



VERIFICATION REPORT

BAESA PROJECT



Document Prepared by Earthhood Services Private Limited

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Summary:

Brief summary of the project activity

The project activity involves the construction and operation of a hydro power-plant implemented with a single reservoir called Barra Grande Hydro Power Plant with 708 MW of installed capacity. The project activity achieves GHG emission reduction through replacing the carbon intensive electricity from the National grid (SIN) 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

Scope of verification

BAESA - Energética Barra Grande S.A has contracted ESPL to conduct the 1st verification of the 2nd Crediting period of the project "BAESA Project" for the period from 01/01/2016 to 30/06/2021 (both days included).

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

- the latest available MR template was used and correctly filled up;
- the project activity has been implemented and operated as per the registered PD and that all physical features (technology and monitoring equipment) of the project are in place;
- the monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of VCUs, verifiable, and in accordance with applicable requirements of the Verified Carbon Standard Version 4;
- the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and approved methodology;
- the data are recorded and stored as per the monitoring methodology.

Conclusion

ESPL has performed the verification of the VCS project "BAESA Project", with VCS Project ID 010, for the monitoring period from 01/01/2016 to 30/06/2021 (both days included).

During the present VCS verification, 02 CLs and 02 CARs were raised and successfully closed.

The verification team has confirmed the implementation of the grouped project as per description in the VCS-PD, the monitoring plan of the PD and the application of the monitoring methodology (ACM0002 v.17.0). In addition, it was confirmed that the monitoring system is in place and the emission reductions are calculated without material misstatements.

The verified emission reductions amount to **2,349,038 tCO₂e** in the above-mentioned monitoring period.

CONTENTS

1	Introduction	5
1.1	Objective	5
1.2	Scope and Criteria	5
1.3	Level of Assurance.....	5
1.4	Summary Description of the Project	5
2	Verification Process.....	7
2.1	Method and Criteria.....	7
2.2	Document Review	7
2.3	Interviews	8
2.4	Site Inspections.....	8
2.5	Resolution of Findings	10
2.6	Eligibility for Validation Activities	10
3	Validation Findings.....	11
3.1	Participation under Other GHG Programs	11
3.2	Methodology Deviations.....	11
3.3	Project Description Deviations.....	11
3.4	Grouped Project	11
4	Verification Findings.....	11
4.1	Project Implementation Status	11
4.2	Safeguards	13
4.3	AFOLU-Specific Safeguards	13
4.4	Accuracy of GHG Emission Reduction and Removal Calculations	13
4.5	Quality of Evidence to Determine GHG Emission Reductions and Removals	20
4.6	Non-Permanence Risk Analysis.....	20
5	Verification Conclusion.....	20
	APPENDIX I: References	22
	APPENDIX II: Abbreviations.....	22
	APPENDIX III: Findings	20
	APPENDIX IV: Competence of Team Members and Technical Reviewers.....	22

1 INTRODUCTION

1.1 Objective

BAESA - Energética Barra Grande S.A has contracted ESPL to conduct the 1st verification of the 2nd Crediting period of the project "BAESA Project" for the period from 01/01/2016 to 30/06/2021 (both days included) according to the requirements of the Verified Carbon Standard Version 4.

1.2 Scope and Criteria

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

- the project activity has been implemented and operated as per the registered PD and that all physical features (technology, project equipment and monitoring and metering equipment) of the project are in place;
- the monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of VCUs, verifiable, and in accordance with applicable VCS Version 4 requirements;
- the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology;
- the data are recorded and stored as per the monitoring methodology.

The verification of this monitoring period is based on the registered VCS-PD, MR and GHG emission reduction calculation spreadsheet and supporting documents.

1.3 Level of Assurance

The verification of this monitoring period has achieved 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 corroborated with information provided by the operation Permit ^{/10/}

The Assured Energy, which is the average generation electricity is 380.6^{/13/} MWh/h (MWaverage).

The project activity also involves a reservoir of 94 km^{2/10/}. Project emissions are calculated due to CH₄ emissions as per applied methodology. This hydropower plant consist in a greenfield project activity.

