



## FOZ DO CHAPECÓ



Document Prepared By RINA Services S.p.A. (RINA)

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### Summary:

RINA Services S.p.A. (RINA), commissioned by Foz do Chapecó Energia SA has verified the greenhouse gas emission reductions reported for the project activity “Foz do Chapecó ” in Brazil, VCS project ID 896, for the period 01/07/2012 to 14/10/2020. The verification includes confirming the implementation of the monitoring plan of the VCS PD (Project ID 896) and the application of the monitoring methodology as per ACM0002, version 13.0.0 dated 11/05/2012. A remote site visit (via video conference) was conducted to verify the data submitted in the monitoring report.

The project activity consists on the supply of clean hydroelectric energy to the Brazilian National Interconnected System (SIN) through the implantation and operation of Hydro Power Plant (HPP) Foz do Chapecó, located in the Southern Region of Brazil, between the cities of Águas de Chapecó, state of Santa Catarina (SC) and Alpestre, state of Rio Grande do Sul (RS), with an installed capacity of 855 MW (4 generation units, with francis turbines), using a small reservoir, with low environmental impact related to its installed capacity.

The objective of the verification is to have an independent review ex post determination of the monitored reductions in GHG emission reductions, Verification was conducted using RINA procedures in line with the requirements specified in the VCS Version 4.0 Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques. The verification consisted of desk review, on-site assessment and the resolution of outstanding issues and the issuance of the final verification report and certification

The verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable VCS / CDM requirements in order to be certified. Verra granted to PP an

exemption from section 4.1.20(2) of the VCS Standard, v4.1, as per the letter dated 09/07/2021/54/. (The exemption requested by the Project Proponent is to allow eight years and three months of the project to be verified by one VVB.)

Method and Criteria: Verification was conducted using RINA procedures in line with the requirements specified in the VCS Requirements, i.e. VCS Program Guide, VCS Version 4.0 of 19/09/2019, and VCS Standard, VCS Version 4.1 of 22/04/2021. The GHG emission reductions are on the basis of the approved Baseline and monitoring methodology ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 13.0.0 of 11/05/2012.

The verification consisted of the following three phases

- Document review;
- Remote On-site assessment including Interviews and Site Inspections, via videoconference;
- Resolution of Any Material Discrepancy and the issuance of the final verification report and certification.

The following sections outline each step in more detail.

During this verification 01 Clarification Requests (CRs) and 03 CAR (Corrective Actions) were identified related to the monitoring, implementation or operations of the proposed VCS project activity (Monitoring Report version 1.0 of 15/06/2021) in relation to all relevant VCS requirements v 4.0 for the project activity and the applied baseline and monitoring methodology; these findings have been discussed in appendix B of this report and were correctly closed.

In conclusion, it is RINA’s opinion that the project activity “Foz do Chapecó”, in “Brazil”, as described in the Monitoring Report version 3.2 of 17/01/2022, meets all relevant requirements for VCS activities and all relevant host Party criteria and correctly applies the baseline and monitoring methodology “ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 13.0.0 of 11/05/2012. Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/07/2012 to 14/10/2020 amount to 12,450,836 tCO<sub>2</sub>e.

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# 1 INTRODUCTION

## 1.1 Objective

RINA is commissioned by “Foz do Chapecó Energia SA ” to perform an independent verification of its VCS project, “Foz do Chapecó ” in Brazil, already registered under VCS with Project ID.896 for the reported GHG emission reductions for the given monitoring period 01/07/2012 to 14/10/2020. The VCS projects must undergo independent third party verification and certification of emission reductions as the basis for issuance of Voluntary Emission Reductions (VERs/VCUs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The project activity has been implemented and operated as per the project description (PD) and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report and other supporting documents are complete;
- The data is recorded and stored as per the monitoring methodology and approved monitoring plan.
- To confirm that the monitoring system is implemented and fully functional to generate Voluntary Emission Reductions (VERs/VCUs) without any double counting, and

To establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

## 1.2 Scope and Criteria

The verification scope is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- to evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement;
- to verify that reported GHG emission data is sufficiently supported by evidence.

The project is assessed against the requirements of VCS version 4.0 and related rules and guidance. RINA has, based on the recommendations in the latest version of CDM Validation and Verification Manual, and employed a rule-based approach (as criteria) in the verification, focusing on the identification of significant reporting rules and the reliability of project monitoring.

Verification is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring

### 1.3 Level of Assurance

The draft final verification report before being submitted to the client were subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions, with reasonable level of assurance.

The verification team and the technical reviewers consist of the following personnel:

Role	Last Name	First Name	Country
Team Leader, Verifier, Technical Expert	Carvalho	Thaís	Brazil
Technical reviewer	Principe Branco Saettoni	Geisa Maria	Brazil

### 1.4 Summary Description of the Project

Foz do Chapecó Hydroelectric Project developed by Foz do Chapecó Energia S/A consists of the installation of a hydroelectric plant with an accumulation reservoir, located in the verge of Águas de Chapecó municipality, in Santa Catarina State, and Alpestre municipality, in Rio Grande do Sul State. Total installed capacity of the Project will be 855 MW (based on generator's plate capacity, confirmed during the videoconference remote audit), consisting of four sets of hydroelectric Francis type turbines with nominal capacity 217.14 MW each and the electricity generator nominal power is 213.75 each, with a predicted electricity supply to the grid of 3,784,320 MWh per annum.

Project Participant(s)	Foz do Chapecó Energia SA Enerbio Consultoria LTDA - ME
Project Title	Foz do Chapecó
Location of the project	HPP Foz do Chapecó is located in Uruguay River, between the municipalities of Águas de Chapecó/SC and Alpestre/RS, in Brazil.



Methodology(ies)	ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 13.0.0 of 11/05/2012		
Sectoral Scope(s)	1	Technical Area(s)	1.2
Registered PDD	Version 03 of 15/09/2012		
Starting date of the crediting period	14/10/2010 (Operation Starting Date of the First Turbine), as defined in the registered VCS PD		
Project’s crediting period	14/10/2010 to 14/10/2020.		
Project documentation link	VCS database: <a href="https://registry.verra.org/app/projectDetail/VCS/896">https://registry.verra.org/app/projectDetail/VCS/896</a>		

# 2 VERIFICATION PROCESS

## 2.1 Method and Criteria

Verification was conducted using RINA procedures in line with the requirements specified in the VCS Requirements, i.e. VCS Program Guide, VCS Version 4.0 of 19/09/2019, and VCS Standard, VCS Version 4.1 of 22/04/2021. The GHG emission reductions are on the basis of the approved Baseline and monitoring methodology ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 13.0.0 of 11/05/2012.

The verification consisted of the following three phases

- Document review;
- Remote On-site assessment including Interviews and Site Inspections, via videoconference;
- Resolution of Any Material Discrepancy and the issuance of the final verification report and certification.

The following sections outline each step in more detail.

## 2.2 Document Review

The monitoring report (MR), version 3.2 of 17/01/2022 and previous versions/01/, the emission reduction calculations spreadsheet “VCUs Foz 2012 a 2020 rev2.1.xlsx” and previous version /03/, were assessed as part of the verification.

