

RENEWAL OF CREDITING PERIOD REPORT

BAESA PROJECT



Document Prepared By Earthood Services Private Limited

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Summary:

The project activity involves the construction and operation of a hydro power-plant implemented with a single reservoir called Barra Grande Hydro Power Plant. The project activity achieves GHG emission reduction through replacing the carbon intensive electricity from the national grid by renewable electricity generated by the hydro power plant.

The project applies the CDM Large-Scale Consolidated methodology ACM0002 – Grid-connected electricity generation from renewable sources – version 17.0

BAESA - Energética Barra Grande S.A have contracted the Earthood Services Private Limited to conduct the Renewal of Crediting period of the project “BAESA Project” with regard to the requirements of VCS Version 3.

The scope of the revalidation is to establish that:

- the proposed PA complies with the corresponding registered VCS-PD^{/3/} and the latest version of the renewed VCS-PD^{/2/};
- the proposed PA complies with all relevant VCS rules and requirements. The VCS renewal of crediting period was based on the updated VCS-PD^{/2/}, estimated emission reduction calculation spreadsheet^{/4/}, information from current validated VCS-PD^{/3/} and supporting documents made available to the ESPL by the project participants.

During this renewal process, 03 Clarifications (CL), 03 Corrections (CAR) and 00 Forward Action Request (FAR) were raised and all were closed accordingly.

As an outcome of this revalidation, the validation team confirms that;

- The latest available VCS-DD template has been applied
- The original baseline is still valid as it was given by the applied methodology
- The project additionality remains valid for the renewal of the Crediting period as per section 3.8.5, paragraph 1 of the VCS Standard version 3.7^{/1/}. No regulatory surplus has been identified. The project is in accordance with all applicable regulations and legislations.
- The project description is in accordance with the characteristics identified on site.
- The monitoring plan is adequate to the project activity and is in accordance with the applied methodology.
- The 2nd crediting period is likely to achieve the estimated of **608,686 tCO₂e** per year.

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1 INTRODUCTION

1.1 Objective

BAESA - Energética Barra Grande S.A. has contracted Earthood Services Private Limited to conduct the revalidation of the 2nd crediting period for the VCS project activity “BAESA Project” for the period from 01/01/2016 to 31/12/2025 (including both days).

1.2 Scope and Criteria

The revalidation of the crediting period is the independent review of the current characteristics of the project activity.

The scope of the revalidation is to establish/verify that:

- The project is in accordance with requirements of the VCS Standard version 03.7^{/1/}
- The update of the applied methodology is in accordance with CDM Large-Scale Consolidated methodology ACM0002 – Grid-connected electricity generation from renewable sources – version 17.0 ^{/5/}
- The revalidation is in accordance with requirements of CDM methodological tool “Assessment of the validity of the original / current baseline and update of the baseline at the renewal of the crediting period” version 3.0.1 ^{/6/}.

The revalidation of this crediting period is based on the registered VCS PD, revised VCS PD and estimated GHG emission reduction Calculations

1.3 Level of Assurance

The revalidation of the crediting period aims to achieve a reasonable level of assurance.

1.4 Summary Description of the Project

The project activity involves the construction and operation of a hydro power plant implemented with a single reservoir called Barra Grande Hydro Power Plant.

The project consists in the installation of three (3) turbines with 236 MW^{/8/} capacity each, resulting in a total installed capacity of 708 MW. This value was assumed as the sum of the three turbines capacity and is corroborate with information provided by the operation Permit ^{/7/}

The Assured Energy, which is the average generation electricity is 380.6^{/9/} MWh/h (MWaverage).

The project activity also involves a reservoir of 94 km² ^{/7/}. Project emissions are calculated due to CH₄ emissions as per applied methodology.

The main equipment of the project activity are described in the table below:

Table 1: Technical description of the project activity

Equipment	capacity	Unit	quantity	Serial Number	Manufacturer / Type
Turbine	236	MW	3	Unit # 1 Unit # 2 Unit #3	Alstom / Francis
Flow	1.64	m ³ /s	-	-	-

The project activity achieves GHG emission reduction through replacing the carbon intensive electricity from the national grid by renewable electricity generated by the hydro power plant.

2 VALIDATION PROCESS

2.1 Method and Criteria

The renewal of the crediting period of this project is based on the registered VCS Project design^{/3/}, updated VCS project design^{/2/}, estimated emission reduction calculation spread sheet^{/4/}, supporting documents made available to the validation team and information collected through interviews and during the on-site assessment. In addition, publicly available information was considered as far as available and required.

No sampling plan has been used to conduct the revalidation of the crediting period of this project activity.

2.2 Document Review

The verification is performed primarily as a desk review of the documents submitted at various stages of assessments. The review is performed by assessment team using dedicated protocols (checklists). The assessment team cross checks the information provided in the documents (VCS-PD) and information from sources other than those used, if available, and conducts independent background investigations.