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	-	-	-
Generators	245	kVA	3	TBTB0043 TBTB0044 TBTB0045	Alstom / Synchron
Power factor	0.95				

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 is listed at VCS and can be accessed by the following link:
<https://registry.verra.org/app/projectDetail/VCS/10>

Some of the characteristics of the project activity are described below:

- Project Proponents: BAESA - Energética Barra Grande S.A and Ecofinance Negócios Eireli^{/23/};
- Project Category: Large project: Greater than 300,000 tonnes of CO₂e per year ;
- Methodology: ACM0002 – Grid-connected electricity generation from renewable sources – version 17.0;
- Start Date: 11/01/2005;
- Crediting Period: from 01/01/2016 to 31/12/2025 – 10 years – renewable (this CP corresponds to the 2nd crediting period;

- Project Location: The project is located between the municipalities of Anita Garibaldi/SC and Pinhal da Serra/RS, Brazil, in the Pelotas River, in the following geographical coordinates^{14/}
 - o Latitude: 27°46'S
 - o Longitude: 51°13' W
- The project is not a grouped project neither an AFOLU project.

2 VERIFICATION PROCESS

2.1 Method and Criteria

The verification process is conducted as per internal CDM Quality Manual and in accordance with criteria laid down by VCS. It includes the following steps:

- contract with PP for the scope and appointment of verification team and technical review team;
- completeness check of Monitoring Report;
- desk review of Monitoring Report and corresponding ER sheet by verification team and planning of onsite audit (including sampling approach to be applied);
- virtual inspection by verification team;
- follow up activities e.g., interviews;
- reporting and closure of findings (CARs/CLs/FARs) and preparation of draft verification report;
- independent technical review of the draft verification report and final/revised documentation (e.g., Monitoring Report, corresponding ER sheet and evidences);
- reporting and closure of TR comments/findings (CARs/CLs/FARs) and final approval for the decision made;
- issuance of final verification report to contracted PP (or authorized representatives).

2.2 Document Review

A desk review was conducted by the verification team that included:

- a review of the data and information presented to verify its completeness;

- a review of the registered monitoring plan, 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;
- 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;
- supporting documents.

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

2.3 Interviews

#	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1	Souza	Alberto	UHE Barra Grande (BAESA)	20/08/2021	Project management and operations	Marcelo Sebben
2	Scapinelli	Ricardo	UHE Barra Grande (BAESA)	20/08/2021	Site visit, technical description, technical information and project diagram	Marcelo Sebben
3	Pereira	Rafael	UHE Barra Grande (BAESA)	20/08/2021	Operation and Maintenance	Marcelo Sebben
4	Cioccarri	Eduardo	CPFL Energias	20/08/2021	Electricity generation and measurement	Marcelo Sebben
5	Baltar	Eduardo	Ecofinance (consultancy)	20/08/2021	ER calculations MR-PD conception	Marcelo Sebben

2.4 Site Inspections

Duration of virtual audit: 20/08/2021				
#	Activity performed on-site	Site location	Date	Team member

1	Opening Meeting: Introduction, scope and objective of work, roles and responsibilities of audit team, resources required, and timetable of the onsite audit including venue for closing meeting and any concerns from PP.	Video call	20/08/2021	Marcelo Sebben
2	Implementation and operation of project activity (project boundary, technology, project equipment, monitoring and metering equipment) as per registered PDD/previous verification. Training of operation and management personnel	Video call	20/08/2021	Marcelo Sebben
3	Site visit to installations (turbines/generators and meters if possible) Visit to Reservoir Project Activity (Technology, Location and Implementation) Physical inspection of the site	Video call	20/08/2021	Marcelo Sebben
4	Visit to substation where the electricity meters are placed - Check the meters installation - Calibration procedures Serial number and meter exchange (maintenance reports)	Video call	20/08/2021	Marcelo Sebben
5	Download of electricity generation data	Video call	20/08/2021	Marcelo Sebben
6	Management and monitoring procedures followed at project site. Verification checklist: compliance of monitoring procedures followed at project site with registered PDD and monitoring methodology.	Video call	20/08/2021	Marcelo Sebben
7	Review of ER and EF calculations in accordance with applied methodology and relevant tools	Video call	20/08/2021	Marcelo Sebben
8	Compilation of the findings by Auditor/s (CARs/CLs)	Video call	20/08/2021	Marcelo Sebben

9	Closing Meeting: Submission of the audit findings to the client and agreement on the issues raised and agreement on timelines.	Video call	20/08/2021	Marcelo Sebben
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The on-site inspection was not conducted by the team leader during this verification process due to the COVID-19 pandemic.

