the power plant. In the project activity's case, CEEE-GT is the concessionaire of SHPP Ernestina and ANEEL established a deadline until 2035 in which CEEE-GT will remain granted to operate the power plant. After this deadline, ANEEL may decide whether or not to renew its concession again. As indicated in the PDD, the project's concession contract can be seen in the following link: <a href="http://www.aneel.gov.br/aplicacoes/Contrato/Documentos_Aplicacao/CG0025CEEE.pdf">http://www.aneel.gov.br/aplicacoes/Contrato/Documentos_Aplicacao/CG0025CEEE.pdf</a>				
<b>Documentation provided by project participant</b>				
PDD; contract concession documentation				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012

<sup>4</sup> <http://www.iea.org/>

PP has clarified the concession modality between CEEE-GT and ANEEL and presented the contract concession documentation /5//6//7//8//9/ which indicate the period for operation of the hydropower plant. <b>CAR#25 was closed.</b>				
<b>CAR ID</b>	26	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to clarify the ERs indicated in the table 18 of the PDD as they are not in accordance with the spreadsheet.				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The PDD states an overall additional electricity generation of 45,552 MWh in a conservative manner, since calculation presented in the CER spreadsheet didn't consider a rounding down in the number calculated and, thus, the number presented in the spreadsheet was 45,256 MWh. The CER calculation spreadsheet was corrected accordingly as can be verified in "CAR26 - CERs Ernestina_v2_27.03.2013.xls".				
<b>Documentation provided by project participant</b>				
PDD; CERs spreadsheet				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PP has corrected the spreadsheet in accordance with methodology and tools and updated the PDD. <b>CAR#26 was closed.</b>				
<b>CAR ID</b>	27	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to explain the absence of monitoring parameter "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" in the PDD.				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
This parameter is not monitored since the project's reservoir area will not be modified with the addition capacity project activity.				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
According to the project design /10/ the project which is a run-off-river will receive new equipment (capacity addition) which will provide with more installed capacity and will not change the current reservoir. Nevertheless, PP has included the parameter to be monitored as described accordingly with the monitoring methodology ACM0002. <b>CAR#27 was closed.</b>				
<b>CAR ID</b>	28	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to clarify the Monitoring frequency of the parameter EG <sub>facility,y</sub>				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
EG <sub>facility,y</sub> will be monitored in a monthly basis. As explained in Section B.7.1, PP will use spreadsheets got every month directly of the meters with the monthly consolidated generation data, which will be confronted with the available generation spreadsheets at the website of CCEE in a monthly basis.				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PP has corrected the PDD stating the Monitoring frequency of the parameter EG <sub>facility,y</sub> is monthly which is in accordance with the methodology. <b>CAR#28 was closed.</b>				
<b>CAR ID</b>	29	<b>Section no.</b>	B.8	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall correct the valued applied for the parameters: EF <sub>grid,CM,y</sub> , EF <sub>grid,BM,y</sub> and CapPJ				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012

The parameters indicated were corrected in Section B.7.1 as follows:				
<ul style="list-style-type: none"> <li>• <math>EF_{grid,CM,y} = 0.1987</math></li> <li>• <math>EF_{grid,BM,y} = 0.1056</math></li> <li>• <math>Cap_{PJ} = 14,400,00</math></li> </ul>				
<b>Documentation provided by project participant</b>				
PDD; CERs spreadsheet				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PP has corrected the spreadsheet and updated the PDD accordingly.				
<b>CAR#29 was closed.</b>				
<b>CAR ID</b>	30	<b>Section no.</b>	B1.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP shall update the Guidelines for Common practice analysis				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The applied guidelines were updated to "Guidelines on Common Practice" (version 02.0, EB69, Annex 8).				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PP has reassessed the financial analysis as per the guidelines and tools accordingly. PDD was updated and it is in accordance.				
<b>CAR#30 was closed.</b>				
<b>CAR ID</b>	31	<b>Section no.</b>	B.11.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to clarify whether cost of equity calculated is in real terms or converted to nominal terms				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
Considering the above mentioned, the benchmark was revised and the WACC was calculated post-tax and in real terms.				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PP clarified cost of equity calculated is converted to nominal terms. PDD was updated and it is in accordance.				
<b>CAR#31 was closed.</b>				
<b>CAR ID</b>	32	<b>Section no.</b>	B.11.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to clarify the average value in the last 2 years is 6.0% and how the time period is appropriate as compared to the lifetime of the project activity in the section of benchmarking analysis.				
<b>Project participant response</b>				<b>Date:</b> 29 October 2012
The financial cost defined by TJLP was revised according to the new benchmark calculation. Throughout the analysis, all input parameters were considered in an average of 5 years between 2006 and 2010 (since the investment decision date is 01/Mar/2011).				
The financial cost (TJLP) was revised and a 5-year average was considered from 2005 to 2010, respecting the project's investment decision date. Thus, the financial cost was modified from 6% to 6.60%. The complete calculation can be verified in "CAR30 – Ernestina Benchmark.xls".				
<b>Documentation provided by project participant</b>				
PDD				
<b>DOE assessment</b>				<b>Date:</b> 21 December 2012
PP has reassessed the benchmarking analysis and applied a 5-year average which is 6.60%. PDD was updated and it is in accordance.				
<b>CAR#32 was closed.</b>				
<b>CAR ID</b>	33	<b>Section no.</b>	B1.	<b>Date:</b> 24 September 2012
<b>Description of CAR</b>				
PP is requested to clarify or justify why is common to consider the maximum value of 3.57% for new enterprises as stated in PDD section of benchmarking analysis.				



