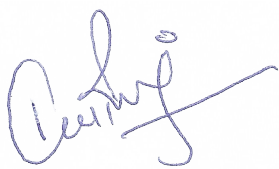




**Validation report form for renewal of crediting period for  
CDM project activities  
(Version 03.0)**

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

**BASIC INFORMATION**

<b>Title and UNFCCC reference number of the project activity</b>	Amaime Minor Hydroelectric Power Plant UNFCCC #: 2600
<b>Number and duration of the next crediting period</b>	2 <sup>nd</sup> crediting period 18/11/2017 – 17/11/2024
<b>Version number of the validation report</b>	1
<b>Completion date of the validation report</b>	24/10/2019
<b>Version number of PDD to which this report applies</b>	03
<b>Project participants</b>	Empresa de Energía del Pacífico S.A. E.S.P. (EPSA S.A. E.S.P.)
<b>Host Party</b>	Colombia
<b>Applied methodologies and standardized baselines</b>	ACM0002 - Large-scale Consolidated Methodology - Grid-connected electricity generation from renewable sources (version 19.0)
<b>Mandatory sectoral scopes</b>	1 : Energy industries (renewable - / non-renewable sources)
<b>Conditional sectoral scopes, if applicable</b>	N/A
<b>Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period</b>	22,470 tCO <sub>2</sub> e
<b>Name and UNFCCC reference number of the DOE</b>	Earthood Services Private Limited UNFCCC Ref. Number: E-0066
<b>Name, position and signature of the approver of the validation report</b>	 Dr. Kaviraj Singh Managing Director

## SECTION A. Executive summary

### Brief summary of the project activity

The project activity consists the operation of one small hydro power plant with 21.34 MW of installed capacity located in the Amaime River, Municipalities of Palmira and Cerrito, Department of Cauca Valley, Colombia (geographical coordinates: latitude: 03°36'33.84" N and longitude: 76°10'03" W).

The plant is connected to the Colombian National Interconnected System (SIN) by Amaime Substation.

#### Technical description and equipment:

##### Turbines:

<b>Characteristic</b>	<b>UNIT</b>	<b>value</b>
<b>Quantity</b>	Un	2
<b>Brand</b>	-	Andritz Hydro
<b>Type</b>	-	Francis Horizontal
<b>Year</b>	-	2009
<b>Head (design)</b>	m	195.98
<b>Flow</b>	m <sup>3</sup> /s	6
<b>Power</b>	kW	10,670 each

##### Generators:

<b>Characteristic</b>	<b>UNIT</b>	<b>value</b>
<b>Quantity</b>	Un	2
<b>Brand</b>	-	Indar
<b>Type</b>	-	Synchronous
<b>Serial Number</b>	#	3010000148 3010000149
<b>RPM</b>	rpm	720
<b>Power factor</b>	-	0.9
<b>Power</b>	kVA	11,513

Total installed capacity of the hydropower plant: 21.34 MW.

The lifetime of the main equipment is 50 years as per evidence provided<sup>/16/</sup>.

The estimated ERs of the project activity is 22,470 tCO<sub>2</sub>e/y and 157,294 tCO<sub>2</sub>e for the entire crediting period.

### Scope of validation

EPSA S.A. E.S.P has contracted ESPL to conduct the validation of the renewal of the crediting period of the project activity "Amaime Minor Hydroelectric Power Plant".

The scope of the validation is to establish that:

- the PA is in accordance with all relevant CDM rules and requirements;
- the PA is in accordance with conditions of the latest version of applied methodology ACM0002: Grid connected electricity generation from renewable sources --- Version 19.0;
- the validation of the renewal of crediting period is in accordance with requirements of CDM methodological tool "TOOL11 – 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.

### Validation process

The validation process involved the following:

- contract with EPSA S.A. E.S.P. for the scope of validation of the renewal of the crediting period of the project activity;
- desk review;
- physical on-site inspection;
- issuance of validation findings;
- reporting, calculation checks, QA/QC and resolution of findings;
- issuance of draft validation report;
- independent technical review of the project documentation;
- issuance of the final validation report;
- submission of the request for renewal, as appropriate.

## Conclusion

ESPL has performed the validation of the renewal of the crediting period of the CDM PA “Amaime Minor Hydroelectric Power Plant” (UNFCCC Ref. Number: 2600) for the 2<sup>nd</sup> crediting period.

The validation team has confirmed that it is in accordance with all relevant CDM rules and requirements and conditions of the latest version of applied methodology ACM0002 – version 19.0. In addition, it was confirmed that the monitoring system is feasible and the estimated emission reductions are conservatively calculated.

The PA is expected to generate an annual average of 22,470 tCO<sub>2</sub>e in the second crediting period.

A site visit has been performed for the validation of the renewal of the crediting period in 30 and 31/08/2019. Therefore, the request for renewal of the crediting period of the PA is being submitted in accordance with the CDM procedures.

