




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

Title of the project activity	Small Hydro Power Plant Bugres CEEE
Version number of the validation report	5.4
Completion date of the validation report	20 June 2016
Version number of PDD to which this report applies	6.3
Date when PDD was uploaded for global stakeholder consultation	02 June 2012
Project participant(s)	CEEE-GT (Companhia Estadual de Geração e Transmissão de Energia Elétrica) and Lumina Engenharia e Consultoria Ltda
Host Party	Brazil
Estimated annual average GHG emission reductions or net removals in the crediting period (tCO₂e)	5,875
Sectoral scope(s) and selected methodology(ies)	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
Name of DOE	Perry Johnson Registrars Carbon Emissions Services, INC
Name, position and signature of the approver of the validation report	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 Bugres 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: 08 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	08 August 2012	Georg Zenk Luiz Cardoso
2.	Installations, equipment, project design and technical documentation related to the project activity	PP Office and project location	08 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	08 August 2012	Monitoring & metering arrangements, Calibration Frequency, Local stakeholder consultation, Technology, O&M Practice	Georg Zenk Luiz Cardoso
2.	Badaro	Clovis	Lumina	08 August 2012	Project development	Georg Zenk Luiz Cardoso
3.	Moss	Ursula Vettori	Lumina	08 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		02	
Authorization			
Contribution to sustainable development			
Modalities of communication		01	
Project design document			
Description of project activity		01	
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline		10	
- Deviation from methodology			
- Clarification on applicability of methodology, tool and/or standardized baseline			
- Project boundary		01	
- Establishment and description of baseline scenario	01		
- Demonstration of additionality	02	13	
- Emission reductions		03	
- Monitoring plan		01	
Duration and crediting period			
Environmental impacts			
Local stakeholder consultation			
Others (please specify)			
Total	03	32	0

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 14 May 2012, was made available on <http://cdm.unfccc.int/Projects/Validation/DB/G0WBQU0BRA2GUXCJBQV16QA086J2TE/view.html> and was open for comments for Parties, Stakeholders and Accredited NGO's for a period of 30 days starting from 02 June 2012 until 01 July 2012. One stake holder 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 Benedict addresses 13 issues. All comments were answered by PP and provided to the validation team as well as included in the PDD version 6.3. The validation team has thoroughly evaluated all the comments and responses received from the PP.

Comments by Benedict	PP's responses	Evaluation of validation team
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 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.	All documentation presented as evidence to the DOE is official and is the same presented to agencies and banks.	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.
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	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.

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.		
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 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.	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.
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	<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 7.23%, 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 -28.65% in the overall investment, +35.60 in the Energy Price and +37.10% 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&M costs, even with a variation of -100% the project's</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>

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 documents from PP, DOE to collect the same from different sources to do independent evaluation.	IRR would still be lower than the selected benchmark.	
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	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.

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.		
11) If applicable only: Is these machines, equipment was a part of any bundle of CDM activity envisaged and developed earlier. 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.	Not applicable.	The contract between the PP and the DOE includes those issues raised by Benedict.
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 who the money is paid, when the money is paid, is	<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\$22,000,000.00 as per the CEEE's Assessment Report,</p>	DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.

<p>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. Then I'm sure the additionality is not there at all in such a situation.</p>	<p>which was made available to the DOE.</p>	
<p>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>	<p>As explained in Section B.4, the project's baseline scenario was defined with reference in the approved methodology ACM0002, version 17.0.0 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 (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.</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>	<p>DOE evaluated thoroughly the evidences provided by the PP and provides its conclusion in this FVR.</p>

D.2. Approval

It has been verified that Letter of Approval/46/ dated 19 May 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.

The PDD version and date differ from the LoA due to a change in the versions of the CDM-PDD-FORM, methodologies and tools applied. However, modifications did not imply into project's additionality modification. It may also be noted that Brazilian DNA only issues the LoA after validation is finished, which, implies in modifying LoA section of PDD and Validation Report, therefore, update version and dates of both documents.

Means of validation	Validated from LoA review.
Findings	CAR01/03
Conclusion	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.

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 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_Deenvolvimento_Limpo.html and comparing with other letters issued by the Brazilian DNA for other registered CDM projects.

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.

In the opinion of the validation team the LoA 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.

D.4. Contribution to sustainable development

It has been verified that Letter of Approval/46/ dated 19 May 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.

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, version 2.1 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/.

Means of validation	Validated from MoC, power of Attorney letter and CEEE Statement review.
Findings	CAR02
Conclusion	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.

D.6. Project design document

Based on the discussion on the section D.7 description of the project activity 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^{/72/} is complying with the relevant forms and guidance.

Means of validation	Validated from permission letter ^{/19/} and the Basic Project Design ^{/10/} review.
Findings	CAR11
Conclusion	In the opinion of the validation team the final PDD ^{/72/} 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 ^{/72/} is found consistent on ground and have been validated from the permission letter ^{/19/} and the Basic Project Design ^{/10/} and found to be accurate and complete.

D.7. Description of project activity

The proposed CDM project activity is a hydro power plant involving a capacity addition of 13 MW to an already existing power plant, resulting in a total installed capacity of 19.2 MW. The existing installed capacity has been verified from the generator plate/13/ physically witnessed during the site visit by the assessment team. It has been noted that the project's current installed capacity is 11.12 MW and with the additional 13 MW capacity it results into total installed capacity of 24.12 MW. However, the electricity generation will be limited by the maximum flow of the project's adduction tunnel (12.2 m³/s), as evident from the Project Basic Design/10/. This limitation results in the reduction of the power plant's current installed capacity from 11.12 MW to 6.20 MW, thus resulting in the project activity's overall installed capacity of 19.20 MW. This has been confirmed from the Project Basic Design/10/ and as per ANEEL Dispatch/8/ of 20 May 2002 and resolution #397 /9/ of 12 August 2003. The capacity addition got an installation license dated 05/03/2010/19/.

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 proposed CDM project activity is located in the Canela municipality, State of Rio Grande do Sul in Brazil under the geographical coordinates latitude 29°20'35.73" S and longitude 50°41'45.11" W, which have been verified by PJRCES with the Google Earth, operation license #7.991/2008-DL /20/, topographic measurements /79/ and physically witnessed during the site visit by the assessment team.