The following table lists the documentation that were reviewed during the verification

/01/	Foz do Chapecó Energia SA and Carbotrader Assessoria e Consultoria em Energia EIRELI: VCS monitoring report for the project activity “Foz do Chapecó ”, version 1.0 of 15/06/2021 version 2 of 14/09/2021 version 3.1 of 10/01/2022 version 3.2 of 17/01/2022
/02/	Foz do Chapecó Energia SA .: VCS project description for project activity “Foz do Chapecó version 03 of 15/09/2012 (registered);
/03/	Foz do Chapecó Energia SA : Emission Reduction spreadsheet “VCUs Foz 2012 a 2020.xlsx” version 1 of 15/06/2021; VCUs Foz 2012 a 2020 rev2.xlsx version 2 of 14/09/2021; VCUs Foz 2012 a 2020 rev2_1.xlsx of 17/01/2022
/04/	VCS: VCS Program Guide, VCS Version 4.0 of 19/09/2019
/05/	VCS: VCS Standard, VCS Version 4.1 of 22/04/2021
/06/	CDM Executive Board: Approved consolidated baseline and monitoring methodology ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 13.0.0 of 11/05/2012
/07/	Website: <a href="https://verra.org/project/rina-services-s-p-a/">https://verra.org/project/rina-services-s-p-a/</a> VCS: List of sectoral scopes RINA S.p.A is accredited Language: English Retrieved on: 01/07/2020
/08/	Brazilian DNA web site, data for the emission factor available in Portuguese at < <a href="https://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html">https://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html</a> > , accessed on 30/08/2021
/09/	*Bureau Veritas verification report N° BRAZIL-VER/BR.1343085- Version 02 of 21/11/2012 for first monitoring period 14-October-2010 to 30-June-2012;
/10/	Bureau Veritas validation report of Foz do Chapecó , N° BR.1236926, Version 02 dated 21/09/2012
/11/	IBAMA operation license number 949/2010, issued on 26/11/2019 valid for 10 years (renewed Operational License) (LO N° 949-2010 - 1ª RENOVAÇÃO.pdf) and previous operational license n° 949/2010 from 25/08/2010 (Licença Operação Usina -949-2010 (original).pdf)
/12/	ONS procedure 12.3 «Manutenção do sistema de medição para faturamento»
/13/	CCEE data for the net energy generation for the project activity
/14/	Metrum calibration certificate CC-0050-12 for the energy meter serial number PT-0902A259-01, performed on 29/02/2012

/15/	Metrum calibration certificate CC-0051-12 for the energy meter serial number PT-0902A301-01, performed on 29/02/2012
/16/	Metrum calibration certificate CC-0052-12 for the energy meter serial number PT-0907A212-01, performed on 29/02/2012
/17/	Metrum calibration certificate CC-0053-12 for the energy meter serial number PT-0810A884-01, performed on 29/02/2012
/18/	Metrum calibration certificate CC-0054-12 for the energy meter serial number PT-0907A215-01, performed on 29/02/2012
/19/	Metrum calibration certificate CC-0055-12 for the energy meter serial number PT-0907A574-01, performed on 29/02/2012
/20/	Metrum calibration certificate CC-0056-12 for the energy meter serial number PT-0902A220-01, performed on 29/02/2012
/21/	Metrum calibration certificate CC-0057-12 for the energy meter serial number PT-0907A571-01, performed on 29/02/2012
/22/	Lactec calibration certificate CCR190/14 for the energy meter serial number PT-0902A259-01, performed on 25/02/2014
/23/	Lactec calibration certificate CCR191/14 for the energy meter serial number PT-0902A301-01, performed on 25/02/2014
/24/	Lactec calibration certificate CCR192/14 for the energy meter serial number PT-0907A212-01, performed on 25/02/2014
/25/	Lactec calibration certificate CCR193/14 for the energy meter serial number PT-0810A884-01, performed on 25/02/2014
/26/	Lactec calibration certificate CCR194/14 for the energy meter serial number PT-0907A215-01, performed on 25/02/2014
/27/	Lactec calibration certificate CCR195/14 for the energy meter serial number PT-0907A574-01, performed on 26/02/2014
/28/	Lactec calibration certificate CCR196/14 for the energy meter serial number PT-0902A220-01, performed on 25/02/2014
/29/	Lactec calibration certificate CCR197/14 for the energy meter serial number PT-0907A571-01, performed on 26/02/2014
/30/	Lactec calibration certificate CCR101/16 for the energy meter serial number PT-0902A259-01, performed on 23/02/2016
/31/	Lactec calibration certificate CCR103/16 for the energy meter serial number PT-0907A212-01, performed on 23/02/2016
/32/	Lactec calibration certificate CCR104/16 for the energy meter serial number PT-0810A884-01, performed on 23/02/2016
/33/	Lactec calibration certificate CCR105/16 for the energy meter serial number PT-0907A215-01, performed on 23/02/2016
/34/	Lactec calibration certificate CCR106/16 for the energy meter serial number PT-0907A574-01, performed on 23/02/2016
/35/	Lactec calibration certificate CCR107/16 for the energy meter serial number PT-0902A220-01, performed on 23/02/2016
/36/	Lactec calibration certificate CCR108/16 for the energy meter serial number PT-0907A571-01, performed on 23/02/2016
/37/	Lactec calibration certificate CCR 100/16 for the energy meter serial number PT-0910A474-01 performed on 23/02/2016 (CCR10016.pdf)
/38/	Metrum calibration certificate CC-00295-17 for the energy meter serial number PT-0902A259-01, performed on 06/12/2017 (1_LP.pdf)
/39/	Metrum calibration certificate CC-00296-17 for the energy meter serial number MW-1511A170-02, performed on 06/12/2017 (2_LP.pdf)
/40/	Metrum calibration certificate CC-00292-17 for the energy meter serial number PT-0810A884-01, performed on 05/12/2017 (2_LR.pdf)