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

### B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader	OR	Sebben	Marcelo	Verifit	Y	Y	Y	Y
2.	Local Expert	OR	Lopes	Ricardo	Verifit	Y	N	N	Y
3.	Methodological Expert	OR	Sebben	Marcelo	Verifit	Y	Y	Y	Y
4.	Technical Expert	OR	Sebben	Marcelo	Verifit	Y	Y	Y	Y

### 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	Gupta	Anshika	Central Office
2.	Technical Expert	IR	Gupta	Anshika	Central Office
3.	Approver	IR	Singh	Kaviraj	Central Office

**SECTION C. Means of validation****C.1. Desk/document review**

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

- a. a review of the data and information presented to assess its completeness;
- b. a review of the registered project activity, the applied methodology including applicable tool(s) and, where applicable, the applied standardized baseline;
- c. a review of supporting documents.

A complete list of documents/evidences reviewed is included as Appendix 3.

**C.2. On-site inspection**

Duration of on-site inspection: 30/08/2019 to 31/08/2019				
No.	Activity performed on-site	Site location	Date	Team member
1.	Opening Meeting: Introduction, scope and objective of work, roles and responsibilities of audit team, resources required, and timetable of the onsite audit including venue for closing meeting and any concerns from PP.	Celsia Office	30/08/2019	Marcelo Sebben
2.	Revalidation checklist: compliance of monitoring procedures, regulations, application of methodology and baseline calculation compared with registered PDD and monitoring methodology.	Celsia Office	30/08/2019	Marcelo Sebben
3.	Review of ex-ante calculation and relevant document in accordance with registered monitoring plan and applied monitoring methodology.	Celsia Office	30/08/2019	Marcelo Sebben
4.	- Implementation and operation of project activity (project boundary, technology, project equipment, monitoring and metering equipment) as per registered PDD/previous verification.	Amaime Power Plant	31/08/2019	Marcelo Sebben
5.	- Physical inspection of the project activity and Substation (if applicable): Site visit and interview of personnel	Amaime Power Plant	31/08/2019	Marcelo Sebben
6.	- Compilation of the audit findings.	Amaime Power Plant	31/08/2019	Marcelo Sebben
7.	Closing Meeting: Submission of the audit findings to the client and agreement on the issues raised and agreement on timelines.	Amaime Power Plant	31/08/2019	Marcelo Sebben

**C.3. Interviews**

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Correa	Juliana	MGM Innova	30/08/2019 31/08/2019	- General aspects - CDM aspects - EF calculation ER calculation	Marcelo Sebben
2.	Rojas	Nicolas	Epsa	30/08/2019	Operation and Maintenance of SHP	Marcelo Sebben
3.	Perez	Franqui	Epsa	30/08/2019	Environmental Aspects of SHP	Marcelo Sebben
4.	Gallego	Martha	Epsa	30/08/2019	Environmental Aspects of SHP Operation of SHP	Marcelo Sebben

5	Espina	Ovídio	Epsa	31/08/2019	Operation of SHP	Marcelo Sebben
6	Rodriguez	Guido	Epsa	31/08/2019	Environmental Aspects of SHP	Marcelo Sebben

#### C.4. Sampling approach

Not applicable as no sampling has been used during the validation.

#### 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			
Validity of original baseline or its update		CAR 01	
Estimated emission reductions or net anthropogenic removals	CL 01 CL 02	CAR 02	
Validity of monitoring plan	CL 03		
Crediting period			
Project participants			
Post-registration changes			
Others (please specify)			
<b>Total</b>	<b>3</b>	<b>2</b>	<b>-</b>

### SECTION D. Validation findings

#### D.1. Compliance with PDD form

<b>Means of validation</b>	The PDD was crosschecked with the CDM-PDD-FORM template available at the UNFCCC website and with the instructions for filling it out.
<b>Findings</b>	N/A
<b>Conclusion</b>	The latest version of the PDD template (CDM-PDD-FORM – version 11.0) available at the UNFCCC website has been used. The issues found were all addressed. It has been filled out in accordance with the instructions.

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

Means of validation	The PA applies approved methodology ACM0002: Grid connected electricity from renewable sources --- Version 19.0, which is latest one available at UNFCCC website. The PA also applies the methodological tools:  a. TOOL07: Tool to calculate the emission factor for an electricity system (version 7.0); b. TOOL11 – 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. The methodology and tools are from UNFCCC CDM website.					
Findings	N/A					
Conclusion	All applicability conditions of the applied methodology and applied tools are met:					
	<table><tr><th>Applicability Criteria – ACM0002 – v. 19.0</th><th>Assessment</th></tr><tr><td>a) Install a Greenfield power plant; b) Involve a capacity addition to (an) existing plant(s); c) Involve a retrofit of (an) existing operating plants/units; d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or e) Involve a replacement of (an) existing plant(s)/unit(s).</td><td>The PA complies with the condition (a) as it was a greenfield power plant</td></tr></table>	Applicability Criteria – ACM0002 – v. 19.0	Assessment	a) Install a Greenfield power plant; b) Involve a capacity addition to (an) existing plant(s); c) Involve a retrofit of (an) existing operating plants/units; d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or e) Involve a replacement of (an) existing plant(s)/unit(s).	The PA complies with the condition (a) as it was a greenfield power plant	
Applicability Criteria – ACM0002 – v. 19.0	Assessment					
a) Install a Greenfield power plant; b) Involve a capacity addition to (an) existing plant(s); c) Involve a retrofit of (an) existing operating plants/units; d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or e) Involve a replacement of (an) existing plant(s)/unit(s).	The PA complies with the condition (a) as it was a greenfield power plant					

