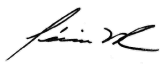
Verification and certification report form for CDM project activities

(Version 02.1)

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	Dona Juana landfill gas-to-energy project 2554
Version number of the verification and certification report	02.0
Completion date of the verification and certification report	21/02/2018
Monitoring period number and duration of this monitoring period	2nd Monitoring Period of the Second Crediting Period 01/04/2017 – 30/09/2017
Version number of the monitoring report to which this report applies	2
Crediting period of the project activity corresponding to this monitoring period	Renewable 22/09/2016 – 21/09/2023, seven years
Project participants	Biogas Doña Juana S.A. ESP (Colombia) Biogas Doña Juana S.A. ESP (Switzerland) Biogas Doña Juana S.A. ESP (Germany) Nordic Environment Finance Corporation (Norway)
Host Party	Colombia
Applied methodologies and standardized baselines	Approve consolidated methodology ACM0001: Flaring or use of landfill gas, Version 17.0
Mandatory sectoral scopes linked to the applied methodologies	13 - Waste handling and disposal
Conditional sectoral scope(s) linked to the applied methodologies	1 - Energy industries (renewable - / non-renewable sources)
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	499,479 tCO2e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	199,740 tCO2e
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 verification and certification report	 Monica Vivas Conformity Assessment Director

SECTION A. Executive summary

ICONTEC performed the 2nd periodic verification of the second crediting period of the registered CDM project Doña Juana landfill gas-to-energy project in Colombia on the basis of UNFCCC criteria contained in Article 12 of the Kyoto Protocol and CDM modalities and procedures according to the Marrakech Agreement, the criteria of 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 verification process is based on methodology ACM0001, version 17.0. The project involves the capture and flaring of landfill gas from different zones and operation phases of the Doña Juana Landfill, located in the district capital of Bogotá, Colombia.

Doña Juana Landfill is the biggest sanitary landfill in Colombia. In addition, the project activity could use the biogas in reciprocating engines and for thermal energy production in nearby industries.

The verification process consisted of the following three phases:

I. Desk review of the monitoring documentation, registered PDD, validation report and if applicable, previous verification reports and relevant information (e.g. IPCC reports).

II. Planning, conducting and reporting of the materiality assessment

III. Onsite visit and follow up interviews with project stakeholders

IV. Resolution of outstanding issues and the issuance of the final verification and certification report.

The review of the monitoring documentation, approved PDD, validation report for renewal crediting period, previous verification reports, relevant information and interviews during the onsite visit allowed ICONTEC to collect sufficient evidence to completely assess the verification criteria and determine that the project has been implemented as planned and as it has been described in the approved PDD version 9.2 (dated on February 1st/2017). It was approved on May 17th/2017. It is important to clarify that this verification period ranges from 01/04/2017 to 30/09/2017. Emission reductions were correctly calculated based on the PDD and the monitoring equipment with an impact on the claimed emission reductions works reliably. The monitoring system is in place and has been calibrated appropriately. ICONTEC can confirm that the GHG emission reductions are calculated without material misstatements.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification 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 review	On-site inspection	Interview(s)	Verification findings
1.	Lead Auditor	IR	Ramirez	Francy	Icontec's	✓	✓	✓	✓

	and Technical Expert (Sectoral Scope 1)				employee				
2.	Technical Expert (Sectoral Scope 13)	IR	Urrego	Erika	Icontec's employee	✓	✓	✓	✓
3.	Technical Expert (Sectoral Scope 13) under observation	EI	Grisales	Cristian	Freelance	✓	✓	✓	✓

B.2. Technical reviewer and approver of the verification and certification report

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 (Sectoral Scope 13)	EI	Aubad	Ana Isabel	Freelance
2.	Technical Expert Reviewer (Sectoral Scope 1)	EI	Grisales	Cristian	Freelance
3.	Approver	IR	Vivas	Monica	Icontec's employee

SECTION C. Application of materiality

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Human error in the quantification of emissions	Low	BDJ uses a software to export directly from a SQL server the monitored parameters in order to calculate the emissions reductions	Despite the automated system for emission quantification, the audit team reviewed deeply the coherence between the spreadsheet used for emission reductions calculations and the data acquired by the monitoring system.
2.	Undue reliance on a poorly designed information system, which may have few effective quality controls	Medium	The information system has quality controls. The spreadsheet used for emission reductions calculations has controls related to data changes/updates.	During the onsite visit the audit team checked how suitable the quality controls are for the information system.
3.	Calibration delays on monitoring equipment	Low	At the time of the desk review, no calibration delays were identified.	On the onsite visit was included the review of all the calibration certificates (100%).
4.	Use of outdated parameters for the calculation of the ERs	Low	During the desk review ICONTEC did not identify the application of outdated parameters in the calculation of the ERs (i.e.	During the onsite visit, ICONTEC checked the overall calculations for emission reduction.

			the grid emission factor).	
5.	Possibility of post-registration changes	Low	During the desk review, ICONTEC did not identify post registration changes. This assessment is the second verification after the renewal of the second crediting period	During the onsite visit, ICONTEC verified the actions taken to met the PDD and applied methodology provisions.
6.	Missing data due to failure of measurement equipment	Low	The monitoring plan defines emergency procedures in case a meter fails.	Check if related meters are installed as per monitoring plan. Check if emergency procedure is known across related personnel via interviews. Check back-up meters on correct calibration.

C.2. Consideration of materiality in conducting the verification

A risk assessment was undertaken by the verification team by means of onsite physical inspection, and document review.

In order to assess possible material misstatements it was established a threshold based on the provisions stated in the VVS/UN2/ paragraph 229 (c), 2 per cent of the emission reductions, for this project activity:

$$199{,}740\ tCO_2e \times 2\% = 3{,}995\ tCO_2e$$

The audit team checked all information provided in the ER spreadsheet /4/ and its sources in order to find possible material misstatements, hence, no sampling plan was required in the monitoring plan. The verification team is able to confirm that all material misstatements were properly conducted and the required corrections were performed by the PP on the version 2 of the MR, therefore, the audit team can confirm that a reasonable level of assurance was achieved.

SECTION D. Means of verification

D.1. Desk/document review

The verification of the project documentation provided by the project proponent is based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the monitoring report submitted. Qualitative information comprises information on internal management controls, calculation procedures, and procedures for transfer of data, frequency of emission reports, and review and internal audit of calculations.

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

- Monitoring report as submitted to UNFCCC, version 1, dated on November 7th/2017 /2/
- Emission reduction calculation file consolidated /3/
- Emission reduction calculation file per month /4/

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

- Approved PDD, version 9.2, dated on February 1st/2017 /1/
- Previous verification report for first monitoring report of the second crediting period issued by ICONTEC, version 03 dated on September 22nd/2017 /5/
- Approved consolidated methodology ACM0001 Flaring or use of landfill gas, version 17.0 /UN1/
- CDM validation and verification standard for project activities, version 01.0 /UN2/
- CDM project standard for project activities, version 01.0 /UN3/
- CDM project cycle procedure for project activities, version 01.0 /UN4/

- Guideline on the application of materiality in verifications, version 02.0 /UN5/
- Monitoring report form, version 05.1/UN6/

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

D.2. On-site inspection

Duration of on-site inspection: 06/12/2017 to 07/12/2017				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Description of operation of the project activity.	Biogas Doña Juana project site	06/12/2017	Francy Ramirez and Erika Urrego
2.	Assessment of compliance of the project implementation with the registered project or programme design document			
3.	Review of maintenance activities for measurement equipment			
4.	Compliance of monitoring activities with the registered monitoring plan			
5.	Check the equipment used, calibration plan and certified calibration.			
6.	Compliance with the calibration frequency requirements for measuring instruments			
7.	Check the record of CDM monitoring Plan. (Information flow, source of data and frequency			
8.	Tour by the facility of Doña Juana landfill project		07/12/2017	Francy Ramirez, Erika Urrego and Cristian Grisales (as Technical Expert in Sectoral Scope 13 under observation)
9.	Assessment of data and calculation of emission reductions or net removals			
10.	Assessment of compliance of the registered monitoring plan with the monitoring methodology including applicable tool(s)			
11.	Check monitoring equipments and QA/QC procedures			
12.	Visit to electrical commercial delivery point to Colombian electrical grid			

D.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Parraga	Fernando	Operations Manager Biogas Doña Juana	06/12/2017	Description of operation of the project activity.	Francy Ramirez and Erika Urrego
					Assessment of compliance of the project implementation with the registered project or programme design document	
					Compliance of monitoring activities with the registered monitoring plan	
					Check the record of CDM monitoring Plan. (Information flow, source of data and frequency	
2.	Orjuela	Yojan	Plant Auxiliar		Review of maintenance	

			Biogas Doña Juana		activities for measurement equipment	
3.	Ajiaco	Juan David	Plant Technician Biogas Doña Juana		Check the equipment used, calibration plan and certified calibration. Compliance with the calibration frequency requirements for measuring instruments	
4.	Parraga	Fernando	Operations Manager Biogas Doña Juana	07/12/2017	Assessment of data and calculation of emission reductions or net removals Tour by the facility of Doña Juana landfill project Assessment of compliance of the registered monitoring plan with the monitoring methodology including applicable tool(s) Check monitoring equipments and QA/QC procedures Visit to electrical commercial delivery point to Colombian electrical grid	Francy Ramirez, Erika Urrego and Cristian Grisales (as Technical Expert in Sectoral Scope 13 under observation)

D.4. Sampling approach

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

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

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	CL 1	-	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered	-	-	-

monitoring plan			
Compliance with the calibration frequency requirements for measuring instruments	CL 2 CL 3	-	-
Assessment of data and calculation of emission reductions or net removals	-	-	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
Total	3	0	0

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	Monitoring report version 1 was submitted to the verification team by the project participants. ICONTEC has made this report publicly available on 20/11/2017, prior to the start of the verification activities. No comments were received. During the verification, mistakes and clarifications were identified. The PP conducted the requested corrections on the latest version 2 of the MR. It can be confirmed that the monitoring report is complete, transparent and in accordance with the approved PDD, relevant CDM requirements and applicable monitoring report form. ICONTEC confirms that the MR version 2 is free of material misstatements
Findings	CL 2. More details about this finding in Appendix 3.
Conclusion	ICONTEC verified through documental review that the valid version of the MR was applied for the 2nd monitoring period of the second crediting period. The finding CL 2 was correctly attended by the PP and ICONTEC was able to close it successfully. Please see explanation on Appendix 4, Table 3.

E.2. Remaining forward action requests from validation and/or previous verifications

There is no remaining forward action request from previous verification.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification

At the time of the desk review, the audit team assessed the implementation of the project reported on MR Version 1, against the one established on the approved PDD.

During the onsite visit, the implementation status and monitoring plan reported on MR Version 1 were compared with the onsite evidence, physical inspection and interviews. No inconsistencies were found.

