**Validation report form for renewal of crediting period for CDM project activities**

**(Version 03.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

| BASIC INFORMATION | |
|---|---|
| **Title and UNFCCC reference number of the project activity** | Maracanã Small Hydropower Project<br>UNFCCC reference number 8474 |
| **Number and duration of the next crediting period** | 2nd crediting period , 07/12/2019 to 06/12/2026 |
| **Version number of the validation report** | 1.1 Aa |
| **Completion date of the validation report** | 01/09/2020 |
| **Version number of PDD to which this report applies** | 2.1 |
| **Project participants** | Maracanã Energética S.A.<br>Carbon do Brasil Consultoria Empresarial Ltda. |
| **Host Party** | Brazil |
| **Applied methodologies and standardized baselines** | AMS-I.D Grid connected renewable<br>electricity generation" version 18.0 of 28/11/2014 |
| **Mandatory sectoral scopes** | Sectoral scope 1: Energy industries (renewable-/ non renewable sources |
| **Conditional sectoral scopes, if applicable** | N/A |
| **Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period** | 14,161 $tCO_2e$ |
| **Name and UNFCCC reference number of the DOE** | RINA Services S.p.A. (RINA), UNFCCC reference number of the DOE E-0037 |
| **Name, position and signature of the approver of the validation report** | **Laura Severino** (Authorized officer signing for the DOE)<br>Head of Certification Innovation & Sustainability Unit |

## SECTION A. Executive summary

**>> Purpose and general description**

The Maracanã Small Hydropower Project (hereinafter referred to as “SHPP Maracanã”) will explore the renewable hydrological potential of the Maracanã stream, located in the municipality of Nova Marilândia, on the State of Mato Grosso, Midwest region of Brazil.

The Project has an installed capacity of 10.656 MW and, with an assured energy of 6.96 MW and in the time and it is expected to generate an average of 60,969 MWh per year.

The proposed project activity reduces greenhouse gas emissions (GHG) that would have occurred otherwise in the absence of the project activity by avoiding electricity generation by fossil fuel sources in the grid.

The project’s baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid connected power plants and by the addition of new generation sources.

The project was validated by DET NORSKE VERITAS (validation report N° 2011-0592 issued on 28/11/2012) and it was registered on 07/12/2012 under the CDM registration reference N° 8474.

**Scope of validation**

The objective of the Validation is to have an independent evaluation of the update PDD’s compliance with relevant UNFCCC requirements and host Party criteria to confirm that the original project baseline is still valid or has been updated taking into account of new data where applicable. In particular, the project’s baseline, monitoring plan and the project’s compliance with relevant UNFCCC requirements and host Party criteria are validated in order to confirm the correctness of the application of the approved baseline methodologies for the determination of the continued validity of the baseline/or its update, and estimation of the emission reductions for the applicable crediting period. The validation scope is to review the updated PDD against the UNFCCC criteria for CDM refer to Article 12 of the Kyoto Protocol, and the subsequent decisions by the CDM Executive Board.

**Validation process**

This report summarizes the findings from the validation of the updated PDD of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given by the CDM Validation and Verification Standard, CDM Project Cycle Procedure and CDM Project Standard and included an assessment of: (a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period; (b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions from the applicable crediting period. This validation opinion is also to be seen in conjunction with the validation report at the time of requesting registration for the first crediting period. The Validation Opinion 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 project design.

**Conclusion**

RINA Services S.p.A. (RINA), commissioned by Maracanã Energética S.A., has performed the validation for renewal of the crediting period for the registered project activity Maracanã Small Hydropower Project in Brazil. In conclusion, it is RINA’s opinion that the project meets all the relevant requirements for the renewal of the crediting period.

## SECTION B. Validation team, technical reviewer and approver

### B.1. Validation team member

| No. | Role | L / T | Last name | First name | Affiliation | Involvement in |
|---|---|---|---|---|---|---|

| | | | | | (e.g. name of central or other office of DOE or outsourced entity) | Desk/document review | On-site inspection | Interview(s) | Validation findings |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Team Leader/ validator Technical Expert | IR | Carvalho | Thaís | RINA Brazil | x | x | x | x |

### B.2. Technical reviewer and approver of the validation report for RCP

| No. | Role | Type of resource | Last name | First name | Affiliation (e.g. name of central or other office of DOE or outsourced entity) |
|---|---|---|---|---|---|
| 1. | Technical reviewer | IR | Principe Branco Saettoni | Geisa Maria | RINA Brasil |
| 2. | Approver | IR | Severino | Laura | RINA HO |

## SECTION C. Means of validation

### C.1. Desk/document review

>> The updated PDD version 2.1 of 24/08/2020 and previous version /02/, in particular the applicability of the methodology, the baseline determination, the emission reduction calculations provided in the form of a spreadsheet “CER_JUN1192_rev2.xlsx” and previous version /10/, and the documents listed in the table 3 below, were reviewed during the validation.

### C.2. On-site inspection

| Duration of on-site inspection: N/A | | | | |
|---|---|---|---|---|
| **No.** | **Activity performed on-site** | **Site location** | **Date** | **Team member** |
| 1. | N/A | N/A | N/A | N/A |

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

In addition, audit team has conducted a remote site inspection via videoconference (teams and skype) with PP on different topics as mentioned under section C.3 of this report.
Based on the videoconference, PDD review, as the review of UNFCCC procedures and guidelines, RINA Validation team has proceeded to skip the presential site visit, in line with paragraphs 30 of CDM Validation and Verification Standard for project activities version 02.0 /5/ (also due to the COVID-19 pandemic /30/). Validation team has used the following alternative means for its assessment and to justify that they are sufficient for the purpose of validation.

- By review of PDD;
- 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 PDD. Details of interviewees, topics covered and additional information presented in the above section “C.3 – Interviews”.

