



**Monitoring report form for CDM project activity  
(Version 08.0)**

**MONITORING REPORT**

<b>Title of the project activity</b>	Saldanha Small Hydroelectric Power		
<b>UNFCCC reference number of the project activity</b>	1526		
<b>Version number of the PDD applicable to this monitoring report</b>	05.2		
<b>Version number of this monitoring report</b>	1		
<b>Completion date of this monitoring report</b>	31/03/2021		
<b>Monitoring period number</b>	4 <sup>th</sup> Monitoring Period		
<b>Duration of this monitoring period</b>	01/01/2013 – 15/03/2019		
<b>Monitoring report number for this monitoring period</b>	1		
<b>Project participants</b>	Hidroluz Centrais Elétricas Ltda.		
<b>Host Party</b>	Brazil		
<b>Applied methodologies and standardized baselines</b>	AMS-I.D: Grid Connected Renewable Electricity Generation, version 13.0		
<b>Sectoral scopes</b>	01 – Energy industries (renewable/non-renewable sources)		
<b>Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period</b>	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0	210,655	0
<b>Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD</b>	174,120		

## SECTION A. Description of project activity

### A.1. General description of project activity

The Saldanha Small Hydroelectric Project (SHP Saldanha) is a small run-of-river hydroelectric power plant project, located at the Saldanha River, in the municipality of Alta Floresta d'Oeste, Rondônia state, Brazil. The plant is located in a very remote area and is linked to Rondônia-Acre isolated electricity system. Many remote places in northern Brazil have their energy supply based on isolated grid systems like this. However, these grid systems are mainly composed by thermal power plants, which are fired by fossil fuels and, hence, increase enormously greenhouse gas (GHG) emissions.

This project aims to increase the grid's electrical supply by offsetting thermal generation with a renewable source of energy, and consequently, reducing CO<sub>2</sub> emissions. This project is operated by Hidroluz Centrais Elétricas Ltda. The power plant has 2 turbines of 2.5MW capacity each (total installed capacity of 5 MW).

Furthermore, the project is in line with host-country specific CDM requirements because it:

- Contributes to local environmental sustainability.
- Contributes towards better working conditions and increases employment opportunities in the area where the project is located.
- Contributes towards better revenue distribution for helping to improve local and regional economic development.
- Contributes to development of technological capacity because all technology, hand labour and technical maintenance will be provided domestically in Brazil.
- Contributes to regional integration and connection with other sectors.
- Increases the contribution of small-scale hydroelectricity projects to electricity generation in the region, and therefore, it may encourage other similar companies that want to replicate this project.

The total GHG emission reductions or removals generated in this monitoring period is: 210,655 (tCO<sub>2</sub>e).

### A.2. Location of project activity

Saldanha River, municipality of Alta Floresta d'Oeste, Rondônia State (RO), North region of Brazil.

GPS Coordinates: Latitude 11°59'09" S and Longitude 62°10'38" W.

### A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil	Hidroluz Centrais Elétricas Ltda. (Private Entity)	No

#### A.4. References to applied methodologies and standardized baselines

The following methodology is applicable to the project activity:

Category	Sectoral Scope	Title	Version
AMS-I.D	01	Grid-connected renewable electricity generation	13.0

The following documents are used in this monitoring report in order to apply the main methodology above:

Reference	Title	Version
TOOL07	Tool to calculate the emission factor for an electricity system".	01.0

No standardized baseline is applied to this project activity.

#### A.5. Crediting period type and duration

Type: Fixed

Starting date: 16/03/09

Length: 10 years

Fixed Crediting period: 16/03/09 - 15/03/19.

### SECTION B. Implementation of project activity

#### B.1. Description of implemented project activity

The project consists of renewable electricity generation from a run-of-river small hydro power plant, supplying electricity to the Rondônia-Acre electricity system. The small hydro power plant has a total installed capacity of 5.0 MW.

SHP Saldanha uses Brazilian Francis type turbines with a horizontal axis (Hydraulic reactor turbine in which the flow exits the turbine blades in a radial direction) and Brazilian generators. The technology used on SHP Saldanha is environmentally safe and sound, because it is a run-of-river power plant requiring a minimum diversion dam, which stores sufficient water to generate electricity for short periods of time in a 0.0075 km<sup>2</sup> reservoir.