Instead, the VVB used other standard auditing techniques for verification, as follows:

- Current pictures of main equipment/20/.
- Document review
- Real time Videoconference with all involved personnel from project activity.
- During this real time videoconference, it has been done a follow up of electricity generation data downloaded directly from electricity meters
- Cross-check data related to electricity generation directly from the public available information provided from Official sources (CCEE)

These audit techniques used have been considered sufficient and credible by the verification team for the purpose of the present verification.

2.5 Resolution of Findings

The findings may be of following types: CAR – Corrective Action Request, CL – Clarification Request and FAR – Forward Action Request.

During the present verification, 02 CLs and 02 CARs were raised and successfully closed.

The list of findings and their resolution are presented at Appendices IV and V of this report.

2.5.1 Forward Action Requests

No FAR was raised.

2.6 Eligibility for Validation Activities

ESPL holds the accreditation for verification of the sectoral scope.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project activity has no participation under any other GHG program.

3.2 Methodology Deviations

The project activity complies with the applied methodology ACM0002 – Grid-connected electricity generation from renewable sources – version 17.0 and all applicable tools.

No deviations were observed.

3.3 Project Description Deviations

For the present monitoring period, no change is being requested.

3.4 Grouped Project

Not applied. This project does not correspond to a grouped project

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

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 (SIN) by renewable electricity generated by the hydro power plant.

There are no material discrepancies between the actual monitoring system, and the monitoring plan set out in the project description and the applied methodology.

In addition, the GHG emission reductions generated by the project have not become included in an emissions trading program or any other mechanism that includes GHG allowance trading. Moreover, the project has not received nor sought any other form of environmental credit, and neither has become eligible to do so since validation or previous verification. Finally, the project has not participated nor been rejected under any other GHG programs since validation or previous verification.

As per the virtual on-site assessment, interviews and collected evidences, it was possible to assess that, in general, the project activity has been implemented as described in the VCS-PD.

It has been observed that during the months of April, May and June/2020, almost no electricity has been generated due to water scarcity in the region. Information has been corroborated by comparison of electricity generation available in public official sources^{/12/}. Moreover, it is known that Brazil faced and is currently facing water scarcity in the region^{/23/} and therefore the information provided in the MR is accurate.

Sustainable development (SD) contribution: Regarding sustainable development contributions, the following ones were identified due to the project activity:

- Supply clean and renewable energy to the National Grid: this has been identified by checking the main goal of the PA, which is generating clean and renewable energy to National Grid
- Generation of jobs during operation. During the site visit it has been observed the jobs generation due to the implementation and operation of project activity. It has been expected that several jobs were created during the construction and implementation phase of the project activity, considering the size of entrepreneurship.
- Increase local taxes income: figures were presented in the monitoring report. The estimated taxes generated due to the project activity were based on the currently tax rates applied in Brazil and are considered accurate, based on the size of power plant and electricity generated by it.
- Environmental and Social programs: the following has been presented^{/10-4/}:
 - Environmental Education Program, aiming capacitation of local community around the power plant related to environmental programs
 - Relationship Program with communities surrounding the Power Plant
 - Monitoring of Water Quality and Hydrosedimentation
 - Monitoring and control of erosion spots
 - Seismological Monitoring
 - Climatologic monitoring
 - Fauna and Ichthyofauna Monitoring

These monitoring programs are part of the conditionings to the environmental license^{/10-3/} and are mandatory. Therefore, as the environmental license is currently up to date, it is confirmed that these programs are ongoing and being duly applied.

4.2 Safeguards

4.2.1 No Net Harm

There are no negative impacts caused by the operation of the project activity. The only impacts identified refer to the construction phase. MR contains all actions carried out by the project proponent in order to mitigate these impacts which are also part of the environmental monitoring, which are mandatory conditions to keep the environmental permit^{/10-3/} valid.

4.2.2 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 a requirement for obtaining the operational license. The consultation was validated during the validation phase of this project activity.

The project activity keeps an ongoing communication channel (Service Center) with community called at the Company's website^{/16/}. Moreover, this channel provides information to the community regarding environmental and social actions carried out by the company. It has been confirmed by interviews performed to project participants and public available news^{/22/} that no complaints have been observed.

4.3 AFOLU-Specific Safeguards

Not applicable, as it is not an AFOLU project.