/41/	Metrum calibration certificate CC-00297-17 for the energy meter serial number MW-1511A526-02, performed on 06/12/2017 (3_LP.pdf)
/42/	Metrum calibration certificate CC-00293-17 for the energy meter serial number PT-0907A574-01, performed on 06/12/2017 (3_LR.pdf)
/43/	Metrum calibration certificate CC-00298-17 for the energy meter serial number PT-0902A220-01, performed on 06/12/2017 (4_LP.pdf)
/44/	Metrum calibration certificate CC-00294-17 for the energy meter serial number PT-0907A571-01, performed on 06/12/2017 (4_LR.pdf)
/45/	Metrum calibration certificate CC-00265-17 for the energy meter serial number MW-1603A689-02, performed on 07/12/2017 (sobressalente.pdf)
/46/	Lactec calibration certificate CCR1345/19 for the energy meter serial number MW-1603A689-02, performed on 03/12/2019 (CCR134519.pdf) (typo mistake in the certificate 1603A689-01)
/47/	Lactec calibration certificate CCR1346/19 for the energy meter serial number PT-0810A884-01, performed on 03/12/2019 (CCR134619.pdf)
/48/	Lactec calibration certificate CCR1347/19 for the energy meter serial number PT-0907A574-01, performed on 03/12/2019 (CCR134719.pdf)
/49/	Lactec calibration certificate CCR1348/19 for the energy meter serial number PT-0907A571-01, performed on 03/12/2019 (CCR134819.pdf)
/50/	Lactec calibration certificate CCR1349/19 for the energy meter serial number MW-1511A526-02, performed on 03/12/2019 (CCR134919.pdf)
/51/	Lactec calibration certificate CCR1350/19 for the energy meter serial number PT-0902A220-01, performed on 03/12/2019 (CCR135019.pdf)
/52/	Lactec calibration certificate CCR1351/19 for the energy meter serial number PT-0902A259-01, performed on 03/12/2019 (CCR135119.pdf)
/53/	Lactec calibration certificate CCR1352/19 for the energy meter serial number MW-1511A170-02, performed on 03/12/2019 (CCR135219.pdf)
/54/	VERRA exemption letter, dated 09/07/2021. Verra is able to grant an exemption from section 4.1.20(2) of the VCS Standard, v4.1, to the Project Proponent. However, the VVB that conducts the crediting period renewal validation and the subsequent verification may not be the same VVB that conducts the eight year and three month verification. (896 Exemption Request Letter 9 July 2021.pdf)
/55/	CCEE public bulletins “Infomercado”, available at <a href="https://www.ccee.org.br/portal/faces/pages_publico/o-que-fazemos/infomercado?_adf.ctrl-state=jy56f4rtr_22&amp;_afLoop=680674817921925">https://www.ccee.org.br/portal/faces/pages_publico/o-que-fazemos/infomercado?_adf.ctrl-state=jy56f4rtr_22&amp;_afLoop=680674817921925</a> , accessed on 31/08/2021
/56/	ANEEL dispatch 911 from 30/03/2007 geographical coordinates, reservoir area (dsp2007911.pdf)
/57/	Consolidated Basic Engineering Project prepared by CENEC Engenharia S.A. “HFC-RT1P-GEG00-1001-0” (CNEC - Projeto Básico - UHE Foz do Chapecó.pdf)
/58/	Mail with the evidences for the meters change on 23/02/2016 and 07/12/2017 (mail_histórico troca dos medidores GEU1B.pdf)
/59/	Service order AES: 14796 for the meter change - GEU2M, on 29/02/2016 (1630061270419_5534087398_22.xmlprint.pdf)
/60/	Service order AES: 14795 for the meter change - GEU3M, on 29/02/2016 (1630061331606_9784028856_32.xmlprint.pdf)
/61/	Hydrological data, available at <a href="http://www.fozdochapeco.com.br/usina/">http://www.fozdochapeco.com.br/usina/</a> , accessed on 12/01/2022
/62/	Google Earth- UHE Foz do Chapecó: <a href="https://earth.google.com/web/search/Usina+Hidrel%C3%A9trica+Foz+do+Chapec%C3%B3,+%C3%81guas+de+Chapec%C3%B3+-+SC/@-27.12330217,-53.04127058,226.43964431a,16402.11436026d,35y,0h,0t,0r/data=CigiJgokCd2rt1WjXTNAEdyrt1WjXTPAGa6LPoRYKmAIXj_LG-ekIbA">https://earth.google.com/web/search/Usina+Hidrel%C3%A9trica+Foz+do+Chapec%C3%B3,+%C3%81guas+de+Chapec%C3%B3+-+SC/@-27.12330217,-53.04127058,226.43964431a,16402.11436026d,35y,0h,0t,0r/data=CigiJgokCd2rt1WjXTNAEdyrt1WjXTPAGa6LPoRYKmAIXj_LG-ekIbA</a>

/63/	PP open channel to stakeholder communication available at < <a href="http://www.fozdochapeco.com.br/socioambiental/">http://www.fozdochapeco.com.br/socioambiental/</a> / > accessed on 12/01/2022
/64/	Activities with local communities 2019 and 2020: <a href="http://177.75.151.203:8080/upfile/Link?id=68DF0A4899240D4B76C1B9764A5447DE">http://177.75.151.203:8080/upfile/Link?id=68DF0A4899240D4B76C1B9764A5447DE</a> accessed on 12/01/2022
/65/	Foz do Chapecó Energia SA biannual reports for the Program 12 (PA-12): Social Communication

## 2.3 Interviews

	Date	Name	Organization	Topic
/a/	31/08/2021	Ana Carolina Felici	CPFL	CCEE remote access for the net energy generation
/b/	31/08/2021	Rogério Aduci Martins	Foz do Chapecó	Project implementation, Equipment's installed Monitored parameters Meters' calibration
/c/	31/08/2021	Roberto Moritz	Foz do Chapecó	
/d/	31/08/2021	Michael Rossetto	Foz do Chapecó	Environmental licenses Reservoir area
/e/	31/08/2021	Fabiano Dalberto	Foz do Chapecó	
/f/	31/08/2021	Arthur Moraes	Carbotrader	Monitoring report, VERs calculation Data analysis

## 2.4 Site Inspections

A complete desk review of the submitted MR (version 1) /2/ and supportive evidences have been checked by the Verification Team.

In addition, audit team has conducted a remote site inspection via videoconference (teams) with PP on different topics as mentioned in the following sections of this report.

Based on the videoconference, MR review, as the review of VCC procedures and guidelines, RINA Verification team has proceeded to skip the presential site visit due to the COVID-19 pandemic. Verification team has used the following alternative means for its assessment and to justify that they are sufficient for the purpose of verification.

- By review of MR;
- By taking follow up actions by conducted interview with PP, to gather information about knowledge of project design, current situation via videoconference. Cross-checked evaluation under the scope of all information and references provided in MR. Details of interviewees, topics covered and additional information presented in the above section “1.8 – Interviews”.

Verification team has done the follow-up actions by:

1. Videoconference with PP Teams (for interviews), Whats APP (for onsite inspection) and ZOOM (for CCEE remote access to extract data) were used with the video camera function. PP also has provided pictures and videos to confirm the installed equipment.
2. Data for the monitored parameters were provided and cross checked with third part documents (CCEE for energy registers /13/ /55/, ANEEL /56/ and executive project for the reservoir area /57/, data publicity available by the Brazilian DNA for the emission factor /08/,
3. PP presented all documents related to monitoring and equipment calibration.

The calculations and assumptions made in determining the CERs were reviewed and discussed with PP by videoconference.

## 2.5 Resolution of Findings

The objective of this phase of the verification is to resolve any outstanding issues which need to be clarified for RINA's positive conclusion on the project description. To guarantee transparency any findings raised during the verification are incorporated in the Appendix A to this report. A corrective action request (CAR) is raised if one of the following occurs:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.
- The VCS Version 4.0 requirements have not been met.
- There is a risk that the emission reductions cannot be monitored or calculated.

Describe the process for the resolution of any findings (corrective actions and clarifications or other findings) raised by the verification team during the verification and, where applicable, outstanding forward action requests from the validation or previous verifications.

During this verification 01 Clarification Requests (CRs) and 03 CAR (Corrective Actions) were identified related to the monitoring, implementation or operations of the proposed VCS project activity (Monitoring Report version 1.0 of 15/06/2021) in relation to all relevant VCS requirements v 4.0 for the project activity and the applied baseline and monitoring methodology; these findings have been discussed in appendix B of this report and were correctly closed.

### 2.5.1 Forward Action Requests

No FAR was raised during the verification.

## 2.6 Eligibility for Validation Activities

RINA is accredited for validating and verifying GHG emission reduction project activities falling under sectoral scope 01 Energy industries (renewable/non-renewable sources) /07/.

# 3 VALIDATION FINDINGS

## 3.1 Participation under Other GHG Programs

Not applicable. The project is not included in any other emission trading program or mechanism

## 3.2 Methodology Deviations

No methodology deviation applicable in the current monitoring period.

### 3.3 Project Description Deviations

No project description deviation applicable in the current monitoring period.

### 3.4 Grouped Project

The verification team confirms that the project is not a grouped project and hence this is not applicable to the project activity.

## 4 VERIFICATION FINDINGS

### 4.1 Project Implementation Status

It was verified during the remote audit conducted on 31/08/2021 that the proposed project activity has been implemented and it is in operation in accordance to the project activity described in the registered VCS PD /01/

The project activity consists on the supply of clean hydroelectric energy to the Brazilian National Interconnected System (SIN) through the implantation and operation of Hydro Power Plant (HPP) Foz do Chapecó, located in the Southern Region of Brazil, between the cities of Águas de Chapecó, state of Santa Catarina (SC) and Alpestre, state of Rio Grande do Sul (RS), with an installed capacity of 855 MW (4 generation units, with francis turbines), using a small reservoir, with low environmental impact related to its installed capacity.