Table 1 - Technical description for turbines and generators

Generator	
Manufacturer	GE
Capacity (kVA)	3,300
Power factor	0.8
Power yield	0.962
Turbine	
Manufacturer	HISA
Type	Francis
Capacity (MW)	2.506

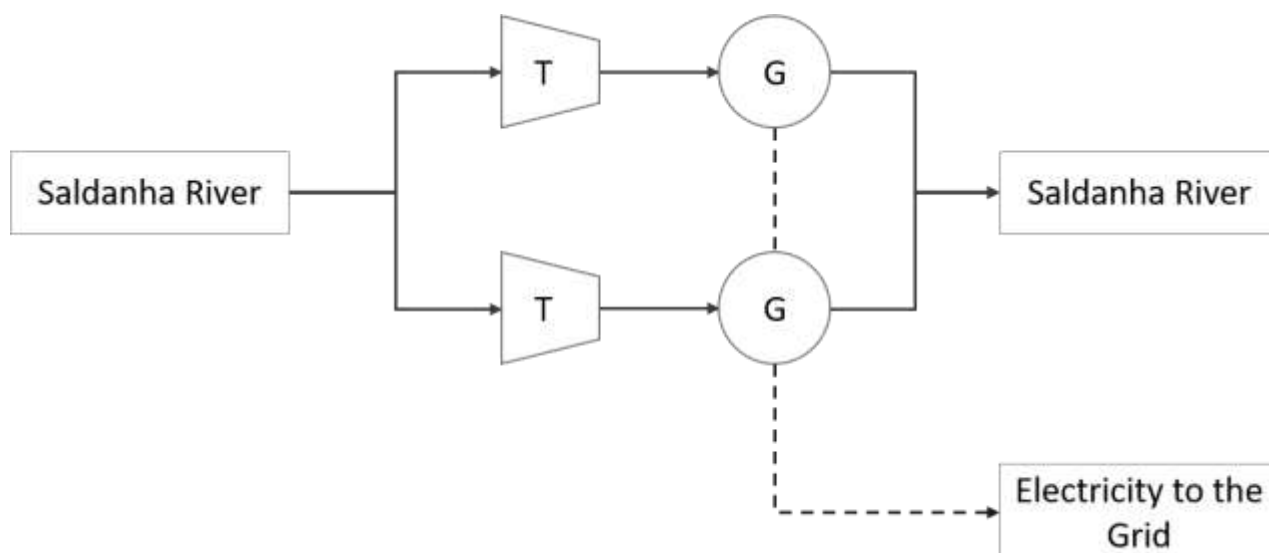


Figure 1 - General Layout of SHP Saldanha

## B.2. Post-registration changes

### B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

No temporary deviation was applied during this monitoring period.

### B.2.2. Corrections

No correction was applied during this monitoring period.

### B.2.3. Changes to the start date of the crediting period

No permanent changes from monitoring plan or methodology were requested.

### B.2.4. Inclusion of monitoring plan

No inclusion of monitoring plan was requested.

### B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

No permanent changes or permanent deviations were requested.

### B.2.6. Changes to project design

There was no post-registration change to this project activity design

### B.2.7. Changes specific to afforestation or reforestation project activity

It does not apply to this project activity.

## SECTION C. Description of monitoring system

**Data generation:** In the power plant (SHP Saldanha) there is a main cumulative meter that records the net electricity exported to the grid. This meter is read monthly to issue sale invoices and hourly/daily for operation control.

**Data recording:** Hourly/daily records are performed by Hidroluz (project participant and operator of the plants). Readings are taken monthly by both CERON and Hidroluz.

**Data aggregation:** A monthly reading is taken to issue sale invoices. The electricity generation in a month is the difference between two consecutive readings, times the constant of the electricity meter.

**Calculation:** see section D.2 and section E. Electricity output is the difference between the cumulative values on the power meter. Net power supplied to the grid times the emission factor are emission reductions.