Validation team has also checked the site visit requirements mentioned in the VVS for Project Activity version 02.0 /5/ and concluded that no site visit is required. The justification for the site visit requirements of VVS PA version 2.0 /5/ have been mentioned below.

| VVS PA version 2.0 requirements | Validation team justification |
|---|---|
| Para 29 (b)<br><br>(b) Follow-up actions (e.g. on-site inspection and telephone or e-mail interviews), including:<br><br>(i) Interviews with relevant stakeholders in the host country, such as personnel with knowledge of the project design and implementation;<br><br>(ii) Cross checks between the information provided by interviewed personnel (i.e. by checking sources or other interviews) to ensure that no relevant information has been omitted; | Validation team has done the follow-up actions by:<br><br>1. Video call and e-mail conversations of PP.<br>2. Cross checks between information provided by interviewed personnel (i.e. by checking sources or other interviews) to ensure that no relevant information has been omitted.<br><br>11/08/2020: video call at Maracanã SHP:<br>-Implementation and operation of the proposed project activity;<br>-Confirm data used in the ex-ante estimative of CERs calculation<br>-Interviewed key personnel of the plant to confirm the operational and data collection procedures; QA QC procedures<br><br>14/08/2020: video call at substation;<br>- Confirm the energy meters / energy delivered to the grid |
| Para 30<br><br>It is mandatory for the DOE to conduct an on- site inspection at validation for the proposed CDM project activity if:<br><br>(a) Its estimated annual average of GHG emission reductions or net anthropogenic GHG removals is more than 100,000 t $CO_2$ eq; or<br><br>(b) There is pre-project information that is relevant to the requirements for registration of the project activity and may not be traceable after the registration. | The validation team has not considered the site visit as mandatory due to the following reasons which are in line with the VVS PA version 2.0 requirements.<br><br>For the CDM project activity to be renewed, this is not applicable as the estimated annual average of GHG emission reductions is less than 100,000 t $CO_2$ eq.<br><br>Also there is no pre-project information that is relevant to the requirements for renewal of the CDM project activity and may not be traceable after the renewal.<br><br>Hence for the proposed CDM project activity, it is not mandatory to conduct the site visit. |

### C.3. Interviews

| No. | Interviewee | | | Date | Subject | Team member |
|---|---|---|---|---|---|---|
| | Last name | First name | Affiliation | | | |
| 1. | Lima | Paulo Henrique | Maracanã Energética S.A. | 11/08/2020 14/08/2020 | Project implementation; equipments installed, assured energy, energy measurements, calibration requirements; environmental license reservoir area | Thaís Carvalho |
| 2. | Ferreira Junior | Dejair | Maracanã Energética S.A. | 11/08/2020 14/08/2020 | | Thaís Carvalho |
| 3. | Moraes | Arthur | Carbotrader | 11/08/2020 14/08/2020 | PDD, CERs estimative, monitoring description | Thaís Carvalho |

### C.4. Sampling approach

>>N/A

### C.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

| Area of validation findings | No. of CL | No. of CAR | No. of FAR |
|---|---|---|---|
| Compliance with PDD form | | | |
| Application and selection of methodologies and standardized baselines | 1 | | |
| Validity of original baseline or its update | | | |
| Estimated emission reductions or net anthropogenic removals | 2 | | |
| Validity of monitoring plan | 1 | 2 | |
| Crediting period | | | |
| Project participants | | | |
| Post-registration changes | | | |
| Others (please specify)- | | | |
| **Total** | 4 | 2 | 0 |

## SECTION D. Validation findings

### D.1. Compliance with PDD form

| | |
|---|---|
| **Means of validation** | PDD applies the applicable CDM- PDD-FORM: Project design document form version 11.0. /07/ RINA verified that for the renewal crediting period, information transferred to the later valid version of the PDD form is materially the same as that in the registered PDD. |
| **Findings** | N/A |
| **Conclusion** | RINA confirms that the PDD is based on the currently valid CDM-PDD-FORM template version 11.0 and is completed in accordance with the Attachment: Instructions for completing this form /07/ |

## D.2. Application and selection of methodologies and standardized baselines

**Means of validation**

The project was originally registered based on version 17 of the methodology AMS-I.D /09/; the revised PDD /02/ applies AMS-I.D Grid connected renewable electricity generation version 18.0 of 28/11/2014 /06/.

RINA verified that the AMS-I.D is still applicable to the project activity, as it comprises renewable energy generation units (hydro):

(a) Supplying electricity to a national or a regional grid;

The applicability of the methodology is described below:

| **Applicability criteria** | **Project activity** | **Criteria is met?** |
|---|---|---|
| 4. This methodology is applicable to project activities that:<br>(a) Install a Greenfield plant;<br>(b) Involve a capacity addition in (an) existing plant(s);<br>(c) Involve a retrofit of (an) existing plant(s);<br>(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or<br>(e) Involve a replacement of (an) existing plant(s). | RINA verified that the option a) Install a Greenfield power plant is applicable to the project activity | Yes |
| 5. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:<br>(a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir;<br>(b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m2;<br>(c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2. | RINA verified that the project activity is results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2 | Yes |
| 6. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW. | Not applicable. There is no non - renewable components in the project activity | Yes |

| | | | |
|---|---|---|---|
| | | | |
| | 7. Combined heat and power (co-generation) systems are not eligible under this category. | Not applicable, since the project activity has not combined heat and power. | Yes |
| | 8. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units. | Not Applicable, the proposed project activity doesn´t involve addition of renewable energy generation units at an existing renewable power generation facility. | Yes |
| | 9.In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW. | Not applicable, the project is a green field hydropower plant. | Yes |
| | 10. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored. | Not applicable to the project activity, since it does not involve landfill gas, wastewater treatment and agro-industries projects methane recovery | Yes |
| | 11. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply. | Not applicable. The project does not involve dedicated plantations to be used as fuel. | Yes |

This methodology also refers to the latest approved versions of the following tools, that are applicable to the project activity:
- "TOOL07: Tool to calculate the emission factor for an electricity system", version 7.0 /13/;
- "TOOL11: 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 /08/.