During the remote visit RINA confirmed that the following equipments are installed:

4 Generators, Alston, model SAV 1450/132/80 with installed capacity 225000 kVA, power factor 0.95, serial numbers TBTG 0133, TBTG 0134, TBTG 0135, TBTG 0136 and 4 Francis Turbines, Alstom with nominal potency of 217.4 MW each. In the substation, there are two energy meters (principal and backup) for each group generator.

### 4.2 Safeguards

#### 4.2.1 No Net Harm

The assessment of socio-economic and environmental impacts of the project activity is part of the environmental licensing required by the environmental agency (IBAMA) to issue the Installation and Operational Permits.

RINA verified that impacts and the programs listed in the Monitoring report is in accordance with registered PD and are based on The EIA (from portuguese Estudo de Impacto Ambiental, Environmental Impact Studies) and RIMA (from portuguese Relatório de Impacto Ambiental, Environmental Impact Document) developed for the Project Activity highlight the environmental impacts of the hydroelectric plant and the actions to minimize the adverse impacts.

RINA verified that the valid Operational License issued by IBAMA /11/ lists the following environmental and social programs, that are monitored by the environmental agency:

- 2.1.1 Program 1 (PA-01): Monitoring and Control of Erosive Processes
- 2.1.2 Program 2 (PA-02): Restoration of Degraded Areas
- 2.1.3 Program 3 (PA-03): Climatological Monitoring
- 2.1.4 Program 4 (PA-04): Monitoring Hydrossedimentological Conditions
- 2.1.5 Program 5 (PA-05): Seismological Monitoring
- 2.1.6. Program 6 (PA-06): Monitoring of Surface Water and Sediment Quality 2.1.7.
- 2.1.7 Program 7 (PA-07): Cold and Thermal Aquifer Monitoring
- 2.1.8. Program 8 (PA-08): Monitoring and Control of Aquatic Macrophytes
- 2.1.9 Program 9 (PA-09): Monitoring and Conservation of Terrestrial Fauna in the Reservoir's APP
- 2.1.10. Program 10 (PA-10): Program for Monitoring and Management of Ichthyofauna and Fishing
- 2.1.11. Program 11 (PA-11): Environmental Education
- 2.1.12. Program 12 (PA-12): Social Communication
- 2.1.13. Program 13 (PA-13): Monitoring of Human Health Problems
- 2.1.14. Program 14 (PA-14): Support to Agricultural Activities - Biofactory
- 2.1.15. Program 15 (PA-15): Restoration of the Permanent Preservation Area of the Reservoir
- 2.1.16. Program 16 (PA-16): Restoration of Permanent Preservation Areas outside the Reservoir
- 2.1.17. Program 17 (PA-17): Support to Fishermen
- 2.1.18. Program 18 (PA-18): Surveillance of the Reservoir and its surroundings
- 2.1.19. Program 19 (PA-19): Management of Solid Waste
- 2.1.20. Program 20 (PA-20): Management of Liquid Effluents
- 2.1.21. Program 21 (PA-21): Monitoring and Control of the Golden Mussel Population
- 2.1.22. Program 22 (PA-22): Environmental Management

Therefore, the potential negative environmental and socio-economic impacts identified by the project proponent during the project implementation are regulated and monitored by the environmental agency in order to mitigate them.

#### 4.2.2 Local Stakeholder Consultation

RINA verified that the local stakeholder consultation was conducted at the validation stage /10/. The public audience is one of the phases of the environmental impact assessment and one of the main channels of community participation at a local level before project construction. RINA confirmed in the validation report /10/ that also stakeholders were invited to comment in the project. The validation report describes the local stakeholder consultation and the communication channels.

PP has provided the valid operational license, issued by IBAMA /11/.

Moreover, RINA verified that for ongoing communication with local stakeholders, the channels for stakeholders communication is permanently opened through: local office in the city, website with news from project activity and also e-mail and phone contacts available. Link: <http://www.fozdochapeco.com.br/> /63/. Several programs and activities involving the local stakeholders has being provided during the project lifetime (as recently examples we have: Water Use Program in Erval Grande City on December 2019, Several press releases material (about sustainable and environmental programs) /64/ on local newspaper during 2020 year (due to the COVID 19 pandemic was not possible in person meetings or activities, etc). Reports and pictures are public available in the project owner' website. Moreover, PP also have several social programs, listed in the operational license /11/ and monitored by the environmental agency.

RINA verified that as part of the programs monitored by the Environmental agency (IBAMA) twice a year, there is the Program 12 (PA-12): Social Communication (listed in the section 4.2.1 above). For example, free translation of the of the Annu Report 2 (July 2020 to June 2021) /65/:

*The Social Communication Program aims to maintain open and permanent communication channels between the community and Foz do Chapecó Energia, passing on information relevant to the enterprise and of public interest, in addition to meeting the demands of the population living in the vicinity.*

The report describes all the actions done, with pictures and evidences (such as signed docs, reports, radio vouchers, etc), confirming the ongoing communication with local stakeholders.

#### 4.3 AFOLU-Specific Safeguards

Not applicable. It is not AFOLU project.

#### 4.4 Accuracy of GHG Emission Reduction and Removal Calculations

According to the methodology ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 13.0.0 of 11/05/2012 and registered PD, the emissions reductions are calculated as follows:

**Emission Reduction (ER<sub>y</sub>):**

$$ER_y = BE_y - PE_y$$

**Where:**

*ER<sub>y</sub>* = Emission reductions in year y (tCO<sub>2</sub>e/yr);

*BE<sub>y</sub>* = Baseline emissions in year y (tCO<sub>2</sub>e/yr);

*PE<sub>y</sub>* = Project emissions in year y (tCO<sub>2</sub>e/yr).

**Baseline Emissions (BE<sub>y</sub>):**

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

**Where:**

*BE<sub>y</sub>* = Baseline emissions in year y (tCO<sub>2</sub>/yr);

*EG<sub>PJ,y</sub>* = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

*EF<sub>grid,CM,y</sub>* = Combined margin CO<sub>2</sub> 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” (tCO<sub>2</sub>/MWh).

During the onsite visit, RINA cross checked data in the VERs spreadsheet against data from energy meters from CCEE /13/ and data from CCEE public bulletins (Infomercado) /55/ and the most conservative data was used in the VERs calculation.

The total energy delivered to the grid during the monitoring period is (MWh/y):

- 2012 = 1,491,444.15
- 2013 = 4,130,870.35
- 2014 = 5,086,805.77
- 2015 = 5,387,312.07
- 2016 = 4,682,993.00
- 2017 = 3,376,820.00
- 2018 = 3,520,188.48
- 2019 = 3,709,080.36
- 2020 = 1,838,898.23

**CO<sub>2</sub> emission factor of the grid (\* EF<sub>grid,CM,y</sub>)**

The CO<sub>2</sub> emission factor of the grid is the result of a weighted average of two emission factors pertaining to the electricity system: the “operating margin” (OM) and the “build margin” (BM). In the case of this project activity, parameters were calculated in accordance with the “Tool to calculate the emission factor for an electricity system” and were determined *ex-post*, as presented in the registered PD.

