



Verified Carbon Standard

RENEWAL OF CREDITING PERIOD REPORT FOZ DO CHAPECÓ



Document Prepared By Earthood Services Private Limited

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Report Title	Renewal of Crediting Period Report – Foz do Chapecó
Client	Foz do Chapecó Energia S.A
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Summary:

The project activity involves the construction and operation of a hydro power-plant implemented with a single reservoir called Hydro Power Plant Foz do Chapecó. 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 20.0

Foz do Chapecó Energia S.A have contracted the Earthood Services Private Limited to conduct the Renewal of Crediting period of the project “Foz do Chapecó” with regard to the requirements of VCS Version 4.

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, 04 Clarifications (CL), 03 Corrections (CAR) were raised and all were closed accordingly. Moreover 01 Forward Action Request (FAR) has been raised and will be addressed at the next monitoring period. .

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 3.8.9, paragraph 1 of the VCS Standard version 4.3^{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 711,523 tCO₂e per year and a total of 7,115,229 tCO₂e for the whole 10 years crediting period.

CONTENTS

1	INTRODUCTION	6
1.1	Objective	6
1.2	Scope and Criteria.....	6
1.3	Level of Assurance	6
1.4	Summary Description of the Project.....	7
2	VALIDATION PROCESS.....	7
2.1	Method and Criteria	7
2.2	Document Review	7
2.3	Interviews	8
2.4	Site Inspections	9
2.5	Resolution of Findings.....	11
2.5.1	Forward Action Requests.....	11
3	VALIDATION FINDINGS	11
3.1	Project Details.....	11
3.2	Safeguards.....	15
3.2.1	No Net Harm.....	15
3.2.2	Local Stakeholder Consultation.....	16
3.2.3	Environmental Impact	16
3.2.4	Public Comments.....	17
3.2.5	AFOLU-Specific Safeguards.....	17
3.3	Application of Methodology	17
3.3.1	Title and Reference.....	17
3.3.2	Applicability.....	17
3.3.3	Project Boundary	22
3.3.4	Baseline Scenario	23
3.3.5	Additionality	26

3.3.6	Quantification of GHG Emission Reductions and Removals.....	26
3.3.7	Methodology Deviations	29
3.3.8	Monitoring Plan	29
3.4	Non-Permanence Risk Analysis	31
4	VALIDATION CONCLUSION	31
	APPENDIX I: ABBREVIATIONS	33
	APPENDIX II: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS	34
	APPENDIX III: FINDINGS.....	36
	APPENDIX IV: REFERENCES	41

1 INTRODUCTION

1.1 Objective

Foz do Chapecó Energia S.A. has contracted Earthood Services Private Limited to conduct the revalidation of the 2nd crediting period for the VCS project activity “Foz do Chapecó” for the period from 14/10/2020 to 13/10/2030 (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 4.3^{/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 20.0 ^{/10/}

The revalidation is in accordance with requirements of VCS Standard and 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^{/11-3/}.

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 has achieved a reasonable level of assurance. All project information could be duly checked with reasonable precision. Design data has been 100% checked by validation team (by videoconference, pictures and official documents). Fixed and estimated monitored parameters were based on reliable data (official or design data) and were 100% checked. Therefore, the validation team ensure that the results of this validation achieved materiality threshold, with respect to the aggregate of errors, omissions and misrepresentations relative to the total reported GHG

emission reductions, a value lower than 1%, which is the threshold required by VCS Standard for this project scale (large scale).

1.4 Summary Description of the Project

The project activity involves the construction and operation of a hydro power plant implemented with a relatively small reservoir (run-of-river) called Foz do Chapecó Hydro Power Plant. Project is located in the municipalities of Alpestre (Power house) in the State of Rio Grande do Sul and Municipality of Águas do Chapecó, in the State of Santa Catarina, Brazil.

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 plant has a total of 855 MW of installed capacity and it will supply clean electricity to the Brazilian Interconnected System (SIN)

For further details, refer to section 3.1 below.

The project is listed at VCS and can be accessed by the following link:
<https://registry.verra.org/app/projectDetail/VCS/896>

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^{/9/}, updated VCS project design^{/6/}, estimated emission reduction calculation spread sheet^{/8/}, 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) a review of the data and information presented to verify their completeness
- b) 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
- c) a review of ex ante calculations and assumptions made in determining the GHG data and emission reductions;
- d) 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 IV

2.3 Interviews

#	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1	Moritz	Roberto	Foz do Chapecó Energia S.A	21/06/2022	Project description Community relationship Environmental Permit	Marcelo Sebben
2	Futatsugi	Kiyomi	Foz do Chapecó Energia S.A	21/06/2022	Environmental Permit	Marcelo Sebben
3	Martins	Rogério	Foz do Chapecó Energia S.A	21/06/2022	Site visit, technical description, technical information and	Marcelo Sebben

					Substation site visit	
4	Rossetto	Michael	Foz do Chapecó Energia S.A	21/06/2022	technical description, Electricity generation and dispatch Operation and Maintenance	Marcelo Sebben
6	Moraes	Arthur	Carbotrad er Consultancy	21/06/2022	ER calculations Data aggregation, PDD description, Baseline assessment	Marcelo Sebben