The status of implementation, progress and operation's starting date for each phase are shown on the next table:

Implementation Status

Phase/Site		Status of Implementation	Progress	Operation	Comments
Phase 1	Landfill gas Network	Completed	100%	Blowers 1, 2 and 3 in operation since 22/09/2009. Flares 1 and 2 in	ICONTEC verified in previous verifications the implementation status for this Phase by reviewing
	Blowers and				Conformity

			flares plant			operation since 22/09/2009. Flare 3 in operation since 13/10/2010. Blower 4 in operation since 17/03/2011.	certificate issued by Veolia Proprete, dated on 01/11/2010, indicating that the commissioning of flare 3 was on 13/10/2010. Notification of completion of work issued by GRS VALTECH, dated on 17/03/2011, providing evidence of the starting date of operation of flare 3 and blower 4
		Phase 2	Treatment and distribution plant	Completed	100%	Installation of the treatment platform from 02/08/2010 to 14/10/2010. Start the commissioning of the treatment platform on 19/10/2010.	ICONTEC verified in previous verifications the implementation status for this Phase by reviewing the certificate of from the equipment supplier PRO2 (supply, installation and commissioning of equipment), issued on 23rd November 2010. Currently, the electricity generated from this landfill gas engine is used mostly by PP to supply the "auto consumption"
			Power Plant BGDJ Ia	Completed	100%	Commissioning of the reciprocating engine on 22/11/2010	
			Power Plant BGDJ Ib	Completed	40%	Commissioning of the first reciprocating engine on 29/04/2016	By means of the onsite inspection, the audit team confirmed the status of implementation for this stage. Likewise, the audit team reviewed the electrical energy delivery point and the documentation related to the notification of start of commissioning of the first reciprocating engine /6//7/. However in the approved PDD /1/, page 9 it was described the

							likelihood to increase the installed capacity for this phase since there are constraints regrinding the connection point to the Colombian electrical grid. At the moment of the onsite visit, the PP has processed the capacity increment with the local electrical network operator: CODENSA, for Power Plant BGDJ Ib with two more reciprocating engines up to 5 MW in total, as the audit team verified by means of documental review /28/. On the other hand the audit team reviewed the leasing contract for 8 generator sets /30/ (6 of them for BGDJ II and the other two for this phase)
			Power Plant BGDJ II	Implementation is still ongoing	40%	These phases have not begun operation yet	By means of the onsite inspection, the audit team confirmed the status of implementation for this stage. Likewise, the audit team reviewed the grid connection status by means of documental review /8//9/, and also the soil studies for the implementation of this phase /9/,/10/ as well as the electrical studies /11/. Likewise the protection and coordination study was updated for Power Plant BGDJ II, as the audit team verified

						by means of documental review /29/. On the other hand the audit team reviewed the leasing contract for 8 generator sets /30/ (2 of them for BGDJ Ib and the other six for this phase)
		Power Plant BGDJ III	Studies for the implementation	10%		By means of the onsite inspection, the audit team confirmed the status of implementation for this stage. Likewise, the audit team reviewed the Commercial offer approval for the grid connection study for this power plant /12/; and also the soil studies for the implementation of this phase /9/,/10/. By means of interviews, the audit team was informed about the development of the study of connection to the national interconnected system
		Power Plant BGDJ IV	Future Plans	0%		By means of the interviews during onsite inspection, the audit team confirmed the status of implementation for this stage.
	During the interviews carried out in the onsite inspection, the PP talked about some financial constraints which impose hurdles to the implementation on phases BGDJ III and BGDJ IV Likewise the audit team reviewed the periodic maintenance activities for the equipment involved in the project activity which covers the entire monitoring period. These maintenance activities assured a proper operation of the project activity.					
Findings	No finding was raised on this issue					
Conclusion	The audit team can confirm that: • The implementation of the project is consistent with the information provided in the approved PDD. • The project is operated as per the approved PDD. • Information provided in the MR is in accordance with that stated in the approved PDD.					

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines

In the monitoring plan stated in the approved PDD/1/, the applied methodology /UN1/ and related methodological tools /UN7/, /UN11/, it is necessary to monitor the volumetric flow of the LFG stream on a dry basis for each power generator ($V_{tb,m}$) as well as the operation of the equipment that consumes LFG ($Op_{j,h}$). However these monitoring controls are not fulfilled during the monitoring period under assessment, for engine generator # 2 (Power Plant BGDJ Ib), for the reasons explained by the PP in section B.2.1 on the MR.

Taking into account that:

$$\underset{①}{LFG_{total}} = \underset{②}{LFG_{flare1,m}} + \underset{③}{LFG_{flare2,m}} + \underset{④}{LFG_{flare3,m}} + \underset{⑤}{LFG_{engine1,m}} + \underset{⑥}{LFG_{engine2,m}}$$

Where:

$LFG_{total,\ m}$ = total landfill gas flow in minute m (in m³)
$LFG_{flare\ 1,\ m}$ = landfill gas flow combusted by flare 1 in minute m (in m³)
$LFG_{flare\ 2,\ m}$ = landfill gas flow combusted by flare 2 in minute m (in m³)
$LFG_{flare\ 3,\ m}$ = landfill gas flow combusted by flare 3 in minute m (in m³)
$LFG_{engine\ 1,\ m}$ = landfill gas flow combusted by engine 1 in minute m (in m³)
$LFG_{engine\ 2,\ m}$ = landfill gas flow combusted by engine 2 in minute m (in m³)

And the parameter $V_{tb,m}$ is currently monitored in points ①, ②, ③, ④ and ⑤; it is possible to determine the value of $LFG_{engine\ 2,\ m}$ (⑥) then the parameter $V_{tb,m}$ for Power Plant BGDJ Ib.

The audit team considered this estimation as reliable since the monitoring equipment for points ①, ②, ③, ④ and ⑤ are calibrated in accordance with the provisions of the monitoring plan stated in the approved PDD/1/, the applied methodology /UN1/ and related methodological tools /UN7/, /UN11/ as the reader of this report will find on section E.7.

Regarding to parameter $Op_{j,h}$ for engine generator # 2 (Power Plant BGDJ Ib), it can be traceable and monitored since the energy delivered to Colombian National Electrical Grid by the project activity is higher that the energy generated by the Power Plant BGDJ Ia (mostly used for auto consumption). The PP assumed as a conservative approach that if energy delivered to Colombian electrical grid is higher than 100 kW the engine generator # 2 (Power Plant BGDJ Ib) was operating.

This deviation will be temporary until the measurement equipment be purchased and installed in point⑥. At the moment of the onsite visit, the PP was quoting the purchase of the measurement equipment /31/.

The audit team deemed that this deviation done by the PP has conservative assumptions that avoid a reduction in the accuracy of the calculation of the emission reductions.

Likewise, the audit team deemed that this deviation met with the provision of the PS /UN3/ (paragraph 232) related to the temporary deviation from the registered monitoring plan.

E.4.2. Corrections

There are no corrections to project information or parameters fixed at validation for second crediting period, as was described in the approved PDD made by the project participant during the current monitoring period.

E.4.3. Change to the start date of the crediting period of the project activity

The project participant did not change the start date of the crediting period during the current monitoring period.

E.4.4. Inclusion of a monitoring plan

No inclusion of a monitoring plan to the registered project activity has been requested to the Board during this monitoring period.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other applied standards or tools

There are no permanent changes from the registered monitoring plan and/or methodology identified during the current monitoring period.

E.4.6. Changes to the project design

There are no permanent changes from the registered monitoring plan and/or methodology identified during the current monitoring period.

E.4.7. Changes specific to afforestation and reforestation project activities

This kind of changes does not apply to this project.

E.5. Compliance of the registered monitoring plan with the methodology including applicable tools and standardized baselines

Means of verification	During the onsite visit, the audit team verified a temporary deviation from the monitoring methodology /UN1/ already explained and assessed in Section E.4.1 on this report for the parameter related with the volumetric flow of the LFG for engine generator # 2 as well as the parameter $OP_{j,h}$ related with the same engine. The other parameters were monitored following the guidelines of the approved monitoring methodology and tools.
Findings	No finding was raised on this issue.
Conclusion	During the verification process, ICONTEC was able to confirm that parameters were measured according to monitoring plan and the equipment received calibration according to the calibration plan defined by the company. See Annex 02 /2/. The above mentioned actions permitted to conclude that the monitoring plan established on PDD /1/ complied with the methodology /UN1/. This statement does not apply for parameters $OP_{j,h}$ and $V_{tb.m}$ related with engine generator #2.

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification

The monitoring parameters related to the GHG emission reductions in the project activity have been implemented in accordance with the monitoring plan contained in the approved PDD /1/.

The following table describes the parameters that were determined ex-ante and not monitored during the monitoring period:

Parameters Determined Ex-Ante in the Registered PDD

Parameter	Description	Value	Source
OX_{top_layer}	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline.	0.1	ACM0001, version 17.0
GWP_{CH4}	Global warming potential of methane.	25 tCO_2e/tCH_4	IPCC[1]
NCV_{CH4}	Net calorific value of methane at reference conditions	0.0504	ACM0001 version 17.0

[1] The value was updated according to EB69 Annex 3: COP/MOP Decision 4/CMP.7 and table 2.14 of the errata to the contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change second commitment period the valid value is 25 tCO_2e. Please see: https://www.ipcc-wg1.unibe.ch/publications/wg1-ar4/ar4-wg1-errata.pdf

η_{PJ}	Efficiency of the LFG capture system that will be installed in the project activity	50%	ACM0001 version 17.0
$\varphi_{default}$	Default value for model correction factor to account for model uncertainties	0.890	Methodological tool (b) "Emissions from solid waste disposal sites", version 07.0
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)	0.1	Methodological tool (b) "Emissions from solid waste disposal sites" (version 07.0
F	Fraction of methane in the SWDS gas (volume fraction)	0.5	Methodological tool (b) "Emissions from solid waste disposal sites" (version 07.0)
DOC_f	Weight fraction	0.5	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
$MCF_{default}$	Methane correction factor	1.0	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
DOCj	Fraction of degradable organic carbon in the waste type j (weight fraction)	Food, food waste, sewage sludge, beverages and tobacco 15% Pulp, paper, cardboard (other than sludge) 40% Wood and wood products 43% Textiles 24% Garden, yard and park waste 20% Glass, plastic, metal, other inert waste 0%	Methodological tool (b) "Emissions from solid waste disposal sites" (version 07.0)
pi,x		Food 74,49% Paper and Cardboard 4,29% Wood 2,08% Textile 3,75% Garden waste 0,0% Inorganic and other 15,39%	UAESP: Complementary Environmental Impact Assessment for the Phase II Optimization of Zones VII and VIII; 2.1 Studies and Designs. Version 3 of 30/11/2013. /6/
k_j	Decay rate for the waste type j	Pulp, paper, cardboard (other than sludge),	IPCC 2006 Guidelines for National

		textiles 0.06 Wood, wood products and straw 0.03 Other (non-food) organic putrescible garden and park waste 0.10 Food, food waste, sewage sludge, beverages and tobacco 0.185	Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
Wx	Total amount of solid waste disposed in the SWDS in the year x (t)		UAESP: Complementary Environmental Impact Assessment for the Phase II Optimization of Zones VII and VIII; 2.1 Studies and Designs; version III; 30/11/2013 /6/.
$SPEC_{flare}$	Manufacturer"s flare specifications for temperature, flow rate and maintenance schedule	Temperature: >900 °C – 1,200 °C Flow rate: 1,000 - 5,000 Nm^3/h (functioning limits 20% - 100%) Maintenance schedule - annually	The audit team confirmed during the onsite visit the specifications of flare operation reviewing the operation manual of Biogas plant of GRS Valtech – Veolia Proprete. Version 1, dated in 2009 /7/. On this manual the information of nominal capacity is 5,000 NM^3 / h biogas to 50% of CH_4, tolerance of operation from 20 to 100% of the nominal power, temperature between 900^oC and 1200^oC and combustion efficiency is indicated at 99% under normal conditions of operation.
$TDL_{k,y}$	Average technical transmission and distribution losses for providing electricity to source k in year y (applied to project electricity generation)	20%	Default value for scenario A according to methodological tool (e) "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity consumption" /UN8/, table 3
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y		

