




**Validation report form for post-registration changes for  
CDM project activities  
(Version 03.0)**

**BASIC INFORMATION**

<b>Title and UNFCCC reference number of the project activity</b>	Introduction of the recovery and combustion of methane in the existing sludge treatment system of the Cañaveralito Wastewater Treatment Plant of EMCALI in Cali, Colombia. 2341.
<b>Process track</b>	<input type="checkbox"/> Prior approval <input checked="" type="checkbox"/> Issuance <input type="checkbox"/> Renewal of crediting period
<b>Version number of the validation report</b>	01.3
<b>Completion date of the validation report</b>	29/09/2019
<b>Type(s) of PRCs</b>	<input type="checkbox"/> Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents <sup>1</sup> <input checked="" type="checkbox"/> Corrections <input type="checkbox"/> Changes to the start date of the crediting period <input type="checkbox"/> Inclusion of a monitoring plan <input type="checkbox"/> Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents <input type="checkbox"/> Changes to the project design <input type="checkbox"/> Changes specific to afforestation and reforestation project activities
<b>Version number of PDD to which this report applies</b>	07.0
<b>Project participants</b>	<input type="checkbox"/> Empresas Municipales de Cali EMCALI EICE ESP <input type="checkbox"/> ALLCOT AG
<b>Host Party</b>	Colombia
<b>Applied methodologies and standardized baselines</b>	Methane recovery in wastewater treatment AMS- III.H, Version 9.0.
<b>Mandatory sectoral scopes</b>	Scope: 13 Waste Handling and disposal
<b>Conditional sectoral scopes, if applicable</b>	NA
<b>Name and UNFCCC reference number of the DOE</b>	Colombian Institute for Technical Standards and Certification (ICONTEC) E- 0024
<b>Name, position and signature of the approver of the validation report</b>	 German Nava Technical Director

<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).

**SECTION A. Executive summary**

ICONTEC was contracted by Empresas Municipales de Cali EMCALI EICE ESP to perform a validation assessment of corrections to the registered CDM project activity No.2341: Introduction of the recovery and combustion of methane in the existing sludge treatment system of the Wastewater Treatment Plant of Cañaveralero EMCALI in Cali, Colombia on the basis of UNFCCC criteria contained in the CDM Executive Board and the host country, as well as the operational and technical monitoring criteria specific to this type of project.

The proposed project activity under validation of post-registration changes is based on the consolidated baseline methodology AMS-III.H. ver. 9 - Methane recovery in wastewater treatment.

The project consists of the reduction of GHG emissions to the atmosphere by recovering the methane from biogenic organic matter in wastewaters by means of Introduction of methane recovery and combustion process carried out in the existing WWTP-C. The sludge is produced in eight sedimentation tanks and next carried into thickener tank. Later, sludge is redirected to four covered anaerobic digestion tanks (digesters) with the purpose of obtaining more stable end-product and eliminating pathogenic microorganisms present in the untreated sludge. The above-mentioned anaerobic digestion, besides stabilizing sludge, generates biogas with high content of methane.

The recovered biogas (methane) will be used for internal electricity consumption (or flared in case the internal consumption is met). The residual heat from energy generation will be used to heat up the digestion tanks to maintain the anaerobic digestion process, same heat as in the baseline scenario.

The project activity is in the northeast of Cali in the Department of Valle del Cauca, Republic of Colombia.

The PRC-2341-001 (approved on 01/07/2015) included the following changes:

- Parameters removed of the monitoring plan:
  - $T_{H,h}$ : Temperature of biogas fed into the water heater (°C)
  - $T_{G,h}$ : Temperature of biogas fed into the engines of the electric generators (°C).
  - $T_{G,h}$ : Temperature of biogas flared (°C)
  - $P_{G,h}$ : Pressure of biogas fed into the engines of the electric generators (mbar)
  - $P_{H,h}$ : Pressure of biogas fed into the water heater (mbar)
  - $P_{G,h}$ : Pressure of biogas flared (mbar)
- Monitoring of flows at normal conditions (measures given directly by the instruments).
- Updating of the management and monitoring structure and responsibilities of staff related to the CDM project activity.

The current post-registration changes assessment process consists of:

1. Desk review of the monitoring documentation, registered and updated PDD, validation report and relevant information (e.g. IPCC reports).
2. On-site visit and follow-up interviews with project stakeholders
3. Resolution of outstanding issues and the technical review and issuance of the final PRC validation report.

The assessment of the project's documentation, onsite inspection and interviews allowed ICONTEC to determine that the proposed post-registration changes (corrections) to the registered CDM project activity are an accurate reflection of actual project information and comply with the relevant CDM rules and requirements.

Hence, ICONTEC issues a positive validation opinion of post-registration changes together with the submission of the request for issuance of CERs for the first monitoring period for approval by the CDM Executive Board.