Methodology ACM0002 "Grid-connected electricity generation from renewable sources", version 20 of 28/11/2019 /14/ is also used to verify the if project emissions from water reservoirs of hydro power plants needs to be accounted.

| | |
|---|---|
| **Findings** | **CL 1:** Section B.1 of the PDD does not consider the tools and methodology |

| | |
|---|---|
| | ACM0002, applicable to the project activity in accordance with the updated methodology AMS-I.D. To close CL 1, applicable tools and methodology are described in the revised PDD. |
| **Conclusion** | RINA confirms that the selected baseline and monitoring methodologies have been previously approved by the CDM Executive Board and are applicable to the project, which complies with all the applicability conditions therein the selected versions are valid at the time of submission of the renewal of crediting period. It is also confirmed that the methodologies are correctly applied by comparing them with the actual text of the applicable versions. |

## D.3. Validity of original baseline or its update

| | |
|---|---|
| **Means of validation** | The baseline was assessed according to the 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" /08/. The following steps were assessed:<br>***Step 1: Assess the validity of the current baseline for the next crediting period***<br>***Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies****.*<br>In accordance with the AMS-I.D, if the project activity consists of the installation of a greenfield power plant, the baseline scenario is: "that the 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 into the grid".<br>The validity of the current baseline doesn´t need to be updated since still valid and in compliance with relevant mandatory brazilian policies:<br>- Brazilian Resolution #652 of 09/12/2003 from National Electric Energy Agency (ANEEL) for Small Hydro Power Plant; /22/<br>- ONS (Operador Nacional do Sistema Elétrico) module 12 rules/requirements. /20/<br>- CCEE SINERCOM Databank (electricity dispatched to the Grid) /21/<br><br>Rina verified during the remote on-site visit that the following equipment's are installed and operational:<br>**Turbines (2):**<br>Type: Francis, horizontal axis<br>Manufacturer: Hisa<br>Installed capacity: 5,528 kW each<br>Serial number: 2169 and 2170<br><br>**Generators (2):**<br>Type: SPD 800<br>Manufacturer: WEG<br>Installed capacity: 5,920 kVA each (5,328 kW each)<br>Cos φ: 0.9<br>Serial number: 1017043405 and 1017024984<br><br>Moreover, PP has provided the operational license number 313678/2016, valid from 24/10/2016 and its renewal protocol date 18/11/2019 /18/<br><br>**Step 1.2: Assess the impact of circumstances**<br>RINA verified that there are no new relevant national and/or sectoral policies and/or circumstances in the sector applicable to the Project Activity, in comparison to the time of the submission of the project activity for validation, which could impact the validity of the current baseline for the next crediting period. Therefore, the current baseline scenario does not need to be updated for this crediting period.<br><br>**Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which the renewal is requested** |

| | |
|---|---|
| | This step is not applicable, since the project ativity is a Greeenfiel small hydro power plant. In the absence of the project, the electricity would be generated by grid connected power plants. The National Interconnected System (SIN, from the Portuguese "Sistema Interligado Nacional") is composed by more than 7,000 plants and each one has specific characteristics and equipment /15/ . Thus this step does not apply, since the whole system would continue to supply energy independently of the lifetime of individual equipment.<br><br>**Step 1.4: Assessment of the validity of the data and parameters**<br>The baseline emissions of the project activity were updated considering the last version of the methodology and related applicable tools. The parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid. And due to TOOL 7 requirements was included as fixed parameter at the start of the second crediting period the parameter EFBM.<br><br>**Step 2: Update the current baseline and the data and parameters**<br>**Step 2.1: Update the current baseline**<br>The current scenario still valid, thus there is no need to be updated. The baseline emissions for the second crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology AMS-I.D and applicable tools.<br><br>**Step 2.2: Update the data and parameters**<br>The data and/or parameter(s) for the second crediting period were updated. The assessment is described in the sections below, considering the CO2 Emission Factor resulting from the electric energy generation verified in the SIN in Brazil, calculated based on generating records from plants centrally operated by the National Electric System Operator (from Portuguese Operador Nacional do Sistema Elétrico - ONS). The data resultant from the ONS, Ministry of Mines and Energy and Ministry of Science and Technology work, are available to CDM project proponents. Thus, they can be applied in calculating ex-ante emissions avoided by the project activity, where the emission reduction will be ex-post calculated. |
| **Findings** | N/A |
| **Conclusion** | RINA verified that the baseline was assessed according to the 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" /08/. The current project baseline is still valid at the renewal crediting period. |

## D.4. Estimated emission reductions or net anthropogenic removals

| | |
|---|---|
| **Means of validation** | The approved baseline and monitoring AMS-I.D Grid connected renewable electricity generation version 18.0 of 28/11/2014 /06/ has been applied.<br><br>Data and parameters fixed ex-ante: |

| Data/parameter / unit | Value applied | Assessment |
|---|---|---|
| $Cap_{BL}$ (W) Installed capacity of the hydro power plant before the implementation of the project activity | 0 | In accordance with the methodology ACM0002, for new hydro power plants, this value is zero. /14/ |

| | | |
|---|---|---|
| $A_{BL}$ ($m^2$) 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. | 0 | In accordance with the methodology ACM0002, for new reservoirs, this value is zero. /14/ |
| $EF_{grid,BM,y}$ (tCO2e/MWh): CO2 Build Margin emission factor of the grid, in a year y | 0.1370 | Data provided by DNA (Designated National Authority) to the year *y*. RINA verified that data for the year 2018 is applied, since it is the latest data available at the time of PDD was submitted to validation of renewal crediting period. /16/ |

## Emission Reduction

Emission reductions are calculated as follows:
$ER_y = BE_y – PE_y$,

Where:
$ER_y$ = Emission reductions in year y ($tCO_2e/yr$);
$BE_y$ = Baseline emissions in year y ($tCO_2e/yr$);
$PE_y$ = Project emissions in year y ($tCO_2e/yr$);

(Leakage is not applicable to the project activity)

**Project emissions**:
In accordance with the applied methodology, for most renewable energy project activities, PEy = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of "ACM0002: Grid-connected electricity generation from renewable sources":
(b) Emissions from water reservoirs of hydro power plants.