For non-AFOLU projects, this section is not required.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

the approved VCS methodology ACM0002 – Grid-connected electricity generation from renewable sources – version 17.0 is applied to the project activity;

GHG emission reduction is calculated as baseline emissions minus project emissions (due to CH₄ emissions from reservoir). No leakage is considered for this kind of project;

Baseline emissions are calculated as follows:

$$BE_y = EGP_{J,y} \times EF_{grid,CM,y}$$

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".

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

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).

The results are as follows:

Wom and wbm for the 2nd crediting period are equal to 0.25 and 0.75 respectively as per TOOL07

$$EF_{CM,2016} = 0.25 \times 0.6228 + 0.75 \times 0.1581 = 0.2743 \text{ tCO}_2\text{e/MWh}$$

$$EF_{CM,2017} = 0.25 \times 0.5882 + 0.75 \times 0.1581 = 0.2656 \text{ tCO}_2\text{e/MWh}$$

$$EF_{CM,2018} = 0.25 \times 0.5390 + 0.75 \times 0.1581 = 0.2533 \text{ tCO}_2\text{e/MWh}$$

$$EF_{CM,2019} = 0.25 \times 0.5181 + 0.75 \times 0.1581 = 0.2481 \text{ tCO}_2\text{e/MWh}$$

$$EF_{CM,2020} = 0.25 \times 0.4539 + 0.75 \times 0.1581 = 0.2321 \text{ tCO}_2\text{e/MWh}$$

$$EF_{CM,2021} = 0.25 \times 0.5842 + 0.75 \times 0.1581 = 0.2646 \text{ tCO}_2\text{e/MWh}$$

The BE_y calculations are as follows:

$$BE_{2016} = 3,687,878 \times 0.2743 = 1,011,477$$

$$BE_{2017} = 2,602,811 \times 0.2656 = 691,344$$

$$BE_{2018} = 2,795,918 \times 0.2533 = 708,305$$

$$BE_{2019} = 2,747,022 \times 0.2481 = 681,530$$

$$BE_{2020} = 1,872,463 \times 0.2321 = 434,505$$

$$BE_{2021} = 545,094 \times 0.2646 = 144,245$$

$$BE_{total} = 3,671,406 \text{ tCO}_2\text{e}$$

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 calculated 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

$$PD = \frac{708,000,000 - 0}{94,000,000 - 0}$$

$$PD = 7.53 \text{ w/m}^2$$

As PD calculation was not demonstrated in the MR, a finding has been raised and duly closed during the process.

As the results are $4 \text{ W/m}^2 < PD \leq 10 \text{ W/m}^2$, 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

The PE_y calculations are as follows:

$$PE_{2016} = \frac{90 \times 3,798,095}{1000} = 341,829$$

$$PE_{2017} = \frac{90 \times 2,682,501}{1000} = 241,426$$

$$PE_{2018} = \frac{90 \times 2,880,049}{1000} = 259,205$$

$$PE_{2019} = \frac{90 \times 2,834,446}{1000} = 255,101$$

$$PE_{2020} = \frac{90 \times 1,933,240}{1000} = 173,992$$

$$PE_{2021} = \frac{90 \times 564,605}{1000} = 50,815$$

$$PE_{total} = 1,322,368 \text{ tCO}_2\text{e}$$

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

Fixed parameters: The following parameters were kept fixed along the crediting period and are being used for calculation of emission reductions

- **GWP_{CH4}** (global warming potential of Methane): value equal to **25 tCO₂e/tCH₄** for the 2nd commitment period (until 31/12/2020) and equal to **28 tCO₂e/tCH₄** from 01/01/2021 as per VCS update overview (Q2/2021, based on IPCC Fifth Assessment Report/17/)
- **EF_{Res}**: (Default emission factor for emissions from reservoirs): the value applied is **90 kgCO₂e/MWh** which is the value presented by the applied methodology.
- **Cap_{BL}** (Capacity of the hydro power plant before the project activity): it is a greenfield project. It is equal to **zero**.
- **A_{BL}** (Area of the reservoir before the implementation of the PA: it is equal to **zero** as no reservoir exists before the PA implementation
- **EF_{BM}**: (Build margin emission factor of the grid): 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:** 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.

