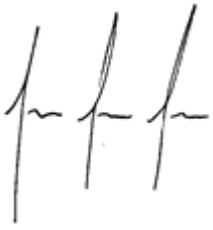
Validation report form for renewal of crediting period for CDM project activities

(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	Alto Tuluá Minor Hydroelectric Power Plant 3570
Number and duration of the next crediting period	Second crediting period (01/01/2019 – 31/12/2025)
Version number of the validation report	03.0
Completion date of the validation report	13/01/2020
Version number of PDD to which this report applies	5.1
Project participants	Empresa de Energía del Pacífico S.A. E.S.P.
Host Party	Colombia
Applied methodologies and standardized baselines	Applied consolidated methodology ACM0002: Grid-connected electricity generation from renewable sources, version 19.0
Mandatory sectoral scopes	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	28,050 tCO_2e
Name and UNFCCC reference number of the DOE	Colombian Institute for Technical Standards and Certification (ICONTEC) – E-0024
Name, position and signature of the approver of the validation report	Signature  Juan Sebastian Salazar Technical Director

SECTION A. Executive summary

ICONTEC has performed the assessment for the renewal of crediting period of Alto Tuluá Minor Hydroelectric Power Plant in Colombia on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. This renewal of crediting period report summarizes the findings of this exercise.

The proposed project activity under the renewal process is based on approved consolidated methodology ACM0002: Grid-connected electricity generation from renewable sources, version 19.0. The project activity under assessment consists of a hydroelectric power plant with an installed capacity of 22 MW which takes advantage of the waters from the Tulua River (middle basin), as well as Bajo Tuluá Minor Hydroelectric Power Plant[1]. The project activity is located in the minucipalities of Tuluá, Buga and San Pedro in the department of Valle del Cauca. The estimated electrical energy delivered by this project activity to Colombian electrical interconnected grid is 114.4 GWh per year.

The renewal of crediting period process consisted of the following three phases: i) a desk review of the revised project design documents, ii) onsite inspection and follow up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final renewal of crediting period report and opinion. (See Appendix 4 on this report)

The total emission reductions from the project are estimated to be on average 28,050 tCO_2e per year for the second crediting period.

In summary, it is ICONTEC's opinion that Alto Tuluá Minor Hydroelectric Power Plant, as described in the version 5.1 of the revised project design document, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0002, version 19.0. Hence, ICONTEC requests the renewal of crediting period of the project as CDM project activity.

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 and Technical Expert in Sectoral Scope 1.2	IR	Ramirez	Francy	Employee	✓	✓	✓	✓

[1] https://cdm.unfccc.int/Projects/DB/AENOR1270024011.59/view

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.	Lead technical reviewer and technical expert reviewer in Sectoral Scope 1.2	EI	Grisales	Cristian	Freelance
2.	Approver	IR	Salazar	Juan Sebastian	Employee

SECTION C. Means of validation

C.1. Desk/document review

The reviewing of the project documentation provided by the project proponent is based upon both quantitative and qualitative information on estimated emission reductions. Quantitative information comprises the reported numbers in the revised PDD submitted. Qualitative information comprises information about description of the project activity and the equipment related, and monitoring procedures.

Main documents reviewed during the desk review stage, provided by the project proponent, are:

- Revised PDD version 1, dated on June 1st /2019 /1/
- Spreadsheet used for the calculation of the emission factor for the Colombian Electricity System and for the calculations of estimated ERs for the second crediting period /2/

In addition to the revised PDD documentation provided by the project proponent, ICONTEC reviewed:

- Approved Consolidated Methodology ACM0002: Grid-connected electricity generation from renewable sources, version 19.0/UN1/
- CDM validation and verification standard for project activities, version 02.0/UN2/
- CDM project standard for project activities, version 02.0/UN3/
- CDM project cycle procedure for project activities, version 02.0/UN4/
- Tool to calculate the emission factor for an electricity system, version 07.0.0/UN5/
- Methodological Tool for 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/UN6/
- Project Design Document form, version 11.0/UN7/

A compilation of the documents related to the verification activities have been compiled under Appendix 3.

C.2. On-site inspection

Duration of on-site inspection: 16/09/2019 to 19/09/20109				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Compliance of the revised PDD with the PDD form	EPSA's office in Cali Colombia	16/09/2019	Francy Ramírez
2.	Application and selection of methodologies and standardized baselines			
3.	Validity of original baseline or its update			
4.	Crediting period			
5.	Project participants			

6	Tour by the project's facility	Project's site located in Tuluá, Buga and San Pedro in the department of Valle del Cauca Colombia	17/09/2019	
7.	Compliance of the project implementation with the approved project design document			
8.	Interviews with personnel in charge of operational and maintenance activities			
9.	Visit to the interconnection Point of the project activity.		18/09/2019	
10.	Compliance of monitoring activities with the approved monitoring plan			
11.	Assessment of estimated emission reductions or net anthropogenic removals	EPSA's office in Cali Colombia	19/09/2019	
12.	Validity of monitoring plan			
13.	Post-registration changes			