In accordance with ACM0002:
a) If the power density of the project activity using) is greater than 4 W/m2 and less than or equal to 10 W/m2 :

$PE_{HP,y} = EF_{Res} \times TEGy$ /1000

Where:
$PE_{HP,y}$= Emission from water reservoirs (tCO2e/yr);
$EF_{Res}$ =Default emission factor for emissions from reservoirs of hydro power plants in year y (kgCO2e/MWh).
$TEG_y$ =Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y* (MWh).

b) If power density of project is greater than 10 W/m2:
$PE_{HP,y} = 0$

The power densities of the project activity are calculated as follows:
$PD = Cap_{PJ} - Cap_{BL} / A_{PJ} – A_{BL}$

Where:
PD = Power density of the project activity, as W/m2;
$Cap_{PJ}$ = Installed capacity of the hydroelectric plant after implementation of the project

activity (W);
$Cap_{BL}$ = Installed capacity of the hydroelectric plant before implementation of the project activity
(W). For new hydroelectric power plants, this value is zero;
$A_{PJ}$ = Reservoir area measured at the surface of the water, after implementation of the project activity when the reservoir is full (m2);
$A_{BL}$ = Reservoir area measured at the surface of the water, before implementation of the project activity when the reservoir is full (m2). For new reservoirs, this value is zero;
$Cap_{PJ}$ (W)= 10,656,00 (RINA confirmed in the generator' plate, during the remote onsite visit)
$A_{PJ}$ ($km^2$)= 318,000 (The reservoir area is confirmed in the ANEEL Basic project as build data sheet /17/)
PD ($W/m^2$)= 33.51

Therefore, project emissions from the resevoir is equal 0.

**Baseline emissions**:

Baseline emissions include only CO2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

$BE_y$= Baseline emissions in year y (t CO2/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of "TOOL07: Tool to calculate the emission factor for an electricity system" (t CO2/MWh)

If the project activity is the installation of a Greenfield power plant, then:

$EG_{PJ,y} = EG_{facility,y}$

Where:

$EG_{PJ,y}$ =Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{facility,y}$= Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

RINA verified that for the ex-ante estimative, the assured energy described in the registered PDD is used /01/ equal 60,969 MWh/yr (rownded down)

For the combined emission factor, data is provided by the Brazilian DNA /16/, in accordance with the requirements of the tool /13/, as described below.

**STEP 1: Identify the relevant electricity system**

The Brazilian DNA published a Resolution #08, issued on 26th May, 2008, defines the Brazilian Interconnected Grid as a single system that covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest) /11/

**STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)**

The Brazilian DNA is responsible for calculating the emission factors and it did not include off-grid power plants in the calculation, therefore Option I is used:Only grid power plants are included in the calculation;

**STEP 3: Select a method to determine the operating margin (OM)**

The Brazilian DNA is responsible for calculating the OM emission factor in Brazil. It uses the method c) Dispatch data analysis OM.
For the dispatch data analysis OM, it is necessary to use the year in which the project activity displaces grid electricity and to update the emission factor annually during monitoring.

**Step 4: Calculate the operating margin emission factor according to the selected method**

$$EF_{grid,OM-DD,y} = \frac{\sum_{m} EG_{PJ,h} \times EF_{EL,DD,h}}{EG_{PJ,y}}$$

Where:

$EF_{grid,OM-DD,y}$ = Dispatch data analysis operating margin CO2 emission factor in year y (tCO2/MWh)

$EG_{PJ,h}$ = Electricity displaced by the project activity in hour h m of year y (MWh)

$EF_{EL,DD,h}$ = CO2 emission factor for power units in the top of the dispatch order in hour h in year y (tCO2/MWh)

$EG_{PJ,y}$ = Total electricity displaced by the project activity in year y (MWh)

h = hours in year y in which the project activity is displacing grid electricity

y = Year in which the project activity is displacing grid electricity

For the ex-ante estimative, data for 2019 was used $EF_{grid,OM-DD,y}$= 0.5181 tCO2/MWh (latest data available) /16/.

**Step 5. Calculate the build margin (BM) emission factor**

For data vintage, Option 1 (ex-post) was chosen for the proposed project in the first crediting period. Therefore, 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. Latest data available at the time PDD was submitted to DOE for starting of the validation is from 2018, thus $EF_{grid,BM,y}$ = 0.1370 tCO2 /MWh /16/

**Step 6: Calculate the Combined Margin emission factor**

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

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

According with the Tool, values adopted for $w_{OM}$ and $w_{BM}$ in the second crediting period is equal $w_{OM}$= 0.25 and $w_{BM}$=0.75.

$EF_{grid,CM,y}$ = 0.25 * 0.5181 + 0.75 * 0.1370 $tCO_2e$/MWh
$EF_{grid,CM,y}$ = 0.23227 $tCO_2e$/MWh

The ex-ante estimative for the crediting period is described in the table below (rounded down)

| Year | Baseline emissions (t $CO_2e$) | Project emissions (t $CO_2e$) | Leakage (t $CO_2e$) | Emission reductions (t $CO_2e$) |
|---|---|---|---|---|
| 2019 Dec | 889 | 0.0 | 0.0 | 889 |
| 2020 | 14,161 | 0.0 | 0.0 | 14,161 |
| 2021 | 14,161 | 0.0 | 0.0 | 14,161 |
| 2022 | 14,161 | 0.0 | 0.0 | 14,161 |
| 2023 | 14,161 | 0.0 | 0.0 | 14,161 |
| 2024 | 14,161 | 0.0 | 0.0 | 14,161 |
| 2025 | 14,161 | 0.0 | 0.0 | 14,161 |
| 2026 Dec | 13,272 | 0.0 | 0.0 | 13,272 |
| **Total** | **99,127** | **0.0** | **0.0** | **99,127** |
| **Total number of crediting years** | 7 | | | |
| **Annual average over the crediting period** | **14,161** | **0.0** | **0.0** | **14,161** |

| | |
|---|---|
| **Findings** | **CL 2**: name of the parameters "$Cap_{Maracanã,y}$" and "$A_{Maracanã,y}$" are not in accordance with the methodology and parameters described in the section B.6.1 of the PDD<br><br>**CL 3**: Data for the emission factor is not the latest data available ($EF_{grid,OM-DD,y}$). Moreover, PDD does not describe the emission factor calculation in the section B.6.1. |
| **Conclusion** | It is RINA's opinion:<br>(a) All assumptions and data used by the PP are listed in the PDD;<br>(b) All documentation used by the PP as the basis for assumption and source of data is correctly quoted and interpreted in the PDD /01/ /06/ /08/ /09/ /10/ /11/ /13/ /14/ /16/ /18/ ;<br>(c) All values used in the PDD and CERs spreadsheet. including GWPs are considered reasonable in the context of the proposed project activity /10/;<br>(d) The baseline methodology and methodological tools have been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions; /01/ /06/ /08/ /09/ /10/ /11/ /13/ /14/ /16/ /18/ ;<br>(e) All estimates of the baseline and project emissions can be replicated using the data and parameters values provided in the PDD and CERs spreadsheet. |