The project is a capacity addition to an already established and in operation hydropower activity since 1952. This was witnessed during the site visit and further confirmed from the Basic Project Design/^{10/}. 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 Parameters	Value
Turbine	
Type	Francis, horizontal axis
Additional Installed capacity	13 MW
Rotation	600 rpm
Reference Fall	183.12 m
Nominal Unit Flow	8 m ³ /s
Top Efficiency	90%
Generator	
Unit Nominal Power	13.45 MVA
Synchronous Rotation	600 rpm
Nominal Tension	6.6 kV
Power Factor	0.9

It is confirmed that the description of the project activity as contained in the final PDD/^{72/} is found consistent on the ground and have been validated from the permission letter/^{19/} and the Basic Project Design/^{10/} 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:

Applicability of selected methodology "ACM0002 Version 17.0"		
Sl. No	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 3 accumulation reservoirs. 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 1952 and since 1952 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"> ○ The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or ○ 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/m²; or ○ 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/m². 	The project will be implemented in existing reservoirs, with no change in the volume of reservoirs. 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 than 4 W/m ² all the following conditions must apply: <ul style="list-style-type: none"> • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m²; • Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project¹ that collectively constitute the generation capacity of the combined power plant; • Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • Total installed capacity of the power units, which are driven using water from the 	The project uses three existing reservoirs with no change in volume of reservoirs. Therefore, the condition is not applicable.

	reservoirs with power density lower than 4 W/m ² , is lower than 15 MW; • Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m ² , is less than 10% of the total installed capacity of the project activity from multiple reservoirs.	
06	The methodology is not applicable to the following: • Biomass fired power plants;	The project is a hydro power plant. Therefore, the condition is fulfilled.
07	The methodology is not applicable to the following: • 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;	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.
08	Tool to calculate the emission factor for an electricity system, version 3.0.0 This methodological tool determines the CO ₂ 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.

Means of validation	It has been confirmed from the project design description and layout of the CDM project activity.
Findings	CAR05/15/16/20/21/22/23/24/25/26
Conclusion	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 16.0.0 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 CO₂ 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.

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.

Means of validation	It has been confirmed comparing and checking the revised PDD containing the correct geographical coordinates crosschecked on Google Earth,
Findings	CAR04
Conclusion	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 the 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)¹ 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 CO₂ emission factors for electricity generation in Brazil^{/35/}, 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

¹ <http://www.iea.org/>

Science and Technology Ministry of the matter of emission factor for an electricity in the host Party and therefore acceptable.

Means of validation	The project participant has been interviewed and it has been observed during the site visit that the monitoring arrangements described in the monitoring plan are feasible within the project design. It has also been confirmed the revised PDD is in accordance with the project design description.
Findings	CL02
Conclusion	<p>In the opinion of the validation team, it is confirmed that:</p> <ul style="list-style-type: none"> a. All the assumptions and data used by the project participants are listed in the PDD, including their references and sources; b. All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD; c. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable; d. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD; <p>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.</p>

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 indicates 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).

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/
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: http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html

07 February 2012	EB/CDM Receipt of PPs Communication	< 1 month	Communication can be found at: http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html
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 which establishes that the project without CDM benefits 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's 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 Bugres /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 Bugres /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.

$$r_d = 6.60\% + 0.9\% + 1.785\%$$

$$r_d = 9.29\%$$

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

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

Where:

- Rf: Risk free rate;
- β : 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 http://www.tesouro.fazenda.gov.br . 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.
(<i>R_m</i>) 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: http://www.portalbrasil.net/igpm.htm 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.
(<i>β</i>) Sectoral Risk	0.83	The investment risk compared to the market (<i>β</i>) is a measure of a stock's price volatility regarding an overall market. For the project activity, <i>β</i> was calculated as a 5-year average of the values published at http://pages.stern.nyu.edu/~adamodar/ . 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 http://pages.stern.nyu.edu/~adamodar/ . 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 and values are considered to be independent and correct applied.

Considering the above parameters the WACC calculates as 10.20% which is considered appropriate.

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	13 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/, ANEEL Resolution #397-2003, 12 August 2003 /9/ 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/. It has been confirmed that the existing installed capacity has been limited due to maximum flow of the project's adduction tunnel (12.2 m ³ /s), which has been confirmed through the Project Basic Design ^{/10/} and that it results in the reduction of the plant's current installed capacity from 11.12 MW to 6.20 MW. But the additional installed capacity is confirmed to be 13 MW. Therefore, PJR CES deem the Installed Capacity of the proposed project is reliable and well applied.
Additional Annual On-grid Supply (MWh)	30,660	Calculated based on additional energy of 3.5 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 http://www.epe.gov.br/imprensa/PressReleases/20101217_1.pdf . Public Brazilian Energy Auction of 17 December 2010. PJRCES checked the Brazilian Public document which is available at Brazilian government website www.epe.gov.br 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 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 /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)	2.73	SHPP Bugres 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 Proinfra, July 2003, p. 8 ²
IRR (%)	7.23	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

² Available at http://www.inee.org.br/down_loads/forum/Parecer%20INEE%20Proinfra.pdf

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 7.23%, 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 correct by PJRCES. The assumptions used in the calculations were deemed to be correct by PJRCES. The project-IRR without CDM revenues is 7.23%, 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	7.23% (no variation)	n.a.
Investment costs	-10% would be 8.10%	-28.65%
Electricity Tariff	+10% would be 8.11%	+35.60%
Power Generation	+10% would be 8.07%	+37.10%
Total Operating costs	-10% would be 7.26%	>-100.00%

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 28.65%. 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 28.65% 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 35.60%. 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).

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 35.60%.

Power generation

The project IRR will reach the 10.20% benchmark if there would be an increase of 37.10% 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 37.10% 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 Bugres will have a total installed capacity of 19.2 and applying the output range of +/- 50%, only plants with installed capacity between 9.75 MW and 28.95 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)	%
CGH	400	239.25	0.2
EOL	85	1,888.28	1.56

PCH	436	4,305.30	3.52
UFV	11	11.58	0.01
UHE	204	82,486.84	65.99
UTE	1,608	34,680.32	27.07
UTN	2	1,990.00	1.66
Total	2,746	125,601.66	100

OUTCOME OF STEP 1: only 195 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 195 power plants identified in Table 18, only 87 are hydro power plants such as the project activity; 9 of those are wind; and 99 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: 85 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 85 project registered, requesting registration or under validation process from the 44, therefore $N_{all} = 41$.

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 I 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 nº10.847 and 10.848 /51//52/ of 15 March 2004 and Decree nº5.163 /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 Bugres.

Therefore, considering the explanations provided above, there were 2 similar power plants identified, hence $N_{diff} = 41$.

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

$$F = 1 - N_{diff} / N_{all} = 1 - 41/41 = 0$$

$$N_{a-i} - N_{diff} = 0$$

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

Means of validation	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.
Findings	CL01/03 – CAR07/09/12/13/17/18/19/27/28/29/30/31/32
Conclusion	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_y) by the project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (Ly), as follows:

a) Baseline emissions: Baseline emissions (BE_y in tCO₂) are the product of the grid emission factor (EF_{grid,CM,y} in tCO₂/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 (tCO₂/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 CO₂ emissions factor in year y (tCO₂/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;

$EG_{PJ,y} = 0$; 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:

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

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)

WOM = Weighting of operating margin emissions factor (%)

WBM = Weighting of build margin emissions factor (%)

According to the tool /3/, for hydropower plants $WOM = 0.5$ and $WBM = 0.5$ shall be used to obtain the $EF_{grid,CM,y}$. The Brazilian DNA website provides for 2011, $EF_{grid,OM,y} = 0.2919$ tCO₂e/MWh and $EF_{grid,BM,y} = 0.1056$ tCO₂e/MWh.