	$EF_{grid,OM,ex-ante}$	Ex ante simple adjusted Operating Margin	Calendar year 2013: 0.6304 tCO_2/MWh Calendar year 2014: 0.6349 tCO_2/MWh Calendar year 2015: 0.5629 tCO_2/MWh Average (3 years vintage): 0.6086 tCO_2/MWh	These values were calculated once at the request of renewal of crediting period as it was established in the approved PDD /1/.
	$EF_{grid,BM,ex-ante}$	Ex ante Build Margin	Calendar year 2015: 0.1631 tCO_2/MWh	
	w_{OM} and w_{BM}	Default values for projects of intermittent output nature for weighting of operating margin and build margin emission factors	w_{OM} = 0.75 w_{BM}= 0.25	Appendix of the approved PDD /1/
	$EF_{grid,CM,ex-ante}$	Ex ante Combined Margin	0.4972 tCO_2/MWh	This value was calculated once at the request of renewal of crediting period as it was established in the approved PDD /1/.
	ICONTEC, confirmed that values established ex-ante were correctly applied by the PP on the calculation of emission reductions. See section E.8.1 of this verification report and spreadsheet used for emission reduction calculations /3/			
Findings	No finding was raised on this issue.			
Conclusion	ICONTEC concludes that all data sources and assumptions are appropriate and calculations are correct on MR version 2 and they result in a conservative estimation of the emission reductions on the spreadsheet Emission reduction calculation file consolidated (BDJ CDM CALCULATION V1.xlsx) /3/.			

E.6.2. Data and parameters monitored

Means of verification	The monitoring parameters related to the GHG emission reductions in the project activity have been implemented in accordance with the monitoring plan contained in the registered PDD /1/. The following table includes all parameters monitored and describes how ICONTEC verified the fulfillment of each parameter with the registered monitoring plan, including the information flow and the values as reported in the MR.

Monitored Parameters

Monitored Parameter	Management of SWDS
Description	Management of SWDS
Value	N/A
Means of Verification	**Source of Data and Frequency:** Icontec verified that there is not change on the original design of the landfill neither any practice to increase methane production, reviewing the following information: - Environmental License Resolution # 1351, June 18th, 2014 /13/, of Authority environmental of Cundinamarca. On this Resolution the conditions of operation landfill are maintained. - Plane desing final dome. Noviembre de 2013. File: 2.4.

	GEN_F2_LLENO-2013.dwg. Elaborated by CGR – operador del LFG./14/ - Surveillance reports of the supervision to the landfill where the operation is monitored, compliance with the designs and the management activity of the landfill./15/ - In Colombia, there is no national or local regulation that compels the burning of biogas. The same conditions are maintained as when the project started./16/ - The local government of Bogotá obliges the operator of the landfill Doña Juana S.A. E.S.P. - CGR through Resolution 198 of 2017 /25/ the construction of more biogas wells for extraction according to the landfill design established in Resolution 724 of 2010: *Regulation for the concession of management and operation of the Doña Juana landfill* /25/, the foregoing was requested by Biogas Doña Juana S.A.E.S.P plant in order to increase the capture of biogas and recover the production of biogas that was had a few years ago. **Consistency Between the QA/QC Defined in the Methodology:** No applicable. **Consistency Between the QA/QC Established by the Project Participants in the PDD:** No applicable.

Monitored Parameter	$Op_{j,h}$
Description	Operation of the equipment that consumes the LFG: - Flares
Value	1
Means of Verification	**Source of Data and Frequency:** Flare has installed a UV sensor, which detects each minute the operation time of each flare. **Used Equipment:** Sensor ultraviolet - UV. **Data Cross Checking:** ICONTEC verified the register of flame system detection operation RG-310-086 /17/ with the spreadsheet BDJ - CDM Raw Data of each month and confirm the use of the correct value on the formulation to calculation ER´s. See spreadsheet BDJ - CDM Raw Data of each month cell AP, AQ, AR and AS. **Consistency Between the QA/QC Defined in the Methodology:** The methodology does not define QA/QC procedures. **Consistency Between the QA/QC Established by the Project Participants in the PDD:** Icontec verified the register: Daily monitoring plant report. RG-310-086 and monthly maintenance report landfill gas plant RG-310-063. On these registers it is indicated flame system detection status and activities of cleanliness of sensor UV. **Application of Default Values:** The application of value 1 or 0 was verified on the file: spreadsheet BDJ - CDM Raw Data - 2017 XX of each month /4/.

	ICONTEC verified that application of this value was correct.

Monitored Parameter	$EG_{PJ,y}$
Description	Amount of electricity generated using LFG by the project activity in year y.
Value	

April 2017	368,569.92 kWh
May 2017	323,016.48 kWh
June 2017	372,125.52 kWh
July 2017	407,710.68 kWh
August 2017	414,100.68 kWh
September 2017	115,938.48 kWh

Means of Verification

Source of Data and Frequency:

Hourly transmission of the information to XM is done by CODENSA (electrical grid operator) via Internet, using the digital and coded mechanisms defined for all the agents of the Colombian Wholesale Power Market. The databases for recording the operations of the Colombian market are managed by XM. It is worth to mention that CODENSA performs the transmission of information based on the data transmitted by the measurement system.

There is a transmission line that connects the power plant BGDJ Ib to the Colombian National Interconnected Electrical Grid.

ICONTEC verified that the connection point located in the transmission line is, in fact, the commercial frontier registered by the project responsible in the National Dispatch Center – CND (as per its acronym in Spanish).

Used Equipment:

Two power meters installed in the commercial frontier. These have identical ITRON features[2], with an accuracy of 0.2 IEC.

Data Cross Checking:

In order to verify the data provided by the PP in the spreadsheet used for emission reduction calculations, ICONTEC reviewed the electricity generation reported in the information service of the Colombian Wholesale Power Market operated by XM[3]. After this review the audit team concluded that information provided by PP is reliable, coherent, consistent and traceable with secondary sources of information.

Consistency Between the QA/QC Defined in the Methodology:

The applied methodology establishes that QA/QC procedures consists of cross checking of measurement results with records for sold electricity. The records for sold energy are issued by XM using the information platform. As it was explained above, the audit team reviewed the information in this platform managed by XM, hence this requirement was fulfilled.

Consistency Between the QA/QC Established by the Project Participants in the PDD:

In section B.7.1 of the approved PDD, the methodology and monitoring plan are described as the performance of calibration activities for the

[2] ITRON Meter, Type SL7000, Voltage: 3X57.7/100V & 3x277/480V, Current: 5(10)A, Class: 0.2S
[3] Available at http://informacioninteligente10.xm.com.co/oferta/Paginas/HistoricoOferta.aspx

	measurement equipment. For more information regarding this issue, see Section E.7 on this report. ICONTEC verified that according to the monitoring plan approved in the PDD /1/ data on electricity generation from the project activity can be checked and it is available in the XM information platform. On the other hand, this monitoring plan is in accordance with the rules established by the Colombian Electrical Authorities[4]. **Application of Default Values:** Not applicable

Monitored Parameter	$EG_{EC, y}$
Description	Amount of electricity consumed by the project activity in year y
Value	

April 2017	3,951 kWh
May 2017	8,087 kWh
June 2017	7, 640 kWh
July 2017	7,108 kWh
August 2017	10,101 kWh
September 2017	14,246 kWh

Means of Verification	**Source of Data and Frequency:** The date of installation of the equipment was on 13/10/2010. Recorded daily power generation (auto-generation). During on site visit, ICONTEC confirmed that the data is read from Electrical meter DEIF A/S and then it is recorded manually on a daily basis and then transferred to the row data file /4/. **Used Equipment:** Electrical meter DEIF (7.4)* *This ID number is referenced to Section C of the MR version 2 and Annex 2 of monitoring report /2/. **Data Cross Checking:** ICONTEC cross checked the data by comparing the ones from the SQL cross check file /18/, with the ones from CDM raw data /4/ and also with the daily records filled on dairy basis. Data from April 2017 to September 2017 were compared. None material mistake in the information was identified. **Consistency Between the QA/QC defined in the methodology:** Since the electricity consumption is supplied by the power plant BGDJ Ia, the methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation /UN8/ states that the electricity meter will be subject to regular maintenance and testing in accordance with the stipulation of the meter supplier or national requirements. There is no national requirement for this type of electricity meters and according to manufacturer DEIF no calibration is required for this equipment /24/. **Consistency Between the QA/QC established by the project**

[4] In accordance with the measurement code issued by the Colombian Regulatory Commission for Electricity and Gas issues (CREG – as its acronym in Spanish): Resolution 038/2014 available in: http://apolo.creg.gov.co/Publicac.nsf/1c09d18d2d5ffb5b05256eee00709c02/0131f0642192a5a205257cd800728c5e

	participants in the PDD: The meter is subject to regular check, testing and maintenance in accordance with manufacturer's specifications /24/ to ensure accuracy. As it was explained above, this requirement is fulfilled. **Application of Default Values:** Not applicable

Monitored Parameter	$T_{EG,m}$
Description	Temperature in the exhaust gas of the enclosed flare in minute m
Value	See spreadsheet BDJ - CDM Raw Data - 2017 MM
Means of Verification	**Source of Data and Frequency:** The PP has installed thermocouples on each flare. The data are imported directly from the database (SCADA system). Data are measured continuously and recorded once per minute, they are aggregated monthly. This information was confirmed by comparing the ERs file /4/, where are shown the raw data from each one of the measuring equipment located in LFG with the cross check BDJ SQL sheet /18/. During the onsite visit, ICONTEC confirmed that the nominal temperature of combustion of the flares, according with the manufacturer's design and technical specification is between 900°C and 1,200°C and the thermocouples are located at 80% of the height of the flare. This information was confirmed based on the site inspection and the flare diagram /19/, elaborated by the external company "IC Inoxidables de Colombia Ltda." The total flares height is 9,144 mm and the measuring points are located at 7,300 mm. This information is supported with manufacturer's specification /20/ in which is presented in section 3.1.5 the normal combustion temperature range between 0ºC and 1,200°C. Inside this document, it is indicated that a high combustion temperature is designed for the flares in order to ensure high rates of destruction of methane. This is further confirmed by the measured flare efficiency (measuring the exhaust gas with a gas analyzer) which can be found in the ERs spreadsheet /4/. **Used Equipment:** Thermocouples type N. This equipment is described in table E.7. **Data Cross Checking:** ICONTEC cross checked the data of temperature by comparing the ones from the SQL cross check file /18/, /21/, with the ones from CDM raw data /4/. Were compared the data from April 2017 to September 2017. It was not identified any material mistake in the information. ICONTEC during data cross checking process confirm that the PP does not claimed CER's when temperature was out specification. **Consistency Between the QA/QC Defined in the Methodology:** Equipment is subjected to annual calibration to ensure accuracy in the measurement. See section E.7. The flare's thermocouples are replaced at least once a year /22/. See section E.7. During the verification, ICONTEC was able to confirm that these equipments received calibration or replacement according to the calibration plan defined by the company. See Appendix 1 of MR. /2/, /22/.