ESPL conducted a desk review, as under:

- a review of the data and information presented to verify their completeness
- a review of the VCS-PD (as described in registered VCS-PD), the monitoring methodology including applicable tool(s) and, where applicable, the applied standardized baseline, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures
- a review of ex ante calculations and assumptions made in determining the GHG data and emission reductions;
- an evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions

A complete list of documents/evidences reviewed is included as Appendix 3

2.3 Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Gregatti	Autusto	BAESA	09/11/2017	Technical description of PA, installed	Marcelo Sebben

					capacity and Assured energy	
2.	Scapinelli	Ricardo	BAESA	09/11/2017	Site visit, technical description, technical information and project diagram	Marcelo Sebben
3	Guedes	Damião	CSC	09/11/2017 10/11/2017	Site visit, environment programs, environment impact	Marcelo Sebben
4	Baltar	Eduardo	Ecofinance	09/11/2017 10/11/2017	Estimated GHG ER calculations VCS-PD conception	Marcelo Sebben

2.4 Site Inspections

Duration of on-site inspection: 09/11/2017 and 10/11/2017				
No.	Activity performed on-site	Site location	Date	Team member
1.	Opening Meeting	BAESA Office	09/11/2017	Marcelo Sebben
2.	Site visit to installations (turbines/generators and meters if possible) Visit to Reservoir Project Activity (Technology, Location and Implementation) Physical inspection of the site	BAESA Office	09/11/2017	Marcelo Sebben
3.	Any regulatory surplus / legislation involved Checking original evidences (licenses, authorizations, etc, technical information) Socio economic and cultural programs	BAESA Office	09/11/2017	Marcelo Sebben
4.	Parameter fixed Ex-ante and Baseline emissions, Project emissions and Leakage calculation	BAESA Office	09/11/2017	Marcelo Sebben
5.	Monitoring plan (feasibility of monitoring arrangements described in VCS PD, QA/QC procedures, responsibility of implementation of monitoring plan, data recording & storage procedures)	BAESA Office	10/11/2017	Marcelo Sebben
6.	Compilation of the findings by Auditor/s (CARs/CLs)	BAESA Office	10/11/2017	Marcelo Sebben

7.	Answer of findings	BAESA Office	10/11/2017	Marcelo Sebben
8.	Finalization of Draft report end of auditing process	BAESA Office	10/11/2017	Marcelo Sebben

2.5 Resolution of Findings

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Project Details	2	-	-
Title and reference of applied methodology	-	-	-
Applicability of the applied methodology	1	-	-
Project boundary	-	1	-
Baseline scenario	-	-	-
Additionality	-	-	-
Quantification of GHG Emission Reductions and Removals	-	2	-
Methodology Deviations	-	-	-
Monitoring plan	-	-	-
Non-permanence Risk analysis	-	-	-
No Net Harm	-	-	-
Environmental Impact	-	-	-
Local Stakeholder Consultation	-	-	-
Public Comments	-	-	-
Total	3	3	-

2.5.1 Forward Action Requests

No forward action request were raised during the renewal of crediting period of the Project activity

3 VALIDATION FINDINGS

3.1 Project Details

During the on-site visit, the validation team checked the implementation status of the project activity as well as all physical features and monitoring equipment. In addition, interviews with personnel and PP's representatives were also performed.

The project activity consists in an installation of a 708 MW ^{17/} hydro power plant in a place where no power plant exists (greenfield project). The project is composed by 3 Francis turbines with 236 MW ^{18/} capacity each and 3 generators. In addition, the project activity have a 94 km² ^{17/}reservoir.

The project proponents are BAESA - Energética Barra Grande S.A and Ecofinance Negócios Eireli.

The project start date is the date when the project starts to generate GHG emission reductions as per VCS Standard. The considered start date in this project activity is 11/01/2005, which is the date when the first turbine starts its operation.

The project activity is renewing its 2nd crediting period which are from 01/01/2016 until 31/12/2025 (both days included)

The project activity is a large-scale one.

The project activity is estimating achieve in its 10 year's 2nd crediting period a total amount of **6,086,860 tCO₂e** or an average of **608,686 tCO₂e** per year.

The project is located between the municipalities of Anita Garibaldi/SC and Pinhal da Serra/RS, Brazil, in the Pelotas River.

This hydropower plant consist in a greenfield project activity.

In order to install and operate this project activity, it is mandatory for the entrepreneurship have operational licenses. These licenses were provided to the validation team as follows/;

- Operation Permit #447/2005 2nd renewal dated on 26/03/2014 and valid for 10 years issued by IBAMA (Brazilian Institute of Environment)^{7/}

According to the evidence provided /9/ (concession contract signed with ANEEL (National Agency of Electric Energy), it was ensured that the project owner is BAESA Energética Barra Grande S.A.