2.4 Site Inspections

Duration of virtual audit: 21/06/2022				
#	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	21/06/2022	Marcelo Sebben
2	Implementation and operation of project activity (project boundary, technology, project equipment, monitoring and metering equipment) as per registered PDD/previous verification.	Video call	21/06/2022	Marcelo Sebben
3	<ul style="list-style-type: none"> - Grievance mechanism - Sustainable Development Goals - Environmental License (annual monitoring as per No net harm assessment) 	Video call	21/06/2022	Marcelo Sebben

4	Video call – Physical inspection of the project activity - Site visit to power plant – turbine and generation for confirmation of its installed capacity and interview of monitoring personnel - Substation with electricity meters located at grid interface	Video call	21/06/2022	Marcelo Sebben
5	- Video call – substation to which electricity is delivered to the SIN): - Check of electricity meters which dispatch electricity to the grid and access to its Serial Number. - Site visit and interview of monitoring personnel	Video call	21/06/2022	Marcelo Sebben
6	Revalidation checklist: compliance of monitoring procedures, regulations, application of methodology and baseline calculation compared with registered PDD and monitoring methodology.	Video call	21/06/2022	Marcelo Sebben
7	Management and operational system: Documentation, allocation of responsibilities, qualification and training, data recording & archiving, internal audit and management review and emergency procedures.	Video call	21/06/2022	Marcelo Sebben
8	Review of ex-ante calculations in accordance with applied methodology and relevant tools.	Video call	21/06/2022	Marcelo Sebben
9	Compilation of the audit findings.	Video call	21/06/2022	Marcelo Sebben
10	Closing Meeting: Submission of the audit findings to the client and agreement on the issues raised and agreement on timelines.	Video call	21/06/2022	Marcelo Sebben

The on-site inspection was not conducted during this renewal process. The alternative means of conducting an audit process have been considered in accordance with VCS Standard and requirements.

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

- Confirmation from PP that no changes occurred in the installed technology, monitoring plan, measuring equipment, obtained from interview with PPs
- Current pictures of main equipment^{12/}.
- Document review
- Real time videoconference overview of Hydro Power plant and installed generators and turbines
- Real time Videoconference with demonstration of installed electricity meters and with explanation of parameters monitoring.

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 renewal process, 04 CL and 03 CAR were raised and successfully closed.

The list of findings and their resolution are presented at Appendix III of this report.

2.5.1 Forward Action Requests

One FAR has been raised during this renewal process. It refers to the start date of next monitoring period, taking into account that the 1st day of the current crediting period has been accounted in the previous verification. Refer to FAR 01 in appendix III of this report.

3 VALIDATION FINDINGS

3.1 Project Details

The VCS-PD provides an accurate a clear description of the Project Activity.

“Foz do Chapecó” is a project activity that consists in the construction and operation of a hydro power-plant implemented with a single reservoir

where it is added the area of passage way for conservative reasons. 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 plant will supply clean electricity to the Brazilian Interconnected System (SIN).

The project consists in the installation of four (4) generators with 225 MVA ($225 \text{ MVA} \times 0.95 (\cos \phi) = 213.75 \text{ MW}$) ^{/12/} capacity each, resulting in a total installed capacity of 855 MW.

The Assured Energy, which is the average generation electricity is 427.2^{/13/} MWh/h (Mwaverage). This information has been revised by Ministry of Mines and Energy and it is considered the official information related to the foreseen electricity generation for the power plant. Therefore, this figure has been correctly applied in the estimated ER calculations. For details refer to CAR 02 below.

The project activity also involves a reservoir of 80.02 km² ^{/14/}. Considering this reservoir area, no Project emissions applicable to this project activity as per applied methodology. Refer to section 3.3.6 below for details.

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

Table 1: Technical description of the turbines from this project activity

Parameter	value	Unit	quantity	Serial Number	Manufacturer / Type
Capacity	217.14	MW	4	Unit # 1 Unit # 2 Unit # 3 Unit # 4	Alstom / Francis vertical
Flow	489.1.64	m ³ /s	-	-	-
Rotation	90	Rpm	-	-	-

Table 2: Technical description of the generators from this project activity

Parameter	value	Unit	quantity	Serial Number	Manufacturer / Type
Capacity	225,000	kVA	4	TBTG0133 TBTG0134 TBTG0135 TBTG0136	Alstom / synchronic
Capacity factor (cos ϕ)	0.95	-	-	-	-
Tension	13,800	V	-	-	-

Rotation	90	Rpm	-	-	-
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The expected lifetime of power plant is 35 years as per Concession Contract^{/15/}.

The following characteristics can be observed in the project activity:

- Project proponent and other entities involved in the project: the project proponent and also the project owner is Foz do Chapecó Energia S.A.. Carbotrader Consultancy is involved in the PA as consultant.
- Start Date: 14/10/2010 –operation start date already described in the registered PDD which refers to the operational start date of the 1st turbine^{/09/}: Nevertheless, the information is not accurate in the VCS-PD and a CAR has been raised. Refer to CAR 1. After CAR assessment, correct date has been included in the VCS PD.
- Crediting Period: 2nd crediting period from 14/10/2020 to 13/10/2030 – 10 years – renewable;
- Project scale and Estimated GHG emission reductions: the PA is defined as a Large Project > 300,000 tCO₂e/y) with estimated ERs equal to **711,523 tCO₂e/year**.
- Project Location of Power plant: Project is located in the municipalities of Alpestre (Power house) in the State of Rio Grande do Sul and Municipality of Águas do Chapecó, in the State of Santa Catarina, Brazil. Coordinates of the plant is presented below and has been checked in the Google Maps for confirmation^{/16/}:
 - o Latitude: 27°08'24" S
 - o Longitude: 53°02'36" W
- Conditions prior to project initiation: The project is a greenfield hydro power plant and prior to the project installation the electricity would be generated by Power Plants connected to the National Grid.
- Project compliance with applicable laws, statutes and other regulatory frameworks: The project is currently implemented and operational. The compliance with the applicable laws and regulations can be evidenced through Environmental License issued by Brazilian Institute of Environment and Natural Resources (IBAMA)^{/17/}
- Ownership and other programs: Foz do Chapecó Energia S.A is the project owners. The ownership is confirmed through the environmental license^{/17/}. Moreover, the Concession Contract between Foz do Chapecó Energia S.A and ANEEL (National Agency of Electric Energy)^{/18/} for generating electricity has been provided as evidence of