	Consistency Between the QA/QC Established by the Project Participants in the PDD: The QA/QC activities performed by the company for the measuring equipment are consistent with the provisions of the PDD, which indicates that calibration has to be performed in accordance with manufacturer's specifications (or for the case of the thermocouples replaced every year). The company has a strict calibration and replacement control, performing annually the calibration and replacement of equipment. **Application of Default Values:** Not apply value default.

Monitored Parameter	$V_{i,RG,m}$
Description	Volumetric fraction of component i in the residual dry gas in minute m, where i = CH_4, CO_2, O_2
Value	See spreadsheet BDJ - CDM Raw Data - YYYY MM
Means of Verification	**Source of Data and Frequency:** The infrared gas analyzer and the oxygen sensor are located in the main collector (Admission pipe, DN600) and their data are continuously measured and once by minute recorded. Similar to the case explained above, this information was confirmed by checking the information from the raw data file /4/, against the information from the cross check BDJ SQL sheet file /18/, /21/. **Used Equipment:** Equipment used is described in section E.7. Landfill gas analyzer (including the oxygen sensor) (1.4)* * Those ID numbers are referenced to Section C of the MR version 2 /2/ and Appendix 1 of monitoring report /2/. **Data Cross Checking:** ICONTEC cross checked the data by comparing the ones from the SQL cross check file /18/, /21/, with the ones from CDM raw data /4/. There were compared the data from April 2017 to September 2017. It was not identified any material mistake in the information. **Consistency Between the QA/QC Defined in the Methodology:** The devices are subjected to annual calibration to ensure accuracy in the measurement. See section E.7. It was verified that each device received timely calibration, according to the calibration plan defined by the company. See Annex 01 of Monitoring report /2/,/22/,/23/. **Consistency Between the QA/QC Established by the Project Participants in the PDD:** The QA/QC activities performed by the company with the measuring equipment are consistent with the provisions of the PDD, which indicates that calibration has to be performed in accordance with manufacturer's specifications /20/, /22/, /23/. The company has a strict control, performing annually the calibration of equipment. **Application of Default Values:** Not apply value default.

Monitored	$V_{RG,tb,m}$

Parameter	
Description	Volumetric flow of the residual gas (LFG) on a dry basis in the minute m (m^3 dry gas/m) for each flare
Value	See spreadsheet BDJ - CDM Raw Data - YYYY MM
Means of Verification	**Source of Data and Frequency:** Flow meter flare No. 1 pipe (DN250). Flow meter flare No. 2 pipe (DN250). Flow meter flare No. 3 pipe (DN250). The data are imported directly from the database (Scada system). Data are measured continuously and recorded once for minute, they are aggregated monthly, after that flow has passed through the trap to retain moisture. Similar to the case explained above, this information was confirmed by comparing the ERs file /4/, where are shown the raw data from each one of the measuring equipment located in LFG with the cross check BDJ SQL sheet /18/. The flow at normal temperature and pressure is calculated continuously from the database. This data is measured in line for each one of the flares. **Used Equipment:** Equipment used is described in table E.7. Flow meter (2.1, 3.1, 4.1)* * Those ID numbers are referenced to Section C of the MR /2/ and appendix 1 of monitoring report /2/. **Data Cross Checking:** ICONTEC cross checked the data by comparing the ones from the SQL cross check file /18/, /21/, with the ones from CDM raw data /4/. Were compared the data from April 2017 to September 2017. It was not identified any material mistake in the information. **Consistency Between the QA/QC Defined in the Methodology:** Equipment is subjected to annual calibration to ensure accuracy in the measurement. See section E.7. During the verification, ICONTEC was able to confirm that these equipments received calibration or replacement according to the calibration plan defined by the company /17/, /22/, /23/. **Consistency Between the QA/QC Established by the Project Participants in the PDD:** The QA/QC activities performed by the company for the measuring equipment are consistent with the provisions of the PDD, which indicates that calibration has to be performed in accordance with manufacturer's specifications. The company has a strict calibration and replacement control, performing annually the calibration and replacement of equipment /17/, /22/, /23/.

Monitored Parameter	$f_{cCH4,FG,h}$ $V_{o2,EG,m}$
Description	Concentration of methane in the exhaust gas of the flare in dry basis at reference conditions in the minute m Volumetric fraction of O_2 in the exhaust gas on a dry basis at reference conditions in minute m
Value	See spreadsheet BDJ - CDM Raw Data - YYYY MM
Means of Verification	**Source of Data and Frequency:** The data are imported directly from the database (Scada system). Data are measured continuously and recorded every one minute, they are aggregated monthly. Similar to the case explained above, this information

	was confirmed by checking the Raw Data file /4/, against the information from the cross check BDJ SQL sheet file /18/, /21/. During the visit ICONTEC could confirm that the sampling points used for this measurement are located at 80% of the height of the flare. This information was confirmed based on the site inspection and the flare diagram /19/, elaborated by the external company "IC Inoxidables de Colombia Ltda." The total flares height is 9,144 mm and the measuring points are located at 7,300 mm. **Used Equipment:** Equipment used is described in section E.7. Infrared Analyzer (5)* Oxygen Sensor (6)* * Those ID numbers are referenced to Section C of the MR version 2 and Annex 1 of monitoring report /2/. **Data Cross Checking:** ICONTEC cross checked the data by comparing the ones from the SQL cross check file /18/, /21/, with the ones from CDM raw data /4/. Were compared the data from April 2017 to September 2017. It was not identified any material mistake in the information. **Consistency Between the QA/QC Defined in the Methodology:** The device is subjected to annual calibration to ensure accuracy in the measurement. See section E.7. It was verified by ICONTEC that the device received calibration, according to the calibration plan defined by the company. See: appendix 1 of the monitoring report V2. /2/,/22/,/23/. **Consistency Between the QA/QC Established by the Project Participants in the PDD:** Analyzers are calibrated according to manufacturer's recommendation or at least annually.

Monitored Parameter	Maintenance
Description	Maintenance events carried in year y
Value	
Means of Verification	**Source of Data and Frequency:** On the chapter 6 of Operation manual of Biogas plant of GRS Valtech – Veolia Proprete /20/ it is indicated frequency and routines for events of maintenance to biogas plant. ICONTEC verified the frequencies and routines established in the operation manual with the records of execution of the activities such as: - Daily monitoring plant report. RG-310-086. On this register it is indicated the enclosed flares status. - Daily maintenance report – Landfill gas plant. RG-310-061. Status visual of equipment that measures the variables that goes to flare. - Weekly maintenance report. RG-310-062. On this form is registered the activities of maintenance made to equipments of landfill gas flares plant. This includes the electrical substation. - Monthly maintenance report. RG-310-063. On this form are registered activities that made to biogas platform, flares, pumping group, analyzer building and electrical substation. Quarterly and annual activities are included in weekly and monthly maintenance.

	Data Cross Checking: ICONTEC made cross check between Routines of maintenance established on chapter 6 of Operation manual of Biogas plant of GRS Valtech – Veolia Proprete /20/ and register daily of maintenance, register monthly manteinance, monthly register photographic and report monthy./22/. The events of flare 2 dated July 28th and 29th /2017 were verified on logbook RG-PLT-001, on this document were indicated the interventions of maintenance. Also, on the same document ICONTEC verified that September 15th at 30th /2017 did not events longer those 24 hours. May 20th /2017, were replaced the thermocouples BG2 and BG3, this activity was registered on logbook RG-PLT-001.The thermocouple BG1 was not replaced to the flare 1, because this flare not operated during this monitoring period by low flow of biogas. ICONTEC verified the photography of May 2017 its was taken when change thermocouples. Also ICONTEC made crosscheck with the follow documents: Biogas Doña Juana sent monthly to its supervision called Union Temporal Inter DJ, the registers: emission reductions, maintenance plan, stops of plant. File: stops plant MMYYYY.xls, generation to XM and Matriz Doña Juana MMYYYY. **Consistency Between the QA/QC Defined in the Methodology:** ICONTEC verified that PP keeps registers of maintenance events at the biogas plant. ICONTEC verified this information, reviewing the registers of maintenance of period 01/04/2017 to 30/09/2017 /19/, /20/, /22/, /23/. **Consistency Between the QA/QC Established by the Project Participants in the PDD:** ICONTEC verified that PP has complied with the keeping of information of maintenance for the biogas plant according to specifications by the manufacturer /1/, /20/. **Application of Default Values:** Not applicable.

Monitored Parameter	1.T_f, T_{EG}, T_{HG} 2. P_f, P_{EG}, P_{HG}
Description	1. Temperature of the landfill gas at the proximity of each flow meter, if volumetric flow meter are used: • at each flare (f), • at each engine (EG). 2. Pressure of the landfill gas near each flow meter, if volumetric flow meter are used: • at each flare (f), • at each engine (EG).
Value	See spreadsheet BDJ - CDM Raw Data - YYYY MM
Means of Verification	**Source of Data and Frequency:** DN80 Engine Pipe. The data are imported directly from the database (Scada system). Data

	are measured continuously and recorded every one minute, they are aggregated monthly. Similar to the case explained above, this information was confirmed by checking the Raw Data file /4/, against the information from the cross check BDJ SQL sheet file /18/. **Used Equipment:** Equipment used is described in section E.7. Flow meter pipe (7.1)* Temperature transmitter (7.2)* Absolute pressure transmitter (7.3)* * Those ID numbers are referenced to Section C of the MR version 2 and appendix 1 of monitoring report /2/. **Data Cross Checking:** ICONTEC cross checked the data by comparing the ones from the SQL cross check file /18/, with the ones from CDM raw data /4/. There were compared the data from April 2017 to September 2017. It was not identified any material mistake in the information. **Consistency Between the QA/QC Defined in the Methodology:** The devices are subjected to annual calibration to ensure accuracy in the measurement. See section E.7. It was verified that each device received timely calibration, according to the calibration plan defined by the company. See Annex 01 of monitoring report /2/ and maintenance registers /22/, /23/. **Consistency Between the QA/QC Established by the Project Participants in the PDD:** The QA/QC activities performed by the company with the measuring equipment are consistent with the provisions of the PDD, which indicates that calibration has to be performed in accordance with manufacturer's specifications. The company has a strict control, performing annually the calibration of equipment.