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Franco Guzman	Carolina	Social Professional in Hydroelectic power plants EPSA	16/09/2019	• Compliance of the project implementation with the approved project design document	Francy Ramirez
2.	Rodriguez Mejía	Guido Andrés	Environmental Professional EPSA			
3.	Schaefer	Libardo	Monitoring and instrumentation Professional in Hydroelectic power plants EPSA	16/08/2019 to 18/09/2019	• Tour by the project's facility • Visit to the interconnection Point of the project activity. • Compliance of monitoring activities with the approved monitoring plan • Compliance of the project implementation with the approved project design document • Interviews with personnel in charge of operational and maintenance activities	
4.	Gallego Parra	Humberto	Operation and Maintenance Professional	17/09/2019	• Tour by the project's facility • Visit to the interconnection Point of the project activity. • Compliance of monitoring activities with the approved monitoring plan • Compliance of the project implementation with the approved project design document	

					• Interviews with personnel in charge of operational and maintenance activities	
5.	Berrio Castro	Kevin	Professional of operation of the wholesale electricity market EPSA	19/09/2019	• Assessment of estimated emission reductions • Validity of monitoring plan • Post-registration changes	
6.	Gallego	Martha Isabel	Environmental Professional EPSA	16/09/2019 to 19/09/2019	• Compliance of the revised PDD with the PDD form • Application and selection of methodologies and standardized baselines • Validity of original baseline or its update • Crediting period • Project participants • Tour by the project's facility • Visit to the interconnection Point of the project activity. • Compliance of monitoring activities with the approved monitoring plan • Compliance of the project implementation with the approved project design document • Interviews with personnel in charge of operational and maintenance activities • Assessment of estimated emission reductions or net anthropogenic removals • Validity of monitoring plan • Post-registration changes	
7.	Correa	Juliana	Project Manager MGM Innova			

C.4. Sampling approach

No sampling approach was 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	CL 1 CL 2	-	-

	CL 3 CL 4		
Application and selection of methodologies and standardized baselines	-	-	-
Validity of original baseline or its update	-	CAR 1	-
Estimated emission reductions or net anthropogenic removals	-	CAR 2	-
Validity of monitoring plan	-	-	-
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	The audit team checked the latest approved PDD form /UN7/ and the contents written by the PP in that form, besides the PDD approved for the current second crediting period, in order to assess if the project participants have updated the relevant sections of the PDD in accordance with relevant requirements in the Project standard for the request of the crediting period renewal.
Findings	CL 1, CL 2, CL 3 and CL4. More details on those issues in Appendix 4
Conclusion	The audit team deems that all information transferred to the latest valid version of the PDD form is materially the same as that in the approved PDD for the second crediting period. Likewise, the audit team confirms that the PDD Version 5.1 /1/ is in compliance with the relevant valid version of project design document form /UN7/ and instructions therein for filling out PDD.

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

Means of validation

The project activity has been registered with the approved methodology, ACM0002, version 12, and now, since this version of ACM0002 is no longer valid, the PDD for the renewal crediting period has been revised in line with the approved methodology ACM002 version 19 /UN1/, which is the latest version of the applied methodology at the time of submitting the revised PDD and is currently valid.

The applicability criteria of this methodology, was verified by ICONTEC, as follows:

Applicability Condition	Means of Validation
This methodology is applicable to grid-connected renewable power generation project activities that: (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).	Alto Tuluá Minor Hydroelectric Power Plant consists of installation of a hydro power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant). ICONTEC verified this statement by means of: - On site visit - Documental Review of Colombian electrical system in the Website of Colombian administrator of the wholesale electric market[2]

[2] http://paratec.xm.com.co/paratec/SitePages/generacion.aspx?q=capacidad

	The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	Alto Tuluá Minor Hydroelectric Power Plant consists of installation of a hydro power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant). ICONTEC verified this statement by means of: - On site visit - Documental Review of Colombian electrical system in the Website of Colombian administrator of the wholesale electric market[2]

	In case of hydro power plants one of the following conditions must apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2; or (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^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;	Alto Tuluá Minor Hydroelectric Power Plant results in a existing single reservoir with no change in the volume of any reservoir (option (a)). ICONTEC verified this statement by means of: - On-site visit

	In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	This project activity does not consist of integrated hydro power projects, as the audit team verified by means of onsite visit
	The methodology is not applicable to: • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants.	The project activity consist of a hydroelectric power plant hence this condition is not applicable to this project activity. ICONTEC verified this statement by means of : - On site visit
	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”.	According to the nature of the project (greenfield project), this condition is not applicable to Alto Tuluá Minor Hydroelectric Power Plant.
	The applicability conditions of this project activity regarding to the tool to calculate the emission factor for an electricity system /UN5/ will be discussed in Sections D.3, D.4 and D.5 of this report.	