## D.5. Validity of monitoring plan

| | |
|---|---|
| **Means of validation** | The approved baseline and monitoring AMS-I.D Grid connected renewable electricity generation version 18.0 of 28/11/2014 /06/ has been applied.<br><br>The assessment of the ex-post parameters are described in the table below: |

| Parameter | Description/Assessment |
|---|---|
| $EG_{facility,y}$ (MWh/yr): Quantity of net electricity generation supplied by the project plant/unit to the grid in year y. | Value applied: 60,969. RINA verified that for ex-ante estimative the assured energy provided by ANEEL described in the registered PDD /01/ is used. Parameter will be monitored in accordance with the applied methodology, using bi-direcional meters. Parameter is continuous monitoring, hourly measurement and at least monthly recording. Calibration will be performed in accordance with National System Operator (Operador Nacional do |

| | | |
|---|---|---|
| | | Sistema – ONS) regulations |
| | $EF_{grid,CM,y}$ (tCO2e/MWh): 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". | Value applied: 0.23227<br>RINA verified that data is in accordance with latest data available by the Brazilian DNA /16/. For Combined Margin Emission Factor, it was used OM data of 2019, considering latest data available by the Brazilian DNA and BM data ffrom 2018, latest data available by Brazilian DNA at the time PDD was submitted to DOE for starting of the validation. |
| | $EF_{grid,OM-DD,y}$ ((tCO2e/MWh): CO2 Operating Margin emission factor of the grid, in a year y | Value applied: 0.5181<br>RINA verified that data is in accordance with latest data available by the Brazilian DNA /16/. This data will be annually updated |
| | $A_{PJ}$ ($m^2$): 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. | Value applied: 318,000. RINA verified that the value described in the PDD is in accordance with the ANEEL Basic project as build data sheet /17/. Parameter is determined once at the beginning of each crediting period |
| | $Cap_{PJ}$ (W): Installed capacity of the hydro power plant after the implementation of the project activity | Value applied: 10,656,000 in accordance with the generator's manufacturer specification, confirmed during the remote onsite visit. Parameter is determined once at the beginning of each crediting period. |
| | | |

**Management system and quality assurance**

An remote onsite inspection has been performed on 11/08/2020 and it is confirmed that the monitoring arrangements in the monitoring plan are feasible within the project design. Moreover on 14/08/2020 an remote on site visit was performed in the substation, to confirm the nergy meters installed. The monitoring is based only on data measured. PDD describes the accuracy and calibration periodicity of the monitoring equipments. The updated PDD /02/ describes that data will be kept for 2 years after the last credit issuance.

All the procedures for measuring the electricity are defined by ONS according to "Module 12" of the Grid Procedures document, which provides for measurements with invoice purposes aiming to establish the responsibilities, systematic and deadlines for the development of projects under the Measurements with Invoice Purposes System ("Sistema de Medição para Faturamento" – SMF), for the maintenance and inspection of the system and for SMF standard meter readings and certification. The established procedures reflect good monitoring and reporting practices. ONS also establishes the calibration frequency of the energy meters.

| | |
|---|---|
| **Findings** | **CAR 1**: The description of the parameter $EG_{facility,y}$ ($EG_{BL,y}$) is not in accordance with the methodology. Moreover, the measurement methods described are not in line with the requirements of the updated methodology:<br>This parameter should be either monitored using bi-directional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured: |

| | |
|---|---|
| | (a) The quantity of electricity supplied by the project plant/unit to the grid;<br>and<br>(b) The quantity of electricity delivered to the project plant/unit from the grid.<br>To close CAR 1, PP clarified that meters are bi-direcional.<br><br>**CAR 2**: the frequency of monitoring of the parameter $EG_{facility,y}$ is not in accordance with the methodology requirements: Continuous monitoring, hourly measurement and at least monthly recording.To close CAR 2, PDD was revised in accordance with methodology.<br><br>**CL 4**: PP is requested to clarify the calibration period described in the PDD in accordance with the ONS procedures. To close CL 4, PDD was revised. |
| **Conclusion** | It is RINA's opinion that the monitoring plan is in accordance with the monitoring methodology; the monitoring plan will give opportunity for real measurement of achieved emission reductions. RINA has checked all the parameters presented in the monitoring plan against the requirements of the methodology and methodological tools; no deviations relevant to the project activity have been found in the plan.<br>RINA confirms that the monitoring arrangements described in the monitoring plan, including the data management and quality assurance and quality control procedures, are feasible within the project design, and the means of implementation of the monitoring plan are sufficient to ensure the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified |

## D.6. Crediting period

| | |
|---|---|
| **Means of validation** | The last day of the 1st crediting period is 06/12/2019.The second crediting period starts on the day immediately after the expiration of the current crediting period, on 07/12/2019. |
| **Findings** | N/A |
| **Conclusion** | RINA confirmed that the second crediting period of the registered CDM project activity commences on the day immediately after the expiration of the current crediting period. |

## D.7. Project participants

| | |
|---|---|
| **Means of validation** | RINA verified that the project participants listed in the PDD are in accordance with project information in the UNFCCC web page: Maracanã Energética S.A. and Carbon do Brasil Consultoria Empresarial Ltda. |
| **Findings** | N/A |
| **Conclusion** | RINA verified that the project participant included in the updated PDD is consistent with the name of the project participant in the project view page. |

## D.8. Post-registration changes

| Type of post-registration changes (PRCs) | Confirmation (Y/N) | Validation report for PRCs | |
|---|---|---|---|
| | | Version | Completion date |
| Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents[1] | N | | |
| Corrections | N | | |
| Change to the start date of the crediting period | N | | |
| Inclusion of a monitoring plan | N | | |
| Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents | N | | |
| Changes to the project design | N | | |
| Changes specific to afforestation and reforestation project activities | N | | |

## SECTION E. Internal quality control

>> The draft final revision of the validation opinion report before being submitted to UNFCCC for request of renewal of crediting period were subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions.
The technical review is performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for CDM validation and verification.