The Brazilian DNA made available the emission factor calculation based on information of the grid power plants only /08/. Considering 0.5 as the weights for OM and BM emission factors available for renewable energy projects, the CO<sub>2</sub> emission factors considered in this monitoring period are as follows:

2012: 0.3895 tCO<sub>2</sub>/MWh  
 2013: 0.4322 tCO<sub>2</sub>/MWh  
 2014: 0.4400 tCO<sub>2</sub>/MWh  
 2015: 0.4075 tCO<sub>2</sub>/MWh  
 2016: 0.3904 tCO<sub>2</sub>/MWh  
 2017: 0.2955 tCO<sub>2</sub>/MWh  
 2018: 0.3380 tCO<sub>2</sub>/MWh  
 2019: 0.3100 tCO<sub>2</sub>/MWh  
 2020: 0.2638 tCO<sub>2</sub>/MWh

### Project emissions (PE<sub>y</sub>)

New hydro electric power projects resulting in new reservoirs, shall account for emissions from reservoirs, estimated as follows:

- a) If the power density (PD) of power plant is greater than 4 W/m<sup>2</sup> and less than or equal to 10 W/m<sup>2</sup>:

$$PE_y = EF_{res} \times TEG_y / 1000$$

Where:

PE<sub>y</sub> = Emission from reservoir expressed as tCO<sub>2</sub>e/year;

EF<sub>Res</sub> = Default emission factor for emissions from reservoirs of hydro power plants in year y (kgCO<sub>2</sub>e/MWh);

TEG<sub>y</sub> = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh)

- b) If power density (PD) of the project is greater than 10W/m<sup>2</sup>, PE<sub>y</sub> = 0.

The power density of the project activity is calculated as follows:

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

Where:

PD = Power density of the project activity (W/m<sup>2</sup>)

Cap<sub>PJ</sub> = Installed capacity of the hydro power plant after the implementation of the project activity (W)

Cap<sub>BL</sub> = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

A<sub>PJ</sub> = 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 (m<sup>2</sup>)

A<sub>BL</sub> = Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m<sup>2</sup>). For new reservoirs, this value is zero.

$$Cap_{PJ} = 855,000,000$$

$$A_{PJ} = 80,020,000$$

Power density = 855,000,000 / 80,020,000 = 10.68 W/m<sup>2</sup>, so project emissions must not be considered

### Leakage

In accordance with the applied methodology, Leakage is zero.

### Parameters available at the time of validation:

**Cap<sub>BL</sub> (W):** Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero, in accordance with applied methodology /06/ and registered PDD /01/

**ABL (m<sup>2</sup>):** Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m<sup>2</sup>). For new reservoirs, this value is zero, in accordance with applied methodology /06/ and registered PDD /01/

### Data and parameters monitored ex-post:

The following parameters are monitored :

Data/Parameter	Electricity Supplied to the Grid – Net Electricity (EG <sub>facility,y</sub> )
Data Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.
Source of data to be used	Project Activity Site (Meters).
Value of monitored parameter for the monitoring period	<p><b>Value:</b></p> <ul style="list-style-type: none"> <li>• 2012 = 1,491,444.15</li> <li>• 2013 = 4,130,870.35</li> <li>• 2014 = 5,086,805.77</li> <li>• 2015 = 5,387,312.07</li> <li>• 2016 = 4,682,993.00</li> <li>• 2017 = 3,376,820.00</li> <li>• 2018 = 3,520,188.48</li> <li>• 2019 = 3,709,080.36</li> <li>• 2020 = 1,838,898.23</li> </ul> <p><b>Cross check:</b> RINA has cross checked the information against the energy meters' readings from CCEE/13/ and information from CCEE public reports (Infomercado) /55/. For the VERs calculation, the most conservative data was used.</p>

Monitoring equipment	<p>The following meters are applicable to the monitoring period:</p> <p><b>GEU1M</b>                  Supplier: Schneider Electric, model 8600A                  Class: 0.2%                  Serial number PT-0902A259-01</p> <p>*Metrum calibration certificate CC-0050-12 for the energy meter serial number PT-0902A259-01, performed on 29/02/2012 /14/</p> <p>*Lactec calibration certificate CCR190/14 for the energy meter serial number PT-0902A259-01, performed on 25/02/2014 /22/</p> <p>* Lactec calibration certificate CCR101/16 for the energy meter serial number PT-0902A259-01, performed on 23/02/2016 /30/</p> <p>* Metrum calibration certificate CC-00295-17 for the energy meter serial number PT-0902A259-01, performed on 06/12/2017 /38/</p> <p>*Lactec calibration certificate CCR1351/19 for the energy meter serial number PT-0902A259-01, performed on 03/12/2019 /52/</p> <p><b>GEU1B</b>                  Supplier: Schneider Electric, model 8600A                  Class: 0.2%                  Serial number PT-0902A301-01 (installed until-23/02/2016 /58/)</p> <p>*Metrum calibration certificate CC-0051-12 for the energy meter serial number PT-0902A301-01, performed on 29/02/2012 /15/</p> <p>*Lactec calibration certificate CCR191/14 for the energy meter serial number PT-0902A301-01, performed on 25/02/2014 /23/</p> <p>Supplier: Schneider Electric, model 8600A                  Class: 0.2%                  Serial number PT-0910A474-01 (installed from 23/02/2016 until 07/12/2017 /58/)</p> <p>*Lactec calibration certificate CCR100/16 for the energy meter serial number PT-0910A474-01, performed on 23/02/2014 /37/</p> <p>Serial number MW-1603A689-02 (8650A) (installed from - 07/12/2017 /58/)</p>
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	<p>*Metrum calibration certificate CC-00265-17 for the energy meter serial number MW-1603A689-02, performed on 07/12/2017 /45/</p> <p>* Lactec calibration certificate CCR1345/19 for the energy meter serial number MW-1603A689-02, performed on 03/12/2019 /46/</p> <p><b>GEU2M</b>                  Supplier: Schneider Electric, model 8600A                  Class: 0.2%                  Serial number PT-0907A212-01 (installed until 29/02/2016 /59/)</p> <p>*Metrum calibration certificate CC-0052-12 for the energy meter serial number PT-0907A212-01, performed on 29/02/2012 /16/</p> <p>*Lactec calibration certificate CCR192/14 for the energy meter serial number PT-0907A212-01, performed on 25/02/2014 /24/</p> <p>*Lactec calibration certificate CCR103/16 for the energy meter serial number PT-0907A212-01, performed on 23/02/2016 /31/</p> <p>Serial number MW-1511A170-02 (8650A) (installed from - 29/02/2016 /59/)</p> <p>*Metrum calibration certificate CC-00296-17 for the energy meter serial number MW-1511A170-02, performed on 06/12/2017 /39/</p> <p>* Lactec calibration certificate CCR1352/19 for the energy meter serial number MW-1511A170-02, performed on 03/12/2019 /53/</p> <p><b>GEU2B</b>                  Supplier: Schneider Electric, model 8600A                  Class: 0.2%                  Serial number PT-0810A884-01</p> <p>*Metrum calibration certificate CC-0053-12 for the energy meter serial number PT-0810A884-01, performed on 29/02/2012 /17/</p> <p>*Lactec calibration certificate CCR193/14 for the energy meter serial number PT-0810A884-01, performed on 25/02/2014 /25/</p> <p>*Lactec calibration certificate CCR104/16 for the energy meter serial number PT-0810A884-01, performed on 23/02/2016 /32/</p>
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\* Metrum calibration certificate CC-00292-17 for the energy meter serial number PT-0810A884-01, performed on 05/12/2017 /40/

\*Lactec calibration certificate CCR1346/19 for the energy meter serial number PT-0810A884-01, performed on 03/12/2019 /47/

### **GEU3M**

Supplier: Schneider Electric, model 8600A

Class: 0.2%

Serial number PT-0907A215-01 (installed until- 29/02/2016 /60/)

