




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

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

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	Zone 3 Landfill Gas Project UNFCCC Ref. Number: 9303
Process track	<input checked="" type="checkbox"/> Prior approval <input type="checkbox"/> Issuance <input type="checkbox"/> Renewal of crediting period
Version number of the validation report	1.0
Completion date of the validation report	10/12/2020
Type(s) of PRCs	<input type="checkbox"/> Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents ¹ <input checked="" type="checkbox"/> Corrections <input checked="" type="checkbox"/> Changes to the start date of the crediting period <input type="checkbox"/> Inclusion of a monitoring plan <input type="checkbox"/> Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents <input checked="" type="checkbox"/> Changes to the project design <input type="checkbox"/> Changes specific to afforestation and reforestation project activities
Version number of PDD to which this report applies	4
Project participants	Industrias de Biogás S.A. ALLCOT AG
Host Party	Guatemala
Applied methodologies and standardized baselines	ACM0001: Flaring or use of landfill gas – version 13
Mandatory sectoral scopes	13 and 1
Conditional sectoral scopes, if applicable	-

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

Name and UNFCCC reference number of the DOE	Earthood Services Private Limited UNFCCC Ref. Number: E-0066
Name, position and signature of the approver of the validation report	 Dr. Kaviraj Singh Managing Director

SECTION A. Executive summary

Brief summary of the project activity

The project activity consists in the collection, combustion and generation of electricity using landfill gas generated in Zone 3 Landfill located in Colonia Landivar – Guatemala City. The is located at: 14.6247° and -90.5322°.

Technical description of main equipment:

- 01 flare – Manufacturer: Biotechogas – Model: BTG 2000 HT – Nominal gas flow (each): 400-2,000 Nm³/h – Serial #: BTG2000HT-082/13²;
- 04 generators
 - o 01 engine – Manufacturer: GE Jenbacher – Type: JGC-320 GS-B.L – Serial # 1116095 with capacity of 1,059 kW; and
 - o 03 engines – Manufacturer: GE Jenbacher – Type: JGS-320 GS-B.L – Serial #s 1196687, 1196704 and 1196731 with capacity of 1,061 kW (each).

Scope of validation

ALLCOT AG has contracted ESPL to conduct the validation of PRCs of the project activity “Zone 3 Landfill Gas Project”.

The scope of the validation is to establish that the PRCs are in accordance with PS for project activities 02.0.

Validation process

The validation process involved the following:

- contract with ALLCOT AG for the scope of validation of the PRCs of the project activity;
- desk review;
- virtual on-site inspection;
- issuance of validation findings;
- reporting, calculation checks, QA/QC and resolution of findings;
- issuance of draft validation report;
- independent technical review of the project documentation;
- issuance of the final validation report;
- submission of the request for renewal, as appropriate.

Conclusion

ESPL has performed the validation of the PRCs of the CDM PA “Zone 3 Landfill Gas Project” (UNFCCC Ref. Number: 9303).

The validation team has confirmed that that the PRCs are in accordance with PS for project activities 02.0, relevant CDM rules and requirements and conditions of the applied methodology ACM0001 – version 13.

The PA is expected to generate an annual average of 167,210 tCO₂e in the first crediting period.

Therefore, the request for registration of the PRC is being submitted in accordance with the CDM procedures.

² there is a plan to install a second flare in 2025.

SECTION B. Validation team, technical reviewer and approver**B.1. Validation team member**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/docu ment	On-site inspection	Interviews	Validation findings
1.	Team Leader	OR	Cruz	Sergio	Verifit	Y	N	Y	Y
2.	Technical Expert	OR	Cruz	Sergio	Verifit	Y	N	Y	Y
3.	Methodological Expert	OR	Cruz	Sergio	Verifit	Y	N	Y	Y
4.	Local Expert	OR	Castillo	Alejandra	Outsourced	Y	N	N	N

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

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Gautam	Ashok	Central Office
2.	Technical Expert	IR	Gautam	Ashok	Central Office
3.	Approver	IR	Singh	Kaviraj	Central Office

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

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

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

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

C.2. On-site inspection

Duration of on-site inspection: -				
No.	Activity performed on-site	Site location	Date	Team member

The physical site visit was not performed for the validation of PRCs. The alternative means has been considered in accordance with Board recommendation, due to COVID-19, which allowed a deviation from the requirements of paragraph 30 of the VVS-PA. It was not possible to forecast when the travel restrictions would be revoked by public authorities as it depended on the evolution of pandemic, especially as it involves two countries (Brazil – home country of validator – and Guatemala – plant location).