project ownership. In addition, the GHG emission reductions generated by the project have not been included in any 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. As evidences of project ownership have not been mentioned in the VCS-PD, a CL has been raised. Refer to CL 02

- Eligibility criteria for grouped projects: this project does not correspond to grouped project, thus this section is not applicable
- Leakage management for AFOLU projects: this project is not an AFOLU project, thus, the leakage management is not applicable. The applied methodology does not make reference to AFOLU projects.
- Commercially sensitive information: the commercial information has not been excluded from the documents made public by the PP.
- Sustainable development contribution:
 - o Contributes to local environmental sustainability, since it decreases the dependence on fossil fuels, thus improving air quality
 - o Contributes towards better working conditions and increases employment opportunities in the area where the project is located;
 - o Contributes towards better revenue distribution since it assists the regional/local economic development;
 - o Contributes to the development of technological capacity because most of the equipment of the project will be manufactured inside Brazil, consolidating the technology in the country

The project activity corresponds to the installation of a greenfield hydro power plant in Brazil, connected to the National Interconnected Grid. The project description is complete, accurate and reflect the information stated in the evidences provided. Nevertheless, not the latest VCS-PD template has been used and a CL has been raised. Refer to CL 01

3.2 Safeguards

3.2.1 No Net Harm

As per environmental analysis carried out during construction phase, some potential negative impacts were mapped through EIA (Environmental Impact Assessment) and RIMA (Environmental Impact Report) which comprehended the following:

- Change of Fluvial System
- Water table elevation
- Alteration of water quality
- Interference of Authorized Areas and Mineral Concessions with the Reservoir
- Start of acceleration of erosive processes
- Occurrence of induced earthquakes
- Reduction of Biological Diversity of Aquatic Ecosystems
- Alteration of the Structure of the Aquatic Fauna and of the Water quality prior operational phase
- Alteration of structure of the aquatic fauna and of the water quality during the wadding phase and the operation of the Dam
- Migratory routes detrimental
- Removal of current vegetal covering and loss of habitats
- Increase of the hunting
- Generation of population expectation due to the implementation of enterprise
- Change of social cultural behaviour population affected
- Familiar production unit unstructured
- Archaeological sites interference
- Healthcare amendment
- Amendment of labour market
- Amendment of the real state market
- Amendment of market goods and regional income and municipal collection
- Improvement of transmission and communication systems
- Traffic intensification and interference with the road infrastructure

- Loss of agricultural production areas
- Compulsory population displacement
- Interference of fluvial passages
- Interference with social infrastructure
- Interference with indigenous communities.

For all these impacts above, 22 mitigation programmes have been built as per requirement for granting the environmental license^{/17/}. Yearly results of these 22 programmes have to be provided to IBAMA in order keep the Environmental License valid. Results of current programmes have been provided to the validation team^{/19/}.

Therefore, by applying these measures, it can be concluded that any possible negative impact caused by project activity is mitigated of the project activity.

3.2.2 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 environmental/operational license. The consultation was validated during the validation phase of this project activity.

As explained by project participants, the company keeps an active communication with surrounding communities as well as social programmes involving the same^{/20/}. The company provides open channel through its website the general community, employees, and stakeholders^{/20/}. It could be observed by interviews to the project proponents and by report provided to the verification team ^{/20/} that the grievance mechanism is currently in place and active.

3.2.3 Environmental Impact

As stated in section 3.2.1 above, the company has carried out an Environmental Impact Assessment during this construction phase and as a result, it has been developed 22 mitigation programmes for mitigating the environmental impacts of the project activity. This monitoring is a prerequisite for granting and keeping the environmental license valid. Results of current programmes have been provided to the validation team^{/19/}. Therefore, the validation team recognizes

that the environmental impacts due to implementation of project activity are being monitored and mitigated.

3.2.4 Public Comments

The local stakeholder consultation has been carried out during the construction phase and its results have already been accessed during the validation of this project activity. Nevertheless, it could be observed by interviews to the project proponents and by report provided to the verification team ^{/20-1/} as well as by the company's website^{/20-2/} that the grievance mechanism is currently in place and active.

3.2.5 AFOLU-Specific Safeguards

As this project is a non-AFOLU project, this section is not required.

3.3 Application of Methodology

3.3.1 Title and Reference

The applied methodology is the ACM0002: "Grid-connected electricity generation from renewable sources" (version 20.0), which is the latest version available.

The applicable tools are all referred in this applied methodology.