\*Metrum calibration certificate CC-0054-12 for the energy meter serial number PT-0907A215-01, performed on 29/02/2012 /18/

\*Lactec calibration certificate CCR194/14 for the energy meter serial number PT-0907A215-01, performed on 25/02/2014 /26/

\*Lactec calibration certificate CCR105/16 for the energy meter serial number PT-0907A215-01, performed on 23/02/2016 /33/

Serial number MW-1511A526-02 (installed from - 29/02/2016 /60/)

\*Metrum calibration certificate CC-00297-17 for the energy meter serial number MW-1511A526-02, performed on 06/12/2017 /41/

\*Lactec calibration certificate CCR1349/19 for the energy meter serial number MW-1511A526-02, performed on 03/12/2019 /50/

### **GEU3B**

Supplier: Schneider Electric, model8600A

Class: 0.2%

Serial number PT-0907A574-01

\*Metrum calibration certificate CC-0055-12 for the energy meter serial number PT-0907A574-01, performed on 29/02/2012 /19/

\* Lactec calibration certificate CCR195/14 for the energy meter serial number PT-0907A574-01, performed on 26/02/2014 /27/

\* Lactec calibration certificate CCR106/16 for the energy meter serial number PT-0907A574-01, performed on 23/02/2016 /34/

\* Metrum calibration certificate CC-00293-17 for the energy meter serial number PT-0907A574-01, performed on 06/12/2017 /42/

	<p>*Lactec calibration certificate CCR1347/19 for the energy meter serial number PT-0907A574-01, performed on 03/12/2019 /48/</p> <p><b>GEU4M</b>                  Supplier: Schneider Electric, model 8600A                  Class: 0.2%                  Serial number PT-0902A220-01                  *Metrum calibration certificate CC-0056-12 for the energy meter serial number PT-0902A220-01, performed on 29/02/2012 /20/</p> <p>* Lactec calibration certificate CCR196/14 for the energy meter serial number PT-0902A220-01, performed on 25/02/2014 /28/</p> <p>* Lactec calibration certificate CCR107/16 for the energy meter serial number PT-0902A220-01, performed on 23/02/2016 /35/</p> <p>* Metrum calibration certificate CC-00298-17 for the energy meter serial number PT-0902A220-01, performed on 06/12/2017 /43/</p> <p>* Lactec calibration certificate CCR1350/19 for the energy meter serial number PT-0902A220-01, performed on 03/12/2019 /51/</p> <p><b>GEU4B</b>                  Supplier: Schneider Electric, model 8600A                  Class: 0.2%                  Serial number PT-0907A571-01                  *Metrum calibration certificate CC-0057-12 for the energy meter serial number PT-0907A571-01, performed on 29/02/2012 /21/</p> <p>* Lactec calibration certificate CCR197/14 for the energy meter serial number PT-0907A571-01, performed on 26/02/2014 /29/</p> <p>* Lactec calibration certificate CCR108/16 for the energy meter serial number PT-0907A571-01, performed on 23/02/2016 /35/</p> <p>* Metrum calibration certificate CC-00294-17 for the energy meter serial number PT-0907A571-01, performed on 06/12/2017 /44/</p> <p>* Lactec calibration certificate CCR1348/19 for the energy meter serial number PT-0907A571-01, performed on 03/12/2019 /49/</p>
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Accuracy of the monitoring equipment	Class 0.2 %, in accordance with ONS requirements /12/ .
Measuring/Reading/Recording frequency	Hourly measurement and monthly recording.
Calculation method (if applicable)	Not applicable.
<b>Calibration</b>	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	<p>The calibration periodicity is in accordance with the ONS requirements at the time of PD registration: calibration should be conducted each 2 years.</p> <p>(Note: according to updated ONS procedures valid on 01/01/2017 onwards, energy meter calibration shall be conducted in a 5-year period).</p>

<b>Data/Parameter</b>	<b>EF<sub>grid,CM,y</sub> Combined Margin CO2 Emission Factor</b>
Data Unit	tCO <sub>2</sub> /MWh
Description	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”.
Source of data to be used	<p>The combined margin emission factor will be calculated using the procedures of the “Tool to calculate the emission factor for an electricity system”.</p> <p>EF<sub>grid,OM,y</sub> and EF<sub>grid,BM,y</sub> data will be supplied by Brazilian Designated National Authority (DNA).</p> <p>The combined margin emission factor used on Foz do Chapecó will be calculated based on National Interconnected System supplied by Brazilian DNA.</p>
Value of monitored parameter for the monitoring period	<p>Value:</p> <p>2012: 0.3895 tCO<sub>2</sub>/MWh                  2013: 0.4322 tCO<sub>2</sub>/MWh                  2014: 0.4400 tCO<sub>2</sub>/MWh                  2015: 0.4075 tCO<sub>2</sub>/MWh                  2016: 0.3904 tCO<sub>2</sub>/MWh                  2017: 0.2955 tCO<sub>2</sub>/MWh                  2018: 0.3380 tCO<sub>2</sub>/MWh                  2019: 0.3100 tCO<sub>2</sub>/MWh                  2020: 0.2638 tCO<sub>2</sub>/MWh</p> <p><b>Cross check:</b> RINA has cross the information presented in the MR and VERs spreadsheet against data publicity available by the Brazilian DNA /08/</p>
Monitoring equipment	Not applicable

Accuracy of the monitoring equipment	Not applicable
Measuring/Reading/Recording frequency	yearly
Calculation method (if applicable)	As per the “tool to calculate the emission factor for an electricity system”. Dispatch Data Analysis OM is the Operation Margin Emission Factor method used and the build margin emission factor is updated annually. Both Operating Margin Emission Factor and Build Margin Emission factor are supplied by MCTI. The combined margin emission factor considers the default value of 0.5 for each emission factor as recommended by the “tool to calculate the emission factor for an electricity system”..
<b>Calibration</b>	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	Not applicable

<b>Data/Parameter</b>	<b>EF<sub>grid,BM,y</sub></b>
Data Unit	tCO <sub>2</sub> /MWh
Description	CO <sub>2</sub> Build Margin emission factor of the grid, in a year y
Source of data to be used	Based on data provided by DNA (Designated National Authority).
Value of monitored parameter for the monitoring period	Value: 2012: 0.2010 tCO <sub>2</sub> /MWh 2013: 0.2713 tCO <sub>2</sub> /MWh 2014: 0.2963 tCO <sub>2</sub> /MWh 2015: 0.2553 tCO <sub>2</sub> /MWh 2016: 0.1581 tCO <sub>2</sub> /MWh 2017: 0.0028 tCO <sub>2</sub> /MWh 2018: 0.1370 tCO <sub>2</sub> /MWh 2019: 0.1020 tCO <sub>2</sub> /MWh 2020: 0.0979 tCO <sub>2</sub> /MWh  <b>Cross check:</b> RINA has cross the information presented in the MR and VERs spreadsheet against data publicity available by the Brazilian DNA /08/
Monitoring equipment	Not applicable
Accuracy of the monitoring equipment	Not applicable
Measuring/Reading/Recording frequency	yearly
Calculation method (if applicable)	-
<b>Calibration</b>	
Calibration frequency/interval	Not applicable

Is the calibration interval in line with the monitoring plan of the PD?	
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Data/Parameter	$EF_{grid,OM-DD,y}$
Data Unit	tCO <sub>2</sub> /MWh
Description	CO <sub>2</sub> Operating Margin emission factor of the grid, in a year y
Source of data to be used	Data provided by DNA (Designated National Authority) to the year y.
Value of monitored parameter for the monitoring period	Value: 2012: 0.5779 tCO <sub>2</sub> /MWh 2013: 0.5932 tCO <sub>2</sub> /MWh 2014: 0.5837 tCO <sub>2</sub> /MWh 2015: 0.5597 tCO <sub>2</sub> /MWh 2016: 0.6228 tCO <sub>2</sub> /MWh 2017: 0.5882 tCO <sub>2</sub> /MWh 2018: 0.5390 tCO <sub>2</sub> /MWh 2019: 0.5181 tCO <sub>2</sub> /MWh 2020: 0.4296 tCO <sub>2</sub> /MWh  <b>Cross check:</b> RINA has cross the information presented in the MR and VERs spreadsheet against data publicity available by the Brazilian DNA /08/
Monitoring equipment	Not applicable
Accuracy of the monitoring equipment	Not applicable
Measuring/Reading/Recording frequency	yearly
Calculation method (if applicable)	-
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	Not applicable

Data/Parameter	$Cap_{PJ}$
Data Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data to be used	Project site
Value of monitored parameter for the monitoring period	855,000,000 Cross check: Confirmed in the equipments specification .