Monitored parameters: The following parameters were monitored along the monitoring period and are being used for calculation of emission reductions

- **EG_{facility}, (Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr):** the parameter was 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)^{/15/}. 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).
The monitored values (SCDE data)^{/11/} have been compared with the ones provide by CCEE ^{/12/}(Chamber of Commercialization of Electric Power).
Nevertheless, when checking the evidences provided (raw data), it has been observed that not the most conservative data has been applied and a CAR has been raised. Moreover, as not all calibration certificates have been provided a CL has been raised. After the findings resolution, it is ensured that the missing information has been duly provided, the calculations were corrected when required and the conservative data have been applied.

The applied values are the following (MWh):

- o 2016: 3,687,878
- o 2017: 2,602,811
- o 2018: 2,795,918
- o 2019: 2,747,022
- o 2020: 1,872,463
- o 2021: 545,094

The following meters were used for measuring the parameter

Parameter	Electricity meter S/N	Calibration company	Calibration dates (frequency required 2 years ^{/15-2/} until 31/12/2016 and 5 years from 01/01/2017 ^{/15-3/})	Delays
EG _{facility,h}	Main TG 01 (PT-1201A372-01)	Metrowatt	26/02/2014	No
		Metrum	23/02/2016	
		Prolux	22/02/2018	
		Prolux	18/02/2020	
	Backup TG 01 (PT-1201A373-01)	Metrowatt	27/02/2014	No
		Metrum	23/02/2016	
		Prolux	22/02/2018	
		Prolux	19/02/2020	
	Main TG 02 (PT-1201A394-01)	Metrowatt	27/02/2014	No
		Metrum	23/02/2016	
		Prolux	22/02/2018	
		Prolux	18/02/2020	

	Backup TG 02 (PT-1201A434-01)	Metrowatt	27/02/2014	No
		Metrum	23/02/2016	
		Prolux	22/02/2018	
		Prolux	19/02/2020	
	Main TG 03 (PT-1201A498-01)	Metrowatt	26/02/2014	No
		Metrum	23/02/2016	
		Prolux	22/02/2018	
		Prolux	19/02/2020	
	Backup TG 03 (PT-1201A505-01)	Metrowatt	27/02/2014	No
		Metrum	23/02/2016	
		Prolux	22/02/2018	
		Prolux	19/02/2020	

- **EF_{Grid,CM} (Combined margin emission factor for the grid in year y):** this parameter is calculated based on EFOM and EFBM calculated and provided by the Brazilian DNA^{/20/}. 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} was monitored 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. It was observed that not the most recent data has been used to determine the EF_{OM} and therefore a CAR has been raised. After the findings resolution, it has been observed that the parameter has been calculated in accordance with registered PDD and applicable TOOLS.
- The values applied for the current period are the following for each year (values in tCO₂e/MWh):
 - o 2016: 0.2743
 - o 2017: 0.2656
 - o 2018: 0.2533
 - o 2019: 0.2481
 - o 2020: 0.2321
 - o 2021: 0.2646
- **TEGy (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 has 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^{/15-1/}. Their calibration is determined by the same regulations^{/15-2 and 15-3/} and are under control of the PP. Nevertheless, As not all calibration certificates have been provided a CL has been raised. After the findings resolution, it is ensured that the missing information has been duly provided, the calculations were corrected when required and the conservative data have been applied.

The applied values are the following (MWh):

- **2016: 3,798,095**
- **2017: 2,682,501**
- **2018: 2,880,049**
- **2019: 2,834,446**
- **2020: 1,933,240**
- **2021: 564,605**

The following meters were used for measuring the parameter

Parameter	Electricity meter S/N	Calibration company	Calibration dates (frequency required 2 years ^{/15-2/} until 31/12/2016 and 5 years from 01/01/2017 ^{/15-3/}) ¹	Delays
TEG _y	Main TG 01 (PT-1201A467-01)	Metrowatt	26/02/2014	No
		Metrum	22/02/2016	
		Prolux	22/02/2018	
		Prolux	18/02/2020	
	Main TG 02 (PT-1201A475-01)	Metrowatt	26/02/2014	No
		Metrum	22/02/2016	
		Prolux	22/02/2018	
		Prolux	18/02/2020	
	Main TG 03 (PT-1201A508-01)	Metrowatt	26/02/2014	No
		Metrum	22/02/2016	
		Prolux	22/02/2018	
		Prolux	18/02/2020	

- **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^{/13/}, operation permits^{/10/} and operation manual of the company. As per applied methodology, the value is to be checked at the start of crediting period. The applied value is equal to **708,000,000 W**

¹ It worth mentioning that from electricity meters calibrated from 01/01/2017 onwards^{/16-3/} the national regulation has changed and calibration frequency is to be carried out every 5 years. Nevertheless, this change does not affect the current MP.