	<p>The methodology is applicable under the following conditions:</p> <ul style="list-style-type: none"> <li>a) The project activity may include renewable energy power plant/unit of one of the following types: <b>hydro power plant/unit with or without reservoir</b>, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;</li> <li>b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.</li> </ul>	<p>The PA complies with the condition (a) as it is composed by one small hydro power plant/unit without reservoir. Even though the plant is run-of river, there is a small flooded area in the water intake. This area, in the case of this project activity, was considered for calculating the Project Density, and consequently whether, project emissions are applicable.</p>
	<p>In case of hydro power plants, one of the following conditions shall apply:</p> <ul style="list-style-type: none"> <li>a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or</li> <li>b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m<sup>2</sup>; or</li> <li>c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m<sup>2</sup> ; or</li> <li>d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m<sup>2</sup> ,</li> </ul>	<p>Even though this plant has no reservoir as it is a Run-of-river SHP, the PP considered the small flooded area in the water intake to calculate Power Density. Thus, in this case, <b>option C</b> is applicable. This measured was taken in order to be in accordance with this condition described in the current version of the methodology.</p>
	<p>In the case of integrated hydro power projects, project proponent shall</p> <ul style="list-style-type: none"> <li>a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or:</li> <li>b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific</li> </ul>	<p>Not applicable, as the PA is not an integrated hydro power project</p>

	combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	
	In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”	The PA is not a project with capacity addition, retrofit, replacement or rehabilitation.

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

<b>Means of validation</b>	<p>The baseline scenario is given by applied methodology ACM0002 – version 19.0: “the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in “TOOL07: Tool to calculate the emission factor for an electricity system” (version 7.0).</p> <p>In addition, in accordance with the directives for the renewal of the crediting period of a registered CDM project activity, the validity of the current baseline shall be reassessed using the latest version of the TOOL11 “Tool to assess the validity of the original/ current baseline and to update the baseline at the renewal of a crediting period” (version 03.0.1).</p> <p>As this tool was not assessed in the current revalidation process, a CAR has been raised.</p>
<b>Findings</b>	<p>CAR 01</p> <p><i>The assessment of the validity of the baseline has not been done in accordance with provisions of TOOL11.</i></p>
<b>Conclusion</b>	<p>The baseline scenario is the one given by the applied methodology ACM0002 – v. 19.0, which is valid for the new crediting period.</p> <p>The assessment of TOOL11 is made as follows:</p> <p><u>Step 1: Assess the validity of the current baseline for the next crediting period</u></p> <p><i>Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies:</i></p> <p>The current baseline scenario complies with all relevant mandatory national/sectoral legislation.</p> <p><i>Step 1.2: Assess the impact of circumstances:</i></p> <p>As the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment the PP informed that there was no changes in the Market characteristics that affect the Project activity.</p> <p>The conditions used to determine the baseline emissions in the previous crediting period are still valid. It was not observed the availability of new fuels or raw materials</p>

	<p>in the power plants connected to the grid, neither significant variation of prices in the power generation.</p> <p><i>Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested:</i></p> <p>The baseline scenario is not the continuation of use of current baseline equipment. The PA consists in the installation of a greenfield hydro power plant where no power plant was installed before. Thus, this step is not applied.</p> <p><i>Step 1.4: Assessment of the validity of the data and parameters:</i></p> <p>The fixed parameters were changed for the 2<sup>nd</sup> crediting period in accordance with new calculations and new version of applied methodology and tools. The following parameters were included to evaluate the applicability of project emissions due to reservoir: Cap<sub>BL</sub> (installed capacity prior the project installation) and A<sub>BL</sub> (area of the reservoir prior the project implementation). These values remain fixed for the crediting period as they are determined once in the beginning of the CP as per ACM0002 v.19. Monitored parameters (monitored only at the start of crediting period) such as <b>Cap<sub>PJ</sub></b> (Installed capacity of the hydro power plant after the implementation of the project activity) and <b>A<sub>PJ</sub></b> (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). This last one, even though no reservoir is attributed to the PA, the small flooded area of the water intake was taken in order to be able to calculate the PD.</p> <p>The application of Steps 1.1, 1.2, 1.3 and 1.4 above confirmed that the current baseline remains valid for the subsequent crediting period and that fixed parameters have been changed due to changes presented above.</p> <p>As there are parameters that were updated for the 2<sup>nd</sup> crediting period, Step 2 is assessed below:</p> <p><u>Step 2: Update the current baseline and the data and parameters</u></p> <p><i>Step 2.1: Update the current baseline:</i></p> <p>Although the current baseline is valid, the baseline emissions were updated in accordance with the stated above in Step 1.4.</p> <p><i>Step 2.2: Update the data and parameters:</i></p> <p>All fixed parameters required by applied methodology and tools were updated with values in accordance with the new version of applied methodology and tools.</p> <p>The baseline emissions were updated taking into account the new values of EF calculated as per TOOL07 and with estimated values for the parameter EG<sub>facility,y</sub> which was based on most reliable long term evidence (Project description carried out by engineering consultancy).</p>
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#### D.4. Estimated emission reductions or net anthropogenic removals