The project activity does not participate of any other emission trading program nor GHG program and does not receive any other form of environmental credit. According to information provided by project participants, and checked by the validation team, the project activity was not rejected by any other GHG program.

The project is not a grouped project neither an AFOLU project.

Regarding sustainable development contributions, the following ones were identified due to the project activity:

- Supply clean and renewable energy to the National Grid
- Generation of jobs during installation and operation
- Increase local taxes income
- Reforestation programs

The description presented in the project description is accurate, complete, and provides an understanding of the nature of the project.

However a clarification was raised regarding commercially sensitive information and other regarding the eligibility criteria.

Findings raised:

CL 1: *The absence of the commercially sensitive information (section 1.13) is not clear, unlike stated in the initial registered VCS PD.*

CL 2: *At 1.13 of the VCS-PD, according to the instructions for completing the form, the Eligibility Criteria refers to grouped project. However, it has not being commented nor considered in the VCS-PD.*

Conclusion:

According to information verified during the site visit, the validation team has to confirm that all physical features (technology, project equipment, and monitoring and metering equipment) of the registered VCS project activity were in place and that the project participants are likely to operate the project activity as per the revised VCS-PD during the next crediting period.

There are no actual or proposed deviations or changes in the implementation of the registered project activity.

3.2 Application of Methodology

3.2.1 Title and Reference

The applied methodology is the ACM0002: “Grid-connected electricity generation from renewable sources” (version 17.0), which is the latest version available.

The applicable tools are all referred in this applied methodology. However a clarification was raised.

Findings raised:

CL 3: *At 2.2 of the VCS-PD, the applicability condition presented in the paragraph 11 of the applied methodology has not being considered.*

CAR 1: *The applied “Tool to calculate the emission factor for an electricity system” is not the latest version available.*

Conclusion:

The MP of the project activity is totally in accordance with the applied methodology (ACM0002) – version 17 and applicable tools.

3.2.2 Applicability

The applied methodology is the ACM0002: “Grid-connected electricity generation from renewable sources” (version 17.0), which is the latest version available.

The applicability of this methodology is as follows:

1. This methodology is applicable to grid-connected renewable energy power generation project activities that, among others, is the installation of a greenfield power plant, which is the case of this project activity.
2. The methodology is applied for installation of renewable energy plant such as hydro, with or without reservoir.
3. The project activity does not comprehend capacity additions, retrofit, rehabilitations or replacements
4. The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m². The power density calculated is 7.53 W/m².
5. The PA is not integrated power plant.
6. PA does not involve switching from fossil fuels to renewable energy sources at the site of the project activity nor Biomass fired power plants/units.
7. PA complies with all applicability conditions of applying tools.

Findings raised:

N/A

Conclusion:

The project activity fulfils all applicability criteria stated in the applied methodology (ACM0002 – version 17 and applicable tools.

3.2.3 Project Boundary

The project boundary comprehends the power plant, reservoir and all plants connected to the Integrated National Grid (SIN). The baseline emissions are the net electricity displaced by the project activity, which is injected in the national Grid.

Project emissions are calculated as the CH₄ emissions generated by the reservoir calculated as per applied methodology.

Findings raised:

N/A

Conclusion:

The project boundary did not change for this crediting period when compared to the previous one and it is in accordance with the applied methodology (ACM0002) – version 17 and applicable tools.

3.2.4 Baseline Scenario

The baseline scenario is still valid for this next crediting period and it is given by the applied methodology: “If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

Thus, as per VCS Standard, para. 2)b. “the GHG emissions associated with the original baseline scenario shall be reassessed using the latest version of the CDM “Tool to assess the validity of the original/ current baseline and to update the baseline at the renewal of a crediting period”

Step 1: Assess the validity of the current baseline for the next crediting period:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The current baseline scenario complies with all relevant mandatory National/sectoral legislation

Step 1.2: Assess the impact of circumstances

The conditions of hydro power in Brazil have not changed considerably since the validation of the project activity: according to public information available in the ANEEL website^{/10/}, the hydro installed capacity in Brazil changed from 73.23% in 2005 to 63.8% in 2015 of the total installed capacity connected to the National Grid (SIN).

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

This step is not applicable to greenfield projects. According to the contract between ANEEL and the PP^{/9/}, the concession contract remains for 35 years, which means that the project is operational until 2035, overlapping the proposed 2nd crediting period.