## 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	Interviews	Validation findings
1.	Team Leader and technical expert in sector 13	EI	Grisales	Cristian	Freelance	x	x	x	x

### B.2. Technical reviewer and approver of the validation report on PRCs

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	EI	Aubad	Ana Isabel	Freelance
2.	Approver	IR	Nava	German	Employee

## SECTION C. Means of validation

### C.1. Desk/document review

The assessment of post-registration changes of the project documentation provided by the project proponent is based upon both quantitative and qualitative information on emission reductions.

Quantitative information comprises figures of BEs, PEs, ERs and monitoring results reported on the MR submitted together with this report. Qualitative information comprises information on internal management controls, calculation procedures, actions taken to ensure QA/QC and procedures followed for transferring and recording of data.

Documents downloaded by ICONTEC from the project's UNFCCC web page:

- PDD registered (version 04.0, dated on Feb 27<sup>th</sup>, 2015) /1/.
- Validation report for the project (version 04, dated on Sep 15<sup>th</sup>, 2009) /2/.
- Authorization as project proponent for ALLCOT AG (dated on Sep 25<sup>th</sup>, 2018) /3/
- Monitoring reports uploaded on the web page of the project as part of the 1<sup>st</sup> request for issuance of the project for the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> monitoring periods<sup>2</sup> /4/.

Documents reviewed during the desk review stage, provided by the project proponent:

<sup>2</sup> It is worth drawing attention to the fact that the request for issuance of CERs for the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> monitoring periods of the project started in 2014 and after receiving a request for review issued by UNFCCC in 2015 (for the 1<sup>st</sup> MP), the project stopped the verification process until 2019, when PP requested to ICONTEC to re-start the verification process. Current request of assessment of post-registration changes together with the submission of the request for issuance is only including the 1<sup>st</sup> monitoring period of the project.

- PDD registered in track changes /5/.
- Updated PDD in clean version /6/.
- Monitoring report for the 1<sup>st</sup> monitoring period /7/.
- Emission reductions calculation file for the 1<sup>st</sup> monitoring period /8/.
- Grid Emission Factor Project 2341/11/.
- Proposed responses to the requests for review raised by UNFCCC on 2015, as part of the 1<sup>st</sup> request for issuance performed by the project activity /9/.

In addition to the abovementioned documentation, ICONTEC reviewed the following regulatory CDM documents:

- CDM VVS, version 02.0 /UN1/.
- CDM PS, version 02.0 /UN2/.
- CDM PCP, version 02.0 /UN3/.
- Methodology AMS-III.H, Methane recovery in wastewater treatment, version 09 /UN4/.
- Methodological tool - Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion, version 03.0 /UN5/.
- Methodological tool - Emissions from solid waste disposal sites, version 08.0 /UN6/.
- Methodological tool - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0 /UN7/.
- Methodological tool - Project emissions from flaring, version 03.0 /UN8/.

A compilation of the documents related to the validation process has been included on Appendix 3.

## C.2. On-site inspection

This request for post-registration changes is submitted under the issuance track. An on-site inspection was carried out on June 4<sup>th</sup>, 2019<sup>3</sup> as part of the verification audit for the first monitoring period (14 Sep 2010 - 31 Oct 2012), where the following activities were performed:

Duration of on-site inspection: 04/06/2019				
No.	Activity performed on-site	Site location	Date	Team member
1	Tour of the project's facilities	Cañaveralero Wastewater Treatment Plant, Cali, Colombia.	June 4 <sup>th</sup> 2019	Cristian Grisales
2	Assessment to the compliance of the monitoring activities with the registered monitoring plan.			
3	Compliance of the project implementation with the registered project design document.			
4	Compliance of the monitoring report with the current monitoring activities of the project.			
5	Compliance of the project implementation and operation with the registered PDD.			
6	Assessment of the corrections requested (post-registration changes) with respect to the current operation of the project.			
7	Assessment of data monitoring, aggregation and calculation of emission reductions.			
8	Assessment of the calibration and QA/QC performance.			
9	Assessment of the information presented on the monitoring report, with respect to the current operation of the project.			

<sup>3</sup> Despite ICONTEC performed an on-site visit to the project during the first request for issuance of ERs for the first monitoring period (2015), a second visit of shorter duration was requested in order to validate the information and state of the project as well as the suitability of the corrections requested together with the issuance track.