3.3.2 Applicability

All applicability conditions of the applied methodology and applied tools are met as follows:

Applicability Criteria – ACM0002 – v. 20.0	Assessment
This methodology is applicable to grid-connected renewable energy power generation project activities that: <ul style="list-style-type: none"> a) Install a Greenfield power plant; b) Involve a capacity addition to (an) existing plant(s); c) Involve a retrofit of (an) existing operating plants/units; d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or e) Involve a replacement of (an) existing plant(s)/unit(s). 	The PA complies with the condition (a) as it was a greenfield power plant. It has been evidenced through validation process ^{/21/} , which was conducted and approved by VCS and operational/environmental permits ^{/17/} which helps the validation team to

	<p>conclude that the PA corresponds to a greenfield power plant.</p>
<p>The methodology is applicable under the following conditions:</p> <ul style="list-style-type: none"> a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit 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, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity. 	<p>The PA complies with the condition (a) as it is composed by one hydro power plant. It has been evidenced through operational/environmental permits^{17/} and pictures^{12/}.</p>
<p>In case of hydro power plants, one of the following conditions shall apply:</p> <ul style="list-style-type: none"> a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m²; or c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m² ; or d) The project activity is an integrated hydro power project involving multiple 	<p>The project complies with letter c). The project is implemented in new reservoir where the power density is greater than 4 W/m². It has been evidenced through operational/environmental permits^{17/} and pictures^{12/}. For Power density calculation, refer to section 3.3.6 below.</p>

<p>reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m²,</p>	
<p>In the case of integrated hydro power projects, project proponent shall</p> <ul style="list-style-type: none"> a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or: b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity. 	<p>Not applicable, as the PA is not an integrated hydro power project. It refers to a single hydro power plant. It has been evidenced through operational/environmental permits^{17/} and pictures^{12/}.</p>
<p>The methodology is not applicable to:</p> <ul style="list-style-type: none"> a) 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; b) Biomass fired power plants/units. 	<p>Not applied for this PA as it corresponds to hydro power plant. It has been evidenced through operational/environmental permits^{17/} and pictures^{12/}.</p>

<p>In the case of retrofits, rehabilitations, 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, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance"</p>	<p>The PA is not a project with capacity addition, retrofit, replacement or rehabilitation as evidenced by operational/environmental permits^{17/}.</p>
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The applicability conditions of all tools are also met as follows:

Applicability Criteria – TOOL 05	Assessment
<p>If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption:</p> <p>(a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer;</p> <p>(b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or</p> <p>(c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive</p>	<p>Project emissions due to electricity consumption are not foreseen in this project activity. This PA refers to generation of energy and therefore, project emissions due to electricity consumptions are neglected as per applied methodology ACM0002. Therefore, this condition is not applicable.</p>

<p>power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.</p>	
<p>This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated:</p> <p>(a) Scenario I: Electricity is supplied to the grid;</p> <p>(b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities;</p> <p>or(c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.</p>	<p>This PA corresponds to a hydro power plant connected to the grid. Therefore, the condition detailed in scenario I is applicable to this project activity.</p>
<p>This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO2 emissions.</p>	<p>This PA does not comprehend captive renewable power generation. Therefore this condition is not applicable.</p>

Applicability Criteria – TOOL 07	Assessment
<p>This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of</p>	<p>The project claims baseline emission by substituting the grid electricity by renewable electricity. Thus, this tool is applicable</p>

electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants.	The Grid emission factor is directly calculated by the Brazilian DNA, based on this TOOL. Therefore, this condition is met.
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 electricity system is not located partially or totally in the Annex I country.
Under this tool, the value applied to the CO2 emission factor of biofuels is zero	The Grid emission factor is directly calculated by the Brazilian DNA, based on this TOOL. Therefore, this condition is met.

Applicability Criteria – TOOL 11	Assessment
This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism.	The tool is duly used for the renewal of Crediting period of this project activity. Therefore this condition is met.

3.3.3 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.

No project emissions are applied as the power density is higher than 10 W/m². for calculations refer to section 3.3.6 below.

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) and applicable tools.

3.3.4 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, section 3.8.9. 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^{/18/}. The Operational Licenses^{/15/} are found up to date and were provided to the validation team, which means that the project is duly following all applicable legislation. The legislation has not changed since the validation process.

Step 1.2: Assess the impact of circumstances

As the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment the PP informed that there was no changes in the Market characteristics that affect the Project activity.

The conditions used to determine the baseline emissions in the previous crediting period are still valid. The baseline scenario determined by the methodology was the electricity being generated by all plants connected to the grid, which

remains unaltered. Comparing to the moment which this project was validated, there is no further incentive to specific source of electricity generation. Therefore, there is no significant variation of prices in the power generation, neither availability of new fuels or raw materials in the power plants connected to the grid. The electricity prices in Brazil are not regulated by government. The rules for generation and commercialization of electricity in Brazil are determined by National Law of Electric Sector^{/22/}, issued on 2004, which is still the ruling law on this matter.

Nevertheless, as no clear information has been provided in the PDD, a finding has been raised. Refer to CL 03. After findings resolution, it is now clear that there is no circumstance that affect the maintenance of the baseline scenario and it can be concluded that the conditions used to determine the baseline emissions in the previous crediting period are still valid.

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.

The baseline scenario is not the continuation of use of current equipment.

The PA consists in the installation of a greenfield hydro power plant where no power plant was installed before. Its lifetime is equal to 35 years as per Concession Contract^{/18/}. Therefore, it will last throughout this CP. Thus, this step is not applied.