Therefore, $EF_{grid,CM,y}$ resulted in 0.1987 tCO₂e/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 tCO₂/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 29,568 MWh, annual estimated emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

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

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

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

$$BE_y = 29,568 \text{ MWh} * 0.1987 \text{ tCO}_2/\text{MWh} = 5,875 \text{ tCO}_2\text{e}/\text{year}$$

$$ER_y = 5,875 \text{ tCO}_2\text{e}/\text{year}$$

Means of validation	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.
Findings	CAR06/08/10
Conclusion	<p>In the opinion of the validation team, it is confirmed that</p> <ol style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD, including their references and sources; All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD; All values used in the PDD are considered reasonable in the context of the proposed project activity; The baseline methodology and corresponding tool(s) have been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions; All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

D.8.8. Monitoring plan

The validation team determined whether the description of the monitoring plan included in the PDD 37/ is based on, ACM0002 – “Grid-connected electricity generation from renewable sources” (version 16.0.0), EB81/Annex 9 /1/ including applicable tool(s) by applying a two-step process, as reported below:

A. ASSESS COMPLIANCE OF THE MONITORING PLAN WITH THE APPROVED METHODOLOGY AND THE APPLICABLE TOOL(S):

PJR CES has assessed the assumptions and data sources of the parameters that will not be monitored and will remain fixed throughout the crediting period.

The parameters determined *ex-ante* are reported in the table below:

Parameter	Description	Value	Data Sources
$EG_{historical}$	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	85.484	Historical Electricity Generation of the SHPP Bugres from CEEE /14/
$\sigma_{historical}$	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.	1,901	Calculation based on the Historical Electricity Generation of the SHPP Bugres from CEEE /14/
$DATE_{BaselineRetrofit}$	Point in time when the existing equipment would need to be replaced in the absence of the project activity	2035	Estimated as per technical literature /73//74/
Cap_{BL}	Installed capacity of the hydro power plant before the implementation of the project activity	11.12 MW	As in the generator plate and Historical Electricity Generation /13//14/.
A_{pj}	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full	12.65 Km ²	As per documentation with topographic measurements /79/
W_{OM}	Weighting of operating margin emissions factor for hydro projects	0.5	Tool to calculate the emission factor for an electricity system, version 3.0.0 /3/
W_{BM}	Weighting of build margin emissions factor for hydro projects	0.5	Tool to calculate the emission factor for an electricity system, version 3.0.0 /3/

The combined margin emission factor is determined ex-post during monitoring, based on updated information provided by Brazilian DNA. The detailed calculations of the combined margin emission factor are described in the following section 4.5.5.

The parameters are found to be correct and in accordance with the applied baseline methodology ACM0002 version 16.0.0 /1/ and the “Tool to calculate the emission factor for an electricity system, version 4.0.0” /3/.

1) PARAMETERS DETERMINED EX-POST

According to the approved monitoring methodology, the parameters monitored *ex-post* are presented in the following table:

Parameter	Description	Value applied in the PDD	Source of Data / Monitoring Frequency
$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	116,144M Wh/year	<p><u>Source:</u> Measured with bi-directional electricity meters – Main and Back up (Accuracy: 0.2%) located at the substation that will monitor:</p> <p>(i) The quantity of electricity supplied by the project plant to the grid and</p> <p>(ii) The quantity of electricity delivered to the project plant from the grid.</p> <p><u>Monitoring frequency:</u> Energy will be measured continuously and will be monthly consolidated.</p>

			<u>Cross-check:</u> Electricity generation by the plant as published by CCEE will be used to cross check project participant's information.
$EF_{grid,CM,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y	0.1987 tCO ₂ /MWh	<u>Source:</u> CM is calculated according to methodology ACM0002 and the "Tool to calculate the emission factor for an electricity system", The emission factors are provided at the CIMGC website every year /3/. <u>Monitoring frequency:</u> Annually.
$EF_{grid,OM,y}$	Operating margin CO ₂ emission factor in year y	0.2919 tCO ₂ /MWh	<u>Source:</u> OM is calculated by CIMGC (Brazilian DNA /47/), according to methodology ACM0002 and the "Tool to calculate the emission factor for an electricity system", Optil(c): Dispatch data analysis OM. The emission factor is provided at the CIMGC website every year /3/. <u>Monitoring frequency:</u> Annually.
$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y	0.1056 tCO ₂ /MWh	<u>Source:</u> BM is calculated by CIMGC (Brazilian DNA /47/), according to methodology ACM0002 and the "Tool to calculate the emission factor for an electricity system". The emission factor is provided at the CIMGC website every year /3/. <u>Monitoring frequency:</u> Annually.
Cap_{PJ}	Total installed capacity of the hydro power plant after the implementation of the project activity.	19.2 MW	<u>Source:</u> ANEEL Dispatch /8/ and ANEEL resolution /9/. <u>Monitoring frequency:</u> Annually.
Ap_j	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full	12.65 km ²	<u>Source:</u> As per documentation with topographic measurements /79/ <u>Monitoring frequency:</u> Annually.

PJRCES confirm that the monitoring parameters are found to be correct and in accordance with the applied baseline methodology ACM0002 version 16.0.0 /1/ and the "Tool to calculate the emission factor for an electricity system, version 4.0.0" /3/.

PJRCES confirms that the description of the monitoring plan contains all necessary parameters, that they are described and that the means of monitoring described in the PDD /72/ plan complies with the requirements of AC-0002 - Grid-connected electricity generation from renewable sources, including applicable tool(s).

A. ASSESS THE IMPLEMENTATION OF THE MONITORING PLAN:

The monitoring and recording of the required parameters will be carried out by trained personnel who will be managed by CEEE-GT's Manager.

Details of the data to be collected, the frequency of data recording and its format, responsibilities and authorities for project management, procedures for monitoring and reporting, QA/QC procedures for calibration of metering equipment and procedures for training and maintenance have been elaborated in the monitoring plan described in the Section B.7.3 of the PDD /72/ following ONS standard procedures /56/.

CEEE-GT is responsible for training of personnel. All monitoring data will be archived for the crediting period plus 2 years beyond as per the approved monitoring methodology. The archiving of metering data follows the ONS procedures /56/. An internal procedure was written for control and archiving of documents related to CERs /57/. All these elements will also be further verified during verification.

Means of validation	The project participant has been interviewed and it has been observed during the site visit that the monitoring arrangements described in the monitoring plan are feasible within the project design. It has also been confirmed the revised PDD is in accordance with the project design description.
Findings	CAR14
Conclusion	PJRCES is able to confirm that all parameters are appropriate, applicable to the project activity and will result in a conservative estimate of the emission reductions. From the above discussion, it has been concluded that PP has got sufficient ability to implement the monitoring plan.

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 Bugres has been granted with the Installation License #230-2010-DL (Licença de Instalação LI nº 230/2010-DL) dated of 05/03/2010, valid until 04/03/2014 /19/.

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.

PJR CES has assessed the license /19/ 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. It is further confirmed that appropriate measures were undertaken up to now to address the identified environmental impacts.