Monitored Parameter	$\rho_{H20,t,Sat}$
Description	Saturation pressure of H_2O at temperature T_t in time interval t
Value	See spreadsheet BDJ - CDM Raw Data - YYYY MM, Sheet 4: Variables SQL.
Means of Verification	**Source of Data and Frequency:** ICONTED verified the correct use of the value default 101.325 Pa atmospheric pressure at normal conditions. **Used Equipment:** N/A **Data Cross Checking:** ICONTEC cross checked the data by comparing the ones from the SQL cross check file /18/, with the ones from CDM raw data /4/. There were compared the data from April 2017 to September 2017. It was not identified any material mistake in the information. **Consistency Between the QA/QC Defined in the Methodology:** Not applicable. **Consistency Between the QA/QC Established by the Project Participants in the PDD:**

		Not applicable. **Application of Default Values:** The value corresponds to 101.325 Pa. This data is taken of the reference Fundamentals of Classical Thermodynamics; Gordon J. Van Wylen, Richard E. Sonntag and Claus Borgnakke; 4º Edition, 1994, John Wiley & Sons, Inc. of Methodological tool "Project emissions from flaring" (Version 02.0.0).
Findings	No finding was raised regarding to this issue.	
Conclusion	ICONTEC has verified completeness and integrity of data used by the project proponents for emission reductions calculations. During the verification, ICONTEC was able to verify that parameters are properly measured according to the monitoring plan and the registered PDD, and information is consistent with secondary information sources used to verify the information. ICONTEC can conclude that data aggregation is appropriate to comply with the methodology and it is in accordance to the information established in the PDD respect to metering equipment. As a general cross check of data, ICONTEC verified the backup system of the company and cross checked information of the ERs spreadsheet /4/ with the backup files, which include raw data information generated by the SCADA system. In conclusion, the process of data management, transferring, storage and reporting was carried out in compliance with the monitoring plan, registered PDD and methodology ACM0001 version 17.0. ICONTEC can thus conclude that: The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters stated in the monitoring plan of the registered PDD have been correctly and sufficiently monitored and listed. The monitored data for required parameters have been verified by ICONTEC and have been found complete, reliable and consistent.	

E.6.3. Implementation of sampling plan

Means of verification	The PP did not apply a sampling approach for the determination of data and parameters monitored.
Findings	N/A
Conclusion	N/A

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	The information revised for confirming the calibration frequency was compared with the calibration certificates revised on site visit, which were registered on the following table in column: "calibration records" and it was compared with annex 1: records of calibration for the monitoring period under assessment of monitoring report /2/. The following table includes the current monitoring equipment for the parameters above mentioned and the information on equipment identification and calibration records. ICONTEC verified that calibration has covered the entire 2nd monitoring period of the second crediting period (01/04/2017 to 30/09/2017).

Monitoring Equipment

Parameter	Equipment	Calibration Frequency	Calibration Records	Date of Calibration

		$LFG_{total.y}$ (ID 1.1.2 and ID 1.1.3)	Flowmeter Endress + Hauser AB08FB0109D (ID 1.1.2) Accuracy up to +/-0.075% of the span /27/.	Annual calibration is performed onsite by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3767-16. Valid until: 23/11/2017 Issued: 22/01/2017	Performed: 24/11/2016
			C603020109D Endress + Hauser Flowmeter (ID 1.1.3) Accuracy up to +/-0.075% of the span /27/.	Annual calibration is performed onsite by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3768-16 Valid until: 23/11/2017 Issued: 22/01/2017	Performed: 24/11/2016
		T_{total} (1.2)	Temperature transmitter Endress + Hauser AB00DA042B6 Accuracy 0.1°C /26/.	Annual calibration is performed onsite by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LT-4983-16. Valid until: 23/11/2017 Issued on: 22/01/2017.	Performed 24/11/2016
		P_{total} (1.3)	Absolute pressure transmitter Endress + Hauser AB02E301020 Accuracy 0.11% /27/.	Annual calibration is performed onsite by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3769-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
		$W_{CH4,y}$ $fv_{CO2,y}$ (1.4) Accuracy ≤0.5% of the span.	Landfill gas analyzer ABB 3.357397.8	Annual calibration is performed onsite by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF-19243-LFQ100-16 Valid until: 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
		$fv_{O2, y}$ (1.4) Accuracy ≤0.2% of the span.	3.357394.8			
		$LFG_{flare\ 1, y}$ (2.1.2) Accuracy up to +/-0.075% of the span /27/.	Flowmeter Endress + Hauser AB08FC0109D	Annual calibration is performed onsite by	Company Industria y Metrología Ltda, calibration certificate	Performed 24/11/2016

			an external laboratory.	IM-OF19243-LP-3770-16 Valid until: 23/11/2017 Issued on: 22/01/2017	
	LFG $_{flare\ 1, y}$ (ID 2.1.3) Accuracy up to +/-0.075% of the span /27/.	Flowmeter Endress + Hauser C603040109D		Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3771-16 Valid until: 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
	$T_{flare\ 1}$ (ID 2.2) Accuracy 0.1°C.	Temperature transmitter Endress+Hauser AB00DF042B6	Annual calibration is performed onsite by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LT-4984-16 Valid until: 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
	$P_{flare\ 1}$ (ID 2.3) Accuracy +/- 0.2 of span.	Absolute pressure transmitter Endress+Hauser D6017901020	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3772-16 Valid until: 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
	$T_{combustion\ Flare\ 1}$ (ID 2.4) Accuracy +/- 0.0075, between 333°C and 1,200°C.	Pyrocapt 1605122	Annually replaced	MESTRA No. 1605122 Valid until: 19/05/2017 Issued on: 20/05/2016	Performed 20/05/2016 During this monitoring period Flare 1 did not work, for this reason there is no claim of CERs nor is calibration of instruments associated with this equipment registered.
	LFG $_{flare\ 2, y}$ (ID 3.1) Accuracy up to +/-0.075% of the span /27/.	Flow meter AB08FD0109D	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3773-16 Valid until: 23/11/2017 Issued on: 23/05/2017	Performed 24/11/2016

	Flow meter Endress+Hauser C603030109D		Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3774-16 Valid until: 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
$T_{flare\ 2}$ (ID 3.2) Accuracy 0.1°C.	Temperature transmitter /26/ AB00DC042B6	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LT-4985-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
$P_{flare\ 2}$ (ID 3.3) Accuracy +/- 0.2 of span.	Absolute pressure transmitter AB02E501020	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, Calibration certificate IM-OF19243-LP-3775-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016 The AB02E501020 equipment suffered damage in July and was replaced on 29/07/2017 by the D6017901020 that was in flare 1.
	Absolute pressure transmitter D6017901020	Annual calibration is performed on site by an external laboratory.	Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3772-16 Valid until: 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016 Equipment installed 29/07/2017.
$T_{combustion\ Flare\ 2}$ (3.4) Accuracy +/- 0.0075, between 333°C and 1,200°C.	Pyrocapt 1605124	Annually replaced	MESTRA Calibration certificate No. 1605124 Valid until 20/05/2017 Issued on 20/05/2016	Performed: 20/05/2016
	Pyrocapt 1605122	Annually replaced	Company Industria y Metrología Ltda, Calibration certificate IM-OF22030-LT-3011-17	Performed: 19/05/2017

				Valid until 18/05/2018 Issued on 21/06/2017	
LFG $_{flare\ 3, y}$ (ID 4.1) Accuracy up to +/-0.075% of the span	Flowmeter D605060109D	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3776-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
	Flow meter D605070109D		Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3777-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
$T_{flare\ 3}$ (ID 4.2) Accuracy 0.1^{o}C.	Temperature transmitter D7004D042B6	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LT-4986-16 Valid until 25/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
$P_{flare\ 3}$ (ID 4.3) Accuracy +/- 0.2 of span.	Absolute pressure transmitter Endress+Hauser. J400EA15128	Annual calibration is performed on site by an external laboratory	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3778-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
$T_{combustion\ Flare\ 3}$ (ID 4.4)	Pyrocapt 1605126	Annually replaced	MESTRA Calibration certificate No. 1605126 Valid until 19/05/2017 Issued on 20/05/2016	Performed 20/05/2016

Accuracy +/- 0.0075, between 333°C and 1,200°C.	Pyrocapt 1605123	Annually replaced	Company Industria y Metrología Ltda, calibration certificate IM-OF22030-LT-3010-17 Valid until 18/05/2018 Issued on: 21/06/2017	19/05/2017
$Fv_{CH4\ i,\ y}$ (ID 5) Accuracy ≤0.2% of span.	Flare exhaust gas analyzer 3.357396.8	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate for 2 equipments No. IM-OF19243-LFQ101-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
$Fv_{O2\ i,\ y}$ (ID 6) Accuracy ≤0.5% of the span.	Flare exhaust gas analyzer 3.357399.8	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate for 2 equipments No. IM-OF19243-LFQ101-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
LFG_{engine} (ID 7.1) Accuracy up to +/-0.075% of the span /27/.	Flow meter D2058B0109D	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3779-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
T_{engine} (ID 7.2) Interval: -50-250°C Accuracy: 0.15 ± 0.002°C	Temperature transmitter Endress + Hausser D20115142FE	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LT-4987-16 Valid until 23/11/2017 Issued on:	Performed 24/11/2016

				22/01/2017	
P_{engine} (ID 7.3) Accuracy +/- 0.2 of span.	Absolute pressure transmitter D2002401128	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate IM-OF19243-LP-3780-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
EL_{LFG} (ID 7.4) Technical specifications of the equipment (Class 1.0 according to IEC 688)	Electricity meter 2034500008 C	According to manufacturer DEIF no calibration is required for this equipment (only replacement if damaged). The evidence was obtained by ICONTEC, through E-mail of July 14, 2011 posted by Anthony C Johnson, Technical Support Engineer DEIF Inc./F4/	ICONTEC evidenced the certificate 78/781/550877 of compliance of technical specifications of equipment according to regulations, issued by Tüv Nord Cert for company DEIF (equipment manufacturer). 08/09/2003 /F5/.	N/A
$EC_{PJ, y}$ (ID 8) Accuracy +/- 0.2%.	Import Electricity Meter BJ1240052001 P	Annual calibration is performed on site by an external laboratory.	ElgSis de Colombia Certificate No. 160819-47748 Valid until: 18/08/2017 Issue on: 19/08/2016	Performed 19/08/2016
			Digitron Certificate No. 170824 Valid until: 15/08/2018 Issue on: 22/08/2017	Performed 16/08/2017

	$Fv_{CH4\ i,\ y}$ Accuracy ≤0.2% of span.	Landfill gas analyzer 3.357395.8	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate for 2 equipments No. IM-OF19243-LFQ102-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
	$Fv_{O2\ i,\ y}$ Accuracy ≤0.5% of the span.	Landfill gas analyzer 3.357398.8	Annual calibration is performed on site by an external laboratory.	Company Industria y Metrología Ltda, calibration certificate for 2 equipments No. IM-OF19243-LFQ102-16 Valid until 23/11/2017 Issued on: 22/01/2017	Performed 24/11/2016
	$EG_{PJ,y}$	Main electricity Meter ITRON, type SL7000 Serial N° 73048827	Maximum every 3 years	Calibration certificate 160211-44165, issued by accredited Elgama Sistemos de Colombia´s calibration laboratory, dated on February 11th/2016.	11-02-2016
		Backup electricity meter ITRON, type SL7000 Serial N° 73049424		Calibration certificate 160211-44166, issued by accredited Elgama Sistemas de Colombia´s calibration laboratory, dated on February 11th/2016	11-02-2016
Findings	CL 2 and CL 3, More details about these findings in Appendix 4.				
Conclusion	ICONTEC concluded that the calibration is conducted at the frequency specified by the methodology and monitoring plan of the approved PDD /1/.				