	The paragraph 280 of PS /UN3/ states: "The project participants are not required to reassess the additionality of the project activity and update the section relating to additionality", hence this report does not contain an assessment regarding to this issue.
Findings	No findings was raised on this issue.
Conclusion	The validation team confirms that the Project meets all the applicability conditions and is in line with all the requirements and stipulations mentioned in the applied methodology /UN1/

D.3. Validity of original baseline or its update

Means of validation	The baseline determination has been developed using methodology ACM0002, Version 19.0 /UN1/ and Tool for the 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/UN6/ According to the tool /UN6/ the PP applied correctly the following steps: **Step 1: Assess the validity of the current baseline for the next crediting period** **Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies** There are no changes in the relevant national and/or sectoral policies since the date of registration of the PDD, which impacts the baseline scenario. Although the national policies encourage the development of renewable energy /3/, but using renewable energy resources for power generation is not mandatory. Power generation by fossil fuel based plants has a relevant role in Colombian power supply, especially in time when ENSO[3] occurs. Likewise, the audit team review the Colombian regulatory framework[4] with the aim to verify the description provided by the PP in the revised PDD /1/. As conclusion current baseline still complies with all relevant Colombian policies. **Step 1.2: Assess the impact of circumstances** As it was described above, the circumstances at moment of request the renewal of crediting period are the same than validation moment; since the existing scenario is that the Colombian electrical interconnected electrical grid provides the same electricity service as the proposed project /4/, where the power generation by fossil fuels still has a relevant share in the Colombian electrical interconnected grid even with the efforts made by the Colombian Government to encourage the investment in electrical generation by the use of renewable energies/3/. PP's assessed the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, in which the baseline emission factor has been updated based on the latest available public data. (See development of Step 2.2 on this report) **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.** In absence of the project activity, equivalent amount of electricity would have been generated by other power plants connected to Colombian electrical grid. Likewise, all power plants in the Colombian interconnected system, independently of their life time will deliver electrical energy. **Step 1.4: Assessment of the validity of the data and parameters**

[3] The El Niño-Southern Oscillation (ENSO) is a recurring climate pattern involving changes in the temperature of waters in the central and eastern tropical Pacific Ocean

[4] http://www.siel.gov.co/Inicio/Normatividad/tabid/65/Default.aspx

The data and parameters used for the baseline follow provisions of the Tool to calculate the emission factor for an electricity system /UN5/.

For the operating margin emission factor (EF_{OM}), it was considered that there are new power plants in the Colombian electrical grid since registration time operating with the existing power plants at the registration time/2/. The baseline emissions of the project activity were updated, considering the Tool to calculate the emission factor for an electricity system /UN5/ and data available in the Colombian administrator of the wholesale electric market (XM) for the calculation of grid emission factor (please refer to Step 2.2 below).

Step 2: Update the current baseline and the data and parameters
Step 2.1: Update the current baseline

As per the applied methodology, ACM002, version 19 /UN1/, the baseline emission is the product of electricity delivered to the Colombian electrical grid by the renewable generating units multiplied by combined margin emission factor of Colombian electrical grid. In accordance with applied methodology /UN1/ and applicable Tool /UN5/ an electricity baseline emission factor has been calculated as a combined margin emission coefficient, consisting of the combination of a simple operating margin (OM) emission coefficient and a build margin (BM) emission coefficient.

Step 2.2: Update the data and parameters

The simple adjusted OM was chosen by the PP to calculate the operating margin emission factor, using 2018, 2017 and 2016 data vintage for the estimation of emissions reductions, in accordance with the parameters stated in the following equation:

$$EF_{grid,OM-adj,y} = (1-\lambda_y) \times \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \times \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}}$$

This emission factor is fixed during the second crediting period. It will not require monitoring during the second crediting period.

Calculations of OM emission factor were made as illustrated in the spreadsheets used for Colombian electrical grid emission factor calculation /2/, which is according to the tool's specifications/UN5/.

Is related to the share of the low-cost/must-run power units (on the margin) in the operating emission factor. Since the low-cost/must-run power units in the interconnected electrical Colombian grid are running with renewable energy sources[5], therefore $EF_{EL,k,y} = 0$, so this part of the equation is '0', as the audit team assessed in the spreadsheet used for Colombian electrical grid emission factor calculation /2/, sheet "OM", cells: H26, H27 and H28.

The audit team validated the values comparing the ones presented for the PP in the mentioned spreadsheet/2/, against the values downloaded, from the XM website[6] during the onsite visit. After the comparison, the audit team deemed reliable and appropriate the values used. The OM emission factor calculated was 0.5522 tCO_2e/MWh, hence ICONTEC deemed the obtained value as reliable and credible.

In order to calculate the BM emission factor (step 5) option 1 (ex-ante) for the second crediting period was adopted. The build margin emission factor is calculated based on the most recent information available on units already built for sample group m at the time of revised CDM-PDD submission to the DOE for validation (2018). The PP took the information from the latest official XM statistics[6].