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

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

C_{apBL} (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. Moreover, the following parameter has now been defined as fixed for the next crediting period as required by TOOL07.

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”^{/11-2/}. The parameter was calculated likewise in the previous crediting period using the latest information available (2021)^{/23/} in the end of the previous crediting period. So, we consider that it is still valid for this next crediting period. The value to be fixed along the crediting period is equal to **0.0540 tCO₂e/MWh**

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”^{/11-3/}

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

The baseline emissions were updated based on the new information related to grid emission factor and information related to the latest Energy Study^{/13/}. The EF_{BM} has been updated to the value of year 2020 which is the year of the end of previous crediting period. Moreover, for estimated ER calculations, the EF_{OM} applied is the latest available in the Brazilian Ministry of Mines and Energy website^{/23/} which is from 2021. Nevertheless this parameter will be monitored ex-post. The EG_{facility} applied in the estimated calculations was based on energy studies but will also be monitored during the next crediting period.

Step 2.2: Update the data and parameters:

All fixed parameters required by applied methodology and tools were included in accordance with applied tools, taking into account most recent information available in accordance with the applicable versions of methodology and tools. Moreover, it worth mentioning that the parameter EF_{OM} has been included as a monitored parameter in accordance with TOOL07 and ACM0002.

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.

3.3.5 Additionality

According to the VCS Standard section 3.8.9, "a full reassessment of additionality is not required when renewing the project crediting period. However, regulatory surplus shall be demonstrated in accordance with VCS Program rules and the project description shall be updated accordingly".

As per VCS program rules, the project shall not be mandated by any law, statute or other regulatory framework, 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.

3.3.6 Quantification of GHG Emission Reductions and Removals

All equations, formulas and assumptions were correctly applied as per the applied methodology (ACM0002) and tools.

The baseline emissions are calculated by the multiplication of the electricity supplied by the project activity to the grid by the combined margin of CO₂ emission factor as follows:

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

Where:

BE_y = Baseline emissions in the year y

EF_{grid,CM,y} = Combined Margin Emission factor of the grid in the year y

EG_{y} = Net electricity of the power plant delivered to grid in the year y (continuously measured and at least hourly aggregated)

The parameter $EG_{Facility,y}$ will be continuously measured by electricity meter installed in the substation at grid interface (Substation Foz do Chapecó), in accordance with requirements of applied methodology. The parameter will be measured with 8 bi-directional electricity meter and accuracy equal to 0.2. Each generator has its own main and backup meter for dispatching electricity to the grid. Calibration will be carried out in accordance with national standards^{/23/}

Calculation of Grid Emission Factor:

The Build Margin and Operating Margin emission factor are directly calculated by Brazilian DNA^{/19/} in accordance with TOOL07.

Then, the Combined margin emission factor of the grid ($EF_{grid,CM,y}$) will be calculated as follows (using weighted average approach):

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

The values of w_{om} and w_{bm} are determined by the TOOL07 for the 2nd crediting period and are equal to 0.25 and 0.75 respectively as per paragraph 86)b) of TOOL07, considering this project refers to a hydro power plant. Therefore, the data is consistent with TOOL requirements.

For this period, the parameter EF_{OM} will be determined ex-post and the parameter EF_{BM} will be determined ex-ante, which is in accordance with TOOL07.

Therefore, the calculations are as follows (for values applied, refer to section 3.3.8 below:

$$EF_{grid,CM,y} = 0.5985 \times 0.25 + 0.0540 \times 0.75$$

$$EF_{grid,CM,y} = 0.1901 \text{ tCO}_2/\text{MWh}$$

Therefore, Baseline emissions are as follows:

$$BE_y = 0.1901 \times 3,742,272 \text{ MWh}$$

$$BE_y = 711,523 \text{ tCO}_2 \text{ year}$$

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

APJ: area of the reservoir of the PA

ABL: 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. Nevertheless, by applying the value in the calculation, the following is observed:

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

$$PD = \frac{885,000,000 - 0}{80,020,000 - 0} = 10.68 \text{ W/m}^2$$

As PD is greater than 10 W/m^2 no project emissions are applied.

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

Thus, E_{Ry} = BE_y

The parameters used to calculate the emission reductions are conservative, traceable and from official, public and reliable sources.

3.3.7 Methodology Deviations

The project activity complies with the applied methodology ACM0002 – Grid-connected electricity generation from renewable sources – version 20.0 and all applicable tools.

No deviations were observed.

3.3.8 Monitoring Plan

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

- **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 (m²)).** 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 to be the one provided by the Brazilian DNA for the year 2021, which is the latest available and is calculated based on the “tool for calculate the emission factor for an electricity system”. As not the latest value the parameter has been used. A CAR has been raised. Refer to CAR 03.

After findings resolution, it could be confirmed that the applied value is **0.0540 tCO₂/ MWh** for the whole 2nd crediting period.

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

- **EG_{PJ, 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) totalizing 8 electricity meters in the substation Foz do Chapecó 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 total electricity generated (Assured energy multiplied by the period). However as the PP did not applied the correct values in the calculations thus a CAR has been raised. Please refer to the CAR 02 below and in the Appendix 4 for its resolution. After findings resolution, it has been observed that correct value for assured energy (MWaverage)¹ has been considered in the calculations. Therefore, by multiplying the value of 427.20 MWaverage x 8,760 hours per year results in a value estimated of electricity equal to **3,742,272 MWh** per year.