Step 1.4: Assessment of the validity of the data and parameters:

The parameters fixed in the previous crediting period are the following:

- GWP_{CH₄} (global warming potential of Methane): remain fixed for the 2nd commitment period
- EF_{res}: (Default emission factor for emissions from reservoirs): remain fixed as per EB 23 and applied methodology
- Cap_{BL} (Capacity of the hydro power plant before the project activity): it is a greenfield project. It remain unaltered and equal to zero.
- A_{BL} (Area of the reservoir before the implementation of the PA): remain unaltered and equal to zero as no reservoir exists before the PA implementation

- EF_{BM}: (Build margin emission factor of the grid): It was a monitored parameter during the 1st crediting period and now it is fixed for the 2nd CP as per “Tool to calculate emission factor for an electricity system”^{16/}. The parameter was calculated likewise in the previous crediting period using the latest information available. So, we consider that it is still valid for this next crediting period.
- The percentage share of total installed capacity of the specific technology: this parameter was included as per requirements of applied version of the methodology in order to determine whether the additionality can be determined per simplified method. It is not applied in the baseline emission calculations.
- The total installed capacity of the technology: this parameter was included as per requirements of applied version of the methodology in order to determine whether the additionality can be determined per simplified method. It is not applied in the baseline emission calculations.

The application of Steps 1.1, 1.2, 1.3 and 1.4 above confirmed that the current baseline as well as data and parameters are still valid for the subsequent crediting period. So, this baseline, data and parameters can be used for the renewed crediting period. Thus, steps 2 of the CDM Tool “Assessment of the validity of the original/ current baseline and to update the baseline at the renewal of a crediting period”^{16/}

Findings raised:

N/A

Conclusion:

It can be concluded that the current baseline is still valid for this crediting period and the situation of the PA did not change over the 1st crediting period. And therefore, no impact in the baseline scenario was observed.

3.2.5 Additionality

According to the VCS Standard section 3.8.5, “a full reassessment of additionality is not required when renewing the project crediting period. However, regulatory surplus shall be demonstrated in accordance with Section 4.6.3 and the project description shall be updated accordingly”.

And according to the section 4.6.3, “The project shall not be mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework. For UNFCCC non-Annex I countries, laws, statutes, regulatory frameworks or policies implemented since 11 November 2001 that give comparative advantage to less emissions-intensive technologies or activities relative to more emissions-intensive technologies or activities need not be taken into account. For all countries, laws, statutes, regulatory frameworks or policies implemented since 11 December 1997 that give comparative advantage to more emissions-intensive technologies or activities relative to less emissions-intensive technologies or activities shall not be taken into account”

This project is a greenfield hydro power plant and it is not mandated by any law, statute or other regulatory framework from the host country or foreign countries or UNFCCC.

Findings raised:

N/A

Conclusion:

Additionality remains unaltered for the 2nd crediting period and this project is not mandated by any law, statute or other regulatory framework from the host country or foreign countries or UNFCCC..

3.2.6 Quantification of GHG Emission Reductions and Removals

All the equations to calculate the ERs are in accordance with the applied methodology, VCS-DD and respective tools

The baseline emissions are calculated by the following formula:

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

Where:

- BE_y : Baseline emissions in year y;
- $EG_{PJ,y}$: 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;
- $EF_{grid,CM,y}$: Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

As the project activity is the installation of a greenfield power plant: $EG_{PJ,y} = EG_{facility,y}$ (quantity of net electricity generation supplied by the project plant/unit to the grid in year y).

For project emissions, according to the applied methodology, "For hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH₄ and CO₂ emissions from the reservoirs"

The project proponents shall calculate the power density as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

- PD = power density
- Cap_{PJ} : installed capacity of the power plant installed under the PA
- Cap_{BL} : installed capacity of the power plant installed prior to the PA
- A_{PJ} : area of the reservoir of the PA
- A_{BL} : area of the reservoir present prior to the PA

If $4 \text{ W/m}^2 < PD \leq 10 \text{ W/m}^2$, the project emissions shall be taken into account through the following equation:

$$PE = \frac{EF_{res} \times TEG_y}{1000}$$

Where:

- PE = project emissions
- EF_{Res} : Default emission factor for emissions from reservoirs of hydro power plants
- TEG_y : Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y

There are no leakage emissions as per the applied methodology. So: $L_y = 0$.

However, some inconsistencies were found. Please refer to the findings below:

Findings raised:

CAR 2: *The applied value for parameter EF_{CM} in section 4.2 of the VCS DD is not the same applied in the calculations nor verified in the evidence provided.*

Conclusion:

- After the resolution of the findings, the validation team attests that:
- all relevant assumptions and data are listed in the project description, including their references and sources
 - All data and parameter values used in the project description are considered reasonable in the context of the project
 - All estimates of the baseline emissions can be replicated using the data and parameter values provided in the project description

The quantification of GHG emission reductions were determined in accordance with applied methodology and tools.

3.2.7 Methodology Deviations

No methodology deviation have been observed in the course of this renewal of crediting period.