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	The DOE checked the correct application of the formula of Methodological tool ACM 0001 /UN1/:

	$BE_y = BE_{CH4_y} + BE_{EC,y}$ Where BE_{CH4}, was calculated as per equation (2) of the methodology ACM 0001: $BE_{CH4} = ((1\text{-}OX_{top\_layer}) \times F_{CH4,PJ,y} - F_{CH4,BL,y}) \times GWP_{CH4}$ Where $F_{CH4,P,J,y}$ was calculated as per equation (5) of the methodology ACM0001: $F_{CH4,PJ,y} = \eta_{PJ} \times BE_{CH4,\ SWDS,y}/GWP_{CH4}$ $BE_{CH4,\ SWDS,y}$ was calculated as per equation 1 of methodological tool "Emissions from solid waste disposal sites" /UN10/ GWP_{CH4}: Global warming potential (25 tCO2e/tCH4) for the second commitment period of the Kyoto Protocol. On the other hand, $BE_{EC,y}$, was calculated as per provisions stated in the methodology ACM 0001/UN1/, section 5.4.2, and the methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation /UN8/, equiation (2): $$BE_{EC,y} = \sum_K EG_{PJ,y} \times EF_{EF,K,Y} \times (1 + TDL_{k,y})$$ This formulae was applied in a right way in the spreadsheets used for emission reduction calculations for every month under assessment for this monitoring period /4/. (Sheet: Electricity).
Findings	No finding was raised regarding to this issue.
Conclusion	Calculations executed by the PP in order to determine baseline emissions, project emissions and leakage of the project in the Emission Reductions file /3/ were properly prepared and are in accordance with the methodology ACM0001, version 17.0 "Large scale Consolidated methodology flaring or use of landfill gas " and related tools /UN7/, /UN8/, /UN9/, /UN10/ and /UN11/. On the other hand, the verification team assessed the whole set of data and calculations of GHG emission reductions resulting from the project activity by the application of selected methodology, formulae and default values applied. After verifying the formulae and calculations made on the ERs calculation file /3/, ICONTEC was able to determine the value of the baseline emissions for this monitoring period as 199,740 tCO_2e.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	Related to the project emission (PE) calculation, only project emissions associated with the electricity imported from the grid are taken into account. Therefore, the emissions from the fraction of electricity consumed by the project activity, which has been purchased from the Colombian grid, are determined as follows: $$PE_{Project} = PE_{EC} = \sum_j EC_{PJ,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$$ Where: EC_{PJ}: Electricity consumed by the project activity during the monitoring period and imported from the grid. ICONTEC verified that the energy consumption is recorded by the energy meter and that the source is the national power grid. $EF_{EL,j,y}$: Emission factor for the grid. The $EF_{EL,J,Y}$ used is a default value of 1.3 tCO_2/ MWh, taken from the methodology "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". TDL: Average technical transmission and distribution losses, that are calculated for the grid for the voltage level at which electricity is obtained from the grid at the

	Project site. For the project activity the default value of 20% has been used. For this monitoring period, the project emissions are calculated as follows: $PE_{Project}$=30.51tCO_2e
Findings	No finding was raised regarding to this issue
Conclusion	After the verification of the formulae and calculations made on the ERs calculation file /4/, ICONTEC was able to determine the following value for the PE_{EC} for this monitoring period.

E.8.3. Calculation of leakage GHG emissions

Means of verification	N/A
Findings	N/A
Conclusion	N/A

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	The calculation of the emission reduction was verified by reviewing each of the Raw Data files that collect the information for each of the months of monitoring period. In the verification of each file it was confirmed the application of the formula, the correct use of the default values and the correct calculation with the data measured minute by minute as established by the methodology ACM 0001 version 17.0.
Findings	No finding was raised regarding to this issue.
Conclusion	The data used for determination of the emission reductions are available and have been monitored in accordance with the registered monitoring plan and methodology ACM0001 version 17.0. The data used for the calculation of ERs in this monitoring period were verified and they were found consistent with those reported in the approved PDD. The appropriate methods and formulae for calculating baseline emissions, project emissions and leakage were followed in accordance with the registered PDD and applied methodology. The assumptions, emission factors and default values applied in the MR and the calculations were correctly justified.

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	ICONTEC verified that the emission reductions achieved during the monitoring period (199,740 tCO_2e) are lower than the ex-ante value (499,479 tCO_2e) of emission reductions in the approved PDD, as it was described in section E.8.4 of this report.
Findings	No finding was raised regarding to this issue.
Conclusion	During on site visit, ICONTEC validated the explanations for the difference provided by the PP in the monitoring report (Section E.6) and considered them as appropriate and consistent.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	During the verification ICONTEC confirm that there was not increase of emission reductions compared with the emissions reductions approved on the PDD, as it was explained in Section E.8.5. above
Findings	No finding was raised regarding to this issue.
Conclusion	During the verification ICONTEC confirm that there was not increase of emission reductions compared with the emissions reductions approved on the PDD.

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	The overall ERs reported on the current MP are part of the period from 1 January 2013 onwards. ICONTEC checked the ER's calculation file /4/ and verified that all the reported ERs are part of the period between 01/04/2017 to 30/09/2017.
Findings	No finding was raised regarding to this issue.
Conclusion	ICONTEC deems that the current ERs have been correctly reported on the period from 1 January 2013 onwards.

E.9. Assessment of reported sustainable development co-benefits

Means of verification	The project activity does not have monitored sustainable development co-benefits.
Findings	No finding was raised on this issue.
Conclusion	Since there is not monitored sustainable development co-benefits of the project activity, it is no necessary to assess this issue by DOE.

E.10. Global stakeholder consultation

Means of verification	The MR version 01 /2/ submitted by Biogas Doña Juana was made publicly available on the UNFCCC website from 20/11/2017 during the time specified in the Project Cycle Procedure/UN4/. Parties, stakeholders and NGOs were invited to provide comments through the website. No comments were received neither during the public consultation nor at the moment of submission of this report for issuance of certified emissions.
Findings	No finding was raised on this issue.
Conclusion	Since there was no comments in comments in the global stakeholder consultation, it is no necessary to assess the actions taken regarding any comment.

SECTION F. Internal quality control

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

The technical review and the quality control process was performed by an internal technical reviewer team in accordance with the ICONTEC's internal procedures for carrying out validation, verification and certification audits of CDM project activities. After this step the submission for requesting for issuance has been conducted.

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

SECTION G. Verification opinion

ICONTEC was engaged by Biogás Doña Juana S.A. ESP to verify the greenhouse gas (GHG) emission reductions reported by the CDM project Doña Juana landfill gas-to-energy project, project registration number 2554, owned by PP for the period 01/04/2017 to 30/09/2017, equating to 199,740 tCO_2e.

The verification was performed based on the requirements set by the CDM and relevant guidance provided by CMP and the CDM Executive Board. ICONTEC considers that the project's GHG emissions and resulting GHG emissions reductions reported in the monitoring report version 2 dated on 12/12/2017, are fairly stated.

ICONTEC confirms that the project is implemented as described in the validated and registered PDD. Installed equipment essential for generating emission reductions are running reliably and calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions as a CDM project.

Biogás Doña Juana S.A. ESP is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's monitoring and verification plan.

Biogás Doña Juana S.A. ESP is responsible for developing and keeping records and reporting procedures in accordance with the monitoring plan.

ICONTEC received the information and asked for explanations deemed necessary to provide enough evidence about the amount of GHG emissions and the calculation of the GHG emission reductions.

The verification consisted of the three following phases: i) desk review of the PDD, the MR and the monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion.

It is ICONTEC´s responsibility to set an independent GHG verification opinion on the GHG emissions from the project and approved a baseline for the monitoring period.

ICONTEC utilizes a risk-based approach that draws on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate them. ICONTEC's examination process includes test-based assessments of all evidence relevant to the amounts and disclosures of a project's GHG emissions and the calculations of such reductions for the reporting period.

ICONTEC can confirm that the GHG emissions reductions are calculated without material misstatements.

ICONTEC's opinion applies to the project's GHG emissions and the resulting GHG emission reductions reported and related to the validated and registered baseline, as well as the monitoring plan and its associated documents. ICONTEC confirms the following statements:

CDM project: Doña Juana landfill gas-to-energy project
Reporting period: 01/04/2017 to 30/09/2017
Baseline emissions: 199,770 tCO_2e
Project emissions: 30,51 tCO_2e
Leakage: 0 tCO_2e
Emission Reductions: 199,740 tCO_2e

SECTION H. Certification statement

ICONTEC has been engaged by Biogás Doña Juana S.A. ESP to examine the greenhouse gas (GHG) emission reductions reported from Doña Juana landfill gas-to-energy project for the corresponding period, equating to 199,740 tonnes of CO_2 equivalent.

We consider that the project's GHG emissions and resulting GHG emissions reductions reported in the Monitoring Report version 2 (12/12/2017) are fairly stated. Monitoring Report first version was publicly available on November 20th/2017.

The owner of the project Doña Juana landfill gas-to-energy project is responsible for the preparation of the GHG emission data and the reported GHG emission reductions on the basis set out within the project's Monitoring and Verification Plan.

The owner of the project Doña Juana landfill gas-to-energy project is responsible for developing and keeping records and reporting procedures in accordance with the Monitoring Plan.

ICONTEC is responsible to set an independent GHG verification opinion on the GHG emissions from the Project activity and approved baseline for the same period.