### C.3. Interviews

The following interviews were carried out during the on-site inspection done on June 4<sup>th</sup>, 2019 as part of the verification audit for the first monitoring period of the project (14 Sep 2010 - 31 Oct 2012):

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Garcia Lopez	Mario	EMCALI's Project Manager	June 4 <sup>th</sup> , 2019	<ul style="list-style-type: none"> <li>Tour by the WWTP facilities (assessment of the projects' description, implementation and operation, interviews). Physical inspection of applicable monitoring equipment.</li> <li>Assessment of the main events happened during the 1st and 2nd MP.</li> <li>Assessment of post-registration changes (corrections).</li> <li>Compliance of monitoring and calibration activities for the 1st MP (calibration certificates, plant logbooks, SCADA system, data aggregation and processing).</li> <li>Assessment of data and calculation of emission reductions (assessment of ER's calculations and emission factor's calculation) for the 1st MP.</li> </ul>	Cristian Grisales
2.	Sala	Sergio	ALLCOT's Associated			
3.	Sepulveda	Gilberto	EMCALI's Department Manager			
4.	Valencia	Orlando	EMCALI's Instrumentation Professional			
5.	Varela	Daniel	EMCALI's Resident Engineer			

### C.4. Sampling approach

ICONTEC checked 100% of project's information hence, no sampling approach was required.

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

The findings related to the corrections to the registered PDD were raised during the verification process<sup>4</sup>, please refer to the verification and certification report /10/

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form		NA	
Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents			

<sup>4</sup> The verification process of the 1<sup>st</sup> monitoring period of the project started in 2014 and was stopped by PP in 2015, after a request for review requested by UNFCCC. In 2019 PP and ICONTEC re-started the verification process. As part of the desk review stage of the new verification process, several inconsistencies in the information included in the registered PDD were identified and the updating of the registered PDD was requested to the PP together with the issuance track for the 1<sup>st</sup> MP. As part of the assessment, and having into account that more than 3 years had elapsed since last on-site visit to the project, ICONTEC performed a new shorter on-site visit, additional to the one done in 2014, which focused on the reinforcement of the on-site evaluation previously performed as well as the validation of the post-registration changes identified (mainly corrections).

Corrections	
Changes to the start date of the crediting period	
Inclusion of a monitoring plan	
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents	
Changes to the project design	
Others (please specify)	
<b>Total</b>	

## SECTION D. Validation findings

### D.1. Compliance with PDD form

<b>Means of validation</b>	<p>During the desk review stage and the on-site visit, ICONTEC validated the compliance of the updated PDD /5, 6/ with the latest version of the form (version 11) in both track-change and clean version. ICONTEC confirms the appropriate and complete of its filling out as per the instructions of the form.</p> <p>ICONTEC also confirms that PP has correctly transferred to the later version of the form (revised PDD version 06) /6/ the same information as that in the registered PDD /1/ without material misstatements.</p>
<b>Findings</b>	Please refer to the verification and certification report /10/
<b>Conclusion</b>	<p>ICONTEC confirms:</p> <ul style="list-style-type: none"> <li>The compliance of the revised PDD version 06 /5, 6/ (both in tracked-change and clean versions) with the valid version of the applicable PDD form and the instructions therein for filling out the PDD form.</li> <li>The information transferred to the PDD version 06 /5, 6/ is materially the same as that in the registered PDD version 04 /1/.</li> </ul>

### D.2. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

<b>Means of validation</b>	NA
<b>Findings</b>	NA
<b>Conclusion</b>	NA

### D.3. Corrections

Means of validation

As part of the re-start of the verification for the 1<sup>st</sup> monitoring period of the project, several inconsistencies in the information included in the registered PDD were identified during the desk review stage and the updating of the registered PDD was requested to the PP, together with the issuance track for the 1st MP.

The following table presents the post-registration changes (corrections) requested by PP as well as the assessment done by ICONTEC.

#	Correction Requested	Validation done by ICONTEC
1	Updating of figure 1, including in the title “baseline scenario”, as well as the use of residual heat from electricity generation in the project activity scenario (addition to the baseline scheme depicted on figure 1).	ICONTEC concluded that the addition to the title of the figure 1 of “baseline scenario” is an editorial correction, just added by PP in order to clarify the scheme. On the other hand, the addition to the scheme of the use of residual heat from electricity was validated by ICONTEC through physical inspection, where it is used to heat up the digestion tanks to maintain the sludge in the anaerobic digestion process at 35°C, while in the baseline scenario the same anaerobic digestion conditions (35°C) were kept by a heater powered by the city’s natural gas network. Therefore, since the heat to be supplied to the digestion tanks in