- **EF_{Grid,OM} (Operating margin emission factor for the grid in year y)**: this parameter is 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 applied value in the estimated calculations was the latest available data which is from 2021. Value applied was equal to **0.5985 tCO₂/MWh**
- **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. As not the latest value of EF_{BM} (parameter above) has been used. A CAR has been raised. Refer to CAR 03.

After findings resolution, it could be confirmed that the parameter EF_{OM} will be determined every year as per applied tool. The parameter EF_{BM} was determined for 2021 (latest available in the end of previous crediting period) 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 equal to **0.1901 tCO₂/MWh**

¹ The concept of assured energy refers to the average of MWh to be generated per hour foreseen in a power plant. This figure is defined in Brazil by Ministry of Mines and Energy and it is used for predict the amount of electricity to be generated by each plant, based on long term studies.

- **C_{apPJ} (installed capacity of the project activity):** this parameter was determined as the sum of the capacity of the four turbines and was cross-checked with the equipment plates/8/, operation permits/7/ and operation manual of the company/14/. The applied value is equal to **855,000,000 W**
- **A_{PJ} (Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full):** it was measured from topographical surveys, maps, satellite pictures, etc once at the beginning of the crediting period. This value is available in the evidences provided /14/ and it is equal to **80,020,000 m²**. Nevertheless, the source of the parameter Apj could not be identified and therefore a CL has been raised. Refer to CL 04. After findings resolution, it could be observed that the value is accurate. Evidences were duly provided.

3.4 Non-Permanence Risk Analysis

Not applicable to this project activity

4 VALIDATION CONCLUSION

Earthood Services Private Limited, contracted by Foz do Chapecó Energia S.A., has performed the independent renewal or crediting period for the VCS project activity “Foz do Chapecó” – Ref.: 896 – in Brazil, for the 2nd crediting period from 14/10/2020 to 13/10/2030 (including both days) as reported in the VCS Project Design. Carbotrader Consultancy 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 20,
- VCS Standard version 4.3,
- 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 4.
- The project is likely to achieve the following estimated GHG emissions reductions during the 10 years' 2nd crediting period

Estimated GHG emissions **711,523 tCO₂e/year** and a total **7,115,229 tCO₂e** for the whole 10 years' 2nd crediting period are likely to occur without material misstatement.

APPENDIX I: ABBREVIATIONS

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
BE	Baseline Emission
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CM	Combined Margin
CO ₂	Carbon dioxide
CO _{2e}	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
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
kW	kilo Watt
kWh	kilo Watt hour
MP	Monitoring Plan
MW	Mega Watt
MWh	Mega Watt hour
OM	Operating Margin
ONS	National System Operator
PA	Project Activity
PE	Project Emission
PLF	Plant Load Factor
PP	Project Participant
PS	Project Standard
SIN	National Interconnected System
tCO _{2e}	Tonnes of Carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VT	Validation Team

APPENDIX II: 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	Yes (ACM0001, ACM0002, ACM0006, AM0065, AMS ID, AMS-I.E, AMS-I.C, AM0026, AMS-I.A, AMS-I.F, AMS-III.E, AMS-III.H, AMS-III.I, AMS-III.J. GS: Ecologically Sound Fuel Switch to Biomass with Reduced Energy Requirement, GS: Technologies and Practices to Displace Decentralized Thermal Energy Consumption)		
Local expert	Brazil, Chile, Honduras, Colombia		
Financial Expert	Yes		
Technical Reviewer	No		
TA Expert	Yes (TA 1.1, 1.2, 4.1, 5.1, 9.1, 13.1)		
Reviewed by	Shreya Garg	Date	29/07/2020
Approved by	Anshika Gupta	Date	29/07/2020

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	Yes (ACM0001, ACM0002, AM0026, ACM0006, AMS ID)		
Local expert	Brazil, Chile, Colombia		
Financial Expert	Yes		
Technical Reviewer	No		
TA Expert	Yes (TA 1.2, 13.1)		
Reviewed by	Shreya Garg	Date	29/08/2019
Approved by	Anshika Gupta	Date	29/08/2019

APPENDIX III: FINDINGS

Table 1: FAR from validation or previous verification

Not applicable

Table 2: CL from this verification

CL ID	01	Section no.	3.1	Date: 23/06/2022
Description of CL				
The VCS-PD template is not the latest version available.				
Project participant response				Date: 23/06/2022
The VCS-PD was revised accordingly, version 4.1 (latest available)				
Documents provided by Project Participant				
VCS_PD_JUN1251_rev2				
DOE assessment				Date: 24/06/2022
The latest version of the template has been used by the Project Developer for describing the project design.				
<u>CL is closed</u>				

CL ID	02	Section no.	3.1	Date: 06/07/2022
Description of CL				
Project ownership. In section 1.7 of PD it is not clear which evidences have been provided to demonstrate the project ownership.				
Project participant response				Date: 06/07/2022
The evidence was included on the footnote 1 and also delivered to ^{vv} B. 3rd Minute from Exploitation Agreement # 128/2001 (04/12/2008)				
Documents provided by Project Participant				
3rd Minute from Exploitation Agreement # 128/2001 (04/12/2008)				
DOE assessment				Date: 07/07/2022
The Concession Contract between ANEEL and Foz do Chapecó Energia S.A has been provided to the validation team which refers to the agreement between ANEEL (Public Entity) and the project developer, for exploring the waters for electricity generation until November, 2036.				
With this document, the ownership of the project activity is duly evidenced. Information has been duly mentioned in the VCS-PD.				
<u>CL is closed</u>				