[5] They include hydro, wind, low-cost biomass, and solar generation.
[6] http://informacioninteligente10.xm.com.co/oferta/Paginas/HistoricoOferta.aspx and http://paratec.xm.com.co/paratec/SitePages/Default.aspx .

	ICONTEC agreed with the data collection used for the PP to calculate the BM, hence the BM is confirmed as reliable and credible. The BM calculated was 0.1429 tCO_2/MWh, hence ICONTEC deemed the obtained value as reliable and credible The grid emission factor for the project activity has been calculated to be 0.2452 tCO_2e/MWh, considering a weighted of W_{OM} = 0.25 and W_{BM} = 0.75, as stipulated for renewable crediting period in the "Tool to calculate the emission factor for an electricity system" /UN5/.
Findings	CAR 1. More details about this issue on Apendix 4.
Conclusion	The audit team confirms the validity of updated baseline in the updated PDD/1/ in accordance with the applicable validation requirements related to the renewal of crediting period/UN6/ in the VVS /UN2/.

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation	According to equation 17 of the methodology ACM002, version 19/UN1/, emission reductions shall be calculated as follows: $ER_y = BE_y - PE_y$ For this type of project activity, according to Methodology L_y = 0 (ACM0002, version 19 section 5.6) and PE_y = 0, since Alto Tuluá Minor Hydroelectric Power Plant results in a existing single reservoir with no change in the volume of any reservoir as it was mentioned before (See section D.2 on this report). Hence, the emission reductions are calculated as: $ER_y = BE_y$ The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of energy produced by the renewable generating unit multiplied by the grid emission factor. $ER_y = BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$ For ex-ante estimation of baseline emissions, the electric energy baseline $EG_{BL,y}$ was established as a total of electrical energy produced by the project activity at registration time (114,400 MWh per year) /5/. The audit team deemed the value used for parameter $EG_{BL,y}$ as credible, reliable and traceable. The Grid emission factor was calculated for estimation of emission reduction as $EF_{grid,y}$ = 0.2452 tCO_2/MWh for the second crediting period. So the baseline emissions (and hence the emissions reductions) are: $ER_y = BE_y$ = 114,400 MWh X 0.2457 tCO_2/MWh = 28,050 tCO_2e/year
Findings	CAR 2. More details about this issue on Apendix 4.
Conclusion	Based on the information reviewed, the audit team confirmed that in the revised PDD, the sources used were correctly quoted and interpreted, the calculation processes are complete and replicable, and the calculation outcomes are reasonable and accurate. The audit team also confirms that: • All assumptions and data used by the project participants are listed in the revised PDD and its annexes, including their references and sources; • All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the revised PDD and its annexes; • All values used in the revised PDD and its annexes are considered reasonable in the context of the proposed CDM project activity; • The baseline methodology/UN1/ and applicable tools/UN5/ have been correctly applied to calculate baseline emissions, project emissions, leakage and emission reductions;

	• All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD and its annexes.

D.5. Validity of monitoring plan

Means of validation	Monitoring plan presented on revised PDD complies with requirements of approved methodology ACM0002 (version 19.0.0) /UN1/. Monitoring of GHG emission reductions is based on the electricity generation by the project activity, which is transparently presented in section B.7 of the revised PDD, version 5.10 /1/. ICONTEC verified through interviews with relevant personnel and onsite visit, that the project is equipped with an extensive monitoring system for electrical energy generation in accordance with the Colombian regulatory framework/6/. Training provided to the operational staff with respect to the monitoring plan has been established to maintain installed equipment and technology performance, as well as to ensure the measurement´s accuracy of data reported. Audit team checked all parameters presented at the monitoring plan of the latest version of the revised PDD /1/, against methodology /UN1/ and applied tools /UN5/ requirements. No deviations to the project activity were found.
Findings	No findings were raised on this issue.
Conclusion	With the above information, ICONTEC confirmed that the monitoring plan established by the PP, is feasible and that the PP has the ability and sufficient means of implementation to ensure that the emission reductions achieved as a result of the project activity, are reported ex-post and verified. It is according with provisions of VVS/UN2/ and PS /UN3/.

D.6. Crediting period

Means of validation	The type of crediting period for this project activity is renewable three times by 7 years.The first crediting period of the project activity was 01/01/2012 – 31/12/2018. The CDM Executive board in its one hundredth meeting[7] established a grace period for the submission of renewal request for the existing registered project activities whose crediting period has expired but has not been renewed as Alto Tuluá Minor Hydroelectric Power Plant. Therefore, it is expected that second crediting period commences on the day immediately after the expiration of the first crediting period (January 1st 2019).
Findings	No findings were raised on this issue
Conclusion	The validation team confirms that the description of the second crediting period in the revised PDD complies with applicable requirements established by the CDM Executive Board.

D.7. Project participants

Means of validation	Audit team checked whether the names of the project participants included in the revised PDD /1/ were consistent with the names of the project participants in the UNFCCC Website[8] by means of desk review and interviews in the onsite visit.
Findings	No finding was raised on this issue
Conclusion	The audit team concluded that the names of project participants in the revised PDD /1/ were consistent with the names of the project participants in the UNFCCC Website[7].