Findings raised:

N/A

Conclusion:

The requirements of the ACM002 ver 17 are duly applied for this project activity.

3.2.8 Monitoring Plan

The following parameters will be fixed for the whole monitoring period.

- **GWP_{CH_4} (Global warming potential of methane valid for the relevant commitment period):** the applied value is based on the second commitment period and is equal to 25 t CO_2e/t_{CH_4}
- **EF_{Res} (Default emission factor for emissions from reservoirs):** the value applied is 90 kg_{CO_2e}/MWh which is the value presented by the applied methodology.
- **Cap_{BL} (Installed capacity of the hydro power plant before the implementation of the project activity):** For new installed capacity the value applied is zero, which is the applied value in this case.
- **A_{BL} (Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2)).** For new reservoirs, the value applied is zero, which is the applied value in this case.

- **EF_{grid,BM,y} (Build margin CO₂ emission factor in year y):** the value applied is the one provided by the Brazilian DNA for the year 2016, which is the latest available and is calculated based on the “tool for calculate the emission factor for an electricity system”. The applied value is 0.1581 tCO₂/ MWh for the whole 2nd crediting period.
- **The percentage share of total installed capacity of the specific technology:** value applied is 61.1 % which is based on the official data provided by ANEEL^{/22/}.
- **The total installed capacity of the technology:** value applied is 93,216,340 MW which is based on the official data provided by ANEEL^{/22/}.

The following parameters are to be monitored during this 2nd crediting period:

- **EG_{facility,y} (Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr):** the parameters will be monitored continuously through two electricity meters per generator (main and backup) in the substation which is the connection point with the National Grid as per national regulations (ONS – National System Operator)^{/12/}. The meters used are standard and regulated by the ONS. Their calibration is determined by the same regulations and are under control of CCEE (Electric Power Commercialization Chamber). For this renewal phase, the estimated value for this parameter was determined as the the total gross electricity generated (Assured energy multiplied by the period) minus the internal consumption and losses estimated in the validation phase. However as the PP did not applied the most recent information available a CAR has been raised. Please refer to the CAR below and in the Appendix 4 for its resolution.
- **EF_{Grid,CM} (Combined margin emission factor for the grid in year y):** this parameter is calculated based on EF_{OM} and EF_{BM} calculated and provided by the Brazilian DNA^{/13/}. Their calculation are based on latest version of the “Tool to calculate emission factor for an electric system” and is validated by the UNFCCC. The parameter EF_{OM} will be calculated every year as per applied tool. The parameter EF_{BM} was determined for 2016 (latest available) and will remain fixed for the whole 2nd crediting period. The calculation of the combined margin EF is made by the PP and is based also in this tool. The value used for estimating the ERs for this crediting period was based on the latest available data (data from 2016)
- **TEG_y (Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y):** the parameters will be monitored continuously through one electricity meters per generator in the power house of the Power plant. The meters used are standard and regulated by the ONS^{/12/}. Their calibration is determined by the same regulations and are under control of the PP. The value used for estimating the ERs for this crediting period was based on the Assured Energy provided by the concession contract^{/9/} multiplied by the period.
- **Cap_{PJ} (installed capacity of the project activity):** this parameter was determined as the sum of the capacity of the three turbines and was cross-checked with the equipment plates^{/8/}, operation permits^{/7/} and operation manual of the company^{/14/}
- **Ap_{PJ} (Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full):** it was measured from topographical surveys, maps, satellite pictures, etc once at the beginning of the crediting period. This value is available in the operation Permit^{/7/}

Findings raised:

CAR 3: *It has been observed that internal power consumptions of the hydropower plant used to calculate the Net electricity generated were based on information that is not the most recent data available.*

Conclusion:

All parameters included in the monitoring plan are in accordance with the applied methodology and tools and were updated using the most recent available data.

3.3 Non-Permanence Risk Analysis

Not relevant to this stage of the project activity

Findings raised:

N/A

Conclusion:

Not applicable.

4 SAFEGUARDS

4.1 No Net Harm

The environmental and socio-economic impacts were raised during the Environmental Impact Assessment generated by the PP and required by the environmental agency (IBAMA) to issue the Installation and Operational Permits.

As an outcome of the Basic Environmental Plan ^{/15/}, several programs and projects were developed in order to mitigate the environmental impacts raised by the construction of the Hydro power plant. These programs are currently ongoing and are conditions for the renewal of the Operational Permit. All the projects and programs are listed in the VCS-PD and were checked against the Basic Environmental Plan (PBA), which is an annex of the EIA

Findings raised:

N/A

Conclusion:

It could be observed that the company is in accordance with all legal requirements raised by the Environmental Agency (IBAMA) in order to maintain the Operational Licence active.

4.2 Environmental Impact

The environmental Impact Assessment is mandatory for obtaining the operational license of the project activity.