For this verification audit ICONTEC was provided the information and asked for explanations we deemed necessary to provide enough evidence that the amount of GHG emission and the calculation of the GHG emission reductions, based on the Monitoring Report, are fairly stated for the reporting period.

Our verification approach was based on the Kyoto Protocol requirements, Marrakech Agreement, as well as those defined by the CDM Executive Board.

ICONTEC's approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate them. Our examination includes review and assessment, of the evidence related to the project's GHG emission and calculations for this reporting period.

ICONTEC is able to certify that the emission reductions from the Doña Juana landfill gas-to-energy project during the verification period from April 1st /2017 to September 30th/2017 equals to 199,740 tonnes of CO_2 equivalent.

Appendix 1. Abbreviations

Abbreviations	Full texts
CAR	Corrective Action Request
CDM	Clean Development Mechanism
ERs	Emission Reductions
CERs	Certified emission reductions
CL	Clarification Request
CO_2E	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
GHG	Greenhouse Gases
ICONTEC	Colombian Institute of Technical Standards and Certification (Instituto Colombiano de Normas Técnicas y Certificación)
LFG	Landfill gas
MoC	Modalities of Communication
PDD	Project Design Document
MR	Monitoring Report
UNFCCC	United Nations Framework Convention for Climate Change
VVS	CDM Validation and Verification Standard
PP	Project Participant
IPCC	Intergovernmental Panel on Climate Change
PS	CDM Project Standard
PCP	CDM Project Cycle Procedure
PRC	Post Registration Change
BDJ	Biogas Doña Juana S.A E.S.P
UPME	Colombian Mining and Energy Planning Unit
UAESP	Administrative Unit of Bogota for Public Services
CREG	Colombian Regulatory Commision for energy and gas

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

Postgrade:
Assessment of Social Projects. Universidad Los Andes, 2005
Master degree on Environmental Management. Universidad Los Andes, 2016

University of Oxford. Curse: Applying Knoledge Management, Principle and Practices (December 1st/ 2009).
University of Oxford. Curse: Succesful Change Management for Engineers, Scientists and Staff in Hi-tech Companies (December 2nd 2009).
University of Oxford. Curse: Essentials of Project Management for Engineers, Scientists and Staff in Hi-tech Companies (December 3rd 2009).
University of Oxford. Curse: 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 21 November 2009)
Conference on Climate Change – Deforestation and Standadization. Bali, Indonesia (31 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

Erika Lucia Urrego Ortiz
CDM Auditor and Technical Expert (Sector 13)

MAIN PROFESSIONAL EDUCATION

Master degree on Quality and integral management. Universidad Santo Tomas en Convenio con ICONTEC. Bogotá, Colombia. April de 2013.

Specialist Environmental Management Systems. Universidad Externado de Colombia. Bogotá D.C. September 2002

Zootechnician, Universidad Agraria de Colombia, Bogotá D.C. Colombia. August 1997.

Lead Auditor on Energy management systems under ISO 50001:2011. Bogotá, Colombia. July 2015.

Lead auditor on Quality Management Systems under ISO 9001, ICONTEC, Bogotá, Colombia. 2006.

Lead auditor on OHSAS 18001, ICONTEC, Bogotá D.C. July 2005.

Lead auditor Environmental management system under ISO 14001, ICONTEC, Bogotá, Colombia. 2002.

Updating on CDM Course, Ministry of Environment, Housing and Territorial Development, Bogotá D.C, Colombia. 2006

PROFESSIONAL EXPERIENCE

- ICONTEC (2006 – Actual)

To prepare and perform the certification services assigned as per her Career Plan qualification, according to the stated on the procedures. To provide guidance to the certification costumers about the technical aspects of the assigned services provision. To participate in changing or designing Certification services, by changing or creating the respective procedures. Perform audits on schemes of ISO 9001, ISO 14001, OHSAS 18001, ISO 50001. Validation and verification of CDM projects like technical expert and lead auditor to scope 13.

- ASOCIACION COLOMBIANA DE PORCICULTORES-FNP (2003 – 2006) (Colombian Association of Pig Farmers)

To coordinate the activities to be performed by the Environmental Window Program in the various country areas. To allocate and execute resources engaged under the Cleaner Production agreements signed together with several environmental authorities. To lead the CDM project, focused to reduce methane (CH4) emissions issued by animal waste.
To be aware of the Ecuadorian and Chilean methodologies already approved by the CDM's Executive Board for Hog Breeding Sector to elaborate a proposal for the hog breeding sector together with the Ministry of Environment, Housing and Territorial Development in order to join farms to CDM projects.

- FICHTNER GmbH & Co. KG (2001 – 2002)

To prepare, design and apply surveys focused to identify power consumption in the sector of slaughter, processed meat and food concentrate for animals

- Regional Environmental Authority (CAR Sumapaz) 1998 – 2001

To support the environmental management unities on technical concepts of processes, permissions, sanctions, control, monitoring and assessment in the proper and timely management of the Sumapaz area's natural resources.

EXPERIENCE IN CDM ACTIVITIES

Lead auditor on validation MDL:

1. Validation of Macano Small Hydro Power Plant, Panamá
2. Validation of Montenegro Landfill Gas Recovery and Flaring, Colombia
3. Validation of Monteria Landfill Gas Recovery and Flaring, Colombia
4. Validation of Pirgua Landfill Gas Recovery and Flaring, Colombia
5. Validation of Tunjita Diversion Hydroelectric Project, Colombia
6. Validation of El Toqui wind power project, Chile
7. Validation of Los Angeles Landfill Gas Flaring Project, Colombia
8. Validation of Ferreira Gomes Hydro Power Plant CDM Project, Brazil
9. Validation of BRASILM 1 - Avoidance of Methane Emissions through Composting of Manure Waste, Brazil
10. Validation of CGR Catanduva Landfill Gas Project, Brazil
11. Validation of Macaubas Landfill Gas Project, Brazil
12. Validation of Palmaceite Wastewater Treatment and Biogas Utilization Project, Colombia
13. Validation of Teresina Landfill Gas Project, Brazil
14. Validation of Maceio Landfill Gas Project, Brazil
15. Validation of SHP Morro Azul CDM Project (JUN1164), Colombia
16. Validation Doña Teresa Small hydro prower plant, Colombia
17. Validation Biogas recovery and heat generation from Palm Oil Mill Effluent (POME), Coopeagropal. Costa Rica.
18. Validation Panuco Bagasse Cogeneration Project. México.

Lead auditor on verification MDL:

1. Verification of Biogas energy plant from palm oil mill effluent, Guatemala 2
2. Verification of Doña Juana Landfill gas-to-energy project, Colombia
3. Verification of Tres Valles Cogeneration Project, Honduras
4. Verification of Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador, El Salvador
5. Verification of La Venta II, México
6. Verification of Jepirachi Wind Power Project, Colombia
7. Verification of Santa Ana Hydroelectric Project, Colombia
8. Verification of BRASCARBON Methane Recovery Project BCA-BRA-01, Brazil
9. Verification of BRASCARBON Methane Recovery Project BCA-BRA-02, Brazil
10. Verification of BRASCARBON Methane Recovery Project BCA-BRA-03, Brazil
11. Verification of Ciudad Juarez Landfill gas-to-energy Project, México.

Lead auditor renewal crediting period:

1. Monte Rosa Bagasse Cogeneration Project (MRBCP)

Lead auditor on other schemes:

1. Validation VCS de Reforestación de áreas de pastura en la Sociedad Agrícola de Interés Social “José Carlos Mariátegui” – Proyecto Joven Forestal, Perú.
2. Validation Gold Standard Energy Efficiency at Ladrillera Alcarraza, Colombia.
3. Validation Gold Standard de Paramonga Bagasse Boiler Project, Perú.
4. Validation and Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-02, Brazil
5. Validation and Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-03, Brazil

6. Validation and Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil
7. Validation and Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil
8. Validation and Verification VCS of BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil

Specialist

1. Validation of ECC methane capture and combustion from AWMS at dairy farms in Mexico – I, México
2. La Calera Biodigesters Project, Perú

Technical Review

1. Validation of Fuel Switching through change of furnaces at Imusa S.A., Colombia
2. Validation of Cervecería Hondureña Methane Capture Project, Honduras
3. Validation of Paysandú Clean Energy, Uruguay
4. Validation of Securitization and Carbon Sinks Project, Chile
5. Validation of METALDOM Fossil fuel switch from reheat furnace, República Dominicana
6. Validation of Reforestation of degraded/degrading land in the Caribbean Savannah of Colombia, Colombia
7. Validation of Co-composting of organic residues in ORO ROJO's Palm Oil Mill at Sabana de Torres, Colombia
8. Validation of EMGEA Small Hydropower (SHP) Run-of-the-River CDM Project Bundle, Colombia
9. Validation of Energy efficiency at Malvinas Gas Plant, Perú
10. Validation of Marañon Hydroelectric Project, Perú
11. Validation of Santa Rita Hydroelectric Plant, Guatemala
12. Verification of Bio energy in General Deheza –Electric power generation from peanut hull and sunflower husk-, Argentina
13. Validation of Biogas project, Olmeca I, Santa Rosa, Guatemala
14. Validation of CTR Rosario Landfill Gas Project, Brazil
15. Validation of SHP Itaguacu CDM Project (JUN 1146), Brazil
16. Validation of Taurichuco Hydropower Project, Perú
17. Validation of Feira de Santana Landfill Gas Project, Brazil
18. Validation of Doña Juana Landfill gas-to-energy Project, Colombia
19. Renovación Inversiones Hondurenas Cogeneration Project
20. Validación SHPs Tambaú, das Pedras and Rio do Sapo CDM Project (JUN1132), Brazil
21. Validación SHPs Poço Fundo and Providência CDM Project (JUN1133), Brazil
22. Validación Santa Rita Hydroelectric Plant, Colombia
23. Validation Conservation and reforestation of degraded areas in Barbosa, Colombia
24. Verification Doña Juana Landfill gas-to-energy Project, Bogotá, Colombia.
25. Verificación Monomeros nitrous oxide abatement project. Barranquilla, Colombia.
26. Verification BRT Bogotá, Colombia: TransMilenio Phase II to IV
27. Verification BRT Macrobus Guadalajara, Mexico
28. Verification Inversiones Hondurenas Cogeneration Project, Honduras.
29. Verification Incauca S. A. Fuel Switch from Coal to Green Harvest Residues CDM Project. Colombia.

Ana Isabel Aubad
Lead technical reviewer and Technical Expert 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
Environmental engineer and project management company G.P.R. S.A., Chile. (2006–2011). Project Manager (main subjects: energy, biogas and waste management projects).
ICONTEC S.A. (2006–Today). External professional ISO 9001/14001/Chilean Technical Standards/Education/Climate Change (CDM, voluntary programs, carbon foodprint).
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 heat and power”
• Validation of “Methane Gas Capture and Fuel Switching at Compañía Argentina de Levaduras S.A.I.C. Plant Project”
• 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”
• 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 in La Providencia, Arcor”
• 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,Tecún 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 and verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-05, Brazil”
• Validation and verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-07, Brazil”
• Validation and verification of VCS “BRASCARBON Methane Recovery Project BCA-BRA-08, Brazil”

Cristian Grisales
Technical Expert Reviewer 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
June - July 2015

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

Certified ISO 50001
ICONTEC- National University of Colombia
July 2016

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.