			<p>the project activity is the same as it was in the baseline scenario, the technology implemented does not increase the amount of methane produced per unit of COD removed compared with the technology used in the baseline, so project emissions or leakage are not to be deducted from the emission reductions calculated from the methane recovered and combusted. In fact, the utilization of the residual heat from electricity generation to heat up the digestion tanks in the project activity scenario is considered an energy efficiency measure as it reduces the amount of fossil fuel (natural gas) compared to the baseline scenario."</p> <p>The abovementioned was also validated by RINA (validating DOE) as par of the response to CAR 4 (validation report, page A-35) and approved by UNFCCC at the registration stage:</p> <p><i>"... the technology implemented does not employ any changes into the anaerobic treatment system of sludge neither of wastewater as consists exclusively of the equipment installed after the process of anaerobic sludge treatment is completed and therefore, the technology introduced does not influence in any way the amount of methane produced per unit of COD removed in comparison with the baseline situation which in other words means that the efficiency of the anaerobic digesters' is not influenced by the introduction of the technology of the CDM project activity."</i></p> <p>This situation is in accordance with paragraph 34 case iv) of the applied methodology AMS.III.H which states that those cases where it can be demonstrated that the technology implemented does not increase the amount of methane produced per unit of COD removed (COD removed is the difference between the inflow COD (COD<sub>y,ww,untreated</sub>) and outflow COD (COD<sub>y,ww,treated</sub>)), the project emissions do not need to be deducted.</p>
	2	New figures (2 and 3) have been included to clarify the technology and boundaries of the project activity.	During the on-site visit it was verified that the description made by PP in figures 2 and 3 corresponds with the current project's operation and agrees with the information approved on registered PDD version 04. The updating of the schemes mainly pursued to clarify the levels of service and existing facilities at the baseline and project's scenario.
	3	The following sentence: "basic technical specifications of the biogas flare, water heater, dehumidificator, biogas storage tanks and generator's engine (more information available upon a request)" has been deleted since it was repeated in Section A.3.	ICONTEC verified the repetition of the statement in 2 places of the PDD version 04.
	4	Information regarding	ICONTEC verified at the UNFCCC web page the

		project participants has been updated in this new version of the PDD to be consistent with the UNFCCC website (inclusion of ALLCOT AG).	approval of ALLCOT AG as new project participant of the project /3/.
	5	Section A.7 has been modified to include the use of the Methodological tool: Assessment of de-bundling for small-scale project activities Version 04.0 instead the Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM Project Activities.	ICONTEC confirmed in the annex 27 of the EB 36 the initial adoption of the tool, consolidating all guidance on de-bundling, including the Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM Project Activities.
	6	Section B.2 has been reinforced including the three applicability conditions of the applied methodology to be consistent with the rest of the document.	<p>The following applicability condition was included:</p> <p>The recovered methane from the above measures may also be utilised for the following applications instead of combustion/flaring:</p> <ol style="list-style-type: none"> <li><b>Thermal or electrical energy generation directly; or</b></li> <li>Thermal or electrical energy generation after bottling of upgraded biogas; or</li> <li>Thermal or electrical energy generation after upgrading and distribution: <ol style="list-style-type: none"> <li>Upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints; or</li> <li>Upgrading and transportation of biogas via a dedicated piped network to a group of end users; or</li> </ol> </li> <li>Hydrogen production.</li> </ol> <p>During the on-site visit ICONTEC verified that the project activity generates energy to satisfy internal demand with the captured biogas as common practice and in case of failure of the biogas energy engines, biogas is used as fuel in the water heater.</p> <p>The abovementioned use of the biogas was approved by UNFCCC in the registered PDD version 04 /1/.</p>
	7	Project boundaries and sources and gases included and excluded in the calculations have been clarified (Section B.3).	ICONTEC reviewed the modifications made to the table of project boundaries and sources of the section B.3 and did not identified any material misstatement or modification to the project's baseline. Corrections done are deemed appropriated in order to provide clarity and precision to the sources and boundaries.
	8	Figure 4 has been included to clarify the boundary of the project activity amongst the inclusion of the Biogas alternative use and Energy Consumption of the Grid.	During the on-site visit ICONTEC verified the consistency between the information reported as project boundary in the updated PDD version 06 against the information included on the registered PDD version 04 /1/ and the current projects' facilities. No material misstatements were identified, hence ICONTEC deems as correct the scheme included.



	9	Ex-post baseline calculations have been clarified in section B.6.1 to be in accordance with paragraph 36 of the applied methodology.	ICONTEC reviewed the corrections done by the PP to the ex-post baseline calculations reported on section B.6.1 and considered them as adequate in order to provide clarity to this section with respect to the information reported in other sections of the PDD. ICONTEC deems as adequate the corrections done in order to provide clarity to this section of the PDD.
	10	The calculation of project activity emissions from electricity consumption are clarified (in section B.6.1) to be determined as per the procedures described in the latest version of the AMS I.D (Grid connected renewable electricity generation) at the moment of the registration of the project activity (version 13).	ICONTEC compared the explanations on emissions by energy consumption given on the registered PDD with the clarifications (corrections) made on this matter in the updated PDD and did not identify any material modification that affects the reliability of the calculation of project emissions. The corrections done in this section are mainly pursuing a better organization of the information on project emissions in order to provide the reader of an easier understanding of the options followed for the calculations as per AMS I.D.
	11	<p>Three monitoring parameters have been detailed in the monitoring plan of the revised PDD to be in accordance with the applied methodology. These parameters are monitored in accordance with the methodology, but they were not correctly reported in the registered PDD.</p> <p>a. Flare efficiency (%).</p> <p>b. Grid electricity consumption in year “y” (MWh).</p> <p>c. Grid emission factor (tCO<sub>2</sub>/MWh).</p> <p>The operating time of the flares and the water heater are calculated using the values of the temperature, and it is clarified in the respective monitoring parameters (<math>T_{\text{flare1}}</math>, <math>T_{\text{flare2}}</math>).</p> <p>The operation hours of the water heaters are also calculated using the values of Volumetric flow rate of biogas and volumetric fraction of methane fed into the water heater. And a clarification is also included in the monitoring parameter.</p>	<p>ICONTEC reviewed the monitoring arrangements related to the parameters: Flare Efficiency, Grid Electricity Consumption and Grid Emission Factor established on the registered PDD, against the ones proposed in the updated PDD and did not identify any material inconsistency or post-registration change different to corrections. The proposed corrections mainly pursue to provide methodological clarity to the monitoring of the abovementioned parameters as well as consistency with the applicable methodologies and tools.</p>
	12	Three monitoring parameters have been detailed in the monitoring plan of the revised PDD to be in accordance with the applied methodology.	ICONTEC considers that the inclusion of these parameters as monitoring parameters can be considered as a correction since all of them were considered in the calculations stated in the registered PDD /1/, but, the tables were not correctly included in the applicable section. This