The environmental and socio-economic impacts were raised during the Environmental Impact Assessment generated by the PP and required by the environmental agency (IBAMA) to issue the Installation and Operational Permits.

As an outcome of the Basic Environmental Plan ^{/15/}, several programs and projects were developed in order to mitigate the environmental impacts raised by the construction of the Hydro power plant. These programs are currently ongoing and are conditions for the renewal of the Operational Permit. All the projects and programs are listed in the VCS-PD and were checked against the Basic Environmental Plan (PBA) which is an annex of the EIA.

Findings raised:

N/A

Conclusion:

It could be observed that the company is in accordance with all legal requirements raised by the Environmental Agency (IBAMA) in order to maintain the Operational Licence active. The project proponent provided to the validation team a valid operational license^{/7/}.

4.3 Local Stakeholder Consultation

The local stakeholder consultation or public audience are one of the phase of the Environmental Impact Assessment. This consultation occurred during the construction phase of the project activity and was an requirement for obtaining the operational license. The consultation was validated during the validation phase of this project activity.

Findings raised:

N/A

Conclusion:

It could be observed that the company is in accordance with all legal requirements raised by the Environmental Agency (IBAMA) in order to maintain the Operational Licence active. The project proponent provided to the validation team a valid operational license^{/7/}.

4.4 Public Comments

According to the validation report^{/16/} and registered VCS-PD^{/3/}, no comments were raised during the local stakeholder consultation

Findings raised:

N/A

Conclusion:

It could be observed that the company is in accordance with all legal requirements raised by the Environmental Agency (IBAMA) in order to maintain the Operational Licence active. The project proponent provided to the validation team a valid operational license.

5 VALIDATION CONCLUSION

Earthood Services Private Limited, contracted by Baesa Energetica Barra Grande S.A., has performed the independent renewal or crediting period for the VCS project activity “Baesa Project” – Ref.: 010 – in

Brazil, for the 2nd crediting period from 01/01/2016 to 31/12/2025 (including both days) as reported in the VCS Project Design. Baesa Energetica Barra Grande S.A. is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

ESPL commenced the revalidation of the crediting period based on the following documents:

- baseline and monitoring methodology ACM0002 – version 17,
- VCS Standard version 03.7,
- methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” version 03.0.1,
- monitoring plan contained in the revised VCS-PD

ESPL’s renewal of crediting period approach is based on the understanding of the risks associated with reporting of estimated GHG emission data and the controls in place to mitigate these. ESPL planned and performed the renewal or crediting period by obtaining evidence and other information and explanations that ESPL considered necessary to give reasonable assurance that reported information and estimated GHG are fairly stated.

The verification team confirms that:

- the project activity was found completely implemented as per the description given in the revised VCS-PD; and
- the actual operation conforms to the description in the revised VCS-PD.
- The project complied with the renewal of crediting period criteria for project set out in VCS Version 3.
- The project is likely to achieve the following estimated GHG emissions reductions during the 10 years’ 2nd crediting period

Estimated GHG emissions **608,686 tCO₂e/year** and a total **6,086,860 tCO₂e** for the whole 10 years’ 2nd crediting period are likely to occur without material misstatement.

Approved by



Dr. Kaviraj Singh
Managing Director
Earthood Services Privated Limited

Date: 17/11/2017
Place: Gurgaon, Haryana

APPENDIX 1: ABBREVIATIONS

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
ANEEL	Brazilian Electrical Energy Regulatory Agency
BE	Baseline Emission
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CH ₄	Methane
CL	Clarification Request
CM	Combined Margin
CME	Coordinating/Managing Entity
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CP	Crediting Period
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EIA	Environmental Impact Assessment
ESPL	Earthood Services Private Limited
FAR	Forward Action Request
GHG	Green House Gas
GW	Giga Watt
GWh	Giga Watt hour
IBAMA	National Institute of Environment
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
kW	kilo Watt
kWh	kilo Watt hour
MoV	Means of Validation
MP	Monitoring Plan
MW	Mega Watt
MWh	Mega Watt hour
OM	Operating Margin
ONS	Electric System Operator
PA	Project Activity
PBA	Basic Environmental Plan
PCP	Project Cycle Procedure
PE	Project Emission
PLF	Plant Load Factor
PP	Project Participant
PS	Project Standard
RCA	Environmental Control Report
RFR	Request for Registration
tCO ₂ e	Tonnes of Carbon di oxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VT	Validation Team