[7] https://cdm.unfccc.int/UserManagement/FileStorage/U92NIBAJF0SOH65YPWEZ8KCMQX3RDT
[8] https://cdm.unfccc.int/Projects/DB/AENOR1269848466.91/view

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[9]	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

This report includes the validation findings that underwent a technical review before being submitted to the project participants.

The technical review and the quality control of the process was performed by an internal technical reviewer in accordance with ICONTEC internal procedures for carrying out validation, verification and certification audits of CDM project activities. The technical reviewers are qualified in accordance with the professional qualification scheme for CDM validation and verification activities established by ICONTEC.

SECTION F. Validation opinion

ICONTEC has performed the renewal of crediting period assessment of Alto Tuluá Minor Hydroelectric Power Plant, in Colombia. The assessment of renewal of crediting period was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the revised Project Design Documentation and the subsequent follow-up interviews has provided ICONTEC with sufficient evidence to determine the fulfilment of the stated criteria.

The project correctly applies the Approved Consolidated Methodology ACM0002: Grid-connected electricity generation from renewable sources, version 19.0.

The project consists of a hydroelectric plant with an installed capacity of 22 MW which takes advantage from the waters of the Tulua River (middle basin), as well as Bajo Tuluá Minor Hydroelectric Power Plant. The project activity is located in the municipalities of Tuluá, Buga and San Pedro in the department of Valle del Cauca. The estimated electrical energy delivered by this project activity to the Colombian Electrical Interconnected Grid (SIN as per its acronym in Spanish) is 114.4 GWh per year.

The total emission reductions from the project are estimated to be on the average of 28,050 tCO_2e per year over the selected 7 year – second crediting period. The emission reductions' forecast has been checked and it is deemed likely that the stated amount is achieved because the underlying assumptions do not change.

[9] 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).

In summary, it is ICONTEC's opinion that Alto Tuluá Minor Hydroelectric Power Plant, in Colombia, as described in the revised PDD version 5.0, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the approved consolidated methodology ACM0002: Grid-connected electricity generation from renewable sources, version 19.0. ICONTEC thus, requests the renewal of the crediting period of the project as a CDM project activity.

Appendix 1. Abbreviations

Abbreviations	Full texts
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CERs	Certified emission reductions
CL	Clarification Request
CO_2e	Carbon dioxide equivalent
CREG	Colombian Regulatory Commission for energy and gas (Comision de Regulación de Energia y Gas)
DNA	Designated National Authority
DOE	Designated Operational Entity
EPSA	Empresa de Energía del Pacífico S.A. E.S.P.
ERs	Emission Reductions
GHG	Greenhouse Gases
ICONTEC	Colombian Institute of Technical Standards and Certification (Instituto Colombiano de Normas Técnicas y Certificación)
IPCC	Intergovernmental Panel on Climate Change
MoC	Modalities of Communication
MR	Monitoring Report
PCP	CDM Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PRC	Post Registration Change
PS	CDM Project Standard for project activities
UNFCCC	United Nations Framework Convention for Climate Change
VVS	CDM Validation and Verification Standard for project activities
UPME	Colombian Unit for mining and energy planning (Unidad de Planeacion Minero Energetica)
XM	Abbreviation for “Market Experts”. XM is a company of the ISA Group that provides integral services. www.xm.com.co. It is Colombian administrator of the wholesale electric market

Appendix 2. Competence of team members and technical reviewers

Francy Ramírez
Lead auditor and Technical Expert in Sectoral Scope 1.2

Education:

Electrical Engineer. Universidad Los Andes, 2001
Post grade:
Assessment of Social Projects. Universidad Los Andes, 2005
Environmental Management. Universidad Los Andes, 2016

University of Oxford. Course: Applying Knowledge Management, Principle and Practices (December 1st/ 2009).
University of Oxford. Course: Successful Change Management for Engineers, Scientists and Staff in Hi-tech Companies (December 2nd 2009).

University of Oxford. Course: Essentials of Project Management for Engineers, Scientists and Staff in Hi-tech Companies (December 3rd 2009).
University of Oxford. Course: Advanced Project Management for Engineers, Scientists and Staff in Hi-tech Companies (December 4th 2009).
Climate Change, Trade and Standardization - in a development perspective". Stockholm, Sweden(23 and 25 November 2009)
ISO global workshop on Greenhouse Gas Schemes Addressing Climate Change – How ISO Standards Help, Stockholm, Sweden. (20 and 21st November 2009)
Conference on Climate Change – Deforestation and Standardization. Bali, Indonesia (31st May and 1st June 2010)

Professional Background:
ICONTEC (2005 - 2010)
Professional of Standardization
Planning, coordinate, implement and ensure compliance with the program of national standardization in technical committees among which are electrical installations, electrical power quality, electrical transformers, substations and equipment for medium and high voltage, lighting, appliances and electrical accessories, protection against lightning strikes and electrical equipment. Develop technical standards. Develop and manage special projects assigned. Participate in programs of regional and international standardization.