Means of validation	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.
Findings	CL02
Conclusion	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 Bugres 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 para 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*);

- Canela's City Hall (*Prefeitura Municipal de Canela – RS*);
- Canela's City Council (*Câmara dos Vereadores de Canela – RS*);
- Canela's Environmental Agency (*Secretaria de Meio Ambiente de Canela - RS*);
- Canela's Comercial 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 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 Bugres 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 CO₂ 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 5,875 tCO₂e 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 Bugres CEEE”, as described in the PDD version 6.3 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 ₂	Carbon dioxide
CO ₂ 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	https://cdm.unfccc.int/filestorage/D/5/Y/D5YFS9I3VKBT18MQNGX0LPZ6U7AWCO/ACM0002_%28v17%200%29_clean.pdf?t=bVN8bzg1cjNvfDDpBUWgLiUYcnSvDWHOIprM	UNFCCC
/2/	UNFCCC	Tool for the demonstration and assessment of additionality, version 07.0.0, EB 70 annex 08	https://cdm.unfccc.int/Reference/tools/index.html	UNFCCC
/3/	UNFCCC	Tool to calculate Emission Factor for an electricity system, version 05.0 27 November 2015 EB 87, Annex 9	https://cdm.unfccc.int/Reference/tools/index.html	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	http://www2.aneel.gov.br/cedoc/res2000278.pdf	ANEEL
/7/	ANEEL	ANEEL Resolution #169-2001 (Resolução nº 169, de 3 de maio de 2001), 03/05/2001	http://www2.aneel.gov.br/cedoc/res2001169.pdf	ANEEL
/8/	ANEEL	ANEEL Dispatch #3080-2009 (Despacho nº 3080, de 17 de agosto de 2009), 17/08/2009	http://www2.aneel.gov.br/biblioteca/pesquisas.cfm	ANEEL
/9/		ANEEL Resolution #397-2003 (<i>Resolução nº 397, de 12 de agosto de 2003</i>), 12/08/2003	http://www2.aneel.gov.br/aplicacoes/noticias_area/arquivos/48100.000293.1994.03.pdf	
/10/	MEK	Basic Project Design (<i>Projeto Básico MEK_UHE_Bugres</i>), September 2010	Basic Project Design.zip	Lumina
/11/	PUC - RS	13.01.2012 Backup Electricity Meter (backup Electricity meter calibration certificate: <i>Relatório de calibração de</i>	backup Electricity meter calibration certificate.pdf	Lumina

		<i>medidor de energia</i>), 13 January 2012		
/12/	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
/13/	PJRCS	Generator Plate – Bugres (photograph of the generator equipment plate with technical information)	Generator Plate – Bugres.jpg	PJRCS
/14/	CEEE	Historical Electricity Generation Records – Bugres - 19/07/2012	Historical Electricity Generation Records – Bugres.zip	Lumina
/15/	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
/16/	FEPAM - RS	Environmental Evidences (issued by the State Environmental Agency: Fundação Estadual de Proteção Ambiental – FEPAM)	Environmental Evidences FEPAM.zip	Lumina
/17/	FEPAM - RS	Preliminary License #0636-2001-DL (<i>Licença Prévia LP nº 0636/2001-DL</i>), 12/09/2001	Preliminary License.pdf	Lumina
/18/	FEPAM - RS	Installation License #14-2006-DL (<i>Licença de Instalação LI nº 14/2006-DL</i>), 09/01/2006	Installation License2006.pdf	Lumina
/19/	FEPAM - RS	Installation License #230-2010-DL (<i>Licença de Instalação LI nº 230/2010-DL</i>), 05/03/2010, valid until 04/03/2014	Installation License2010.pdf	Lumina
/20/	FEPAM - RS	Operation License # 8910/2008-DL (<i>Licença de Operação LO nº 8910/2008-DL</i>), 03 December 2008 valid until 02 December 2012.	Operation License.pdf	Lumina
/21/	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
/22/	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	www.mme.gov.br/programas/proinfa	Brazilian Ministry of Mines and Energy
/23/	CEEE	O&M Costs (<i>Custos O&M - Auditoria Crédito de Carbono</i>), by Engineer Ricardo da Costa Effler and Engineer Luiz Vacilotto	O&M Costs.pdf	Lumina
/24/	Eletrobrás	OPE Eletrobras - Dec.11 (Eletrobrás Standard Budget - <i>Orçamento Padrão Eletrobrás</i>), December 2011	OPE Eletrobras.pdf	Lumina
/25/	Brazilian Government	Auction price (Brazilian Alternative Energy Auction - <i>Leilões de Fontes Alternativas</i>), 20/12/2010	http://www.epe.gov.br/leiloes/Paginas/default.aspx?CategoriaID=6976	Brazilian Government
/26/	Lumina	Prior Consideration of the CDM Form - SHPP Bugres CEEE, 06/02/2012	Prior Consideration of the CDM Form - SHPP Bugres CEEE.pdf2/2012	Lumina
/27/	Several	Signed letters and ARs SHPP Bugres (Brazilian DNA Letter and stakeholder letters, 16/11/2011 and receipts, 02/12/2011 to 06/12/2011)	Signed letters and ARs SHPP Ernestin.zip	Lumina

/28/	CEEE	Cash Flow SHPP Bugres, 19/03/2012	Cash Flow SHPP Bugres.xls	Lumina
/29/	CEEE	Diagrama unifilar Bugres (unifilar diagram of SHPP Bugres), 05/04/2010	Diagrama unifilar Bugres.pdf	Lumina
/30/	CEEE	PDD_SHPP Bugres, version 1, 14/05/2012	PDD_SHPP Bugres, version 1, 14052012.doc	Lumina
/31/	CEEE	PDD_SHPP Bugres, version 2, 15/10/2012	PDD_SHPP Bugres, version 2, 15102012.doc	Lumina
/32/	Lumina	Modalities of Communication Statement (Version 02.1), 09/08/2012	Modalities of Communication Statement.pdf	Lumina
/33/	CEEE	CEEE-GT Statement, 19/10/2011	CEEE-GT Statement.pdf	Lumina
/34/	Lumina's attorney	Lumina Letter Attorney, 13/07/2007	Procuracao.pdf	Lumina
/35/	Brazilian DNA	Emission Factor for an electricity published by Brazilian DNA	http://www.mct.gov.br/index.php/content/view/72764.html	Brazilian DNA
/36/	Brazilian Government	National System Operator (ONS)	http://www.ons.org.br/institucional/oque_e_o_ons.aspx	Brazilian Government
/37/	Lumina	PDD_SHPP Bugres, version 3, 03/12/2012	PDD_SHPP Bugres, version 3, 03122012.doc	Lumina
/38/	Brazilian DNA	Brazilian DNA website for Grid Emission Factors:	http://www.mct.gov.br/index.php/content/view/74689.html	Brazilian DNA
/39/	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").	http://www.mct.gov.br	Brazilian Government
/40/	Lumina	CER spreadsheet provided by PPs	CERspreadsheet.xls	Lumina
/41/	CEEE	Bugres Work Schedule provided by PPs dated of 24 August 2012	Cronograma Bugres.xls	Lumina
/42/	Brazilian DNA	Emission factors for ex post calculation of CM	http://www.mct.gov.br/index.php/content/view/77650.html	Brazilian DNA
/43/	Brazilian Government	CIMGC - Resolution N° 7- Procedures for local stakeholder consultation process of CDM project activities, dated 5 March 2008.	Available at: http://www.mct.gov.br/index.php/content/view/336403/Resolucao_n_7_de_05_de_marco_de_2008.html . Retrieved October 2012	Lumina
/44/	PJRCES/ Lumina	Contract between PJR and Lumina – 21 May 2012	Contract.pdf	PJRCES
/45/	Lumina/ CEEE	Contract between Lumina and CEEE-GT – 01 March 2011	Contract.pdf	Lumina/ CEEE
/46/	Brazilian DNA	LoA from Brazil – 19 May 2014	http://www.mct.gov.br	Brazilian DNA
/47/	CEEE	CIMGC (Brazilian DNA) - CO2 emission factors for electricity generation in Brazil for the CDM. Base year 2010	http://www.mct.gov.br/index.php/content/view/307492.html	Brazilian DNA
/48/	UNFCCC	Guidelines on the Assessment of Investment Analysis - Version 05 - EB 62 Report Annex 5	http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf	UNFCCC
/49/	CEEE	SHPP Bugres O&M historic average cost sourced from CEEE's information	O_M.pdf	Lumina
/50/	Brazilian Government	ANEEL – Database of Electricity Generation plants (BIG – form Portuguese “Banco de Informações de geração”).	http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp . Retrieved October 2012	Brazilian Government