It is important to note that the PP has a World Bank PAFERN with the possibility to sell CERs to the World Bank and another ERPA for CERs. To perform the verification of the project activity to issue the CERs, it is necessary to perform first a PRC to change the start date of the crediting period, the change in project design and corrections, and for those tasks an alternative means for site visit was granted as a delay in those validations and, as consequence, in verification and in delivering the CERs could lead to significant financial losses to the PP.

To allow a credible and sufficient means for the present validation, the DOE used other standard auditing techniques for validation, as referred to in section 7.1.3 of the VVS-PA, as follows:

- confirmation from PP that no changes occurred in monitoring plan, measuring equipment;
- current pictures of main equipment;

- video tour in real time;
- document review; and
- interview with PP's representatives (responsible for the management and monitoring of project activity).

Therefore, the PPs have provided all necessary information for a clear and precise understanding of the project activity, which has been considered sufficient by the validation team for the purpose of the present validation.

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Gil	Alfredo	ALLCOT	12/06/2020	- CDM aspects	Sergio Cruz
2.	Siliezar	Christian	ALLCOT	12/06/2020	- Project monitoring - Virtual tour	Sergio Cruz
3.	Diem	Carlos	INBIO	12/06/2020	- Project implementation - Guatemalan legal authorizations - Virtual tour	Sergio Cruz

C.4. Sampling approach

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

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

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form	-	1	-
Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents	-	-	-
Corrections	1	-	-
Changes to the start date of the crediting period	1	-	-
Inclusion of a monitoring plan	-	-	-
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents	-	-	-
Changes to the project design	-	1	-
Changes specific to afforestation and reforestation project activities	-	-	-
Others (please specify)	-	-	-
Total	02	02	00

SECTION D. Validation findings

D.1. Compliance with PDD form

Means of validation	The project participants have used the latest version of the PDD form for the revised PDD. By checking the updated PDD, the DOE can confirm that the information transferred to the later version of the form is materially the same as that in the registered PDD.
Findings	CAR 01
Conclusion	The latest version of the PDD template (CDM-PDD-FORM – version 11.0) available at the UNFCCC website has been used. It has been filled out in accordance with the instructions for filling it out.