## SECTION F. Validation opinion

>> RINA Service Spa (RINA) has performed a validation of the updated PDD for the project activity "Maracanã Small Hydropower Project" in Brazil, CDM Registration Reference N° 8474. The validation of the updated PDD has performed for the second renewal crediting period (from 07/12/2019 to 06/12/2026) and is based on the information made available to us.

RINA has performed this validation in accordance with CDM validation and verification standard for project activities version 02.0 of 29/11/2018 and included an assessment of:

- An impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period:
- The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

During the validation, there are not proposed post-registration changes for the next crediting period that is submitted together with the request for renewal of crediting period of the registered CDM project activity.

The review of the PDD version 2.1 of 24/08/2020 and the subsequent follow-up interviews have provided RINA with sufficient evidence to determine the validity of the original baseline scenario. The project correctly applies the baseline and monitoring methodology AMS-I.D Grid connected renewable

electricity generation version 18.0 of 28/11/2014. The total emission reductions from the Maracanã Small Hydropower Project are estimated to be on an average 14,161 tCO2e $tCO_2e$ per year over the selected 7 years renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

It is RINA's opinion that the project "Maracanã Small Hydropower Project" in Brazil meets all the relevant requirements for the renewal of the crediting period. Hence RINA requests the renewal of the crediting period of the project activity**.**

[1] Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

# Appendix 1. Abbreviations

| Abbreviations | Full texts |
|---|---|
| BE | Baseline Emissions |
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CDM M&P | Modalities and Procedures CDM |
| CER(s) | Certified Emission Reduction(s) |
| $CH_4$ | Methane |
| CL | Clarification Request |
| $CO_2$ | Carbon dioxide |
| $CO_2e$ | Carbon dioxide equivalent |
| CRT | Coordination and Technical Control Staff |
| DCI | Certification Division of RINA Services Spa |
| DNA | Designated National Authority |
| DOE | Designated Operational Entity |
| EB | Executive Board |
| ER | Emission Reductions |
| FAR | Forward Action Request |
| GHG(s) | Greenhouse gas(es) |
| GWP | Global Warming Potential |
| IPCC | Intergovernmental Panel on Climate Change |
| LoA | Letter of Approval |
| MoV | Means of Verification |
| MR | Monitoring Report |
| NGO | Non-governmental Organization |
| ODA | Official Development Assistance |
| PDD | Project Design Document |
| PE | Project Emission |
| PP(s) | Project Participant(s) |
| Ref. | Document Reference |
| RINA | RINA Services Spa |
| SS(s) | Sectoral Scope(s) |
| TA(s) | Technical Area(s) |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VVS | Validation and Verification Standard |

# Appendix 2. Competence of team members and technical reviewers

CERTIFICATO DI QUALIFICA
*QUALIFICATION CERTIFICATE*

| | |
|---|---|
| Si attesta che il sig./sig.ra:<br>*We declare that Mr/Mrs/Ms:* | Thais DE LIMA CARVALHO |
| è qualificato come[1]:<br>*is qualified as:* | CDM -TEC, -VAL, -VER, -TL<br>ITRP, REG-EXP[2] |
| per le seguenti aree tecniche:<br>for the following technical areas: | 1.1, 1.2, 2.1, 13.1 |

| AREE TECNICHE<br>TECHNICAL AREAS | DESCRIZIONE DELL'AREA TECNICA<br>*TECHNICAL AREA DESCRIPTION* | SCOPO SETTORIALE<br>*SECTORAL SCOPE* |
|---|---|---|
| 1.1 | Thermal energy generation | 1 |
| 1.2 | Renewables | 1 |
| 2.1 | Electricity distribution | 2 |
| 13.1 | Solid waste and wastewater | 13 |

in accordo alle istruzioni della Unità Certification Innovation and Sustainability.
*in accordance with the instructions of the Certification Innovation and Sustainability Unit*

| REVISIONE<br>*REVISION* | DATA<br>*DATE* | MOTIVAZIONI PER LA REVISIONE<br>*REASON FOR THE REVISION* |
|---|---|---|
| 0 | 19-08-2009 | - |
| 13 | 31-03-2017 | Added qualification as ITRP |
| 14 | 20-07-2018 | Added qualification as REG-EXP |
| 15 | 15/11/2019 | Update qualification with "Sampling and surveys for CDM PAs and PoAs" |

Il Resp. CEINS
*Head of CEINS*

[1] Legend:

| | | | |
|---|---|---|---|
| VAL: | Validator | CDM: Clean Development Mechanism | |
| VER: | Verifier | VCS : Verified Carbon Standard: | |
| TEC: | Technical Expert | GS: Gold Standard | |
| TL: | Team Leader | SCS: SocialCarbon Standard | |
| FIN-EXP: | Financial Expert | JI: Joint Implementation | |
| DET: | Determiner | | |

[2] Argentina, Mexico, Panama, Colombia, Dominican Republic, Honduras, Ecuador, Chile, Cape Verde

RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologica Institute per condurre la Validazione e la Verifica di rapporti SCS

*RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologica Institute, to carry out Validation and Verification of SCS Reports*