/51/	Brazilian Government	Federal law No 10,847 – Creation of the Power Research Company, dated 15 March 2004. Retrieved October 2012.	http://www.leidireto.com.br/imprimir.php?fonte=lei/10847	Brazilian Government
/52/	Brazilian Government	Federal law No 10,848 – Commercialization of electricity, dated 15 March 2004. Retrieved October 2012.	http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/l10.848.htm	Brazilian Government
/53/	Brazilian Government	Decree No 5,163 – Regulation of the electricity market, dated 30 July 2004. Retrieved October 2012	http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/decreto/d5163.htm	Brazilian Government
/54/	UNFCCC	Federal Republic of Brazil communication to UNFCCC- Letter including nationally appropriate mitigation actions (29 January 2010). Retrieved October 2012	http://unfccc.int/meetings/cop_15/copenhagen_accord/items/5262.php	UNFCCC
/55/	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
/56/	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.	http://www.ons.org.br/procedimentos/modulo_12.aspx . Retrieved October 2012	Brazilian Government
/57/	CEEE	Internal procedure for archiving CDM documentation.	Procedimentos de arquivamento.pdf	Lumina
/58/	CEEE	Environmental Impact Assessment (RELATÓRIO AMBIENTAL SIMPLIFICADO) May 2011	Simplified Environment Report – Bugres.pdf	Lumina
/59/	Brazilian DNA	CIMGC – Manual for submission of CDM project Activities for LoA approval, version 02, dated 01 July 2008. Retrieved October 2012	http://www.mct.gov.br/index.php/content/view/37142.html	Brazilian DNA
/60/	UNFCCC	Guidelines for completing the Project Design Document form, version 01.0 – EB 66 Annex 8, dated 02 March 2012.	UNFCCC Guidelines	UNFCCC
/61/	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
/62/	PJRCES	F-06 16 Opening and Closing Meeting_SHPP Bugres_Closing (10Aug12)	PJRCES documents	PJRCES
/63/	PJRCES	F-06.17 Attendance Sheet_Small Hydro Power Plant Bugres CEEE_Closing(10Aug12)	PJRCES documents	PJRCES
/64/	UNFCCC	Guidelines for the reporting and validation of plant load factors	UNFCCC Guidelines	UNFCCC
/65/	UNFCCC	Guidelines on Common Practice version (version 02.0, EB69, Annex 8)	UNFCCC Guidelines	UNFCCC

/66/	CEEE	Bugres common practice analysis of 22 February 2013	BugresCommonPractice.xls	Lumina
/67/	Lumina	CER spreadsheet provided of 22 February 2013 CER spreadsheet provided of 22 June 2015	CER spreadsheet 22 February 2013.xls CER spreadsheet of 22 June 2015.xls	Lumina
/68/A	Lumina	PDD_SHPP Bugres, version 4, 22 February 2013	PDD_SHPP Bugres22 February 2013.doc	Lumina
/69/B	Lumina	Prior Consideration Brazilian DNA	Prior Consideration Brazilian DNA.pdf	Lumina
/70/	UNFCCC	EB70/Annex 22 - "Tool to calculate Emission Factor for an electricity system" (version 03.0.0);	UNFCCC Guidelines	UNFCCC
/71/	UNFCCC	"Guidance on the Demonstration and Assessment of Prior Consideration of the CDM", version 4, EB62;	UNFCCC Guidelines	UNFCCC
/72/	UNFCCC	PDD_SHPP Bugres, version 4, 27 June 2013	PDD_SHPP Bugres, version 4, 27 June 2013.doc	Lumina
	UNFCCC	PDD_SHPP Bugres, version 5, 10 January 2014	PDD_SHPP Bugres, version 5, 10 January 2014.doc	Lumina
	UNFCCC	PDD_SHPP Bugres, version 5.1.2, 22 June 2015	PDD_SHPP Bugres, version 5.1.2, 22 June 2015.doc	Lumina
		PDD_SHPP Bugres, version 6.3, 16 May 2016	PDD_SHPP Bugres, version 6.3, 16 May 2016.doc	
/73/	Brazilian Government	Hydropower plants highlights - 12 May 2010	Hydropower plants highlights - 12 May 2010.pdf	Brazilian Government
/74/	Brazilian Government	Renewable Energy Essentials: Hydropower – 17 November 2010	Renewable Energy Essentials: Hydropower – 17 November 2010	Brazilian Government
/75/	UNFCCC	Cash Flow SHPP Bugres	CAR35 - Cash Flow SHPP Bugres_v2_27.03.13.xls	Lumina
/76/	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:	www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financieiro/Custos_Financeiros/Taxa_de_Juros_de_Longo_Prazo_TJLP/index.html	Brazilian Government
/77/	UNFCCC	U.S. Federal Reserve - 30-year US Treasury Yield; 10-year T. Notes; 10-year TIPS. Available at:	http://www.federalreserve.gov/econresdata/researchdata.htm	Lumina
/78/	UNFCCC	CEEE CDM Assessment Report for the power plant	CAR32 - CEE CDM Assessment Report.pdf	Lumina
/79/	UNFCCC	F-CDM-PDD - Project Design Document form – Version 6	http://cdm.unfccc.int/Reference/PDDs_Forms/index.html#reg	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.	http://www.epe.gov.br/acessoainformacao/Documents/Institucional/Relatorio%20de%20Administracao%20da%20Administracao%20EPE%20-%202010.pdf	Brazilian Government
/81/	UNFCCC	Documentation with correct coordinates and area of the dams (correct coordinates and area of the dams.rar)	Drawings.rar	Lumina

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: 21 November 2012
Description of CL				
(i) IRR has to be revised according to revised capacity addition. (ii) Please revise O&M costs to 13.56 according to reference.				
Project participant response				Date: 29 October 2012
The O&M costs were revised as per CCEE's historical values presented in "Annex 10 – O&M Costs.pdf", which presents that the average historic value for all CCEE's power plants is R\$13.56/MWh. However, project participants decided to use the specific historical average O&M cost of SHPP Bugres, in a more conservative manner, which can be verified as R\$2.73/MWh. Consequently, the project's IRR was modified to 7.23%. Section B.5 of the PDD and the cash flow spreadsheet were both revised accordingly.				
Documentation provided by project participant				
PDD; Annex 10 – 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: 21 November 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
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: 21 November 2012
Description of CL				
PP is requested to clarify the 5 parameters mentioned in the Sub-step 2d: Sensitivity analysis of the PDD.				
Project participant response				Date: 29 October 2012
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.				
Documentation provided by project participant				
PDD; investment analysis spreadsheet; Annex 10 – O&M Costs.pdf				
DOE assessment				Date: 21 December 2012
The PDD was revised and 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.				