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

Means of validation	Not applicable
Findings	-
Conclusion	Not applicable

D.3. Corrections

Means of validation	Correction # 1 The PPs are taking the opportunity to be more specific and correct the name of some monitoring parameters:																						
	<table><tr><th>Name and description of the parameter as per registered PDD</th><th>Name and description of the parameter as per PRC Correction</th></tr><tr><td>$V_{t,db}$ – Volumetric flow of the gaseous stream in time interval t on a dry basis</td><td>V_{t,db_flare} – Volumetric flow of the gaseous stream sent to the flare in time interval t on a dry basis</td></tr><tr><td>$V_{i,t,db}$ – Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a dry basis</td><td>V_{i,t,db_flare} – Volumetric fraction of greenhouse gas i in the gaseous stream sent to flare in time interval t on a dry basis</td></tr><tr><td>T_t – Temperature of the gaseous stream in time interval t</td><td>T_{t_flare} – Temperature of the gaseous stream sent to the flare in time interval t</td></tr><tr><td>P_t – Absolute pressure of the gaseous stream in time interval t</td><td>P_{t_flare} – Absolute pressure of the gaseous stream sent to the flare in time interval t</td></tr><tr><td>$V_{t,db}$ – Volumetric flow of the gaseous stream in time interval t on a dry basis</td><td>$V_{t,db_electricity}$ – Volumetric flow of the gaseous stream used for electricity generation in time interval t on a dry basis</td></tr><tr><td>$V_{i,t,db}$ – Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a dry basis</td><td>$V_{i,t,db_electricity}$ – Volumetric fraction of greenhouse gas i in the gaseous stream used for electricity generation in time interval t on a dry basis</td></tr><tr><td>T_t – Temperature of the gaseous stream in time interval t</td><td>$T_{t_electricity}$ – Temperature of the gaseous stream used for electricity generation in time interval t</td></tr><tr><td>P_t – Absolute pressure of the gaseous stream in time interval t</td><td>$P_{t_electricity}$ – Absolute pressure of the gaseous stream used for electricity generation in time interval t</td></tr><tr><td>$V_{RG,m}$ – Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m</td><td>$V_{RG,m}(=V_{t,db_flare})$ – Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m</td></tr><tr><td>$V_{i,RG,m}$ – Volumetric fraction of component i in the residual gas on a dry basis at minute m where $i = \text{CH}_4, \text{CO}, \text{CO}_2, \text{O}_2, \text{H}_2, \text{H}_2\text{S}, \text{NH}_3$ and N_2</td><td>$V_{i,RG,m}(=V_{i,t,db_flare})$ – Volumetric fraction of component i in the residual gas on a dry basis at minute m where $i = \text{CH}_4, \text{CO}, \text{CO}_2, \text{O}_2, \text{H}_2, \text{H}_2\text{S}, \text{NH}_3$ and N_2</td></tr></table>	Name and description of the parameter as per registered PDD	Name and description of the parameter as per PRC Correction	$V_{t,db}$ – Volumetric flow of the gaseous stream in time interval t on a dry basis	V_{t,db_flare} – Volumetric flow of the gaseous stream sent to the flare in time interval t on a dry basis	$V_{i,t,db}$ – Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a dry basis	V_{i,t,db_flare} – Volumetric fraction of greenhouse gas i in the gaseous stream sent to flare in time interval t on a dry basis	T_t – Temperature of the gaseous stream in time interval t	T_{t_flare} – Temperature of the gaseous stream sent to the flare in time interval t	P_t – Absolute pressure of the gaseous stream in time interval t	P_{t_flare} – Absolute pressure of the gaseous stream sent to the flare in time interval t	$V_{t,db}$ – Volumetric flow of the gaseous stream in time interval t on a dry basis	$V_{t,db_electricity}$ – Volumetric flow of the gaseous stream used for electricity generation in time interval t on a dry basis	$V_{i,t,db}$ – Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a dry basis	$V_{i,t,db_electricity}$ – Volumetric fraction of greenhouse gas i in the gaseous stream used for electricity generation in time interval t on a dry basis	T_t – Temperature of the gaseous stream in time interval t	$T_{t_electricity}$ – Temperature of the gaseous stream used for electricity generation in time interval t	P_t – Absolute pressure of the gaseous stream in time interval t	$P_{t_electricity}$ – Absolute pressure of the gaseous stream used for electricity generation in time interval t	$V_{RG,m}$ – Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m	$V_{RG,m}(=V_{t,db_flare})$ – Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m	$V_{i,RG,m}$ – Volumetric fraction of component i in the residual gas on a dry basis at minute m where $i = \text{CH}_4, \text{CO}, \text{CO}_2, \text{O}_2, \text{H}_2, \text{H}_2\text{S}, \text{NH}_3$ and N_2	$V_{i,RG,m}(=V_{i,t,db_flare})$ – Volumetric fraction of component i in the residual gas on a dry basis at minute m where $i = \text{CH}_4, \text{CO}, \text{CO}_2, \text{O}_2, \text{H}_2, \text{H}_2\text{S}, \text{NH}_3$ and N_2
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In addition, the PPs also filled out the table of the parameters with necessary information.																							
Findings	CL 01																						
Conclusion	<p>The requested change is in accordance with paragraph 232 of Project Standard for project activities – version 2.0, as the PP are correcting the names of parameters that were set at the registration of the project activity.</p> <p>In addition, the requested change is in accordance with paragraphs 287 and 289 of VVS for project activities – version 2.0, as the new names are more accurate and enables a better understanding about what is being monitored. No changes in the application of the applied methodologies, registered monitoring plan and other applied methodological regulatory documents occurred due to these corrections.</p>																						