- **APJ (Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full):** 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^{/10/} and is equal to **94,000,000 m² (94 km²)**.

The emission reduction spreadsheet is transparent, traceable and correct, with no manual transposition errors.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

- the electricity generation was checked directly at the company's system (SCDE) and cross-checked with official information (CCEE), as evidences to determine emission reduction;
- the records, data and information provided were found valid for the current verification period. The documents were verified during virtual site visit and when possible, were checked directly from its source;
- interviews were performed during virtual site visit with involved personnel and PP's representatives;
- the GHG emission reduction calculations were check step by step with PP's representatives;
- the quality of evidences was found of adequate level by the verification team to ensure an accurate quantification of the emission reductions.

4.6 Non-Permanence Risk Analysis

Not applicable.

5 VERIFICATION CONCLUSION

ESPL, contracted by BAESA - Energética Barra Grande S.A, has performed the independent verification of the emission reductions of the VCS project "BAESA Project", with VCS Project ID 10, for the monitoring period 01/01/2016 to 30/06/2021 (both days included).

Ecofinance Consulting 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 verification based on the baseline and monitoring methodology ACM0002 v.17.0 and the monitoring plan contained in the VCS-PD and draft Monitoring Report.

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

The verification team confirms, based on final revised MR, that:

1. the project activity was found completely implemented as per the description given in the registered VCS-PD; and
2. the actual operation conforms to the description in the registered VCS-PD.

In our opinion, the GHG emissions reductions reported for the project activity for the period mentioned above are correct in the final version of the Monitoring Report. The GHG emission reductions were calculated correctly based on the approved baseline and monitoring methodology and the monitoring plan contained in the VCS-PD.

Therefore, ESPL can certify that the emission reductions from the VCS project "BAESA Project" as follows:

Verification period informed above.

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2016*	1,011,477	341,829	0	669,648
2017*	691,344	241,426	0	449,918
2018*	708,305	259,205	0	449,100
2019*	681,530	255,101	0	426,429

2020*	434,505	173,992	0	260,513
2021**	144,245	50,815	0	93,430
Total	3,671,406	1,322,368	0	2,349,038

* whole year

** from 01/01/2021 to 30/06/2021

Approved by



Dr. Kaviraj Singh
Managing Director
Earthood Services Privated Limited

Date: 03-December-2021
Place: Gurgaon, Haryana

[illegible]

11.	<u>Electricity generation</u> 1. Monthly reports with hourly electricity generation information provided from SCDE – Energy meters 2. Normative Resolution # 697 issued by ANEEL on 16/12/2015 regarding systemic Losses, which are not discounted from net electricity generated 3. Unifilar diagram depicting the location of internal losses	2016, 217, 2018, 2019, 2020 and 2021
12.	<u>Electricity generation Cross-check (CCEE)</u> Monthly reports with hourly electricity generation information provided from SCDE – Energy meters	2016, 217, 2018, 2019, 2020 and 2021 https://www.ccee.org.br/portal/faces/pages_publico/o-que-fazemos/infomercado?_afdf.ctrl-state=4gdvtz7bj_1&_afLoop=89745809127000
13.	<u>Proof of installed capacity</u> - Plates pictures of the turbines - Plates pictures of the generators	07/2021
14.	<u>Geographical location of project activity</u> Google maps search at the presented geographical coordinates	https://www.google.com.br/maps/place/27%C2%B046'00.0%22S+51%C2%B013'00.0%22W/@-27.7646548,-51.2291583,3565m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d-27.7666667!4d-51.2166667
15.	<u>Electricity meters maintenance regulations (issued by National Operator of System – ONS)</u> 1. Procedure 12.2 from ONS (National Electric System Operator) regulating the accuracy class of the electricity meters 2. Procedure Submodule 12.3 from ONS (National Electric System Operator) regulating the frequency of calibration (2 years calibration frequency) 3. New regulation (ONS Grid Procedure, submodule 12.3) issued on 01/01/2017 revision 2016/12 stating	-