Table 2. CAR from this validation

CAR ID	01	Section no.	A.1, A.3, B.5 (table 6), B.6.3, B.6.4 and B.7.1	Date: 21 November 2012
Description of CAR				
The capacity of existing power plant and has to be changed according to the data of the plate at the generator.				
Project participant response				Date: 29 October 2012

<p>The project's current installed capacity is 11.2 MW and the project activity will add 13 MW to SHPP Bugres, resulting in a total generating capacity of 24.2 MW.</p> <p>The current assured energy of the power plant, however, is 10 MWavg instead of 9.94 MWavg as previously stated in the PDD. 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.</p> <p>Regarding the project activity, ANEEL granted an assured energy of 10 MWavg to SHPP Bugres as can be verified in Resolution #169 of 03/May/2001 which is being made available to the DOE in "Annex 1 – ANEEL Resolution #169-2001.pdf".</p> <p>Also, table 1 in Section A.3 of the PDD was modified accordingly.</p>				
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#01 was closed				
CAR ID	02	Section no.	A.2.	Date: 21 November 2012
Description of CAR				
Provide MoC to confirm details of the PPs.				
Project participant response				Date: 29 October 2012
<p>Please see "Annex 1 - MoC Bugres.pdf" with the participation statement of all project participants.</p> <p>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.</p>				
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	03	Section no.	A.2. and A.3.	Date: 21 November 2012
Description of CAR				
The LoA of the host country is pending.				
Project participant response				Date: 29 October 2012
<p>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).</p> <p>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</p>				
Documentation provided by project participant				
PDD				
DOE assessment				Date: 21 December 2012
<p>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.</p> <p>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.</p>				
CAR ID	04	Section no.	B.5.	Date: 21 November 2012
Description of CAR				

Please add the coordinates of the dam, which provides water to the new turbines.																
Project participant response				Date: 29 October 2012												
<p>The project activity is regularized successively by Divisa, Blang and Salto's dams. Their respective geographical coordinates were included in the PDD according to the Ordinance #253/2011 issued by the Water Resources Department of the Rio Grande do Sul State's Environmental Secretary on 15/Sep/2011 (please, see "Annex 5 – Ordinance 253_2011.pdf").</p> <table border="1"> <thead> <tr> <th>Dam</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>Divisa</td> <td>29°17'56" S</td> <td>50°34'10" W</td> </tr> <tr> <td>Blang</td> <td>29°19'33" S</td> <td>50°37'01" W</td> </tr> <tr> <td>Salto</td> <td>29°18'49" S</td> <td>50°40'41" W</td> </tr> </tbody> </table> <p>Section A.2.4 of the PDD was revised accordingly and table 1 with the project's dam geographical coordinates was included.</p>					Dam	Latitude	Longitude	Divisa	29°17'56" S	50°34'10" W	Blang	29°19'33" S	50°37'01" W	Salto	29°18'49" S	50°40'41" W
Dam	Latitude	Longitude														
Divisa	29°17'56" S	50°34'10" W														
Blang	29°19'33" S	50°37'01" W														
Salto	29°18'49" S	50°40'41" W														
Documentation provided by project participant																
PDD and ANEEL supporting documentation																
DOE assessment				Date: 21 December 2012												
It has been revised in version 2 of the PDD. Therefore, the CAR is closed.																
CAR ID	05	Section no.	B.2.	Date: 21 November 2012												
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												
<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 Bugres project activity received ANEEL's authorization to implement the capacity addition project activity in 12/Aug/2003, as can be verified in the Resolution #397 which is being made available for the DOE in "Annex 6 – SHPP Bugres ANEEL Authorization.pdf".</p>																
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.																
CAR ID	06	Section no.	A.1, A.3, B.5 (table 6), B.6. and B.7.	Date: 21 November 2012												
Description of CAR																
<p>The commercialisation agency keeps records of the power delivered. A sample record of one historical year should be provided.</p> <p>The generation history and the meter's calibration reports are sufficient to prove it.</p>																
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 7 - 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 7 presents CCEE's data in a more polished way so that the specific data for SHPP Bugres can be verified. CCEE's gross data can also be verified in the file "Annex 8 – 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>																
Documentation provided by project participant																
PDD, spreadsheet and supporting documentation																

DOE assessment			Date: 21 December 2012	
The reference has been provided to the DOE. Therefore, CAR#06 was closed.				
CAR ID	07	Section no.	B.10	Date: 21 November 2012
Description of CAR				
Authorisation of project design by ANEEL is pending.				
Project participant response				Date: 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 Bugres project activity received ANEEL's authorization to implement the capacity addition project activity in 12/Aug/2003, as can be verified in the Resolution #397 which is being made available for the DOE in "Annex 6 – SHPP Bugres ANEEL Authorization.pdf".</p>				
Documentation provided by project participant				
PDD and 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#07 was closed.				
CAR ID	08	Section no.	B.8.	Date: 21 November 2012
Description of CAR				
The calculation of estimated emission reductions has to be revised to reflect the change of capacity.				
Project participant response				Date: 29 October 2012
<p>The CER estimation was not affected by the alteration in the project's current assured energy, since the calculation was done with the additional assured energy, which is defined as 3.5 MWavg in the Project's Basic Design.</p> <p>The CER estimation was modified, however, due to a correction in the calculation considering only two decimals in a more conservative way. Thus, the project's emission reductions are actually 5,875 and not 5,877 tCO₂e.</p> <p>Section A.1 of the PDD and the CER calculation spreadsheet ("CERs Bugres.xls") were both modified accordingly.</p>				
Documentation provided by project participant				
PDD, Basic Project Design, CER spreadsheet.				
DOE assessment			Date: 21 December 2012	
The evidences presented were checked. All the parameters were justified or included in the PDD. Therefore, the CAR#08 was closed.				
CAR ID	9	Section no.	B.9.	Date: 21 November 2012
Description of CAR				
Start date: Add a justification and the day of the month.				
Project participant response				Date: 29 October 2012
<p>The project starting date is expected to be until 01/Dec/2012 since the project's bidding date is scheduled to happen in that date.</p> <p>The schedule of the implantation of the SHPP Bugres project activity can be verified in CEEE's schedule, wh–ch is being made available to the DOE in "Annex 9 - Bugres Work Schedule.xls".</p> <p>Sections B.5 and C.2.2 of the PDD were modified accordingly.</p>				
Documentation provided by project participant				
PDD				
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#09 is closed.				
CAR ID	10	Section no.	A. B.11.	Date: 21 November 2012