	Sum of Installed capacity of the generators (The total of 4 generators capacity: nominal power of 213.75 MW each generator) as indicated by manufacturer's specifications, confirmed during the videoconference remote audit.
Monitoring equipment	Not applicable
Accuracy of the monitoring equipment	Not applicable
Measuring/Reading/Recording frequency	yearly
Calculation method (if applicable)	The total of 4 generators capacity (nominal power of 213.75 MW each generator)
<b>Calibration</b>	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	Not applicable

<b>Data/Parameter</b>	<b>APJ</b>
Data Unit	m <sup>2</sup>
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data to be used	Project site
Value of monitored parameter for the monitoring period	<p>The area of the reservoir of HPP Foz do Chapecó is 79,930,000 m<sup>2</sup> from the "principal reservoir" + 90,000 m<sup>2</sup> from the "passage way". Total of 80,020,000 m<sup>2</sup>.</p> <p>2012 = 80,020,000 m<sup>2</sup>                  2013 = 80,020,000 m<sup>2</sup>                  2014 = 80,020,000 m<sup>2</sup>                  2015 = 80,020,000 m<sup>2</sup>                  2016 = 80,020,000 m<sup>2</sup>                  2017 = 80,020,000 m<sup>2</sup>                  2018 = 80,020,000 m<sup>2</sup>                  2019 = 80,020,000 m<sup>2</sup>                  2020 = 80,020,000 m<sup>2</sup></p> <p>Cross check: RINA confirmed the area of the principal reservoir in accordance with ANEEL /56/ and Operational license /11/ and are from the passage way in the executive project /57/.</p> <p>The minimum operational height of UHE Foz do Chapecó is 264 m and the maximum operational height is 265 m /61/ . Due to the above and characteristic of the point where the hydroelectric dam is located, the reservoir area does not change, always remaining (perennially) as a full river. Therefore, the area values remain constant during (continuous) monitoring. Through Google Earth itself (point "UHE Fóz do Chapecó) /62/ it is possible to check the above.</p> <p>Additionally, according to Ibama's Environmental License</p>

	/11/, it is necessary to: “2.1.18. Program 18 (PA-18): Inspection of the Reservoir and its Surroundings” Based on the above, the environmental agency already annually inspects the area of the reservoir and its surroundings (APP, land, bathymetry, etc).
Monitoring equipment	N/A
Accuracy of the monitoring equipment	N/A
Measuring/Reading/Recording frequency	yearly
Calculation method (if applicable)	Not applicable
<b>Calibration</b>	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	N/A

RINA verified that the VCU spreadsheet /03/ reports all the monitored data in accordance with the evidences provided and no error is found in the final version. Methods and Formulaes are correctly presented in accordance with the methodology and registered PD as detailed above. Data used in the VCU calculation are from official sources and manually transferred to the VCU spreadsheet. No transposition error was found.

It is RINA's opinion that the GHG emission reductions /03/ have been quantified correctly in accordance with the project description /02/ and applied methodology /06/ with reasonable level of assurance.

The emission reduction verified ex-post is twice the ex-ante values (12,450,836 tCO<sub>2</sub>e- verified x 6,206,005 tCO<sub>2</sub>e- estimated). The ex ante estimative calculation is based on 31,220,640 MWh (total electricity supplied to the grid) and emission factor of 0.1988 tCO<sub>2</sub>/MWh.

In the ex-post monitored period the total electricity achieved was 33,224,412 (6.42% only over) but the

average emission factor for the monitored period has achieved 0.3630 tCO<sub>2</sub>/MWh (82.60% over) resulting in a total of 12,450,836 VCUs (100.63% over).

Based on the numbers above is it possible to conclude that the emission factor was very higher during the ex-post period (due to major use of fossil fuelled Power plants in Brazil).

RINA verified that the difference is mainly due to the difference in the emission factor, not under PP control, based on official data from Brazilian DNA. The higher energy generation of 6.42 % does not impact in the additionality of the project activity (As per the registered PD, Sensitivity analysis shows that to reach the benchmark, the amount of electricity should be 18.6% higher than the assured energy during all concession period) nor eligibility of the project activity (there is not impact in the scale nor monitoring of the project activity).

## 4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

A remote audit has been performed on 31/08/2021 and it is confirmed that the monitoring arrangements in the monitoring plan are feasible within the project design. The monitoring is based only on data measured. The VERs calculation /07/ is based only in data obtained through the monitoring.

All monitored data was cross checked against official sources Data used the VCUs calculation are from external/official sources /13/ /55/ /08/ /56/ /11/ /57/ and manually transferred to the VCUs spreadsheet. No transposition error was found.

The calibration periodicity was correctly followed in accordance with the ONS requirements at the time of PD registration: calibration should be conducted each 2 years. (Note: according to updated ONS procedures valid on 01/01/2017 onwards, energy meter calibration shall be conducted in a 5-year period).

The data presented in the monitoring report /02/ were assessed by reviewing in detail project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. Verified during the remote audit, that the roles and responsibilities are in accordance with the registered PD.

It is RINA's opinion that the GHG emission reductions /03/ have been quantified correctly in accordance with the project description /02/and applied methodology /06/ with reasonable level of assurance.

## 4.6 Non-Permanence Risk Analysis

There is no non-permanence risk rating determined by the project proponent.

# 5 VERIFICATION CONCLUSION

RINA Service S.p.A (RINA) has performed verification of the emission reductions reported for the project activity “Foz do Chapecó ” in Brazil, VCS Registration Reference ID - 896, for the VCS monitoring period from 01/07/2012 to 14/10/2020, with regard to the relevant requirements for VCS and CDM rules. Verra granted to PP an exemption from section 4.1.20(2) of the VCS Standard, v4.1, as per the letter dated 09/07/2021/54/.

The project participants Foz do Chapecó Energia SA and Enerbio Consultoria LTDA – ME of the project “Foz do Chapecó ” are responsible for:

- The preparation of greenhouses gas emissions data and the reported greenhouse gas emission reductions from the project on the basis set out in the monitoring plan contained in the registered VCS Registration Reference ID – 896 and registered PD version 03 of 15/09/2012, for the VCS monitoring period from 01/07/2012 to 14/10/2020.
- The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of greenhouse gas emission reductions of the project.

It is the responsibility of RINA to express an independent verification opinion about the project’s conformity with the VCS requirements and procedures and on the reported greenhouse gas emission reductions from the project.