**Reporting:** The monthly electricity supplied to grid data is recorded on site log sheets. At the end of each month the monitoring data are transferred to electronic files and reported to EcoSecurities.

**Organizational structure, roles and responsibilities:** A CDM manager has been appointed and trained who is responsible for the CDM monitoring system. Monthly recording of power meter falls under the responsibility of the site manager and the grid company. A monitoring organization has been set up and procedures developed for all the staff involved in the CDM Project.

**Emergency procedures for the monitoring system:** The site manager will notify the grid company in case there is doubt about the correct functioning of the meter mentioned in the monitoring plan. In that case, the grid company and the operator will check and where necessary replace the meter. If the problem can be solved quickly, no CERs are claimed for the period during which the meter was not functioning correctly. If the problem cannot be solved quickly the grid company and the operator estimate the power delivered to the grid using the gross electricity generation readings taken from the equipment panel, by the plant operator, discounting estimated electricity losses.

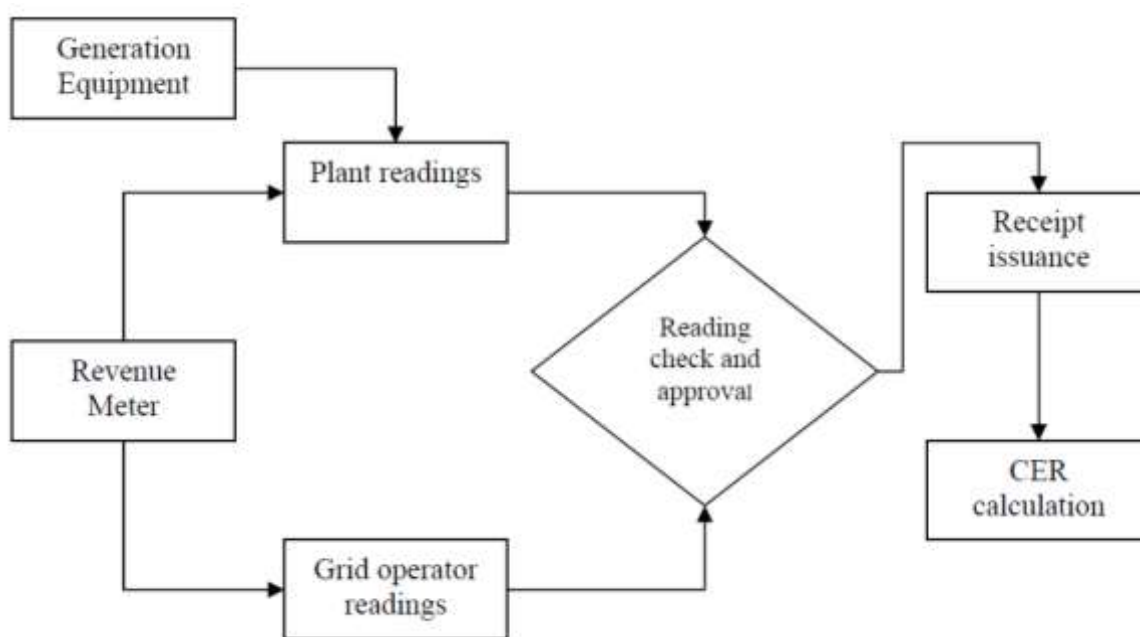


Figure 2 – Organization Chart

**SECTION D. Data and parameters****D.1. Data and parameters fixed ex ante**

<b>Data/Parameter</b>	<b>Installed Capacity</b>
Unit	MW
Description	The installed capacity of the project activity
Source of data	ANEEL Resolution no 349, October 5th 2004 and Equipment Manual
Value(s) applied	5 MW
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	There are two generator units, each with installed capacity of 2.5MW.

<b>Data/Parameter</b>	<b>EF<sub>grid, BM, y</sub></b>
Unit	tCO <sub>2</sub> /MWh
Description	Build margin CO <sub>2</sub> emission factor of the grid in year y (tCO <sub>2</sub> /MWh)
Source of data	CERON, Termonorte, Eletronorte, Eletrobrás
Value(s) applied	1.0160
Choice of data or measurement methods and procedures	The Build Margin Emission Factor is determined ex-ante considering the generation-weighted average emission factor of a sample of power plants.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	The data was calculated ex-ante so that will not need to be revised within crediting period.