CODENSA (2002 - 2005)
Inspections and electrical works coordinator
Supervise field work and download the results in the central information system, evaluate the inspections performed, reconciled with contractors, addressing the results of inspections to different areas of the company, charging inspections and electrical work to clients of the firm , coordination and support group field sales engineers, technical training for technical staff, administrative support to department business processes and lost control, maintenance of the database for internal management inspections. Project Leader for the Optimization of Technical Processes and Regional Trade in Cundinamarca.

CDM Experience
Lead Auditor

• Validation of Guanaquitas 9.74 MW hydroelectric project, Colombia
• Validation of Fuel Switching through change of furnaces at Imusa S.A., Colombia
• Validation of Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate heat and power, Argentina
• Validation of Cueva Maria Hydroelectric Expansion Project, Guatemala
• Validation of Paysandú Clean Energy, Uruguay
• Validation of La Vegona Hydroelectric project, Honduras
• Validation of Chamelecón 280 Hydroelectric project, Honduras
• Validation of Pardos SHPs and LOGICarbon CDM Project, Brazil
• Validation of Pequi and Sucupira SHPs and LOGICarbon CDM Project, Brazil
• Validation of Cambará and Embaúba SHPs and LOGICarbon CDM Project, Brazil
• Validation of Bonyic hydroelectric project, Panamá
• Validation of METALDOM Fossil fuel switch from reheat furnace, República Dominicana
• Validation of Toachi – Pilaton Hydroelectric Project, Ecuador
• Validation of EMGEA Small Hydropower (SHP) Run-of-the-River CDM Project Bundle, Colombia
• Validation of Energy efficiency at Malvinas Gas Plant, Perú
• Validation of Marañon Hydroelectric Project, Perú
• Validation of Santa Rita Hydroelectric Plant, Guatemala
• Validation of Ventana, Suba and Usaquén Hydroelectric CDM Bundled, Colombia
• Verification of Los Algarrobos hydroelectric project, Panamá
• Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk-, Argentina
• Validation of Taurichuco Hydropower Project, Perú

• Validation of Aguafresca Multipurpose and Environmental Service Project, Colombia
• Verification of Agua Fresca Multipurpose and Environmental Service Project, Colombia
• Verification of La Joya Hidroelectric project, Costa Rica
• Verification of Amaime Minor Hydroelectric Power Plant, Colombia

Specialist:

• Validation of Rio Bonito and Baitaca SHPs and LOGICarbon CDM Project, Brazil
• Validation VCS of Pequi and Sucupira SHPs and LOGICarbon CDM Project, Brazil
• Verification of three crediting periods of La Vuelta and la Herradura hydroelectric project, Colombia

CDM Technical Reviewer:

• Validation of improving energy efficiency in a new Gas Plant in Gibraltar - Colombia
• Validation of Tres Valles Cogeneration Project, Honduras
• Validation of Tunjita Diversion Hydroelectric Project, Colombia
• Validation of Ferreira Gomes Hydro Power Plant CDM Project, Brazil
• Verification of two crediting periods of La Venta II, México
• Verification of two crediting periods of La Joya Hidroelectric Project, Costa Rica
• Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk-, Argentina
• Verification of Tres Valles Cogeneration Project, Honduras
• Verification of Agua Fresca Multipurpose and Environmental Services, Colombia
• Verification of La Venta II, México
• Verification of two crediting periods of Fertinal Nitrous Oxide Abatement Project, México
• Verification of Co-composting of EFB and POME project, Guatemala
• Verification of Biogas Project, Olmeca III, Tecun Uman, Guatemala
• Verification of Jepirachi Wind Power Project, Colombia
• Verification of Biogas energy plant from palm oil mill effluent, Guatemala
• Verification of Santa Ana Hydroelectric Project, Colombia
• Validation of SHP Morro Azul CDM Project (JUN1164), Colombia
• Verification of Biogas Project, Olmeca III, Tecun Uman, Guatemala

Specialist Technical Reviewer

• Validation of Biogas project, Olmeca I, Santa Rosa, Guatemala
• Validation of CGR Catanduva Landfill Gas Project, Brazil
• Validation of Macaubas Landfill Gas Project, Brazil

Cristian Grisales
Lead technical reviewer and Technical Expert in Sectoral Scope 1.2

Education:

Clean Technologies – Environmental technology, innovation and management systems as means for regional and local economic development
Weitz Center for Development Studies – Israel
July 2015

Master Executive in Renewable Energies
EOI-Madrid, Spain
February 2015

Certified ISO 14001
ICONTEC

May 2012

Certified ISO 9001
ICONTEC
August 2012

Electrical Engineer
National University of Colombia
Bogotá - Colombia
July 2009

Professional Background

Professional of Climate Change
ICONTEC
May 2012 – Today
Professional on developing validation and verification on CDM projects as lead auditor and as technical expert in the energy sector.