APPENDIX 2: COMPETENCE OF TEAM MEMBER AND TECHNICAL REVIEWER

Competence Statement			
Name	Marcelo Sebben		
Country	Brazil		
Education	M.Sc. (Sustainable Energy System) B. Eng. (Chemical Engineering)		
Experience	11 Years		
Field	Chemical process industry, CDM, Energy, Climate Change		
Approved Roles			
Team Leader	Yes		
Validator	Yes		
Verifier	Yes		
Methodology Expert	Yes (ACM0001, ACM0002, ACM0006, AM0065, AMS ID)		
Local expert	Brazil		
Financial Expert	No		
Technical Reviewer	Yes		
TA Expert	Yes (TA 1.1, 1.2, 5.1, 13.1)		
Reviewed by	Abhishek Mahawar	Date	16/08/2017
Approved by	Ashok Kumar Gautam	Date	16/08/2017

Competence Statement			
Name	Sergio Bonanno Cruz		
Country	Brazil		
Education	Post Graduate Diploma in Environment		
Experience	21 Years		
Field	Environmental Law, CDM, Energy, Climate Change		
Approved Roles			
Team Leader	Yes		
Validator	Yes		
Verifier	Yes		
Methodology Expert	Yes (ACM0001, ACM0002, AM0026, ACM0006, AMS ID)		
Local expert	Brazil		
Financial Expert	No		
Technical Reviewer	Yes		
TA Expert	Yes (TA 1.2, 13.1)		
Reviewed by	Abhishek Mahawar	Date	16/08/2017
Approved by	Ashok Kumar Gautam	Date	16/08/2017

APPENDIX 3: DOCUMENTS REVIEWED OR REFERENCED

No.	Author	Title	References to the document	Provider
1.	VCS	VCS Standard	Version 3.7	Other
2	PP	Revised VCS-PD “BAESA Project”	v.1: 16/10/2017 v.2: 10/11/2017 v.3: 13/11/2017	
3	PP	Registered VCS-PD “BAESA Project”	v.4: 03/02/2009	
4	PP	Estimated GHG Emission reductions excel spreadsheet	v.1: 16/10/2017 v.2: 10/11/2017	
5.	UNFCCC	Methodology: ACM0002 – Grid-connected electricity generation from renewable sources	version 17.0	Other
6	UNFCCC	“Tool to calculate emission factor for an electric system	Version 06.0	
		“Tool for the demonstration and assessment of additionality”	Version 7.0.0	
		“Combined tool to identify the baseline scenario and demonstrate additionality”,	Version 7.0	
		“Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”,;	Version 3	
		“Tool to determine the remaining lifetime of equipment”,	Version 1;	
		CDM methodological tool “Assessment of the validity of the original / current baseline and update of the baseline at the renewal of the crediting period”	version 3.0.1	
		“Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”,	version 03.0	
7	IBAMA	Operational permit # 447/2005 dated on 04/07/2005 valid for one year Report 02/2008 - 1 st Renewal of operational permit dated on 10/01/2008 and valid for 6 years 2 nd renewal of operational permit dated on 26/03/2014 valid for 10 years	-	PP
8	Alstom	- Plates pictures of the turbines - Plates pictures of the generators	-	PP
9	PP	- Concession contract # 036/2001 between ANEEL	10/05/2001	PP

		and AHE Barra Grande (GEAB Consortium) - 2 nd Term of the Concession Contract process # 48500.006606/99-76 regarding the transference of the Consortium participation to BAESA – Energetica Barra Grande S.A	23/12/2002	
10	ANEEL	National Agency of Electric Energy website	http://www.aneel.gov.br/	
11	UNFCCC	CDM UNFCCC website	http://cdm.unfccc.int	
12	ONS	National System Operator	http://ons.org.br/pt/paginas/sobre-ons/procedimentos-de-rede/vigentes	
13	Brazilian DNA	National Emission factor	http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_de_spacho.html	Other
14	BAESA	Operation Manual of the Hydropower Plant. Volume XV.	Rev. 00 from 30/10/2014	
15	BAESA	Basic Environmental Plan (PBA) – Comprehend several environmental and socio-economic plans and programs required by the environmental permit.	May/2014	
16	BAESA	VCS Validation report of the project “BAESA Project” # VAL/03615/2008 issued by Bureau Veritas Certification Holding SAS	Version 3 19/11/2007	
17.	-	Brazilian Institute for the Environment	http://www.ibama.gov.br/	Other
18.	-	Chamber of Electric Energy Commerce	http://www.ccee.org.br/	Other
19.	DNA Brazil	Ministry of Science and Technology of Brazil	http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/index.html	
20.	-	IPCC publications	www.ipcc-nggip.iges.or.jp	Other
21	BAESA	“Energia gerada.xls” spreadsheet. Gross and net electricity generated obtained directly from the company system in order to estimate the losses and internal	-	Other

		consumptions for Estimated ER calculations.		
22	ANEEL	Management information report issued in June 2017 regarding the current power installed capacity of all technologies in Brazil.	http://www.aneel.gov.br/documents/656877/14854008/Boletim+de+Informa%C3%A7%C3%B5es+Gerenciais+2%C2%BA+trimestre+de+2017/6f1fac17-8146-4a17-508a-567419d35fae	

APPENDIX 4: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS AND FORWARD ACTION REQUESTS

Table 1. Remaining FAR from validation and/or previous verification

There is no FAR from validation and/or previous verification.