Based on documented evidence and corroborated by an on-site assessment RINA can confirm that:

- The project has been implemented and operated as per the registered VCS PD;
- The monitoring plan in the registered VCS-PD is as per the applied baseline and monitoring methodology.
- The monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS and CDM requirements

It is RINA's opinion that the GHG emission reduction stated in the VCS monitoring report version 3.2 of 17/01/2022 for the "Foz do Chapecó" in Brazil for the period 01/07/2012 to 14/10/2020 are fairly stated. The GHG emission reductions were calculated correctly on the basis of the baseline and monitoring methodology, ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 13.0.0 of 11/05/2012.

Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/07/2012 to 14/10/2020 amount to 12,450,836 tCO<sub>2</sub>e Verification period:

Year	Baseline emissions or removals (tCO <sub>2</sub> e)	Project emissions or removals (tCO <sub>2</sub> e)	Leakage emissions (tCO <sub>2</sub> e)	Net GHG emission reductions or removals (tCO <sub>2</sub> e)
2012	580,867	0	0	580,867
2013	1,785,551	0	0	1,785,551
2014	2,238,088	0	0	2,238,088
2015	2,195,217	0	0	2,195,217
2016	1,828,435	0	0	1,828,435
2017	997,779	0	0	997,779
2018	1,189,897	0	0	1,189,897
2019	1,149,984	0	0	1,149,984
2020	485,018	0	0	485,018
<b>Total</b>	<b>12,450,836</b>	<b>0</b>	<b>0</b>	<b>12,450,836</b>

# 6 APPENDIX A: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS AND FORWARD ACTION REQUESTS

**Table 1. Remaining FAR from validation and/or previous verifications**

<b>FAR ID</b>		<b>Section no.</b>		<b>Date:</b>
<b>Description of FAR</b>				
No FAR in the previous verification				
<b>Project participant response</b>				<b>Date:</b>
<b>Documentation provided by project participant</b>				
<b>DOE assessment</b>				<b>Date:</b>

**Table 2. CR from this verification**

<b>CR ID</b>	1	<b>Section no.</b>	4.4	<b>Date:</b> 31/08/2021
<b>Description of CR</b>				
Verified during the onsite visit that the calibration of the energy meter serial number PT-0902A301-01 was not performed on 23/02/2016.				
<b>Project participant response</b>				<b>Date:</b> 14/09/2021
<i>This is true, so based on this was provided evidence that the energy meter "PT-0902A301-01" was exchanged by "PT-0910A474-01" on 23/02/2016. This information was included on MR version 2, Table 2 on page 6.</i>				
<b>Documentation provided by project participant</b>				
<i>Revised MR and documents related to the meters change</i>				
<b>DOE assessment</b>				<b>Date:</b> 27/09/2021
MR was revised in accordance with the calibration certificates and evidences for the meters' change This CL is closed				

**Table 3. CAR from this verification**

<b>CAR ID</b>	1	<b>Section no.</b>	4.4	<b>Date:</b> 31/08/2021
<b>Description of CAR</b>				

Data in the MR for the energy generation described in the MR for 2012 is not in accordance with energy meters' readings from CCEE. Moreover, data for 2020 does not take into account the correct number of days of the monitoring period.	
<b>Project participant response</b>	<b>Date:</b> 14/09/2021
The datas for energy generation (in MWh) for years 2012 and 2020 were adjusted accordingly in MR version 2 and also VCUs calculation spreadsheet.	
<b>Documentation provided by project participant</b>	
Revised MR and VCUs spreadsheet	
<b>DOE assessment</b>	<b>Date:</b> 27/09/2021
RINA verified that the documents were revised accordingly. This CAR is closed	

<b>CAR ID</b>	2	<b>Section no.</b>	4.4	<b>Date:</b> 31/08/2021
<b>Description of CAR</b>				
MR version 1 describes the meters' change, however, it is not clear the period that each meter was operational.				
<b>Project participant response</b>				<b>Date:</b> 14/09/2021
The information about period that each meter was operational was included in the MR version 2 on Section 4.3 - Table 1.				
<b>Documentation provided by project participant</b>				
Revised MR and evidences for the meters' change				
<b>DOE assessment</b>				<b>Date:</b> 27/09/2021
MR was revised in accordance with the evidences for the meters' change This CAR is closed				

<b>CAR ID</b>	3	<b>Section no.</b>	4.4	<b>Date:</b> 31/08/2021
<b>Description of CAR</b>				
Data in the MR for the combined margin is not in accordance with the VERs spreadsheet for the emission factor CM in 2012, OM 2012 and 2020 and not in accordance with Brazilian DNA web site for the BM 2020.				
<b>Project participant response</b>				<b>Date:</b> 14/09/2021
The datas for CM in 2012, OM 2012 and 2020 and also BM in 2020 were adjusted accordingly in the spreadsheet and MR version 2.				
<b>Documentation provided by project participant</b>				
Revised MR and VCUs spreadsheet				
<b>DOE assessment</b>				<b>Date:</b> 27/09/2021
RINA verified that documents were revised in accordance with data available by the Brazilian DNA This CAR is closed				



**CERTIFICATO DI QUALIFICA PER GLI SCHEMI VOLONTARI\***  
**QUALIFICATION CERTIFICATE FOR VOLUNTARY SCHEMES\***

Si attesta che il sig./sig.ra:  
 We declare that Mr/Mrs/Ms:

Thais De Lima Carvalho

è qualificato come:  
 is qualified as:

TEC, VAL, VER, TL, ITRP

per le seguenti aree tecniche:  
 for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORIAL SCOPE
1.1	Thermal energy generation	1
1.2	Renewables	1
2.1	Electricity distribution	2
13.1	Solid waste and wastewater	13

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	19/07/2016	First issue with new template (this certificate is linked to CDM qualification)

Responsabile di schema  
 Scheme Leader  
 Rita Valoroso

\*SCHEMI VOLONTARI/ VOLUNTARY SCHEMES: ACR American Carbon Registry, CCB The Climate, Community & Biodiversity Alliance, GS Gold Standard, JI Joint Implementation, SGS Social Carbon Standard, VCS Verified Carbon Standard.

TEC: Technical expert; VAL: Validator; VER: Verifier; TL: Team leader; FIN EXP: Financial Expert; ITRP: Independent technical reviewer

RINA Services S.p.A. è accreditato/ricosciuto da  
 RINA Services S.p.A. is accredited /recognized by:

UNFCCC	quali Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects
VCSA	per condurre la Validazione e la Verifica di Progetti VCS to carry out Validation and Verification of VCS Projects
GS Foundation	per condurre la Validazione e la Verifica di Progetti GS to carry out Validation and Verification of GS Projects
Ecologica Institute	per condurre la Validazione e la Verifica di rapporti SGS to carry out Validation and Verification of SGS Reports
American Carbon Registry ACR	per condurre la Validazione e la Verifica di Progetti ACR to carry out Validation and Verification of ACR projects
The Climate, Community & Biodiversity Alliance CCB	per condurre la Validazione e la Verifica di Progetti co-benefit CCB to carry out Validation and Verification of co-benefit CCB projects



**CERTIFICATO DI QUALIFICA PER GLI SCHEMI VOLONTARI\***  
**QUALIFICATION CERTIFICATE FOR VOLUNTARY SCHEMES\***

Si attesta che il sig./sig.ra:  
 We declare that Mr/Mrs/Ms:

**Geisa Maria Principe Branco Sabettoni**

è qualificato come:  
 is qualified as:

**TEC, VAL, VER, TL, ITRP**

per le seguenti aree tecniche:  
 for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.1	Thermal energy generation	1
1.2	Renewables	1
13.1	Solid waste and wastewater	13

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
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Responsabile di schema  
 Scheme Leader  
 Rita Valoroso

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