Means of validation	Correction # 2 <p>The PPs are correcting an editorial mistake, as in the description of project implementation (Section A.3 of the PDD) was said that open flares were installed. Nevertheless, the project activity has an enclosed flare (one already installed and the PPs plan to install another one in 2025).</p> <p>Throughout the PDD, including specific parameters used for the monitoring of enclosed flares, every time a flare is mentioned, it is referred as “enclosed flares”.</p> <p>There was never an open flare installed at the project activity. Thus, this reference was clearly an editorial mistake.</p>
Findings	CL 01
Conclusion	<p>The requested change is in accordance with paragraph 232 of Project Standard for project activities – version 2.0, as the PP are correcting the names of parameters that were set at the registration of the project activity.</p> <p>In addition, the requested change is in accordance with paragraphs 287 and 289 of VVS for project activities – version 2.0, as it is accurate. No changes in the application of the applied methodologies, registered monitoring plan and other applied methodological regulatory documents occurred due to this correction.</p>

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

Means of validation	<p>Originally, the start date of the crediting period is 01/03/2013. The PPs are proposing to change the start date to 26/07/2014, which is the date of start of commercial operations of the project activity. Thus, between one and two years.</p> <p>The change is necessary as the required procedures of the host country (Guatemala) to authorize importation of equipment for renewable energy projects of less than 5 MW took more time than expected. As per the requirements, equipment cannot be imported until the General Directory of Energy (DGE) and the Ministry of Energy and Mines (MEN) issue the resolution of approval of the project that happened only on 27/03/2014.</p> <p>No changes occurred to the project activity that would result in a less conservative baseline, as it is assumed to be the atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons. Since LFG is also used in the project activity for generating electricity, the baseline scenario is also assumed to be the electricity that would be generated in the grid or in captive fossil fuel fired power plants. There were no changes in Guatemalan legislation (Technical Standard DRPSA-004-2018) that result in an obligation to burn and/or use the LFG.</p> <p>In addition, it was demonstrated that substantive progress has been made by the project participants to start the project activity, as the delay has happened because of administrative and legal requirements, which were promptly accomplished by the PPs and all arrangements have been made to execute the import and installation of equipment as soon as the authorizations were issued. In fact, the PPs have started the negotiation, prior to the issuance of the resolution, and then, effectively performed the purchase of the equipment, demonstrating their real intention and assuming financial risks with more delays.</p>
Findings	CL 02
Conclusion	<p>The new crediting period is from 26/07/2014 to 25/07/2021.</p> <p>The requested change is in accordance with paragraph 235 of Project Standard for project activities – version 2.0, as there were no changes that occurred to the project activity that would result in a less conservative baseline and that were substantive progress made by the project participants to start the project activity.</p> <p>In addition, the requested change is in accordance with Section 8.3.2 of VVS for project activities – version 2.0.</p> <p>It is important to note that exactly because the crediting period is totally after 01/01/2013, the value of parameter GWP_{CH_4} was updated to be in line with actual value for the 2nd commitment period. Therefore, the ER estimates were also updated.</p>

D.5. Inclusion of a monitoring plan

Means of validation	Not applicable
Findings	-

Conclusion	Not applicable
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D.6. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents

Means of validation	Not applicable
Findings	-
Conclusion	Not applicable

D.7. Changes to the project design

Means of validation	<p>The change to the project design is a decrease in the capacity specified in the registered PDD – at the registered PDD, the capacity is 4.8 MW and the change decreases the capacity to 4.242 MW.</p> <p>It is a large scale project activity.</p> <p>The decision for this decrease occurred after the investment decision and validation of the project activity. It was taken due to a commercial decision. Therefore, instead of four engines of 1.2 MW each, it was implemented one engine of 1,059 kW on 22/03/2015 and three engines of 1,061 kW (each) on 02/06/2017.</p> <p>This change to project design was detected by the validation team during the virtual site visit, by the video tour, pictures of nameplates of equipment and interviews with PPs' representatives.</p> <p>It is important to state that there was no change in the engines during the crediting period and that the financial analysis considered the planned configuration of the equipment at the time of the validation process.</p> <p>The change has no negative impact to:</p> <ul style="list-style-type: none"> - the registered monitoring plan, as the monitoring of those generators is the same as predicted in the registered PDD; - the level of accuracy of the monitoring activity is the same set at the registered PDD. Thus, the monitoring necessary for parameters used in the calculations had not suffer any changes. So, the level of accuracy of the monitoring activity continues the same as before; - the applied methodology and other methodological regulatory documents, as all requirements of ACM0001 and related tools continue being applied to the project activity. <p>In addition, the change does not adversely impact:</p> <ul style="list-style-type: none"> - the additionality of the registered CDM project activity: a new financial analysis^{/16/} has been performed. <p>The Investment Costs were updated with real invoices and has decreased, whereas the installed capacity and hence net electricity generation varied accordingly and hence resulted in lower revenues.</p> <p>With those changes, the Equity IRR was decreased from -1.76% (original assessment) to -4.12% (assessment with the new configuration of installed capacity, electricity generation and actual investment), which is far below the validated benchmark of 12.50%.</p> <p>It is also important to note that, conservatively, the total electricity generation (and consequently, the revenues generated with its sale) continue being accounted since the first year of the original financial analysis (2013), although the first engine has only been installed in March/2015 and the other three engines have only been installed in June/2017.</p> <p>New sensibility analysis has been performed and the project continues being additional.</p> <p>So, it was concluded that even with this slight decrease of proposed/planned installed capacity, <u>the project remains additional</u>.</p> <ul style="list-style-type: none"> - the scale of the registered CDM project activity, as it is already a large-scale project activity; - the applicability and application of the applied methodologies and other methodological regulatory documents, as project continues to follow all requirements of ACM0001 and related tools;
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	<ul style="list-style-type: none"> - the compliance of the monitoring plan with the applied methodologies and other methodological regulatory documents. as project continues to follow all requirements of ACM0001 and related tools. <p>Moreover, the revised PDD also complies with all requirements of the applied methodologies and other methodological regulatory documents.</p>
Findings	CAR 02
Conclusion	<p>The proposed change to the project design is in accordance with paragraph 241 (b) of PS for project activities – version 2.0, as it represents a decrease in the capacity specified in the registered PDD.</p> <p>In addition, the change is in accordance with paragraph 242 of PS, as:</p> <ul style="list-style-type: none"> - it has no impact to the applicability and application of the applied methodology, as the methodology indicates the installation of generators as one of its scenarios. This installation was already described in the registered PDD and it continues to follow all requirements of ACM0001 and related tools; - the monitoring plan continues to follow all the requirements of the applied version of the methodology and tools; - it has no impact to the level of accuracy and completeness in the monitoring of the project activity, which remains as accurate and complete as before; - the decrease of the installed capacity does not adversely affect the additionality of the project as demonstrated by the new financial analysis. Therefore, no adverse impact in the additionality is expected due to this proposed design change. The new financial analysis was done in accordance with paragraph 243 (a) of PS; - the change has no impact to the scale of the project activity, as it continues to be a large-scale project activity. <p>In addition, the requested change is in accordance with Section 8.3.5 of VVS for project activities – version 2.0, as:</p> <ul style="list-style-type: none"> - it complies with CDM PS; - it reflects the real implementation and proposed design of the project activity; - it has no negative impact to the registered monitoring plan; - the project continues to be additional (new additionality assessment was performed), large scale, no negative impact to application of methodology and tools and complies with the monitoring plan. - the description now reflects the implementation of the project activity since its start date and they were not known at the original validation of the project activity.