<b>Data/Parameter</b>	<b>EF<sub>grid, OM, y</sub></b>
Unit	tCO <sub>2</sub> /MWh
Description	Simple operating margin CO <sub>2</sub> emission factor of the grid in year y
Source of data	CERON, Termonorte, Eletronorte, Eletrobrás
Value(s) applied	0.8682
Choice of data or measurement methods and procedures	The Operating Margin Emission Factor is determined ex-ante considering the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	The data was calculated ex-ante so that will not need to be revised within crediting period.

<b>Data/Parameter</b>	<b>EF<sub>grid, CM, y</sub></b>
Unit	tCO <sub>2</sub> /MWh
Description	Combined margin emission factor of the grid in year y
Source of data	CERON, Termonorte, Eletronorte, Eletrobrás
Value(s) applied	0.9421
Choice of data or measurement methods and procedures	The Baseline Emission Factor calculation consists of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved Tool to calculate the emission factor for an electricity system
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	It was calculated using the weighted average method

**D.2. Data and parameters monitored**

<b>Data/Parameter</b>	<b>EG<sub>y</sub></b>		
Unit	MWh		
Description	Net electricity generated that is supplied to the grid in year y		
Measured/calculated/default	Measured on site. More details are provided in the section C: "Description of Monitoring System".		
Source of data	Power meter recorded by CERON (or equivalent) and the project developer		
Value(s) of monitored parameter	223,605 Total value for the monitoring period after delayed calibration discount. Yearly values are described in section E.1.		
Monitoring equipment	Electronic bidirectional meters Class D (0.2%)		
	Meter type/class	Serial number	Calibration frequency <sup>1</sup>
	ELSTER Alpha A2R	4999304	3 years
	ELSTER Alpha A3RBR PLUS	5049637	3 years
	Specific calibration and operational information are provided in the tables below.		
Measuring/reading/recording frequency	Continuous measurement, hourly recording, monthly aggregated.		
Calculation method (if applicable)	The period between 13/07/2013 and 07/10/2013 was considered a calibration delay period. Therefore, the delayed calibration guidance provided in the latest approved version of VVS-PA (Appendix) was used. For conservativeness, EG <sub>y</sub> was corrected using the equipment's maximum permissible error for the net electricity delivered in months 07 to 10 (both included, totalling 04 months).		
QA/QC procedures	Meters calibrated according to the manufacturer manual. Data collected has low uncertainty levels and to guarantee its accuracy it is cross checked with the electricity sales receipts obtained from the grid operator.		
Purpose of data/parameter	Calculation of baseline emissions		
Additional comments	-		

SN 4999304	Start date	End date	SN 4999304	Start date	End date
Calibration	13/07/2010	12/07/2013	Calibration	15/10/2015	14/10/2018
Operation	(not relevant)	07/10/2013	Operation	17/11/2015	05/10/2017
Calibration delay	13/07/2013	07/10/2013	Calibration delay	-	-
SN 5049637	Start date	End date	SN 5049637	Start date	End date
Calibration	18/07/2013	17/07/2016	Calibration	18/09/2017	17/09/2020
Operation	07/10/2013	17/11/2015	Operation	05/10/2017	(not relevant)
Calibration delay	-	-	Calibration delay	-	-

**D.3. Implementation of sampling plan**

No sampling was taken.

<sup>1</sup> According to the meter manufacturer the meter does not need calibration. However to assure the quality of the monitored data Project Developers have set the calibration frequency as 3 years.