CL ID	03	Section no.	3.3.4	Date: 23/06/2022
Description of CL				
Section 3.4: step 1.2. it is not clear in the conclusion whether the circumstances have been duly evaluated by project participants.				
Project participant response				Date: 23/06/2022
The section 3.4 was revised accordingly in the PD version 2.				
Documents provided by Project Participant				
VCS_PD_JUN1251_rev2				
DOE assessment				Date: 24/06/2022
It is now clear that there is no circumstances that impact the baseline scenario for this renewal. No significant changes in the electricity market have been observed in the past 10 years. Information is duly provided in the revised PDD.				
<u>CL is closed</u>				

CL ID	04	Section no.	3.3.8	Date: 23/06/2022
Description of CL				
The exact sources of the parameter Apj could not be identified.				
Project participant response				Date: 23/06/2022
The parameter Apj was revised, the source now is the monitored data available on January 2020 (78,034,000 m2). Evidence provided to VVB.				
Documents provided by Project Participant				
VCS_PD_JUN1251_rev2–CNEC - Projeto B–sico - UHE Foz do Chapecó ANEEL's Dispatch 911 of 30/03/2007 for flooded reservoir area of 79.93 km ²				
DOE assessment				Date: 23/06/2022
All evidences of reservoir are have been duly provided and it is confirmed that the maximum reservoir area is equal to 79.93 km ² + 0.09 km ² = 80,020 km ² . The values have been duly provided in the ER calculations spreadsheet. Power density has been determined for this project activity and resulted in values higher than 10 w/m ² . Therefore, no project emissions from reservoir are applied.				
<u>CAR is closed</u>				

Table 3: CAR from this verification

CAR ID	01	Section no.	3.1	Date: 23/06/2022
Description of CAR				

The start and end dates of 2 nd crediting period stated in the VCS-PD and in the ER calculations is not in accordance with VCS requirements and information provided in the Verra Registry webpage.	
Project participant response	Date: 23/06/2022
The start and end dates of the 2 nd crediting period were revised accordingly (now from 14/10/2020 to 13/10/2030).	
Documents provided by Project Participant	
VCS_PD_JUN1251_rev2 JUN1243_VCUs_rev2	
DOE assessment	Date: 24/06/2022
The values applied are now in accordance with start date of 1 st CP. The 2 nd CP will start immediately after the end of 1 st CP, i.e. from 14/10/2020 to 13/10/2030	
<u>CAR is closed</u>	

CAR ID	02	Section no.	3.3.8	Date: 23/06/2022
Description of CAR				
The assured energy used for determining the estimated annual electricity is not in accordance with evidences provided.				
Project participant response				Date: 23/06/2022
The assured energy was adjusted accordingly (now with 427.20 MW average).				
Documents provided by Project Participant				
VCS_PD_JUN1251_rev2 JUN1243_VCUs_rev2				
DOE assessment				Date: 24/06/2022
The value has not been applied consistently with evidences provided. Nevertheless, it is not clear why the predicted electricity supply to the grid now is 3,742,272 MWh, if for the 1 st CP it was 3,784,320 MWh as no information has been provided in the VCS-PD.				
<u>CAR remains open</u>				
Project participant response				Date: 06/07/2022
Since the assured energy was revised to 427.2 MW average, as per Ordinance #178 of 03/05/2017, the total electricity amount was revised in line with the Ordinance.				
Documents provided by Project Participant				
Ordinance #178 of 03/05/2017 ^{13/}				
DOE assessment				Date: 07/07/2022

According to the National Legislation, from time to time the assured energy (MWaverage) of power plants is reviewed by Ministry of Mines and Energy in order to keep the predictability of the electricity generation in the country. The new determined assured energy (MWaverage) is the official average electricity generation foreseen for this power plant. This value is determined based on long term hydrological studies and therefore has been applied for estimate the electricity generated in the next crediting period. The approach is considered accurate. No equipment nor any change in project design is needed due to this change, considering that this figure refers to the estimated calculations of electricity generated, which will be duly measured along the crediting period. Moreover, the fact that the assured electricity (MWaverage) has been revised, it should not affect the additionality of this project activity as the date of this review is recent (2017) and this information was not available at the validation phase of the project activity. In fact, by reducing the electricity estimated, the project would be even more additional as less electricity would be generated and less income would be received by the project activity.

CAR is closed

CAR ID	03	Section no.	3.3.4	Date: 06/07/2022
Description of CL				
5.1: EF_{BM} is not the latest one available at the Brazilian DNA's webpage, unlike required by TOOL07, which states "For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE"				
Project participant response				Date: 06/07/2022
The information has been updated as per latest information available				
Documents provided by Project Participant				
EF calculation 2021 provided by Brazilian DNA.				
DOE assessment				Date: 07/07/2022
The latest information for parameter EF_{BM} has been used, as required by TOOL07. Therefore, the determination of the parameter is in accordance with TOOL07 requirements.				
<u>CAR is closed</u>				

Table 4: FAR from this verification

FAR ID	01	Section no.	2.5.1	Date: 31/10/2022
Description of FAR				
It has been observed that the previous monitoring period related to the 1 st crediting period accounted emission reductions also for 1 st day of this crediting period. Therefore, the next monitoring period shall not account emission reductions for the date 14/10/2020, in order to avoid double counting.				
Project participant response				Date: 31/10/2022
The PPs are aware of this measure and agree with it				

Documents provided by Project Participant	
-	
DOE assessment	Date: 31/10/2022
The next monitoring period will start accounting emission reductions from 15/10/2020 onwards.	
FAR will be closed during the next monitoring period.	