Electrical Maintenance Engineer
EMGESA S.A ESP. Colombia
November 2009 – May 2012
Electrical maintenance engineer in the Bogotá River Hydroelectric plants. Executing preventive, predictive and corrective maintenance of the generators, auxiliary services, power transformers and electrical substation. Developed the investment projects' inventory in accordance with the annual operating budget. Implementation of RCM maintenance programs. Monthly service availability in the plant, and full-time availability in failure care. Electrical testing of generators, transformers, motors and substation equipment.

CDM Experience

Auditor and Specialist:

• Validation of Biogas project, Olmeca I, Santa Rosa, Guatemala
• Validation of CGR Catanduva Landfill Gas Project, Brazil
• Validation of Macaubas Landfill Gas Project, Brazil
• Validation of Taurichuco Hydropower Project, Perú
• Validation of Teresina Landfill Gas Project, Brazil
• Validation of Maceio Landfill Gas Project, Brazil
• Validation of Doña Teresa Hydroelectric Power Plant, Colombia
• Validation of SHPs Poço Fundo and Providência CDM Project (JUN1133), Brazil
• Validation of SHPs Tambaú, das Pedras and Rio do Sapo CDM Project (JUN1132), Brazil
• Verification of Amaime Minor Hydroelectric Power Plant, Colombia
• Verification of Ciudad Juarez Landfill Gas to Energy Project, Mexico
• Verification of Santa Ana Hydroelectric Plant, Colombia
• Verification of Biogas Project, Olmeca III, Tecún Uman, Guatemala
• Verification of Berlin Geothermal Project, Phase Two, San Salvador

Technical Reviewer:

• Validation of Thuan Nhien PhongWind Farm, Viet Nam
• Validation of Phuong Mai 3 Wind Power Project, Viet Nam
• Validation of Chamelecón 280 Hydroelectric project, Honduras
• Validation of Providencia I: 1.8MW Small Hydro Power Generation Plant, Colombia
• Validation of Providencia III: 9.11MW Small Hydro Power Generation Plant, Colombia

• Validation of SHP Itaguacu CDM Project (JUN 1146), Brazil, Brazil
• Renewal of Aguafresca Multipurpose and Environmental Service Project, Colombia
• Validation of Feira de Santana Landfill Gas Project, Brazil
• Validation of SHP Morro Azul CDM Project (JUN1164), Colombia
• Verification of Santa Ana Hydroelectric Plant, Colombia
• Verification of Methane recovery and effective use of power generation project Norte III-B Landfill, Argentina.

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
/1/	EPSA	Revised Project Design Document (PDD) for Alto Tuluá Minor Hydroelectric Power Plant	Version 1 dated on June 1st/2019 Version 5.0 dated on September 30th/2019 Version 5.1 dated on January 3rd/2020	PP
/2/	EPSA	Spreadsheet used for the calculation of the emission factor for the Colombian Electricity System and for the calculations of estimated ERs for the second crediting period	Files: • EF Colombia 2016-2018_Alto Tuluá.xlsx • EF Colombia 2016-2018_Alto Tuluá_v2F.xlsx	PP
/3/	Congress of the Republic of Colombia	Law 1715, which promotes the development and use of non-conventional energy sources, mainly those of a renewable nature, in the national energy system.	Dated on May 13th/2014	Other
/4/	XM	2018 annual report This report includes the operation figures of the Colombian Electrical interconnected system during 2018	Available at: http://informes.xm.com.co/gestion/2018/Documents/Reporte%20integral%20de%20sostenibilidad%2C%20operaci%C3%B3n%20y%20mercado%202018.pdf	Other
/5/	AENOR	Validation report for registration purposes of Alto Tuluá Minor Hydroelectric Power Plant	Dated on September 20th/2011	Other
/6/	CREG	Resolution 038 (Colombian Regulatory Framework)	Dated on March 20th/2014	Other
/UN1/	UNFCCC	Approved Consolidated Methodology ACM0002: Grid-connected electricity generation from renewable sources, version 19.0		Other
/UN2/	UNFCCC	CDM validation and verification standard for project activities, version 02.0		Other
/UN3/	UNFCCC	CDM project standard for project activities, version 02.0		Other
/UN4/	UNFCCC	CDM project cycle procedure for project activities, version 02.0		Other

No.	Author	Title	References to the document	Provider
/UN5/	UNFCCC	Tool to calculate the emission factor for an electricity system, version 07.0.0		Other
/UN6/	UNFCCC	Methodological Tool for 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		Other
/UN7/	UNFCCC	Project Design Document form, version 11.0		Other

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

Table 1. CL from this validation

CL ID	1	**Section no.**	D.1	**Date:** 22/08/2019
Description of CL				
The version of the revised PDD (version) does not match with the previous registered PDD (version 4). *CDM Requirements:* *• CDM project standard for project activities,version 02.0, paragraph 229*				
Project participant response				**Date:** 27/09/2019
The version of the updated PDD was corrected in order to match with the frequency of previous registered PDD (version 4).See front page of updated PDD.				
Documentation provided by project participant				
30 09 2019 Alto Tulua - New PDD-v11.0 - v02.doc				
DOE assessment				**Date:** 04/10/2019
In tne updated version of the revised PDD, the version of this document matchs with the previous registered PDD (version 4). Audit team conclusion: Closed				