<b>Means of validation</b>	<p>All equations, formulas and assumptions were correctly applied as per the applied methodology (ACM0002) and tools.</p> <p>The baseline emissions are calculated by the multiplication of the electricity supplied by the project activity to the grid by the combined margin of CO<sub>2</sub> emission factor. Considering that the plant consist in a hydro power plant without reservoir, the project emissions were not taken into account.</p> <p>However issues were found in the Emission reduction calculations, in the project emission reference and in the EF calculation, thus findings were raised. Moreover, an issue in the parameters fixed was also found</p>
<b>Findings</b>	<p>CL 01 <i>It is not clear the source of the estimated values for parameter EG<sub>facility,y</sub></i></p> <p>CL 02 <i>The project emission calculations were not mentioned in the PDD unlike required by the applied methodology.</i></p>



	<p>CAR 02</p> <p>EF calculations</p> <ul style="list-style-type: none"> <li>- Tab "Gen 2016": the total generation presented in cell B201 is not in accordance with the sum of all generation in lines 5 to 199.</li> <li>- Tab "Gen 2016", Tab "Gen 2017" and Tab "Gen 2018": the total generation is rounded, which is not conservative.</li> <li>- Tab OM: the cells C26 to C28 and D26 to D28 are not adding all power plants applicable</li> <li>- Lambda 2016: it is not clear why in column F, the formula contains the parameter B8602</li> <li>- Tab BM: <ul style="list-style-type: none"> <li>o it is not clear why VCS plants are also being excluded from calculations unlike required by the applied tool07</li> <li>o the parameter <math>AEG_{SET \geq 20\%}</math> is not being calculated as per Tool07</li> </ul> </li> <li>- Tab Fuel EF: the EF for kerosene is not in accordance with evidences provided</li> <li>- Tab Fuel+HR: the fuel type data and the values of MMBTU/MWh are not in accordance with evidence provided.</li> </ul>
<b>Conclusion</b>	<p>The methodology and tools were correctly applied in order to calculate the estimates of emission reductions, with reliable and conservative parameters.</p> <p>The <math>EF_{OM}</math> was determined based on the 3-year generation-weighted average calculated by the PP based on public available data<sup>/20/</sup> and provided in the ER calculations spreadsheet. The <math>EF_{BM}</math> used was calculated based on most recent data available in accordance with applied TOOL07.</p> <p>Both data (<math>EF_{OM}</math> and <math>EF_{BM}</math>) were determined ex-ante</p> <p>The parameters used to calculate the emission reductions are conservative, traceable and from official, public and reliable sources.</p> <p>All fixed ex-ante parameters necessary for the project activity are listed at the Section B.6.2 of PDD, in accordance with the applied methodology and tools. They are:</p> <ul style="list-style-type: none"> <li>- <math>EF_{grid,OM-adj,y}</math>: Operating margin CO<sub>2</sub> emission factor in year y;</li> <li>- <math>EF_{grid,BM,y}</math>: Build margin CO<sub>2</sub> emission factor in year y</li> <li>- <math>EF_{grid,CM,y}</math>: Combined margin CO<sub>2</sub> emission factor in year y</li> <li>- <b>Cap<sub>BL</sub></b>: Installed capacity of the hydro power plant before the implementation of the project activity</li> <li>- <b>ABL</b>: 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</li> </ul>

#### D.5. Validity of monitoring plan

<b>Means of validation</b>	<p>The PDD sets a monitoring plan, which is feasible and in accordance with the applied methodology and tools.</p> <p>The management structure and roles and responsibilities are established for data collection, calibration frequency of meters, data report and data archiving.</p> <p>Moreover, there are procedures set for crosschecking the monitored data.</p> <p>However, not monitored parameters are included in accordance with applied methodology. Thus a CL has been raised.</p> <p>No sampling plan is set to monitor the parameter.</p>
<b>Findings</b>	<p>CL 03</p> <p>PDD section B.6.2 and B.7.1</p> <p>The parameter "Installed capacity" is not described in accordance with applied methodology. Moreover, other parameters used to determine Power density, and consequently, whether Project Emissions are applied, are also not mentioned in the PDD</p>
<b>Conclusion</b>	<p>The monitoring plan of the PA is in accordance with the approved monitoring methodology and the means of monitoring of the parameters contained in the monitoring plan are feasible.</p> <p>The management structure and roles and responsibilities are set for data collection, calibration frequency of monitoring equipment, data report and data archiving. In addition, procedures for quality assurance and quality control are be set, as well as specific training for involved personnel.</p>

	<p>There is no sampling plan set to monitor the parameters.</p> <p>The parameters fixed are listed in section above and the ones to be monitored necessary for the project activity are listed at the PDD section B.7.1, in accordance with the applied methodology and tools.</p> <p>The parameters required for monitoring are contained in the monitoring plan:</p> <ul style="list-style-type: none"> <li>- <b>EG<sub>facility,y</sub></b>: Quantity of net electricity supplied by the project plant/unit to the grid in year y;</li> <li>- <b>Cap<sub>PPJ</sub></b> : Installed capacity of the hydro power plant after the implementation of the project activity</li> <li>- <b>A<sub>PPJ</sub></b>: 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.</li> </ul> <p>It is important to point out that even-though the SHP has no reservoir, the PP determined the parameter A<sub>PPJ</sub> as the flooded area of the water intake in order to be able to determine the PD and consequently, estimate Project emission (equal to zero). This measure was taken as the eligibility criteria #3 of the applied methodology, does not give option of assuming no reservoir in case of hydro power plants. Thus, the PP attested the non-existence of reservoir, but considered the criteria 3c) of the applied methodology ("The project activity results in new single or multiple reservoirs and the power density is greater than 4 W/m<sup>2</sup>"). They use the flooded area to calculate the Power Density. In both cases, it is confirmed that no PE due to CH<sub>4</sub> emissions from reservoir are applied to this project activity</p>
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#### D.6. Crediting period