<b>Project participant response</b>			<b>Date:</b> 29 October 2012
<p>The Brazilian National Development Bank (<i>Banco Nacional de Desenvolvimento – BNDES</i>) defines that the credit risk rate in the country varies between 0 and 3.57%. This rate is a margin to cover non-performing loans.</p> <p>Project participants adopted the average value of 1.785% in a conservative manner.</p>			
<b>Documentation provided by project participant</b>			
PDD			
<b>DOE assessment</b>			<b>Date:</b> 21 December 2012
<p>The Brazilian National Development Bank, which is a governmental entity defines credit risks in the country as it can be found at:  <a href="http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Instituicao_Financeira_Credenciada/normas_risco.html">http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Instituicao_Financeira_Credenciada/normas_risco.html</a></p> <p>PP has updated calculations applying the mid value for the range.</p> <p>PDD was updated and it is in accordance.</p> <p><b>CAR#33 was closed.</b></p>			
<b>CAR ID</b>	34	<b>Section no.</b>	B1.
			<b>Date:</b> 24 September 2012
<b>Description of CAR</b>			
PP is requested to clarify or justify 10-year amortization period stated in PDD section of benchmarking analysis.			
<b>Project participant response</b>			<b>Date:</b> 29 October 2012
<p>The average amortization period prior to the investment decision date was 16 years, as evidenced in the following link:  <a href="http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Sala_de_Imprensa/Noticias/2010/energia/20100809_energias_alternativas.html">http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Sala_de_Imprensa/Noticias/2010/energia/20100809_energias_alternativas.html</a></p>			
<b>Documentation provided by project participant</b>			
PDD			
<b>DOE assessment</b>			<b>Date:</b> 21 December 2012
<p>PP has presented governmental evidences about amortization which was corrected applied.</p> <p>PDD was updated and it is in accordance.</p> <p><b>CAR#34 was closed.</b></p>			
<b>CAR ID</b>	35	<b>Section no.</b>	B1.
			<b>Date:</b> 24 September 2012
<b>Description of CAR</b>			
<p>It is stated in the table 7 of the PDD that the project lifetime is 23 years (until 07/Jul/2035). PP is requested to clarify, justify or correct:</p> <ol style="list-style-type: none"> <li>1. Is 23 years inclusive of period of construction?</li> <li>2. Were all input parameters available at the investment decision date?</li> <li>3. The IRR is calculated for 23 years including 2 years of construction period; however, tax and JSCP is calculated for 20 years</li> <li>4. Insurance cost is not included in the financial parameter; both in PDD and in spreadsheet calculations?</li> <li>5. Provide source or web link reference for losses of 2.2% and MRE expenditure of 15%; rates of taxes.</li> <li>6. Why salvage value is not considered as an inflow in the calculation of IRR.</li> <li>7. In the cell I81 in calculation tab of spreadsheet calculations when the value "1" is applied, the project IRR is 7.44% and when the same is deleted, the project IRR is 8.45%.</li> <li>8. What is the PPA referred in the table.</li> </ol>			
<b>Project participant response</b>			<b>Date:</b> 29 October 2012

1. The project activity has a lifetime until 2035 as defined by ANEEL's concession contract and includes the two years of construction of the capacity addition project.
2. Considering that the investment decision date is 01/Mar/2011, all input parameters of the financial and benchmark analysis were revised accordingly.
3. The tax was not calculated for the two years construction period since it is only incident when there is revenue in a project. Considering that the cash flow shows that in the first two years of project (construction) there is no revenue generated, the tax is not incident. The same applies to JSCP.
4. The insurance cost is described and considered in the cash flow on worksheet "Calculation" I30. The description of its value was included in Section B.5 of the PDD.

**5. Losses: 2.2%**

This rate was mistakenly included in the cash flow and was therefore excluded from the analysis.

**MRE 15%**

MRE is the Energy Reallocation Mechanism and its expenses are defined as ANEEL's TEO rate (*Tarifa de Energia de Otimização*). This rate covers O&M incremental costs from power plants and financial compensation for power exchanged in the Energy Reallocation Mechanism (MRE) in the Chamber of Electric Energy Commercialization (CCEE). In 2010, TEO was fixed as R\$8.51/kW according to ANEEL

([http://www.aneel.gov.br/aplicacoes/noticias\\_boletim/?fuseaction=boletim.detalharNoticia&idNoticia=554](http://www.aneel.gov.br/aplicacoes/noticias_boletim/?fuseaction=boletim.detalharNoticia&idNoticia=554)). The rate was corrected accordingly in the cash flow.