Engineering Intern
INGENIERIA ESPECIALIZADA
Commercial visits to different industries, sales, design and assembly of shielding systems, grounding grids, power quality studies, calculation of electrical installations, RETIE inspections, diagnostic grounding systems, implementation, supervision and maintenance of the developed projects.

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	Biogas Doña Juana S.A.E.S.P.	Approved Project Design Document (PDD)	Version 9.2, dated on February 1st/2017	Other
2	Biogas Doña Juana S.A.E.S.P.	Monitoring Report for second monitoring period of second crediting period (01/04/2017 – 30/09/2017) of Doña Juana landfill gas-to-energy project	Version 1, dated on November 7th/2017 Version 2, dated on December 12nd/2017.	PP
3	Biogas Doña Juana S.A.E.S.P.	Emission reduction calculation file consolidated (BDJ CDM CALCULATION V1.xlsx)	Version 1, dated on December 12th/2017	PP
4	Biogas Doña Juana S.A.E.S.P.	Emission reduction calculation files per month. Files: • BDJ - CDM Raw Data - 2017 04.xlsx • BDJ - CDM Raw Data - 2017 05.xlsx • BDJ - CDM Raw Data - 2017 06.xlsx • BDJ - CDM Raw Data - 2017 07.xlsx • BDJ - CDM Raw Data - 2017 08.xlsx • BDJ - CDM Raw Data - 2017 09.xlsx	Version 1, dated on November 29th/2017	PP
5	ICONTEC	Verification report for first monitoring report of the second crediting period issued by ICONTEC, version 03	Dated on September 22nd/2017	Other
6	Biogas Doña Juana S.A.E.S.P.	Notification of entry into operation and SIC code for the generation plant Doña Juana I of 1.77 MW sent to electrical grid operator (CODENSA S.A. ESP)	Dated on June 21/2016	PP
7	CODENSA S.A. ESP	Notification of accomplishment of connection code for the generation plant Doña Juana I of 1.77 MW sent to Colombian National Dispatch Center	Dated on April 28th/2016	PP
8	Distrital Government	Project opinion about power plant Biogas II –	Dated on	PP

	of Bogota	provisory connection sent to electrical grid operator (CODENSA S.A. ESP)	August 23rd/2016	
9	UPME	Connection approval for biogas power plant with an installed capacity of 1.7 MW in Doña Juana Landfill	Dated on April 28th/2015	PP
9	INGEOSOLUM	Geothechnical study for power plants Biogas DoñaJuana II and III in Doña Juana landfill	Dated on February 4th/2016	PP
10	INGEOSOLUM	Structural Foundation study for power plant Doña Juana II and III in Doña Juana landfill	Dated on January 27th/2016	PP
11	HMV	Electrical studies for power plant Doña Juana II	Dated on May 2016	PP
12	CODENSA S.A. ESP	Commercial offer approval for connection study for biogas power plant with an installed capacity of 9.88 MW in Doña Juan Landfill	Dated on January 7th/2016	PP
13	Authority Environmental of Cundinamarca	Environmental License Resolution # 1351	June 18th, 2014	Other
14	Elaborated by CGR – operator of LFG.	Plane desing final dome. 2.4. GEN_F2_LLENO-2013.dwg.	November, 2013	PP
15	Special administrative unit of public services (UAESP).	Surveillance reports of the supervision of the landfill. http://www.uaesp.gov.co/index.php/aseo-uaesp/disposicion-final/informes-de-supervision	September 2016 to March 2017	Other
16	Ministry of environmental and sustainable development.	http://www.minambiente.gov.co/index.php/normativa	Consultation of webpage during verification.	Other
17	Biogas Doña Juana S.A.E.S.P.	Daily monitoring plant report. RG-310-086. On this register it is indicated the enclosed flares status. Includes the cell UV.	01/04/2017 to 30/09/2017	PP
18	Biogas Doña Juana S.A.E.S.P.	SQL database for monthly cross check of the data from the monitoring period (Since April 2017 to September 2017), issued by Biogás Doña Juana S.A. ESP. CDM-CROSS CHECK Data Year Month.xlsx	01/04/2017 to 30/09/2017	PP
19	IC Inoxidables de Colombia Ltda.	Flare Drawings.pdf (This file presents the technical specifications of the biogas plant)	18/06/2010	PP
20	GRS Valtech – Veolia Proprete.	Operation manual of Biogas plant of GRS Valtech – Veolia Proprete.	Version 1. 2009.	Other
21	Biogas Doña Juana S.A.E.S.P.	Instructive of generation files raw data y cross check IN-PLT-001 V01.pdf	07/02/2011	PP
22	Biogas Doña Juana S.A.E.S.P.	Logbook RG-PLT-001 Flare April 2017 to September 2017. Change of thermocouples and events Maintenance equipments.	April 2017 to September 2017.	PP
23	Biogas Doña Juana	Maintenance: Report of information to interventoria Union Temporal Inter DJ monthly.	April 2017 to September 2017.	PP
24	DEIF	Email sent by Anthony C Johnson, DEIF's Technical Support Engineer regarding calibration frequency of electrical meter	Dated on July 14th /2011	PP
25	UAESP Unidad administrativa especial de servicios públicos. Special administrative unit of public services.	Resolution 198 of 2017: Compliance obligations of CGR. http://www.uaesp.gov.co/index.php/uaesp-le-declara-incumplimiento-al-operador-del-relleno-sanitario-dona-juana Resolution 724 of 2010: Regulation for the	Dated: May 9/2017 Dated: October	PP

		concession of management and operation of the Doña Juana landfill http://legal.legis.com.co/document?obra=legcol&document=legcol_aea8fa7cfc9f019ae0430a010151019a	11st/2010	
26	Endress + Hauser	Technical specification for Temperature transmitter Endress + Hauser. File: "Technical information iTEMP ® TMT84.pdf". Technical information for Endress + Hauser Flowmeter Deltabar S PMD70/75. File "Technical information Deltabar S PMD70/75, FDM76/77/78.pdf"	August 2008	PP
27	Endress + Hauser	Technical information for Endress + Hauser Flowmeter Deltabar S PMD70/75. File "Technical information Deltabar S PMD70/75, FDM76/77/78.pdf"	August 2008	PP
28	CODENSA S.A. ESP and HMV Ingenieros	Biogas Doña Juana I Extension. Study of connection to the national interconnected system	Dated on September 12th/2017	PP
29	CODENSA S.A. ESP and HMV Ingenieros	Protections coordination study for Power Plant Biogas Doña Juana II	Dated on September 12th/2017	PP
30	Biogas Doña Juana and EMCORP Group SAS	Lease contract with irrevocable purchase option (in favor of the tenant) of 8 generator sets with biogas engines. Model TCG2020v20	Dated on September 29th/2017	PP
31	Endress+Hauser (Colombia) SAS	Quotation COT – 0004202 for measurement equipments (absolute pressure transmitter) issued for Biogas Doña Juana	Dated on July 31st/2017	PP
/UN1/	UNFCCC	Approved consolidated methodology ACM0001 Flaring or use of landfill gas, version 17.0		Other
/UN2/	UNFCCC	CDM validation and verification standard for project activities, version 01.0		
/UN3/	UNFCCC	CDM project standard for project activities, version 01.0		Other
/UN4/	UNFCCC	CDM project cycle procedure for project activities, version 01.0		Other
/UN5/	UNFCCC	Guideline on the application of materiality in verifications, version 02.0		Other
/UN6/	UNFCCC	Monitoring report form for CDM project activity, version 06.0		Other
/UN7/	UNFCCC	Methodological tool: Project emissions from flaring, version 02.0.0		Other
/UN8/	UNFCCC	Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 02.0		Other
/UN9/	UNFCCC	Methodological tool: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 02		Other
/UN10/	UNFCCC	Methodological tool "Emissions from solid waste disposal sites" Version 07.0		Other
/UN11/	UNFCCC	Methodological tool: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 03.0		Other

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

Table 1. Remaining FAR from validation and/or previous verifications

FAR ID	N/A	**Section no.**	E.2	**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

Table 2. CL from this verification

CL ID	1	**Section no.**	E.1	**Date:** 07/12/2017
Description of CL				
In the MR version 1, section B.1, page 14, the events # 010 and # 011 have the same information.				
Project participant response				**Date:** 23/01/2018
the MR is updated and the duplicated information is corrected, the row is deleted from the table and the numeration is adjusted				
Documentation provided by project participant				
Monitoring Report N2 V2				
DOE assessment				**Date:** 26/01/2018
In the updated version of MR (version 2), the information duplicated was corrected. Audit team conclusion: Closed				

CL ID	2	**Section no.**	E.7	**Date:** 07/12/2017
Description of CL				
The calibration certificate number for thermocouples located at Flare 2 and Flare 3 listed in the MR are not coherent with the calibration certificate reviewed at the onsite visit. *Likewise the calibration date stated in the calibration certificate for the Flare exhaust gas analyzer identified with the ID 3.357396.8 and 3.357399.8 is not coherent with the calibration certificate reviewed at the onsite visit.*				
Project participant response				**Date:** 23/01/2018
the MR is updated and the information according to the certificates number and dates was corrected				
Documentation provided by project participant				
Monitoring Report N2 V2 – Scanned Copy of the Calibration Certificates				
DOE assessment				**Date:** 26/01/2018
In the updated MR (version 2), the calibration certificate number for thermocouples located at Flare 2 and Flare 3 listed in the MR are coherent with the calibration certificate reviewed at the onsite visit. Likewise the calibration date stated in the calibration certificate for the Flare exhaust gas analyzer identified with the ID 3.357396.8 and 3.357399.8 is coherent with the calibration certificate reviewed at the onsite visit. Audit team conclusion: Closed				

CL ID	3	**Section no.**	E.7	**Date:** 07/12/2017
Description of CL				
The calibration date for the Absolute pressure transmitter identified with the ID D2002401128 is not coherent with the calibration frequency established in the monitoring plan				

Project participant response	**Date:** 23/01/2018
The calibration certificate presented a typographical error that was corrected by the service provider, the right date was 2016-11-24.	
Documentation provided by project participant	
Scanned Copy of the certificate	
DOE assessment	**Date:** 26/01/2017
It was an editorial error in the certificate issued by the laboratory which perform the calibration. The corrected certificate was reviewed by the audit team and the calibration date for the Absolute pressure transmitter identified with the ID D2002401128 is coherent with the calibration frequency established in the monitoring plan. Audit team conclusion: Closed	

Table 3. CAR from this verification

CAR ID	N/A	**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 4. FAR from this verification

FAR ID	N/A	**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*
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
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: Issuance
Keywords: project activities, verifying and certifying