	that from this date on 5 years calibration frequency is to be applied to electricity meters	
16.	<u>Community Service Centre</u>	http://www.baesa.com.br
17.	IPCC, 2013: <i>Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change</i>	https://www.ipcc.ch/report/ar5/wg1/
18.	Brazilian Institute for the Environment	http://www.ibama.gov.br/
19.	Chamber of Electric Energy Commerce	http://www.ccee.org.br/
20.	Ministry of Science and Technology of Brazil – Grid Emission factor calculation (last accessed on 06/09/2021)	https://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html
21.	IPCC publications	www.ipcc-nggip.iges.or.jp
22.	Web search for public information related to complaints	https://www.google.com/search?q=baesa+energetica+barra+grande+sa&rlz=1C1RUCY_pt-BRBR946BR947&biw=1366&bih=568&tbn= nws&ei=Cp1XYcbxLo fY1sQPntiS4Ag&oq=baesa+&gs_l=psy-ab.1.0.0i512k112j0i512i10k1j0i30k117.26268.26268.0.29912.1.1.0.0.0.0.192.192.0j1.1.0....0..1c.1.64.psy-ab..0.1.191....0.b0mB9IWQMcl Accessed on 01/10/2021
23.	<u>Change of PP's name</u> 1. 3rd contractual change of Enerbio Consultoria Ltda-EPP, issued on 22/11/2012 and certified by Commercial Office of Rio Grande do Sul on 07/12/2012 under number 3729153 where, in its 5th Clause, it is stated that the Company will be now named Ecofinance Negócios Ltda – EPP	07/12/2012

	2. 4th contractual change dated on 20/05/2013 and Registered in the Commercial Office of Rio Grande do Sul on 28/06/2013 under # 43600043482, where, on its first clause, is named Ecofinance Negócios Eireli. It is confirmed that the activities of the company remain unaltered due to the above changes and are compatible with the activity provided by the company, which is "Consulting and development of project which obtain Certified or Verified Emission Reductions" among other activities. 3. Revised Registration Representation, where it is confirmed the Project participants (BAESA - Energética Barra Grande S.A and Ecofinance Negócios Eireli) of the project activity.	28/06/2013 03/12/2021
24.	National Institute of Meteorology website	https://clima.inmet.gov.br/prec
25.	Brazilian Institute for the Environment	http://www.ibama.gov.br/
26.	Chamber of Electric Energy Commerce	http://www.ccee.org.br/
27.	UNFCCC	http://cdm.unfccc.int
28.	VCS	https://verra.org/

APPENDIX II: ABBREVIATIONS

Abbreviations	Full texts
BE	Baseline Emissions
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CCEE	Commercialization Chamber of Electric Energy
CDM	Clean Development Mechanism
CO₂e	Carbon dioxide equivalent
CL	Clarification Request
ER	Emission Reduction
ESPL	Earthood Services Private Limited
FAR	Forward Action Request
GHG	Greenhouse gas(es)
MR	Monitoring Report
PA	Project Activity
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCS-PD	VCS – Project Description
VCU	Verified Carbon Unit
XLS	Emission Reduction Calculation Spread Sheet

APPENDIX III: FINDINGS

CL from this verification

CL ID	01	Section no.	4.4	Date: 06/09/2021
Description of CL				
Calibration certificates for the parameter EGfacility,y and TEG covering the period between 01/01/2016 and 22/02/2016 were not provided to the verification team.				
Project participant response				Date: 16/09/2021
Calibration certificates were supplied to DOE in 10/09/2021.				
DOE assessment				Date: 22/09/2021
Calibration certificates were duly provided and it is confirmed that the period is duly covered by calibration.				
<u>CL is closed</u>				

CL ID	02	Section no.	4.4	Date: 26/09/2021
Description of CL				
MR section 5.2: demonstration of the calculation of the power density has not been demonstrated in the MR.				
Project participant response				Date: 27/09/2021
Demonstration of the calculation of the power density was added to MR.				
DOE assessment				Date: 01/10/2021
The calculation of power density is now duly provided. It is now clear in the MR that the power density is between 4 and 10w/m ² and therefore, project emissions from reservoir are applied. The calculation of project emissions has already been described in the MR and is considered accurate by the verification team.				
<u>CL is closed</u>				

CAR from this verification

CAR ID	01	Section no.	4.4	Date: 06/09/2021
Description of CAR				
The EF _{OM} used in the ER calculations for 2021 is not the latest available in the DNA website.				
Project participant response				Date: 16/09/2021

EF_{OM} used in the ER calculations for 2021 was updated.