**PIS/COFINS: 0.65% and 3%**

<http://www.receita.fazenda.gov.br/legislacao/ins/2002/in2472002.htm>

**ANEEL: 306.23**

This rate was mistakenly described. ANEEL establishes a rate for the supervision of electricity services (TFSEE – *Taxa de Fiscalização de Serviços de Energia Elétrica*).

The TFSEE rate was created by Law #9.427/96

([http://www.planalto.gov.br/ccivil\\_03/leis/L9427cons.htm](http://www.planalto.gov.br/ccivil_03/leis/L9427cons.htm)) and the value fixed for 2010 (prior to the investment decision date) was R\$363.60 as per ANEEL's Dispatch # 4774/09 (<http://www.aneel.gov.br/cedoc/dsp20094774.pdf>).

**ONS: 2%**

This rate was mistakenly applied in the cash flow calculation and was excluded from the analysis.

**Utility RGE: 4.23**

This rate makes reference to the Distribution System Use rate (TUSD – *Tarifa de Uso do Sistema de Distribuição*), which is defined by ANEEL. As per ANEEL's Resolution #1.009/2010, Group A4, Annex II-B, the value that should be applied is R\$2.88/kW and not 2%. This rate was corrected accordingly in the cash flow.

**APE/PIE: R\$0.76/MWh**

This rate was mistakenly applied in the cash flow calculation and was excluded from the analysis.

**IR: 25% (15% + 10%)**

<http://www.receita.fazenda.gov.br/aliquotas/contribpj.htm>

**Social Contribution: 9%**

<http://www.receita.fazenda.gov.br/aliquotas/ContribCsl/Default.htm>

**6. Salvage value**

As per the Brazilian regulation given in the Water Code (*Código das Águas*), Article 165:

*"At the expiry of the concessions all construction techniques, regularization and derivation, principal and accessory, the raceways water, the penstocks and discharge channels and leakage, as well as the machinery for the production and processing of energy and transmission and distribution lines revert to the Union, to the States or to the municipalities, as the area that is subject to the watercourse.*

*Single paragraph. When the use of hydropower is intended for public federal, state or municipal use, the facilities mentioned in this Article shall revert:*

- a) for the Union in the case of federal public services, whatever the owner of the source of energy used;
- b) for the state, in the case of state services in rivers other than the federal domain, in which case they will revert to the Union;
- c) for the municipality, in the case of municipal services or individuals in rivers other than the domain of the Union or the States.

Source: [http://www.planalto.gov.br/ccivil\\_03/decreto/d24643.htm](http://www.planalto.gov.br/ccivil_03/decreto/d24643.htm)

Therefore, considering that SHPP Ernestina is of Rio Grande do Sul State use, at the end of the concession period defined by ANEEL's Concession Contract (already made available to the DOE) the power plant facilities shall revert to the State without any compensations. Thus, the residual value is not applicable to the project's case and it wasn't applied in its cash flow.

7. The cell I81 was mistakenly considered in the cash flow and was removed from the spreadsheet.
8. The previous PPA of R\$91.20/MWh was not in line with the project's investment decision date. Therefore, PPA was updated to the most recent energy auction prior to the investment decision date, which occurred on Dec/2010 with a price of R\$67.31/MWh. Both PDD and cash flow were updated accordingly.

It's important to notice that the project's investment was modified since the previous evidence (OPE Eletrobrás) dated of Dec/2011, after the investment decision date. The value used on CEEE's Assessment Report of the CDM was used instead (please see "CAR34 - CEEE CDM Assessment Report.pdf"), since it is the most recent evidence prior to the investment decision date.

Considering all the above mentioned modifications, the project's IRR was modified to 2.70%. Please see "CAR35 – Cash Flow SHPP Ernestina\_v2\_27.03.2013.xls" for more information.

#### Documentation provided by project participant

PDD

**DOE assessment**

**Date:** 21 December 2012

1. Refer to CAR 26 - OK
  2. PP has reassessed the financial analysis and considered inputs were brought before to the decision date - OK
  3. PP clarified the taxes are not included during the period of construction of the plant which is in accordance with Brazilian regulation - OK
  4. PP has correctly included the insurance cost in financial analysis and described it in the PDD section B.5 – OK
  5. PP has removed the losses from the calculation and have presented references for the taxes and MRE which are find to be traceable – OK
  6. PP has clarified that salvage value is not applicable to the project activity as the per regulation indicated and found to be in accordance with Brazilian regulation and also could be checked,
  7. PP has corrected the spreadsheet which is considered to be in accordance.
  8. PP has updated the spreadsheet considering the most recent information previous to the investment decision date. PPA price is the price established in a Brazilian National auction for electricity sell.
- All clarifications given on CAR 36 are considered to be in accordance and it is considered to be CLOSED. PDD was updated and it is in accordance.

**CAR#35 was closed.**