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.				
Project participant response				Date: 29 October 2012
References are considered reliable as they belong to government. 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).				
Documentation provided by project participant				
PDD.				
DOE assessment				Date: 21 December 2012
The application of the updated price is considered conservative. The PDD was updated and corrected, the CAR#10 was closed.				
CAR ID	11	Section no.	A.7.	Date: 21 November 2012
Description of CAR				
PP shall clear indicate the scale of the project.				
Project participant response				Date: 29 October 2012
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 19.2 MW, the capacity addition project is considered of large 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), permission letter.				
DOE assessment				Date: 21 December 2012
The PDD was updated and corrected, the CAR#11 was closed.				
CAR ID	12	Section no.	B.13.	Date: 21 November 2012
Description of CAR				
PP shall update PDD with latest tools and guidelines (additionality, emission factor, financial guidelines and common-practice guidelines)				
Project participant response				Date: 29 October 2012
The applied tools and guidelines were all updated as follows: <ul style="list-style-type: none"> - EB70/Annex 08 - "Tool for the demonstration and assessment of additionality" (version 07.0.0); - EB70/Annex 22 - "Tool to calculate Emission Factor for an electricity system" (version 03.0.0); - "Guidance on the Demonstration and Assessment of Prior Consideration of the CDM", version 4, EB62; - "Guidelines on the Assessment of Investment Analysis" (version 05, EB62, Annex 5); - "Guidelines on Common Practice" (version 02.2, EB69, Annex 8). All relative sections of the PDD were updated accordingly.				
Documentation provided by project participant				
PDD				
DOE assessment				Date: 21 December 2012
PDD was updated and it is in accordance. CAR#12 was closed.				
CAR ID	13	Section no.	B.9.	Date: 21 November 2012
Description of CAR				
PP shall update the start date of the project				
Project participant response				Date: 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.				
Documentation provided by project participant				
PDD; Annex 7 - Bugres 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.				
CAR ID	14	Section no.	B.11.	Date: 21 November 2012
Description of CAR				
PP shall clarify and correct the frequency of the monitoring parameter EG _{facility,y}				
Project participant response				Date: 29 October 2012
The frequency of the monitoring of parameter EG _{facility,y} is annually and not every two years as previously stated on the PDD. The table on section B.7.1 was modified accordingly.				
Documentation provided by project participant				
PDD				
DOE assessment			Date: 21 December 2012	
PDD was updated and it is in accordance. CAR#14 was closed.				
CAR ID	15	Section no.	B.2.	Date: 21 November 2012
Description of CAR				
PP shall confirm that the existing power plant/units will continue to operate after the implementation of the project activity.				
Project participant response				Date: 29 October 2012
As justified during the site visit on SHPP Bugres, 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 (13 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.				
Documentation provided by project participant				
PDD				
DOE assessment			Date: 21 December 2012	
Confirmation is consistent and documentation corroborates with the capacity addition. CAR#15 was closed.				
CAR ID	16	Section no.	B.8.	Date: 21 November 2012
Description of CAR				
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				
Project participant response				Date: 29 October 2012
As can be verified in the CER calculation spreadsheet, the historical electricity generation of SHPP Bugres has always been constant, without any indication that would lead to the conclusion that the power plant was retrofitted or had a capacity addition.				
Documentation provided by project participant				
PDD; Historical Electricity Generation				
DOE assessment			Date: 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. CAR#16 was closed.				
CAR ID	17	Section no.	B.8	Date: 21 November 2012
Description of CAR				
A letter sent to the UNFCCC on 06/Feb/2012 is not available in UNFCCC website under http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html . PP is requested to explain				

Project participant response			Date: 29 October 2012	
<p>The prior consideration of CDM communication was sent to CDM under the project's abbreviated name "SHPP Bugres CEEE", as can be verified in UNFCCC's website http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html.</p> <p>An explanation was included in Section B.5 of the PDD as follows:</p> <p><i>It's important to notice that on the UNFCCC website the project is listed under the title "SHPP Bugres CEEE", which was an abbreviation of the current project activity title "Small Hydro Power Plant Bugres CEEE".</i></p> <p>Please see "CAR17 - Prior Consideration of the CDM Form - SHPP Bugres 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 Bugres CEEE.</p>				
Documentation provided by project participant				
PDD; CAR21 - Prior Consideration of the CDM Form - SHPP Bugres CEEE.pdf				
DOE assessment			Date: 21 December 2012	
Clarification and documentation is considered to be correct and reliable.				
CAR#17 was closed.				
CAR ID	18	Section no.	B.8	Date: 21 November 2012
Description of CAR				
PP shall indicate the investment date in the PDD in accordance with the glossary of terms and EB 62 annex 5				
Project participant response			Date: 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 Bugres was signed (Please see CAR18 – CEEE – Lumina contract.pdf). This date was included in Table 6 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 Bugres 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 "CAR18 – Bugres 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>				
Documentation provided by project participant				
PDD; CAR18 – CEEE – Lumina contract.pdf; CAR18 – Bugres Work Schedule.pdf				
DOE assessment			Date: 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>				
CAR#18 was closed.				
CAR ID	19	Section no.	B.13	Date: 21 November 2012
Description of CAR				
The subsection Step 4. Common practice analysis of the PDD is not in accordance with EB69 annex 8. PP is correct it.				
Project participant response			Date: 29 October 2012	
<p>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 the file "CAR19 – Common practice analysis.rar" along with all evidence documentation.</p>				
Documentation provided by project participant				
PDD				

DOE assessment				Date: 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. CAR#19 was closed.				
CAR ID	20	Section no.	B.8	Date: 21 November 2012
Description of CAR				
PP is requested to clarify what is chosen to determine the parameter EG _{historical}				
Project participant response				Date: 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_{historical}:</p> <p>a) The five last calendar years prior to the implementation of the project activity; or</p> <p>b) The time period from the calendar year following DATE_{hist}, 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_{hist} is latest point in time between:</p> <p>i. The commercial commissioning of the plant/unit;</p> <p>ii. If applicable: the last capacity addition to the plant/unit; or</p> <p>iii. If applicable: the last retrofit of the plant/unit.</p> <p>Project participants chose method a) five last calendar years prior to the implementation of the project activity for calculating EG_{historical}. This decision was documented as requested on the PDD in Section B.6.1.</p>				
Documentation provided by project participant				
PDD				
DOE assessment				Date: 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_{historical}.</p> <p>PP provided documentation including the history of electricity generation of the power plant.</p> <p>CAR#20 was closed.</p>				
CAR ID	21	Section no.	B.8	Date: 21 November 2012
Description of CAR				
PP is requested to clarify what is the adopted for the parameter Date _{baselinereetrofit}				
Project participant response				Date: 29 October 2012
<p>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_{BaselineRetrofit}), project participants may take the following approaches into account:</p> <p>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.;</p> <p>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.</p> <p>PPs chose to define DATE_{Baseline,Retrofit} according to option a) with technical literature. Please see Section B.6.1 for more information.</p>				
Documentation provided by project participant				
PDD; supporting documentation				
DOE assessment				Date: 21 December 2012
<p>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 - http://www.iea.org/) 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.</p> <p>CAR#21 was closed.</p>				
CAR ID	22	Section no.	B. 2.3 B.9 B.14	Date: 21 November 2012