<b>Means of validation</b>	The crediting period is 7 years renewable. This is the 2 <sup>nd</sup> crediting period and its start date is 18/11/2017, which is the first date after the end of the 1 <sup>st</sup> crediting period and it ends on 17/11/2024.
<b>Findings</b>	-
<b>Conclusion</b>	<p>The 2<sup>nd</sup> crediting period is from 18/11/2017 to 17/11/2024 – the request for renewal of the crediting period is being done in accordance with paragraph 32 (iv) of Meeting Report: CDM Executive Board one hundredth meeting, "the grace period for the submission of renewal request for the existing registered project activities whose crediting period has expired but has not been renewed (i.e. overdue for renewal) is to be by 31 December 2019."</p> <p>Therefore, the project activity is in accordance with CDM requirements and EB directives.</p>

#### D.7. Project participants

<b>Means of validation</b>	<p>The project participant is:</p> <ul style="list-style-type: none"> <li>- Empresa de Energía del Pacífico S.A. E.S.P. (EPSA S.A. E.S.P.)</li> </ul>
<b>Findings</b>	N/A
<b>Conclusion</b>	<p>The name of the project participant included in the updated PDD were assessed in accordance with the applicable validation requirements related to the renewal of crediting period.</p> <p>All information is in accordance with UNFCCC website.</p>

#### 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 <sup>1</sup>	N		
Corrections	N		
Change to the start date of the crediting period	N		
Inclusion of a monitoring plan	N		

<sup>1</sup> 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).

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 validation report that is prepared by validation team is reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by ESPL were duly complied with and such opinion/conclusion is reached in an objective manner that complies with the applicable CDM rules/requirements.

The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope to which the project activity is related. All members of technical review team are independent of the validation team.

During the technical review process, additional findings may be identified or the closed-out findings may be opened, which needs to be satisfactorily resolved before the request for the renewal of the crediting period is submitted to UNFCCC. The independent technical reviewer may either approve the report as such or reject/return the same, in such case, providing the comments/findings/issues that needs to be resolved by the validation team. The decision taken by the technical reviewer is final and is authorized on behalf of ESPL.

## SECTION F. Validation opinion

ESPL, contracted by EPSA S.A. E.S.P., has performed the independent validation of the renewal of crediting period of the project "Amame Minor Hydroelectric Power Plant", with UNFCCC Ref. Number: 2600.

ESPL commenced the validation based on the baseline and monitoring methodology ACM0002 – version 19.0, the registered PDD (from previous crediting period) and draft PDD (for the 2<sup>nd</sup> crediting period).

ESPL's validation approach is based on the understanding of the risks associated with reporting the project activity, estimates of GHG emission data and the controls to be implemented to mitigate these. ESPL planned and performed the validation by obtaining evidence, other information and explanations that ESPL considered necessary to give reasonable assurance that the estimated GHG emission reductions are fairly to be achieved.

The validation team confirms, based on final version of revised PDD for the 2<sup>nd</sup> crediting period, that:

- the original baseline is still valid as it is given by the applied methodology;
- the project additionality is valid for the renewal of the crediting period. No regulatory surplus has been identified. The project is in accordance with all applicable regulations and legislations;
- the project description is in accordance with the characteristics identified on site;
- the monitoring plan is adequate to the project activity and it is in accordance with the applied methodology;

at this 2<sup>nd</sup> crediting period, the project activity is likely to achieve the estimated of 22,470 tCO<sub>2</sub>e per year.

## Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
BE	Baseline Emission
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CM	Combined Margin
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
CP	Crediting Period
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EIA	Environmental Impact Assessment
ESPL	Earthood Services Private Limited
FAR	Forward Action Request
GHG	Green House Gas
GSC/GSP	Global Stakeholder Consultation Process
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
kW	kilo Watt
kWh	kilo Watt hour
LoA	Letter of Approval/Authorization
MoC	Modalities of Communication
MP	Monitoring Plan
MW	Mega Watt
MWh	Mega Watt hour
OM	Operating Margin
PA	Project Activity
PCP	Project Cycle Procedure
PDD	Project Design Document
PE	Project Emission
PLF	Plant Load Factor
PP	Project Participant
PS	Project Standard
tCO <sub>2</sub> e	Tonnes of Carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VT	Validation Team
VVS	Validation and Verification Standard