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# CERTIFICATO DI QUALIFICA
## *QUALIFICATION CERTIFICATE*

Si attesta che il sig./sig.ra: **Geisa Maria Principe BRANCO SAETTONI**

*We declare that Mr/Mrs/Ms:*

è qualificato come[1]: **CDM-TEC, VAL, VER, TL, ITRP, REG-EXP[2]**
*is qualified as:*

per le seguenti aree tecniche: **1.1, 1.2, 13.1**
for the following technical areas:

| AREE TECNICHE<br>TECHNICAL AREAS | DESCRIZIONE DELL'AREA TECNICA<br>*TECHNICAL AREA DESCRIPTION* | SCOPO SETTORIALE<br>*SECTORAL SCOPE* |
|---|---|---|
| 1.1 | Thermal Energy generation | 1 |
| 1.2 | Energy generation from renewable energy sources | 1 |
| 13.1 | Waste Handling and Disposal | 13 |

in accordo alle istruzioni della Unità Certification Innovation and Sustainability.
*in accordance with the instructions of the Certification Innovation and Sustainability Unit.*

| REVISIONE<br>*REVISION* | DATA<br>*DATE* | MOTIVAZIONI PER LA REVISIONE<br>*REASON FOR THE REVISION* |
|---|---|---|
| 0 | 27-08-2009 | - |
| 10 | 31-03-2017 | Added qualification as ITRP |
| 11 | 07/12/2018 | Added qualification as REG-EXP |
| 12 | 15/11/2019 | Update qualification with "Sampling and surveys for CDM PAs and PoAs" |

Il Resp. CEINS
*Head of CEINS*

[1] Legend:

| | | |
|---|---|---|
| VAL: | Validator | CDM: Clean Development Mechanism |
| VER: | Verifier | VCS : Verified Carbon Standard: |
| TEC: | Technical Expert | GS: Gold Standard |
| TL: | Team Leader | SCS: SocialCarbon Standard |
| FIN-EXP: | Financial Expert | JI: Joint Implementation |
| DET: | Determiner | |

[2] Argentina, ,Perù, Colombia, Mexico, Honduras, Panama, Dominican Republic, Guatemala

RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologica Institute per condurre la Validazione e la Verifica di rapporti SCS

*RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologica Institute, to carry out Validation and Verification of SCS Reports*

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# Appendix 3. Documents reviewed or referenced

| No. | Author | Title | References to the document | Provider |
|---|---|---|---|---|
| 1 | Maracanã Energética S.A. | CDM-PDD for project activity "Maracanã Small Hydropower Project" in Brazil | Version 03 of 17/09/2015 (first crediting period) | PP |
| 2 | Maracanã Energética S.A. | CDM-PDD updated for the third crediting period "Maracanã Small Hydropower Project". | version 01 of 07/07/2020<br>version 2.0 of 20/08/2020<br>version 2.1 of 24/08/2020 | PP |
| 3 | CDM Executive Board | CDM project cycle procedure for project activities | version 02.0 of 29/11/2018 | Other |
| 4 | CDM Executive Board | CDM project standard for project activities | version 02.0 of 29/11/2018 | Other |
| 5 | CDM Executive Board | CDM validation and verification standard for project activities | version 02.0 of 29/11/2018 | Other |
| 6 | CDM Executive Board | Baseline and monitoring methodology AMS-I.D Grid connected renewable electricity generation | version 18.0 of 28/11/2014 | Other |
| 7 | CDM Executive Board | CDM-PDD-FORM: Project design document form, including its Attachment: Instructions for completing this form | Version 11 of 31/05/2019 | Other |
| 8 | CDM Executive Board | CDM Executive Board: TOOL 11: "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period' | version 03.0.1 of 02/03/2012 | Other |
| 9 | CDM Executive Board | Baseline and monitoring methodology AMS-I.D Grid connected renewable electricity generation | Version 17 (1st crediting period) | Other |
| 10 | Maracanã Energética S.A. | CERs spreadsheet "CER_JUN1192_rev1.xlsx"<br><br>"CER_JUN1192_rev2.xlsx" | Version 1 of 07/07/2020<br><br>Version 2 of 24/08/2020 | PP |
| 11 | MCTI-Brazilian DNA | Resolution number 8, that defines the grid for CDM project | 26/05/2008 | Other |
| 12 | DET NORSKE VERITAS | Validation report number NO. 2011-0592 for the project Maracanã Small Hydropower Project, | version 02a dated 28/11/2012 | Other |
| 13 | CDM Executive Board | TOOL 7: "Tool to calculate the emission factor for an electricity system | Version 7 of 31/08/2018 | Other |
| 14 | CDM Executive Board | ACM0002 "Grid-connected electricity generation from renewable sources" | version 20 of 28/11/2019 | Other |

| | | | | |
|---|---|---|---|---|
| 15 | ANEEL | Installed capacity and power plants: http://www2.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.cfm | Accessed on 06/08/2020 | Other |
| 16 | MCTI (Brazilian DNA) | Emission factor data: http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html | Accessed on 05/08/2020 | Others |
| 17 | ANEEL | Basic project as build data sheet (FichaResumo PB PCH Maracanã-.pdf) | 14/03/2014 | PP |
| 18 | SEMA/MT | operational license number 313678/2016, valid from 24/10/2016 and its renewal protocol date 18/11/2019 (LO - PCH MARACANÃ.PDF; MR2019.11.18_Of_149154_SEMA_Vigencia_L.O..pdf) | 24/10/2016<br>18/11/2019 | PP |
| 19 | ONS | Grid Procedures: Module 12. Procedure for energy meter class: Sub-module 12.2 v2019.08. Available at: http://www.ons.org.br/%2FProcedimentosDeRede%2FMódulo%2012%2FSubmódulo%2012.2%2FSubmódulo%2012.2%202019.08.pdf. Procedure for calibration: Sub-module 12.3 v2016.12. Available at: http://www.ons.org.br/%2FProcedimentosDeRede%2FMódulo%2012%2FSubmódulo%2012.3%2FSubmódulo%2012.3%202016.12.pdf. | 04/09/2019<br><br>16/12/2016 | Other |
| 20 | National Electric System Operator (ONS) | Web site available at http://www.ons.org.br | Accessed on 18/08/2020 | Other |
| 21 | The Chamber of Electrical Energy Commercialization (CCEE) | Operator of Brazilian electric energy market web site, available at: https://www.ccee.org.br/. | Accessed on 18/08/2020 | other |
| 22 | ANEEL | Resolution #652 of 09/12/2003 for Small Hydro Power Plants | - | Other |