	<p>These parameters were monitored in accordance with the methodology, but, they were not correctly reported in the registered PDD.</p> <ul style="list-style-type: none"><li>▪ Flare efficiency (%).</li><li>▪ Grid electricity consumption in year “y” (MWh).</li><li>▪ Grid emission factor (tCO<sub>2</sub>/MWh).</li></ul> <p>The operating time of the flares and the water heater are calculated using the values of the temperature, and it is clarified in the respective monitoring parameters (T<sub>flare1</sub>, T<sub>flare2</sub>).</p> <p>The operation hours of the water heaters are also calculated using the values of Volumetric flow rate of biogas and volumetric fraction of methane fed into the water heater. And a clarification is also included in the monitoring parameter.</p>	<p>change does not affect neither the baseline, nor the additionality or design of the project, in accordance with appendix of the CDM Project Standard.</p> <p>As additional assessment, ICONTEC performed the following analysis in order to discard other existing kinds of PRC for the inclusion of the abovementioned parameters in the updated PDD:</p> <table><tr><th>Types of PRC</th><th>Justification</th></tr><tr><td>Temporary deviations from the monitoring plan as described in the registered PDD.</td><td>Not applicable. This cannot be considered as a temporary deviation from the monitoring plan since the three parameters have always been considered in the project activity and are fully applicable during the crediting period.</td></tr><tr><td>Corrections</td><td>Applicable. This change is considered as a correction and it is aligned with paragraph 1 c) of Appendix of the CDM PS: Changes to the monitoring of a registered CDM project activity that have no material impact on the applicability of the applied methodologies or the other applied methodological regulatory documents, or the accuracy and completeness of the monitoring. No impact on the applicability of the methodology is produced. The accuracy and the completeness of the monitoring is not affected since the three parameters were latently considered in the registered PDD /1/ (pages 35, 37 and 38). They have been included in tables of section B.7.1 in order to improve the clarity and consistency in all sections of the PDD.</td></tr><tr><td>Changes to the start date of the crediting period.</td><td>Not applicable since the start date of the crediting period is not modified.</td></tr><tr><td>Inclusion of the monitoring plan (to the registered PDD, if the monitoring plan was not included at the time of their</td><td>Not applicable because the monitoring plan was already included during the registration of the project.</td></tr></table>	Types of PRC	Justification	Temporary deviations from the monitoring plan as described in the registered PDD.	Not applicable. This cannot be considered as a temporary deviation from the monitoring plan since the three parameters have always been considered in the project activity and are fully applicable during the crediting period.	Corrections	Applicable. This change is considered as a correction and it is aligned with paragraph 1 c) of Appendix of the CDM PS: Changes to the monitoring of a registered CDM project activity that have no material impact on the applicability of the applied methodologies or the other applied methodological regulatory documents, or the accuracy and completeness of the monitoring. No impact on the applicability of the methodology is produced. The accuracy and the completeness of the monitoring is not affected since the three parameters were latently considered in the registered PDD /1/ (pages 35, 37 and 38). They have been included in tables of section B.7.1 in order to improve the clarity and consistency in all sections of the PDD.	Changes to the start date of the crediting period.	Not applicable since the start date of the crediting period is not modified.	Inclusion of the monitoring plan (to the registered PDD, if the monitoring plan was not included at the time of their	Not applicable because the monitoring plan was already included during the registration of the project.
Types of PRC	Justification											
Temporary deviations from the monitoring plan as described in the registered PDD.	Not applicable. This cannot be considered as a temporary deviation from the monitoring plan since the three parameters have always been considered in the project activity and are fully applicable during the crediting period.											
Corrections	Applicable. This change is considered as a correction and it is aligned with paragraph 1 c) of Appendix of the CDM PS: Changes to the monitoring of a registered CDM project activity that have no material impact on the applicability of the applied methodologies or the other applied methodological regulatory documents, or the accuracy and completeness of the monitoring. No impact on the applicability of the methodology is produced. The accuracy and the completeness of the monitoring is not affected since the three parameters were latently considered in the registered PDD /1/ (pages 35, 37 and 38). They have been included in tables of section B.7.1 in order to improve the clarity and consistency in all sections of the PDD.											
Changes to the start date of the crediting period.	Not applicable since the start date of the crediting period is not modified.											
Inclusion of the monitoring plan (to the registered PDD, if the monitoring plan was not included at the time of their	Not applicable because the monitoring plan was already included during the registration of the project.											