Description of CAR				
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				
Project participant response				Date: 29 October 2012
<p>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 Bugres 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.</p> <p>As indicated in the PDD, the project's concession contract can be seen in the following link: http://www.aneel.gov.br/aplicacoes/Contrato/Documentos_Aplicacao/CG0025CEEE.pdf</p>				
Documentation provided by project participant				
PDD; contract concession documentation				
DOE assessment				Date: 21 December 2012
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. CAR#22 was closed.				
CAR ID	23	Section no.	B. 2.3 B.9 B.14	Date: 21 November 2012
Description of CAR				
PP is requested to clarify the ERs indicated in the table 18 of the PDD as they are not in accordance with the spreadsheet.				
Project participant response				Date: 29 October 2012
<p>The PDD states an overall additional electricity generation of 29,568 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 29,569 MWh.</p> <p>The CER calculation spreadsheet was corrected accordingly as can be verified in "CAR23 - CERs Bugres_v2_27.03.13.xls".</p>				
Documentation provided by project participant				
PDD; CERs spreadsheet				
DOE assessment				Date: 21 December 2012
PP has corrected the spreadsheet in accordance with methodology and tools and updated the PDD. CAR#23 was closed.				
CAR ID	24	Section no.	B. 2.3 B.9 B.14	Date: 21 November 2012
Description of CAR				
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.				
Project participant response				Date: 29 October 2012
This parameter is not monitored since the project's reservoir area will not be modified with the addition capacity project activity.				
Documentation provided by project participant				
PDD				
DOE assessment				Date: 21 December 2012
<p>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.</p> <p>CAR#24 was closed.</p>				
CAR ID	25	Section no.	B. 2.3 B.9 B.14	Date: 21 November 2012
Description of CAR				

PP is requested to clarify the Monitoring frequency of the parameter EG _{facility,y}				
Project participant response				Date: 29 October 2012
EG _{facility,y} 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.				
Documentation provided by project participant				
PDD				
DOE assessment				Date: 21 December 2012
PP has corrected the PDD stating the Monitoring frequency of the parameter EG _{facility,y} is monthly which is in accordance with the methodology. CAR#25 was closed.				
CAR ID	26	Section no.	B. 2.3 B.9 B.14	Date: 21 November 2012
Description of CAR				
PP shall correct the valued applied for the parameters: EF _{grid,CM,y} , EF _{grid,BM,y} and Cap _{PJ}				
Project participant response				Date: 29 October 2012
The parameters indicated were corrected in Section B.7.1 as follows: <ul style="list-style-type: none"> • EF_{grid,CM,y} = 0.1987 • EF_{grid,BM,y} = 0.1056 • Cap_{PJ} = 24,120,000 				
Documentation provided by project participant				
PDD; CERs spreadsheet				
DOE assessment				Date: 21 December 2012
PP has corrected the spreadsheet and updated the PDD accordingly. CAR#26 was closed.				
CAR ID	27	Section no.	B.9.	Date: 21 November 2012
Description of CAR				
PP is requested to clarify how the default value as per EB 62 indicates sovereign risk sector risk is applied.				
Project participant response				Date: 29 October 2012
As explained in CAR 18, the investment decision date is 01/Mar/2011 and the financial analysis had to be reassessed according to EB51 Annex 58. Therefore, the benchmark calculation was also revised. Please see "CAR28 - Bugres Benchmark.xls" to verify the new calculation.				
Documentation provided by project participant				
PDD; CAR28 - Bugres Benchmark				
DOE assessment				Date: 21 December 2012
PP has reassessed the financial analysis as per the guidelines and tools accordingly. PDD was updated and it is in accordance. CAR#27 was closed.				
CAR ID	28	Section no.	B.9.	Date: 21 November 2012
Description of CAR				
PP is requested to clarify whether cost of equity calculated is in real terms or converted to nominal terms				
Project participant response				Date: 29 October 2012
Considering the above mentioned, the benchmark was revised and the WACC was calculated post-tax and in real terms.				
Documentation provided by project participant				
PDD				

DOE assessment				Date: 21 December 2012
PP clarified cost of equity calculated is converted to nominal terms. PDD was updated and it is in accordance. CAR#28 was closed.				
CAR ID	29	Section no.	B.11.	Date: 21 November 2012
Description of CAR				
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.				
Project participant response				Date: 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 2005 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 2006 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 "CAR28 – Bugres Benchmark.xls".				
Documentation provided by project participant				
PDD; CAR28 – Bugres Benchmark				
DOE assessment				Date: 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. CAR#29 was closed.				
CAR ID	30	Section no.	B1.	Date: 21 November 2012
Description of CAR				
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.				
Project participant response				Date: 29 October 2012
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. Project participants adopted the average value of 1.785% in a conservative manner.				
Documentation provided by project participant				
PDD				
DOE assessment				Date: 21 December 2012
The Brazilian National Development Bank, which is a governmental entity defines credit risks in the country as it can be found at: http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Instituicao_Financeira_Credenciada/no_rmas_risco.html PP has updated calculations applying the mid value for the range. PDD was updated and it is in accordance. CAR#30 was closed.				
CAR ID	31	Section no.	B1.	Date: 21 November 2012
Description of CAR				
PP is requested to clarify or justify 10-year amortization period stated in PDD section of benchmarking analysis.				
Project participant response				Date: 29 October 2012
The average amortization period prior to the investment decision date was 16 years, as evidenced in the following link: http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Sala_de_Imprensa/Noticias/2010/energia/20100809_energias_alternativas.html				
Documentation provided by project participant				
PDD				
DOE assessment				Date: 21 December 2012

PP has presented governmental evidences about amortization which was corrected applied. PDD was updated and it is in accordance. CAR#31 was closed.				
CAR ID	32	Section no.	B1.	Date: 21 November 2012
Description of CAR				
<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"> 1. Is 23 years inclusive of period of construction? 2. Were all input parameters available at the investment decision date? 3. The IRR is calculated for 23 years including 2 years of construction period; however, tax and JSCP is calculated for 20 years 4. Insurance cost is not included in the financial parameter; both in PDD and in spreadsheet calculations? 5. Provide source or web link reference for losses of 2.2% and MRE expenditure of 15%; rates of taxes. 6. Why salvage value is not considered as an inflow in the calculation of IRR. 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%. 8. What is the PPA referred in the table. 				
Project participant response				Date: 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). 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) 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

Therefore, considering that SHPP Bugres 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 "CAR32 - 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 7.23%. Please see "CAR32 – Cash Flow SHPP Bugres_v2_27.03.2013.xls" for more information.

Documentation provided by project participant

PDD; CAR32 – Cash Flow SHPP Bugres_v2_27.03.2013

DOE assessment

Date: 21 December 2012

1. Refer to CAR 22 - 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 32 are considered to be in accordance and it is considered to be CLOSED. PDD was updated and it is in accordance.

CAR#32 was closed.