APPENDIX IV: REFERENCES

No.	Title	References
1.	VCS Standard	V.4.3
2.	VCS Program Guide	V.4.2
3.	VCS-V4-Summary-of-Effective-Dates	version 03.0
4.	VCS-Project-Description-Template	v4.1
5.	VCS-PD (draft)	version 1 – 15/02/2022
6.	VCS-PD (revised/final)	version 2.0 – 23/06/2022 version 2.1 – 06/07/2022 version 2.2 – 31/10/2022
7.	ER calculations spreadsheet	version 1
8.	ER calculations spreadsheet (final)	version 2.2
9.	Current valid version of PDD (1 st CP)	version 03, dated 15/09/2012
10.	Methodology: ACM0002: Grid-connected electricity generation from renewable sources	version 20.0
11.	<u>Methodological tools:</u> 1. "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation". 2. TOOL07 – Tool to calculate the emission factor for an electricity system 3. TOOL 11 – Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	Version 03.0 version 07.0 version 03.0.1
12.	<u>Pictures project plant</u> Turbines plates Generator plates Facility Electricity meters Electricity meters system interface	06/2022
13.	Estimated energy generated by project plant 1. Review of assured energy of Hydroelectric Power Plants issued by EPE (Energetic Research Company from Ministry of Mines and Energy)	26/04/2017 03/05/2017

	2. Ordinance #178 issued by Ministry of Mines and Energy where it officially states the Assured energy equal to 427.20 MW average.	
14.	<p><u>Reservoir area</u></p> <ol style="list-style-type: none"> 1. Original operational License issued by IBAMA # 949-2010 2. Topographical study of reservoir issued by Flow Engenharia, rev 00 3. CNEC - Projeto Básico - UHE Foz do Chapecó (area of duct equal to 9 ha or 0.09 km²) 4. ANEEL's Dispatch 911 for flooded reservoir area of 79.93 km² <p>By adding 79.93 + 0.09 km², conservatively it is considered APJ equal to 80.020 km²</p>	<p>25/08/2010</p> <p>13/01/2022</p> <p>30/10/2005</p> <p>30/03/2007</p>
15.	<p><u>Project lifetime</u></p> <ul style="list-style-type: none"> - Concession contract between Foz do Chapecó and ANEEL related to the 35 year of project's lifetime (Decree 9356 from 15/10/2001 issued by National Government) 	<p>https://www.planalto.gov.br/ccivil_03/dnn/2001/dnn9356.htm</p>
16.	<p><u>Project geographical location</u></p> <p>Plot made in google maps in order to confirm the project's location</p>	<p>https://www.google.com.br/maps/place/27%C2%B008'24.0%22S+53%C2%B002'36.0%22W/@-27.1422612,-53.154054,22947m/data=!3m1!1e3!4m5!3m4!1s0x0:0xebb47ed43efb404f!8m2!3d-27.14!4d-53.0433333</p>
17.	<p><u>Environmental / Operational License</u></p> <p>Environmental license issued by IBAMA # 949-2019 on 26/12/2019</p>	<p>Valid for 10 years</p>
18.	<ol style="list-style-type: none"> 1. Concession Contract between Foz do Chapecó Energia S.A and ANEEL (National Agency of Electric Energy) (Decree 9356 from 15/10/2001 issued by National Government) 2. 3rd Minute from Exploitation Agreement #128/2001 (04/12/2008) 	<p>https://www.planalto.gov.br/ccivil_03/dnn/2001/dnn9356.htm</p>
19.	<u>Results of annual environmental monitoring</u>	

	Annual Report on execution of Environmental Programmes CE-FCE-0117/21	08/09/2021
20.	<u>Social programs and grievance mechanism</u> 1. Monthly compiled report regarding social actions carried out by Foz do Chapecó Energia S.A (clipping mensal) 2. http://www.fozdochapeco.com.br/fale-conosco/	Apr/2022
21.	<u>Validation report</u> VCS Validation report Foz do Chapecó Energia S.A issued by Bureau Veritas	Version 02 21/09/2012
22.	Law 10,848 issued on 15/03/2004 – which establish the rules for generation, commercialization and transmission of electricity in Brazil.	http://www.planalto.gov.br/ccivil_03/Atos/2004/2006/2004/Lei/L10.848.htm#:~:text=%C2%A7%20%C2%BA%20Submeter%2Dse%2D%C3%A3o,eI%C3%A9trica%20para%20o%20mercado%20regulado
23.	<u>Grid emission factor</u> Data is directly calculated and provided by Ministry of Science and Technology (MCTIC). Considering that the previous Crediting period ended on 2020, this value has been used for EF_{BM} as it was the available data for that year (last access on 23/06/2022) Data for EF_{OM} is already available for year 2021, which has been used for estimate the $EF_{CM,grid}$ for this renewal. (last access on 23/06/2022)	https://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html
24.	IPCC publications	www.ipcc-nggip.iges.or.jp