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

Means of validation	Not applicable
Findings	-
Conclusion	Not applicable

SECTION E. Internal quality control

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

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

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

SECTION F. Validation opinion

The following changes are being requested under the prior approval track.

- the requested Corrections are in accordance with paragraph 232 of Project Standard for project activities – version 2.0, as the PPs are correcting the names of parameters that were set at the registration of the project activity and an editorial mistake in section A.3 of PDD;
- the requested Change to the start date of the crediting period is in accordance with paragraph 235 of Project Standard for project activities – version 2.0, as there were no changes that occurred to the project activity that would result in a less conservative baseline and that were substantive progress made by the project participants to start the project activity; and
- the requested Change to the project design is in accordance with paragraph 241 (b) of PS for project activities – version 2.0, as it represents a decrease in the capacity specified in the registered PDD.

As per VVS sections 8.3.1, 8.3.2 and 8.3.5, the validation team concludes the following:

- the changes above reflect the actual information observed during the virtual site visit and are considered in compliance with CDM PS for PA;
- the changes above are considered accurate by the validation team as observed during the virtual site inspection;
- the change to the start date of the crediting period is between one and two years and no changes occurred to the project activity that would result in a less conservative baseline and it was demonstrated that substantive progress has been made by the project participants to start the project activity;
- there is no impact in the monitoring plan, level of accuracy of monitoring activities, applied methodology and other applied methodological documents due to the proposed changes;
- the proposed changes do not adversely affect the conclusions of the validation report of the registered PDD regarding the additionality, scale, applicability and application of methodology and compliance with monitoring plan. Regarding the additionality, the changes do not adversely impact the investment analysis;
- the revised PDD complies with all requirements of applied methodologies and all information was duly transferred from original PDD to the revised version;
- the validation team opinion is that the proposed changes comply with relevant requirements of CDM PS for PA.

The change in the ER calculations is due to the new installed capacity, new starting date and the use of revised GWP_{CH4} for the 2nd commitment period.

The new version of PDD accurately and clearly reflects the proposed changes.

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
BE	Baseline Emissions
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CH ₄	Methane
CL	Clarification Request
CM	Combined Margin
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CP	Crediting Period
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EIA	Environmental Impact Assessment
ESPL	Earthood Services Private Limited
FAR	Forward Action Request
GHG	Green House Gas
GSC/GSP	Global Stakeholder Consultation Process
INBIO	Industrias de Biogás S.A.
IPCC	Intergovernmental Panel on Climate Change
LE	Leakage Emissions
LFG	Landfill gas
KP	Kyoto Protocol
LoA	Letter of Approval/Authorization
MP	Monitoring Plan
OM	Operating Margin
PA	Project Activity
PCP	Project Cycle Procedure
PDD	Project Design Document
PE	Project Emissions
PP	Project Participant
PS	Project Standard
tCO ₂ e	Tonnes of Carbon di oxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VT	Verification Team
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers

Competence Statement	
Name	Sergio Bonanno Cruz
Country	Brazil
Education	Post Graduate Diploma in Environment
Experience	25 Years
Field	Environmental Law, CDM, Energy, Climate Change

Approved Roles			
Team Leader	Yes		
Validator	Yes		
Verifier	Yes		
Methodology Expert	ACM0001, ACM0002, AM0026, ACM0006, AMS-I.D		
Local expert	Brazil, Chile		
Financial Expert	Yes		
Technical Reviewer	No		
TA Expert	1.2, 13.1		
Reviewed by	Shreya Garg	Date	04/06/2019
Approved by	Anshika Gupta	Date	04/06/2019