## Appendix 2. Competence of team members and technical reviewers

Competence Statement			
<b>Name</b>	Marcelo Sebben		
<b>Country</b>	Brazil		
<b>Education</b>	M.Sc. (Sustainable Energy System) B. Eng. (Chemical Engineering)		
<b>Experience</b>	12.5 Years		
<b>Field</b>	Chemical process industry, CDM, Energy, Climate Change		
Approved Roles			
<b>Team Leader</b>	Yes		
<b>Validator</b>	Yes		
<b>Verifier</b>	Yes		
<b>Methodology Expert</b>	Yes (ACM0001, ACM0002, ACM0006, AM0065, AMS ID, AMS-I.E, AMS-I.C, AM0026, AMS-I.A, AMS-I.F, GS: Ecologically Sound Fuel Switch to Biomass with Reduced Energy Requirement, GS: Technologies and Practices to Displace Decentralized Thermal Energy Consumption)		
<b>Local expert</b>	Brazil, Chile, Honduras		
<b>Financial Expert</b>	Yes		
<b>Technical Reviewer</b>	No		
<b>TA Expert</b>	Yes (TA 1.1, 1.2, 5.1, 9.1, 13.1)		
<b>Reviewed by</b>	Shreya Garg	<b>Date</b>	04/06/2019
<b>Approved by</b>	Anshika Gupta	<b>Date</b>	04/06/2019

Competence Statement			
<b>Name</b>	Ricardo Lopes		
<b>Country</b>	Brazil		
<b>Education</b>	Technical Diploma in Data Processing		
<b>Experience</b>	12 years		
<b>Field</b>	CDM, Energy, Environment		
Approved Roles			
<b>Team Leader</b>	Yes		
<b>Validator</b>	Yes		
<b>Verifier</b>	Yes		
<b>Methodology Expert</b>	Yes (ACM0001, ACM0002, AM0026, AMS ID, AMS IIH)		
<b>Local expert</b>	Brazil, Argentina, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Honduras, Mexico, Nicaragua, Uruguay		
<b>Financial Expert</b>	Yes		
<b>Technical Reviewer</b>	Yes		
<b>TA Expert</b>	Yes (1.2, 13.1)		
<b>Reviewed by</b>	Abhishek Mahawar	<b>Date</b>	22/02/2018
<b>Approved by</b>	Ashok Kumar Gautam	<b>Date</b>	22/02/2018

Competence Statement	
<b>Name</b>	Anshika Gupta
<b>Country</b>	India
<b>Education</b>	M.Sc. (Climate Science & Policy), TERI University

<b>Experience</b>	4 Years +		
<b>Field</b>	Climate Change		
<b>Approved Roles</b>			
<b>Team Leader</b>	Yes		
<b>Validator</b>	Yes		
<b>Verifier</b>	Yes		
<b>Methodology Expert</b>	AMS-I.A, AMS-II.G, ACM0002, AMS-III.A.V		
<b>Local expert</b>	India		
<b>Financial Expert</b>	No		
<b>Technical Reviewer</b>	Yes		
<b>TA Expert</b>	1.2, 3.1		
<b>Reviewed by</b>	Shreya Garg	<b>Date</b>	12/03/2019
<b>Approved by</b>	Kaviraj Singh	<b>Date</b>	12/03/2019

## Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1.	UNFCCC	Standard: CDM PS for PA	version 02.0	Other
2.	UNFCCC	Standard: CDM PCP for PA	version 02.0	Other
3.	UNFCCC	Standard: CDM VVS for PA	version 02.0	Other
4.	UNFCCC	Form: CDM-PDD-FORM	version 11	Other
5.	UNFCCC	Project design document (registered)	version 06 – 09/01/2013	PP
6.	PP	Project design document (draft)	version 1 – 30/05/2019	PP
7.	PP	Project design document (revised/final)	version 02: 15/09/2019 Version 03: 23/10/2019 (final)	PP
8.	PP	ER Spreadsheet (draft)	version 1	PP
9.	PP	ER calculation Spreadsheet (revised/final)	version 2 version 3 (final)	PP
10.	UNFCCC	<u>Methodology</u> : ACM0002: Grid-connected electricity generation from renewable sources	version 19.0	Other
11.	UNFCCC	Methodological tools: 1. TOOL07 – Tool to calculate the emission factor for an electricity system 2. TOOL 11 – Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	version 07.0  version 03.0.1	Other
12.	PP	<u>Project Lifetime</u> : 50 years as per Renewable & Sustainable Energy Reviews, “Small hydro power: technology and current status”, (pg.538)	<a href="https://dspace.ist.utl.pt/bitstream/2295/296312/1/paper%2520small%2520hydro%2520power.pdf">https://dspace.ist.utl.pt/bitstream/2295/296312/1/paper%2520small%2520hydro%2520power.pdf</a>	PP
13.	PP	<u>Estimated EG<sub>facility,y</sub></u>  Project Description Chapter 4 – issued by Hidro Occidente Engineering Consultancy as part of the environmental permit request		
14.	EPSA	<u>Technical description</u> : 1. Pictures of plant 2. Pictures turbines and generators 3. Pictures of electricity meters of SE Amaime 4. Operation Manual of the SHP issued by EPSA -	08/2019 08/2019  07/2018	PP
15.	PP	<u>Reservoir Area</u> Topographical study with current reservoir area		
16.	CREG - (Commission of	Resolucion CREG 038 from 2014 (Art. 28) which regulates the		Others