			registration);	
			Permanent change to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents;	Not applicable. This is not considered as a permanent change in the registered monitoring plan, since the three parameters were used for the calculations, and were considered in the registered PDD /1/. Nevertheless, the reporting was not clear enough in the PDD, and PP considered the opportunity to clarify and edit the information in a revised PDD in order to improve the clarity and consistency in the whole document.
			Changes to the project design.	The design of the project has not been changed.
<b>Findings</b>	Please refer to the verification and certification report /10/			
<b>Conclusion</b>	ICONTEC concludes: <ul style="list-style-type: none"> <li>▪ Corrections presented by PP together with the issuance track for the 1<sup>st</sup> monitoring period in the revised PDD /5, 6/ comply with the relevant requirements in the CDM project standard for project activities /UN2/.</li> <li>▪ The corrected information presented on the updated PDD is an accurate reflection of actual project information as per the assessment done by the DOE at the on-site visit and desk review stage.</li> <li>▪ The corrections done by PP are in accordance with the applied methodologies and the registered monitoring plan.</li> </ul>			

**D.4. Changes to the start date of the crediting period**

<b>Means of validation</b>	NA
<b>Findings</b>	NA
<b>Conclusion</b>	NA

**D.5. Inclusion of a monitoring plan**

<b>Means of validation</b>	NA
<b>Findings</b>	NA
<b>Conclusion</b>	NA

**D.6. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents**

<b>Means of validation</b>	NA
<b>Findings</b>	NA
<b>Conclusion</b>	NA

**D.7. Changes to the project design**

<b>Means of validation</b>	NA
<b>Findings</b>	NA
<b>Conclusion</b>	NA

**D.8. Changes specific to afforestation and reforestation project activities**

<b>Means of</b>	NA
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<b>validation</b>	
<b>Findings</b>	NA
<b>Conclusion</b>	NA

### SECTION E. Internal quality control

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

The technical review and QA/QC process were performed by an internal technical reviewer team in accordance with the ICONTEC's internal procedure for carrying out validation, verification and certification audits of CDM project activities. After this step, the submission for request for issuance has been conducted.

The technical reviewers are qualified in accordance with the ICONTEC's professional qualification scheme for CDM validation and verification audits.

### SECTION F. Validation opinion

ICONTEC performed the validation of post-registration changes together with the submission of the request for issuance of CERs for the 1<sup>st</sup> monitoring period of the registered CDM project: Introduction of the recovery and combustion of methane in the existing sludge treatment system of the Cañaveralero Wastewater Treatment Plant of EMCALI in Cali, Colombia, registration number 2341, owned by Empresas Municipales de Cali EMCALI-EICE ESP. This validation was performed based on the requirements set by the CDM and relevant guidance provided by CMP and the CDM Executive Board.

The assessment consisted of the following phases:

- i) Desk review of the project design document and additional background documents;
- ii) On-site inspection and follow-up interviews with project stakeholders;
- iii) Resolution of outstanding issues and the issuance of the final validation report and opinion.

The assessment to the proposed post-registration changes (corrections) presented in both, track change and clean version of the updated PDD and subsequent follow-up interviews have provided ICONTEC with enough evidence to determine the positive fulfilment of stated criteria.

It is the opinion of ICONTEC, that the post-registration changes requested by the PP meet all relevant requirements for the CDM, thus a positive validation opinion is issued, and it is requested to the CDM Executive Board its approval together with the submission of the request for issuance of the certified emission reductions achieved by the project during the first monitoring period.