Table 2. CL from this verification

CL ID	01	Section no.	3.1	Date : 07/11/2017
Description of CL				
<i>Absence of the commercially sensitive information (section 1.13) is not sufficient justified unlike stated in the initial registered VCS PD.</i>				
Project participant response				Date : 10/11/2017
<i>No commercially sensitive information has been excluded from the public version of this project. The statement was corrected.</i>				
Documentation provided by project participant				
<i>VCS-PD version 2 dated on 09/11/2017</i>				
DOE assessment				Date: 10/11/2017

It was observed that no commercially sensitive information was used in this phase of the project activity which is the renewal of the crediting period. The statement was rephrased and is in accordance with VCS standards requirements.

CL is closed

CL ID	02	Section no.	3.1	Date : 12/11/2017
Description of CL				
<i>At 1.13 of the VCS-PD, according to the instructions for completing the form, the Eligibility Criteria refers to grouped project. However, it has not being commented nor considered in the VCS-PD.</i>				
Project participant response				Date : 13/11/2017
<i>Information that BAESA Project is not a grouped project was added to the VCS-PD.</i>				
Documentation provided by project participant				
VCS-PD – version 3				
DOE assessment				Date: 13/11/2017
The information provided is now in accordance with instructions for completing the VCS-PD.				
<u>CL is closed</u>				

CL ID	03	Section no.	3.2	Date : 12/11/2017
Description of CL				
<i>At 2.2 of the VCS-PD, the applicability condition presented in the paragraph 11 of the applied methodology has not being considered.</i>				
Project participant response				Date : 13/11/2017
Information regarding the applicability condition presented in the paragraph 11 of the applied methodology was added to item 2.2 of the VCS-PD.				
Documentation provided by project participant				
VCS-PD – version 3				
DOE assessment				Date: 13/11/2017
All applicability conditions of the applied methodology were discussed and are met for this 2 nd crediting period.				
CL is closed				

Table 3. CAR from this verification

CAR ID	01	Section no.	3.2.1	Date : 07/11/2017
Description of CAR				
<i>The applied “Tool to calculate the emission factor for an electricity system” is not the latest version available.</i>				
Project participant response				Date : 10/11/2017
<i>The VCS PD was updated with the latest version of the “Tool to calculate the emission factor for an electricity system” (version 06.0)</i>				
Documentation provided by project participant				
VCS-PD version 2 dated on 09/11/2017				
DOE assessment				Date: 10/11/2017
<i>The validation team verified that the applied version of the tool is the latest available.</i>				

CAR is closed

CAR ID	02	Section no.	3.2.6	Date : 07/11/2017
Description of CAR				
<i>The applied value for parameter EF_{CM} in section 4.2 of the VCS DD is not the same applied in the calculations nor verified in the evidence provided.</i>				
Project participant response				Date : 10/11/2017
Section 4.2 of the VCS PD was corrected				
Documentation provided by project participant				
VCS-PD version 2 dated on 09/11/2017				
DOE assessment				Date: 10/11/2017
It was verified that it consisted in an typographic error and no influence in the calculations was observed. The VCS PD was corrected accordingly.				
<u>CAR is closed</u>				

CAR ID	03	Section no.	3.2.8	Date : 07/11/2017
Description of CAR				
<i>It has been observed that internal power consumptions of the hydropower plant used to calculate the Net electricity generated were based on information that is not the most recent data available.</i>				
Project participant response				Date : 10/11/2017
Internal power consumption was corrected. It was based on data presented by spreadsheet "Energia Gerada.xls". Internal power consumption was an estimated value based on Gross Electricity and Net Electricity data from October, 2005 to September, 2017.				
Documentation provided by project participant				
Energia gerada.xls Estimated ER calculations spreadsheet version 2				
DOE assessment				Date: 10/11/2017
It has been observed that the calculation of the estimated net electricity generated is now based on the following:				
1. Determination of the total gross electricity generated which is estimated based on the assured energy presented in the concession contract^{9/} 2. Estimation of internal consumption and losses calculated as gross electricity minus net electricity generated. This data was obtained from real data obtained from company's system 3. Determination of Estimated net electricity generation for the next crediting period calculated as the gross electricity (item 1 above) minus the losses (item 2 above).				
It is important to point out that the gross electricity was not based on real data for this estimation as the assured energy ^{9/} is the most reliable data as it was calculated for the whole concession period (35 years) and is based on almost 70 years of hydrological studies. Moreover, this is the data used as the generation stipulated under contract.				