	Gas and Energy Regulation)	frequency of calibration (4 years calibration frequency)		
17.	XM	XM reports – Official source of electric data used for cross-check electricity measurements		PP
18.	CVC	<ul style="list-style-type: none"> <li>- Environmental License - Resolution 0100 No. 0720-0470 from 25/09/2007 issued by CVC (Autonomous Regional Corporation of Cauca Valley)</li> <li>- Report of Environmental Fulfillment #0722-498472019 issued by CVC on 04/07/2019</li> </ul>	Valid for all project lifetime	PP
19.	PP	<u>Installed capacity evidences</u> 1. Equipment plaques (turbines) for the nameplate installed capacity (21.34 MW)		PP
20.	XM (SIN operator and Administrator)	<u>Grid Emission factor evidences</u> - Name, type of plant, fuel type and consumption, electricity generation, grid exports and imports	<a href="http://informacioninteligente10.xm.com.co/oferta/Paginas/HistoricoOferta.aspx">http://informacioninteligente10.xm.com.co/oferta/Paginas/HistoricoOferta.aspx</a>  <a href="http://paratec.xm.com.co/paratec/SitePages/generacion.aspx?q=capacidad">http://paratec.xm.com.co/paratec/SitePages/generacion.aspx?q=capacidad</a>	
21.	FECOC – Colombian Combustibles Emission Factor UPME – Unit of Planning for Mines and Energy	<u>Evidence of Emission factor from fuels consumed in the Colombian Grid</u> <i>Consultoría técnica para el fortalecimiento y mejora de la base de datos de factores de emisión de los combustibles colombianos-FECOC</i>	<a href="http://www.mvccolombia.co/images/Informe_Final_FECOC.pdf">http://www.mvccolombia.co/images/Informe_Final_FECOC.pdf</a>  and  <a href="http://www.upme.gov.co/calculadora_emisiones/aplicacion/calculadora.html">http://www.upme.gov.co/calculadora_emisiones/aplicacion/calculadora.html</a>	PP
22.	PP	<b><u>Trainings and Duties of Personnel:</u></b> Operator: Ovidio Espina		PP
23.	-	DNA of Colombia (Ministry of Environment and Sustainable Development)	<a href="http://www.minambiente.gov.co/">http://www.minambiente.gov.co/</a>	Other
24.	XM	Electric Market Operation in Colombia	<a href="http://www.xm.com.co/">www.xm.com.co/</a>	
25.	CREG	CREG – Commission of Gas and Energy Regulation	<a href="http://www.creg.gov.co">www.creg.gov.co</a>	Other
26.	-	IPCC publications	<a href="http://www.ipcc-nggip.iges.or.jp">www.ipcc-nggip.iges.or.jp</a>	Other
27.	-	UNFCCC	<a href="http://cdm.unfccc.int">http://cdm.unfccc.int</a>	Other



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

Table 1. CL from this validation

<b>CL ID</b>	01	<b>Section no.</b>	D.4	<b>Date :</b> 31/08/2019
<b>Description of CL</b>				
<i>It is not clear the source of the estimated values for parameter <math>EG_{facility,y}</math></i>				
<b>Project participant response</b>				<b>Date :</b> 03/09/2019
<i>The parameter has been fixed according to what is established in the Environmental Management Plan, were an average production of 92.4 GWh/y has been estimated for Amaime hydraulic plant.</i>				
<b>Documentation provided by project participant</b>				
15 09 2019 Amaime - New PDD-v11.0 -v2.doc 2 - AMAIME capítulo 4 descripción Proyecto.pdf 4 - Licencia Ambiental CH Amaime.pdf				
<b>DOE assessment</b>				<b>Date:</b> 19/09/2019
The estimated annual generation was determined based on Project Description Study, which relied on historical long term hydrological regime. Therefore, the validation team considers this estimation plausible and correct as it overlaps frequent climatological phenomena that occurs in the region (El Niño, La Niña, etc...)				
<b>CL is closed</b>				

<b>CL ID</b>	02	<b>Section no.</b>	D.4	<b>Date :</b> 31/08/2019
<b>Description of CL</b>				
<i>The project emission calculations were not mentioned in the PDD unlike required by the applied methodology.</i>				
<b>Project participant response</b>				<b>Date :</b> 03/09/2019
<i>Project emission calculations are mentioned in the PDD v2. Please see section B.6.3. updated.</i>				
<b>Documentation provided by project participant</b>				
15 09 2019 Amaime - New PDD-v11.0 -v2.doc				
<b>DOE assessment</b>				<b>Date:</b> 19/09/2019
Project emissions calculation were included in the revised PDD. No Project emissions are estimated for this project activity.				
<b>CL is closed</b>				

<b>CL ID</b>	03	<b>Section no.</b>	D.5	<b>Date :</b> 31/08/2019
<b>Description of CL</b>				
<i>PDD section B.6.2 and B.7.1</i> - <i>The parameter "Installed capacity" is not described in accordance with applied methodology. Moreover, other parameters used to determine Power density, and consequently, whether Project emissions are applied, are also not mentioned in the PDD.</i>				
<b>Project participant response</b>				<b>Date :</b> 03/09/2019
<i>PDD v2 section B.6.2 and B.7.1 have been updated adding parameter CAPpj.</i>				
<b>Documentation provided by project participant</b>				
15 09 2019 Amaime - New PDD-v11.0 -v2.doc				
<b>DOE assessment</b>				<b>Date:</b> 19/09/2019
The PP included parameters as required by current version of the applied methodology, such as Cap <sub>PJ</sub> , AP <sub>PJ</sub> , CAP <sub>BL</sub> and A <sub>BL</sub> . However, it is important to point out that, even though the power plant is a hydro power plant without reservoir, in order to be able to calculate the Power Density, the PP used the flooded area in the water intake as AP <sub>PJ</sub> to prove that the Power Density is much superior than 10W/m <sup>2</sup> . The parameters are now in accordance with the applied methodology.				
<b>CL is closed</b>				