## SECTION E. Calculation of emission reductions or net anthropogenic removals

### E.1. Calculation of baseline emissions or baseline net removals

As explained in the PDD, there are no project emissions or leakage emission. Therefore:

$$ER_y = BE_y$$

Where:

$ER_y$  = Emission reduction in year y (tCO<sub>2</sub>e)

$BE_y$  = Baseline emissions in year y (tCO<sub>2</sub>e)

The baseline emissions are calculated as follows:

$$BE_y = EF_y \times EG_y$$

Where:

$BE_y$  = Baseline emissions in year y (tCO<sub>2</sub>e)

$EF_y$  = Simple operating margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)

$EG_y$  = Net electricity generated that is supplied to the grid in year y (MWh)

To the applicable period between months 07/2013 and 10/2013, a calibration delay was identified. Then, the  $EG_y$  values were corrected by applying the equipment's maximum permissible error, as follows:

$$EG_y * (1 - \text{Max. permissible error}\%/100) = \text{corrected } EG_y$$

Variable	Units	2013	2014	2015	2016	2017	2018	2019	Total
Days included in the monitoring period		365	365	365	366	365	365	74	2265
EG <sub>y</sub> : Net Electricity supplied to the grid	MWh	37,287	41,748	36,450	29,500	32,692	36,457	9,485	223,619
EG <sub>y</sub> : Net Electricity (after calibration correction)	MWh	37,272	41,748	36,450	29,500	32,692	36,457	9,485	223,605
Baseline Emission Factor	tCO <sub>2</sub> e/MWh	0.9421							
Baseline Emission	tCO <sub>2</sub> e	35,114	39,331	34,339	27,792	30,799	34,347	8,936	210,658
Emission reduction (ROUNDED DOWN)	tCO <sub>2</sub> e	35,114	39,330	34,339	27,792	30,799	34,346	8,935	210,655

### E.2. Calculation of project emissions or actual net removals

According to the Methodology and the PDD, project emissions for this project activity are zero.

### E.3. Calculation of leakage emissions

According to the Methodology and the PDD, project emissions for this project activity are zero.



**E.4. Calculation of emission reductions or net anthropogenic removals**

	Baseline GHG emissions or baseline net GHG removals (t CO <sub>2</sub> e)	Project GHG emissions or actual net GHG removals (t CO <sub>2</sub> e)	Leakage GHG emissions (t CO <sub>2</sub> e)	GHG emission reductions or net anthropogenic GHG removals (t CO <sub>2</sub> e)			
				Before 01/01/ 2013	From 01/01/ 2013 until 31/12/ 2020	From 01/01/ 2021	Total amount
<b>Total</b>	210,655	0	0	0	210,655	0	210,655

**E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD**

Amount achieved during this monitoring period (t CO <sub>2</sub> e)	Amount estimated ex ante for this monitoring period in the PDD (t CO <sub>2</sub> e)
210,655	174,120

**E.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”**

The calculation considered the yearly estimated emission reductions for the project as 28,059 tCO<sub>2</sub>e in 365 days, resulting on a daily average of 76.87 tCO<sub>2</sub>e/day. The current monitoring period has 2265 days, so considering the expected daily average, the result is 174,120 tCO<sub>2</sub>e for the entire monitoring period.

**E.6. Remarks on increase in achieved emission reductions**

The resulting amount achieved during this monitoring period is higher than the amount estimated ex ante for this monitoring period in the PDD. The reason for this increase is explained below.

The PDD calculations estimated a load factor of 70.83% and an authorized installed capacity of 4.8MW. Therefore, it stands clear that PDD numbers are overconservative. In a scenario which the Load Factor increases to 86% (considering the same 4.8MW), a very reasonable assumption, the total amount of estimated emission reductions would be 34,066 tCO<sub>2</sub>e each 365 days, or 93.33 tCO<sub>2</sub>e/day.

When considering the monitoring period, this would represent a total estimated emission of 211,396 tCO<sub>2</sub>e, indicating that the achieved emission reductions are fully in accordance with the estimated figures.

**E.7. Remarks on scale of small-scale project activity**

The project activity remained under the limit of the small-scale Type I threshold of 15 MW output capacity (defined by the latest version applicable of the CDM Project Standard) during the crediting period and during the monitoring period.

## Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
08.0	6 April 2021	Revision to: <ul style="list-style-type: none"> <li>• Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).</li> </ul>
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);</li> <li>• Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period;</li> <li>• Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes;</li> <li>• Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods;</li> <li>• Make editorial improvements.</li> </ul>
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);</li> <li>• Make editorial improvements.</li> </ul>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		