DOE assessment

Date: 22/09/2021

The values used in the calculations are the latest available and therefore in accordance with requirements of TOOL07. The calculations are now accurate.

CAR is closed

CAR ID	02	Section no.	4.4	Date: 06/09/2021
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Description of CAR

The following inconsistencies were observed when checking the raw data provided to the verification team when comparing it to the ones applied in the ER calculations spreadsheet

- From CCEE generation data (Cross-check), (E.g. spreadsheets 2016 01), information regarding the meaning of column N called "G(MWh)" is being required, considering that this value is the most conservative values of electricity generation.
- From the spreadsheets provided from SCDE, the values provided for the parameter EG_{facility,y} in the ER calculations are not in accordance with evidences provided (the consumption has not been discounted)
 - o e.g from jan/2016, spreadsheet called 2382425.csv the net generation for the month is equal to 345,134.790 MWh whereas the value provided in the ER calculations is equal to 348,810
 - o e.g from fev/2016, spreadsheet called 2382426.csv the net generation for the month is equal to 294,251 MWh whereas the value provided in the ER calculations is equal to 296,991
 - o e.g from mar/2016, spreadsheet called 2382427.csv the net generation for the month is equal to 264,341 MWh whereas the value provided in the ER calculations is equal to 268,694

Therefore it is being requested to explain the differences found and how the applicable values are conservative.

Project participant response

Date: 16/09/2021

CCEE generation data (Cross-check) for net electricity supplied to the grid was updated considering column N called "G(MWh)".

Regarding the spreadsheet provided from SCDE, the consumption that appears in the spreadsheet does not correspond to internal consumption of the plant. It is related to the role of synchronous compensator of the system that the Grande Barra plant plays.

This consumption related to the system's synchronous compensator role is considered a systemic loss, as per the article 10 of the ANEEL Resolution 697 (16/12/2015). This systemic loss is shared among all generation and distribution agents. In the CCEE report, BAESA's share already appears in the loss discounts.

It is important to clarify that internal consumption happens before the measurement point as measurement diagram provided.

DOE assessment

Date: 22/09/2021

Conservative data has been considered in the cross-check values (CCEE reports^{/12/}). Moreover, evidences have been provided regarding the meaning of the consumption reported in the SCDE report^{/11-2/} and therefore it is agreed that they do not represent internal consumption and are not to be discounted from net electricity generation. Moreover, a unifilar diagram has been provided^{/11-3/} which confirms the information provided by the project proponent.

Calculation is now accurate and conservative, in accordance with applied methodology, tools and National Regulations.

CAR is closed

APPENDIX IV: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

Competence Statement			
Name	Marcelo Sebben		
Country	Brazil		
Education	M.Sc. (Sustainable Energy System) B. Eng. (Chemical Engineering)		
Experience	+12.5 Years		
Field	Chemical process industry, CDM, Energy, Climate Change		
Approved Roles			
Team Leader	Yes		
Validator	Yes		
Verifier	Yes		
Methodology Expert	ACM0001, ACM0002, ACM0006, AM0065, AMS ID, AMS-I.E, AMS-I.C, AM0026, AMS-I.A, AMS-I.F, AMS-III.H, AMS-III.I.		
Local expert	Brazil, Chile, Honduras, Colombia		
Financial Expert	Yes		
Technical Reviewer	Yes		
TA Expert	1.1, 1.2, 4.1, 5.1, 9.1, 13.1		
Reviewed by	Shreya Garg	Date	01/03/2018
Approved by	Anshika Gupta	Date	01/03/2018

Competence Statement	
Name	Sergio Bonanno Cruz
Country	Brazil
Education	Post Graduate Diploma in Environment
Experience	+25 Years
Field	Environmental Law, CDM, Energy, Climate Change
Approved Roles	
Team Leader	Yes
Validator	Yes
Verifier	Yes
Methodology Expert	ACM0001, ACM0002, AM0026, ACM0006, AMS ID
Local expert	Brazil, Chile, Colombia
Financial Expert	Yes
Technical Reviewer	Yes
TA Expert	1.2, 13.1

Reviewed by	Shreya Garg	Date	29/08/2019
Approved by	Anshika Gupta	Date	29/08/2019