## Appendix 1. Abbreviations

Abbreviations	Full texts
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CERs	Certified emission reductions
CL	Clarification Request
CO <sub>2</sub> e	Carbon dioxide equivalent
CAR	Corrective Action Request
CDM	Clean Development Mechanism
ERs	Emission Reductions
GHG	Greenhouse Gases
ICONTEC	Colombian Institute of Technical Standards and Certification
IPCC	Intergovernmental Panel on Climate Change
MoC	Modalities of Communication
MR	Monitoring Report
ERs	Emission Reductions
MP	Monitoring Period
ERs	Emission Reductions
PDD	Project Design Document
CMP	Modalities and procedures
PCP	CDM Project Cycle Procedure
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
PCP	CDM Project Cycle Procedure

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

### Cristian Grisales

Lead auditor and technical expert in Sectoral Scope 13

#### Education:

- Clean Technologies - Weitz Centre for Development Studies - Israel - 2015
- ISO 50001 Energy Efficiency Manager - National University - ICONTEC - 2016
- Master Executive in Renewable Energies - EOI-Madrid, Spain - 2015
- Certified ISO 14001- ICONTEC- 2012
- Certified ISO 9001- ICONTEC- 2012
- Electrical Engineer - National University of Colombia - 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 and waste management sectors.

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 Nhen Phong Wind 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 Methane recovery and effective use power generation project Norte III-B , Argentina.

### **Ana Isabel Aubad**

#### **Technical expert reviewer in Sectoral Scope 13**

#### **Education:**

- International Master (MSc.) "Material and Energy Flow Management". Universidad Trier, Germany. Area of study in depth: "Use of solid waste for energy generation". Master's thesis with the biogas company Kompogas. 2005
- ISO 14000 and ISO 9000 Quality Auditor. Universidad de Antioquia in association with Bureau Veritas, Medellin, Colombia. 1999
- Environmental Engineer". Escuela de Ingeniería de Antioquia, Envigado, Colombia. 1998
- Internship - November 2009: company specialized in design, construction and operation of biogas plants: Chfour Biogas Inc. Ontario, Canada.
- Internship- September 2008: company specialized in design, construction and operation of biogas plants: Agraferm Ag-Luxemburgo.
- Internship- April-May 2007: companies specialized in design, construction and operation of biogas plants (Agraferm, Biogasnord, Ökobit). Germany.
- Practical training – November 2004: "Local Administration of the Environment, Agenda 21 and sustainable development (2 phase)". Life Academy, San José, Costa Rica.
- Practical training – April-May 2002: "Local Administration of the Environment, Agenda 21 and sustainable development (1 phase)". Life Academy, Karstad, Sweden.

- Internship – July- August 1999: “Practical training on Environmental Management Systems and Cleaner Production”. Federal Swiss Institute for Research and Materials Testing (EMPA). St. Gallen, Switzerland.

### **Professional Background**

- ICONTEC S.A. (2006–Today). External professional ISO 9001/14001/Chilean Technical Standards/Education/Climate Change (CDM, voluntary programs, carbon footprint).
- Environmental engineer and project management company G.P.R. S.A., Chile. (2006–2011). Project Manager (main subjects: energy, biogas and waste management projects).
- Deuman S.A., Chile. (2007). Team work engineering for development and implementation of CDM – Kyoto Protocol projects.
- ISAGEN S.A. E.S.P, Colombia (2000–2006). Analysts of the national energy company.
- Fulda-Südwest“. Öko Institut (German Ecology Institute), Darmstadt-Germany. (July to September 2004). Co-realization of the feasibility study for the construction of an energy plant from the biomass potential of the region of Fulda.
- MVR Müllverwertung Rugenberger Damm GmbH & Co. KG, Hamburg-Germany. (December 2003 to February 2004). Environmental engineering (professional internship), waste incineration with co-generation plant.
- National Center of Cleaner Production and Environmental Technologies (CNPMLTA), Medellín-Colombia. (1999 – 2000). Environmental engineering.
- ISAGEN S.A. E.S.P, Colombia. (1997 – 1998). Professional practice, work team member responsible for designing the EMS based on ISO 14001.

### **CDM Experience**

#### **Technical Reviewer:**

- Verification of three periods for “Agua Fresca Multipurpose and Environmental Services Project”
- Validation of “Fuel Switching through change of furnaces at Imusa S.A.”
- Validation of “Pirgua Landfill Gas Recovery and Flaring”
- Validation of “Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate
- Validation of “Methane Gas Capture and Fuel Switching at Compañía Argentina de Levaduras
- Validation of “Cueva Maria Hydroelectric Expansion Project”
- Validation of “Montenegro Landfill Gas Recovery and Flaring”
- Validation of “La Vegona Hydroelectric project”
- Validation of “Chamalecón 280 Hydroelectric project”
- Validation of “Metaldom Fossil fuel switch from reheat furnace”
- Verification of “Doña Juana Landfill gas-to-energy project” (many monitoring periods)
- Verification of “La Vuelta and la Herradura hydroelectric project”
- Verification of “Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador”
- Verification of “Co-composting of EFB and POME project”
- Verification of “Biogas Project, Olmeca III, Tecun Uman”
- Verification of “Los Algarrobos hydroelectric project”
- Verification of “La Venta II Project2
- Verification of “Toachi – Pilaton Hydroelectric Project”
- Verification of VCS Scheme “Fuel-Switching Project from Fossil Fuels to Biomass
- Validation of “CTR Teresina landfill gas project”
- Validation of “CTR Maceio landfill gas project”
- Validation of “Santa Rita Hydroelectric Plant”