CL ID	2	**Section no.**	D.1	**Date:** 22/08/2019
Description of CL				
The installed capacity of Alto Tulúa Hydroelectric power plant and the installed capacity of Francis Turbines have different values in the registered PDD and the revised PDD *CDM Requirements:* *• CDM validation and verification standard for project activities, version 02.0, paragraph 403*				
Project participant response				**Date:** 27/09/2019
The installed capacity of Alto Tulúa Hydroelectric power plant and the installed capacity of Francis Turbines were corrected according to the values presented in the registered PDD. See updated PDD.				
Documentation provided by project participant				
30 09 2019 Alto Tulua - New PDD-v11.0 - v02.doc				
DOE assessment				**Date:** 04/10/2019
The installed capacity of Alto Tulúa Hydroelecvtric power plant and the installed capacity of Francis Turbines have been corrected in accordance with the values stated in the approved PDD and the avlues verified by the audit team in the onsite inspection. Audit team conclusion: Closed				

CL ID	3	Section no.	D.1	Date: 22/08/2019
Description of CL				
In section A.2 of the revised PDD (version 1) is missing a unique identification of the project activity's power house *CDM Requirements:* *• Project design document form, version 11.0. Attachment. Instructions for completing this form. Section A.2*				
Project participant response				**Date:** 27/09/2019
In section A.2 of the updated PDD (version 2) it was included the unique identification of the project activity's power house (location coordinates).				
Documentation provided by project participant				
30 09 2019 Alto Tulua - New PDD-v11.0 - v02.doc				
DOE assessment				**Date:** 04/10/2019
In the updated version of the revised PDD (version 5.0), it was included a unique identification of the project activity's power house in section A.2 Audit team conclusion: Closed				

CL ID	4	Section no.	D.1	Date: 22/08/2019
Description of CL				
In section A.3 of the revised PDD (version 1) is missing a description about The monitoring equipment and their location in the systems. *CDM Requirements:* *• Project design document form, version 11.0. Attachment. Instructions for completing this form. Section A.3. paragrapgh 1(g)*				
Project participant response				**Date:** 27/09/2019
In section A.3 of the updated PDD (version 2) it is added the description about The monitoring equipment and their location in the systems.				
Documentation provided by project participant				
30 09 2019 Alto Tulua - New PDD-v11.0 - v02.doc				
DOE assessment				**Date:** 04/10/2019
In the updated version of the revised PDD (version 5.0), it was included a description about the monitoring equipment and their location in the systems in section A.3 Audit team conclusion: Closed				

Table 2. CAR from this validation

CAR ID	1	Section no.	D.3	Date: 22/08/2019
Description of CAR				
The project participants shall demonstrate the validity of the original baseline or update it in accordance with the provisión stated in CDM project standard for project activities *CDM Requirements:* *• CDM project standard for project activities,version 02.0, paragraph 282*				
Project participant response				**Date:** 27/09/2019
It was demonstrated the validity of the original baseline and updated in accordance with the provisión stated in CDM project standard for project activities. In this sense TOOL 11 was applied in section B.4. of the updated PDD (version 2).				
Documentation provided by project participant				
30 09 2019 Alto Tulua - New PDD-v11.0 - v02.doc				
DOE assessment				**Date:** 04/10/2019
In version 5.0 of the revised PDD, the PP has included, in section B.4 the assessment of the validity of the original baseline or update. The appraisal carried out by the audit team is described in Section D.3 on this report. Audit team conclusion: Closed				

CAR ID	2	Section no.	D.4	Date: 19/09/2019
Description of CAR				
The power plants listed for the build margin calculation shall be listed in accordance with the provision stated in the methodological tool to calculate the emission factor for an electricity system. *CDM Requirements:* *• Methodological tool to calculate the emission factor for an electricity system,version 07.0, paragraph 75*				
Project participant response				**Date:** 27/09/2019
The power plants listed for the build margin calculation were updated and listed in accordance with the provision stated in the methodological tool to calculate the emission factor for an electricity system. See excel file for emission factor calculation worksheet BM.				
Documentation provided by project participant				
EF Colombia 2016-2018_Alto Tuluá_v2F.xls				
DOE assessment				**Date:** 04/10/2019
In the updated spreadsheet used for calculation of the emission factor for Colombian electricity system (EF Colombia 2016-2018_Alto Tuluá_v2F.xlsx) the power plants listed for the build margin calculation are listed in accordance with the provision stated in the methodological tool to calculate the emission factor for an electricity system. Audit team conclusion: Closed				

Table 3. FAR from this validation

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

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Document information

Version	*Date*	*Description*
03.0	31 May 2019	Revision to: • 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); • 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