Table 2. CAR from this validation

<b>CAR ID</b>	01	<b>Section no.</b>	D.3	<b>Date :</b> 31/08/2019
<b>Description of CAR</b>				
<i>The assessment of the validity of the baseline has not been done in accordance with provisions of TOOL11.</i>				
<b>Project participant response</b>				<b>Date :</b> 03/09/2019
<i>The assessment of the validity of the baseline has been done in accordance with provisions of TOOL11 in section B.4. of the PDD v2.</i>				
<b>Documentation provided by project participant</b>				
<i>15 09 2019 Amaime - New PDD-v11.0 -v2.doc</i>				
<b>DOE assessment</b>				<b>Date:</b> 19/09/2019
The assessment of the validity of the baseline, following the requirements of the TOOL11 "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) were duly carried out in the revised PDD.				
<b>CAR is closed</b>				

<b>CAR ID</b>	02	<b>Section no.</b>	D.4	<b>Date :</b> 31/08/2019
<b>Description of CAR</b>				
<i>EF calculations</i>				
<ul style="list-style-type: none"> <li>- <i>Tab "Gen 2016": the total generation presented in cell B201 is not in accordance with the sum of all generation in lines 5 to 199.</i></li> <li>- <i>Tab "Gen 2016", Tab "Gen 2017" and Tab "Gen 2018": the total generation is rounded, which is not conservative.</i></li> <li>- <i>Tab OM: the cells C26 to C28 and D26 to D28 are not adding all power plants applicable</i></li> <li>- <i>Lambda 2016: it is not clear why in column F, the formula contains the parameter B8602</i></li> <li>- <i>Tab BM:</i> <ul style="list-style-type: none"> <li>o <i>it is not clear why VCS plants are also being excluded from calculations unlike required by the applied tool07</i></li> <li>o <i>the parameter <math>AEG_{SET \geq 20\%}</math> is not being calculated as per Tool07</i></li> </ul> </li> <li>- <i>Tab Fuel EF: the EF for kerosene is not in accordance with evidences provided</i></li> <li>- <i>Tab Fuel+HR: the fuel type data and the values of MMBTU/MWh are not in accordance with evidence provided.</i></li> </ul>				
<b>Project participant response</b>				<b>Date :</b> 03/09/2019
<i>In the spreadsheet "EF Colombia 2016-2018 Amaime v2.xls":</i> <i>Gen 2016 -2017-2018 were corrected</i> <i>For the OM calculation all power units were added</i> <i>Lambda 2016 was updated according to the tool</i> <i>BM was fully updated taking into account just CDM registered power plants</i> <i>Fuel EF and Fuel+HR worksheets were updated</i>				
<b>Documentation provided by project participant</b>				
<i>15 09 2019 Amaime - New PDD-v11.0 -v2.doc</i> <i>EF Colombia 2016-2018 Amaime v2.xls</i>				
<b>DOE assessment</b>				<b>Date:</b> 19/09/2019
Corrections have been made in the Excel spreadsheet. However still there are the following issues: <ol style="list-style-type: none"> <li>a. Tab Lambda 2017 – cell C1: the value of Total Generation is not consistent with the value presented at the Excel spreadsheet (tab Gen 2017) and Section B.6.3 – Table 13 of the PDD</li> <li>b. The list of plants at tab "BM" is not complete when comparing to tab GEN 2018;</li> <li>c. Tab "CM": if the calculation of ERs for 2024 is done by number of days, it has to be considered that Feb/2024 has 29 days</li> </ol>				
<b>CAR remains open.</b>				
<b>Project participant response</b>				<b>Date :</b> 23/10/2019

- a. Tab Lambda 2017 – cell C1: was corrected the value of Total Generation to be consistent with the value presented at the Excel spreadsheet (tab Gen 2017) and Section B.6.3 – Table 13 of the PDD
- b. The list of plants at tab “BM” does not show all the plants presented in the tab GEN 2018; considering that the missed plants start their operation years before 1995 and they are not significant for the BM calculation.
- c. Tab “CM”: the calculation of ERs for 2024 done by number of days, was updated considering that Feb/2024 has 29 days. According to this 2020 was updated as well as Feb/2020 has 29 days.

**Documentation provided by project participant**

15 09 2019 Amaime - New PDD-v11.0 -v2.doc

EF Colombia 2016-2018 Amaime v2.xls

**DOE assessment****Date:** 24/10/2019

The calculations are now correct.

- a. The values are now consistent between both tabs in the Emission factor calculation
- b. It can be observed that the list of plants does not show all plants. However it has been observed that the plants older than 20 years only have not been considered<sup>/20/</sup>. Thus, no influence in the calculation was observed.
- c. The calculation has been done taking into account the leap years in 2020 and 2024. Thus, these both years account for one more day when estimating the Baseline emissions. These information is duly clarified in the PDD and ER calculations spreadsheet.

**CAR is closed****Table 3. FAR from this validation**

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

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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"><li>• 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);</li><li>• Make editorial improvements.</li></ul>
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		