#### **Specialist (onsite visit)-Auditor:**

- Verification of two periods “Biogas energy plant from palm oil mill effluent”
- Validation “Los Angeles Landfill Gas Flaring Project”
- Verification “Doña Juana Landfill gas-to-energy project”
- Verification “Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador”
- Verification “La Joya hydroelectric project”
- Verification “Hydroelectric Santa Ana”
- Verification “Biogas Project, Olmeca III, Tecun Uman”

**Lead Auditor:**

- Verification “BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil”
- Verification “BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil”
- Verification “BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil”
- Validation “Biogas Project, Olmeca I, Santa Rosa”
- Verification “Co-composting of EFB and POME project”
- Validation “CTR Rosario Landfill Gas Project2
- Validation “CTR Feira de Santana Landfill Gas Project”
- Validation “SHP Itaguaçu CDM project (JUN 1146), Brazil”
- Verification “Doña Juana Landfill gas-to-energy project”
- Verification of two periods for “Biogas Project, Olmeca III, Tecún Uman”
- Verification “Methane recovery and effective use of power generation project Norte III-B Landfill”

**Lead auditor in voluntary schemes:**

- Validation - verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil”
- Validation - verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil”
- Validation - verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil”

**Appendix 3. Documents reviewed or referenced**

No.	Author	Title	References to the document	Provider
1	EMCALI S.A E.S.P	PDD registered: PDD_2341 06-04-15. Pdf.	Version 04.0, dated on Feb 27th, 2015.	Others
2	RINA	Validation report: SSCCDM_FINAL_Validation_Report & Protocol EMCALI_III-H_Rev4.pdf	Version 04, dated on Sep 15th, 2009.	Others
3	Swiss Confederation	Authorization as project proponent for ALLCOT AG: 2341_LoA_CH_merged.pdf	Version 01, dated on Sep 25th, 2018.	Others
4	EMCALI S.A E.S.P	Monitoring reports 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> MP:  -CDM MR FORM 2341 1st Period Emcali uv.pdf -CDM MR FORM 2341 2nd Period Emcali uv.pdf -MR_2341_Thirt_Period_V1-1.pdf	-Version 01, dated on Jul 31 <sup>st</sup> , 2014. -Version 01, dated on Jul 31 <sup>st</sup> , 2014. -Version 01, dated on Nov 19 <sup>th</sup> , 2015.	Others
5	ALLCOT Group	PDD registered in track changes.	Version 07, dated on Sep 16 <sup>th</sup> , 2019.	PP
6	ALLCOT Group	Updated PDD in clean version.		
7	ALLCOT Group	Monitoring report 1 <sup>st</sup> MP: 22082019 Monitoring report Period 1 v7.2 cleanpdf	Version 07, dated on Aug 14 <sup>th</sup> , 2019.	PP
8	ALLCOT Group	Emission reductions calculation file 1st MP: 22082019 ER Calculation_Emcali_1stMP_v04.xls	Version 04, dated on Aug 17 <sup>th</sup> , 2019.	PP
9	ALLCOT Group	Proposed response to the request for review raised by UNFCCC: -Final response to request CDM 2341 v1.word	Version 01, dated on May 6 <sup>th</sup> , 2019.	PP
10	ICONTEC	Verification and certification report for the 1 <sup>st</sup> MP of the project activity:	Version 04, dated on Sep 29 <sup>th</sup> , 2019.	Others
11	ALLCOT Group	Grid Emission Factor Calculation Project 2341: 09082019 Grid emission factor AMSID v04.xls	Version 04, dated on Aug 17 <sup>th</sup> , 2019.	PP
UN1	UNFCCC	CDM VVS.	Version 02.0	Others
UN2	UNFCCC	CDM PS.	Version 02.0	Others
UN3	UNFCCC	CDM PCP.	Version 02.0	Others
UN4	UNFCCC	Methodology AMS-III.H, Methane recovery in wastewater treatment.	Version 09	Others
UN5	UNFCCC	Methodological tool - Tool to calculate project or leakage CO2 emissions from fossil fuel	Version 03.0	Others



		combustion.		
UN6	UNFCCC	Methodological tool - Emissions from solid waste disposal sites.	Version 08.0	Others
UN7	UNFCCC	Methodological tool - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation.	Version 03.0	Others
UN8	UNFCCC	Methodological tool - Project emissions from flaring.	Version 03.0	Others
UN9	UNFCCC	Methodology AMS-ID - Grid connected renewable electricity generation.	Version 13.0	Others

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

The findings related to the post-registration changes were raised during the verification process. Please refer to the verification and certification report /10/

**Table 1. CLs from this validation**

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

**Table 2. CARs from this validation**

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

**Table 3. FARs from this validation**

FAR ID	NA	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