# Appendix 4. Clarification requests, corrective action requests and forward action requests

**Table 1. CL from this validation**

| **CL ID** | 1 | **Section no.** | D.2 | **Date:** 18/08/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| Section B.1 of the PDD does not consider the tools and methodology ACM0002, applicable to the project activity in accordance with the updated methodology AMS-I.D. | | | | |
| **Project participant response** | | | | **Date:** 24/08/2020 |
| *Section B.1 was adjusted accordingly on PDD version 2.* | | | | |

| **Documentation provided by project participant** | |
|---|---|
| *Revised PDD* | |
| **DOE assessment** | **Date:** 25/08/2020 |
| RINA verified that the tools were revised in accordance with applicable methodology.<br>This CL is closed | |

| **CL ID** | 2 | **Section no.** | D.4 | **Date:** 18/08/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| Name of the parameters "$Cap_{Maracanã,y}$" and "$A_{Maracanã,y}$" are not in accordance with the methodology and parameters described in the section B.6.1 of the PDD | | | | |
| **Project participant response** | | | | **Date:** 24/08/2020 |
| *The name of the parameters* "$Cap_{Maracanã,y}$" and "$A_{Maracanã,y}$" *were adjusted accordingly in the Section B.6.2.* | | | | |
| **Documentation provided by project participant** | | | | |
| *Revised PDD* | | | | |
| **DOE assessment** | | | | **Date:** 25/08/2020 |
| RINA verified that the parameters were revised in accordance with the applicable methodology.<br>This CL is closed | | | | |

| **CL ID** | 3 | **Section no.** | D.4 | **Date:** 18/08/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| Data for the emission factor is not the latest data available ($EF_{grid,OM-DD,y}$). Moreover, PDD does not describe the emission factor calculation in the section B.6.1. | | | | |
| **Project participant response** | | | | **Date:** 24/08/2020 |
| *Data for the emission factor* $EF_{grid,OM-DD,y}$ *was updated to 2019 year.The description of the emission factor calculation was included in the Section B.6.1.* | | | | |
| **Documentation provided by project participant** | | | | |
| *Revised PDD and CERs spreadsheet* | | | | |
| **DOE assessment** | | | | **Date:** 25/08/2020 |
| RINA verified that the documents were correctly revised.<br>This CL is closed | | | | |

| **CL ID** | 4 | **Section no.** | D.5 | **Date:** 18/08/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| PP is requested to clarify the calibration period described in the PDD in accordance with the ONS procedures. | | | | |
| **Project participant response** | | | | **Date:** 24/08/2020 |
| PDD was revised | | | | |
| **Documentation provided by project participant** | | | | |
| *Revised PDD* | | | | |
| **DOE assessment** | | | | **Date:** 25/08/2020 |
| RINA verified that PDD was correctly revised. Calibration will follow the ONS procedures.<br>This CL is closed | | | | |

**Table 2. CAR from this validation**

| **CAR ID** | 1 | **Section no.** | D.5 | **Date:** 18/08/2020 |
|---|---|---|---|---|
| **Description of CAR** | | | | |

| |
|---|
| The description of the parameter $EG_{facility,y}$ ($EG_{BL,y}$) is not in accordance with the methodology. Moreover, the measurement methods described are not in line with the requirements of the updated methodology:<br>This parameter should be either monitored using bi-directional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured:<br>(a) The quantity of electricity supplied by the project plant/unit to the grid;<br>and<br>(b) The quantity of electricity delivered to the project plant/unit from the grid. |
| **Project participant response** **Date:** 24/08/2020 |
| *The description of the parameter* $EG_{facility,y}$ *was adjusted accordingly in the Section B.7.1. Also was highlighted that the meters are bi-directionals.* |
| **Documentation provided by project participant** |
| Revised PDD |
| **DOE assessment** **Date:** 25/08/2020 |
| RINA verified that the revised PDD is in accordance with methodology requirements.<br>This CAR is closed |

| | | | | |
|---|---|---|---|---|
| **CAR ID** | 2 | **Section no.** | D.5 | **Date:** 18/08/2020 |
| **Description of CAR** | | | | |
| The frequency of monitoring of the parameter $EG_{facility,y}$ is not in accordance with the methodology requirements: Continuous monitoring, hourly measurement and at least monthly recording. | | | | |
| **Project participant response** | | | | **Date:** 24/08/2020 |
| *The monitoring frequency was adjusted accordingly in the Section B.7.1 parameter* $EG_{facility,y.}$ | | | | |
| **Documentation provided by project participant** | | | | |
| Revised PDD | | | | |
| **DOE assessment** | | | | **Date:** 25/08/2020 |
| RINA verified that the revised PDD is in accordance with methodology requirements.<br>This CAR is closed | | | | |

**Table 3. FAR from this validation**

| | | | | |
|---|---|---|---|---|
| **FAR ID** | xx | **Section no.** | | **Date:** DD/MM/YYYY |
| **Description of FAR** | | | | |
| *N/A* | | | | |
| **Project participant response** | | | | **Date:** DD/MM/YYYY |
| | | | | |
| **Documentation provided by project participant** | | | | |
| | | | | |
| **DOE assessment** | | | | **Date:** DD/MM/YYYY |
| | | | | |

- - - - -

## Document information

| *Version* | *Date* | *Description* |
|---|---|---|
| 03.0 | 31 May 2019 | Revision to:<br>• Ensure consistency with version 02.0 of the "CDM validation and verification standard for project activities" (CDM-EB93-A05-STAN) and version 02.0 of the "CDM project cycle procedure for project activities" (CDM-EB93-A06-PROC);<br>• Make editorial improvements. |
| 02.0 | 31 October 2017 | Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0). |
| 01.0 | 23 March 2015 | Initial publication. |

Decision Class: Regulatory
Document Type: Form
Business Function: Renewal of crediting period
Keywords: crediting period, project activities, validation report