Competence Statement			
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Education	M. Sc. (Environmental Sciences) M. Tech. (Energy & Environmental Management)		
Experience	16 Years +		
Field	Energy, Climate Change & Environment		
Approved Roles			
Team Leader	Yes		
Validator	Yes		
Verifier	Yes		
Methodology Expert	AMS-I.D, AMS-I.A, AMS-I.C, AMS-I.E, AMS-II.D, AMS-II.G, AMS-III.E, AMS-III.H, AMS-III.Q, AMS-III.Z, AMS-III.AV, AM0029, AM0025, AM0056, ACM0001, ACM0002, ACM0004, ACM0012, ACM0006, AM0018, ACM0009, AM0034, AMS.I.B		
Local expert	India		
Financial Expert	Yes		
Technical Reviewer	Yes		
TA Expert	1.1, 1.2, 3.1, 13.1		
Reviewed by	Shreya Garg	Date	25/01/2019
Approved by	Anshika Gupta	Date	25/01/2019

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1.	UNFCCC	Standard: CDM PS for PA	version 02.0	Other
2.	UNFCCC	Standard: CDM PCP for PA	version 02.0	Other
3.	UNFCCC	Standard: CDM VVS for PA	version 02.0	Other
4.	UNFCCC	Form: CDM-PDD-FORM	version 11.0	Other
5.	UNFCCC	Project design document (registered)	version 2 – 20/12/2012	PP
6.	PP	Project design document (draft)	version 3 – 17/07/2020	PP
7.	PP	Project design document (final)	version 4 – 09/12/2020	PP
8.	PP	ER Spreadsheet (draft / revised)	version 02 version 03 version 04 version 05	PP
9.	PP	ER Spreadsheet (final)	version 07	PP
10.	UNFCCC	Methodology ACM0001: Flaring or use of landfill gas	version 13.0	Other

11.	UNFCCC	<u>Methodological tools</u> - TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality	version 05.0.0	Other
		- TOOL04: Emissions from solid waste disposal sites	version 06.0.1	
		- TOOL05: Baseline, project and/or leakage emissions from electricity consumption	version 01	
		- TOOL06: Project emissions from flaring	version 02.0	
		- TOOL07: Tool to calculate the emission factor for an electricity system	version 03.0.0	
		- TOOL08: Tool to determine the mass flow of a greenhouse gas in a gaseous stream	version 02.0	
12.	PP	<u>Pictures and Virtual tour</u> - Virtual tour on site - Pictures of all main equipment and nameplates	12/06/2020 Jun/2020	PP
13.	Ministry of the Environment and Natural Resources INBIO	<u>Start Date</u> - Resolution # 1175-2014/DIGARN/UCA/RMHH/aetf (Page 154)	27/03/2014	PP
	GE	- Bank account with evidence of the transference confirmation of the first payment performed	07/04/2014	
	INBIO	- Main equipment commissioning certificates	-	
		- Letter explaining the delay	30/04/2020	
14.	PP	<u>New Financial Analysis</u> - Financial study Zone 3 (PRC)	version 3 version 4 version 5 version 7 version 8 06/05/2016	PP
	INBIO and Cobra	- Contract between to Industrias de Biogás and COBRA S.A	-	
	PP Suppliers	- Financial costs	-	
		- Invoices	-	
15.	Ministry of Public Health and Social Assistance	<u>Legislation</u> Technical Standard DRPSA-004-2018	02/05/2018	Other
16.	-	DNA of Guatemala	https://www.marn.gob.gt/	Other
17.	-	IPCC publications	www.ipcc-nggip.iges.or.jp	Other
18.	-	UNFCCC	cdm.unfccc.int	Other

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

Table 1. CLs from this validation

CL ID	01	Section no.	D.3	Date: 22/06/2020
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Description of CL	
<i>It was verified during the virtual audit that the PPs had changed the PDD to be more specific in the name of some monitoring parameters (e.g. change from "Volumetric flow of the gaseous stream in time interval t on a dry basis" to "Volumetric flow of the gaseous stream sent to the flare in time interval t on a dry basis"). Nevertheless, those changes are not being reported as a PRC.</i>	
Project participant response	Date: 08/07/2020
The new version of the PDD comply with all the parameters of the Monitoring Plan as per registered PDD. However, some names of ex-post parameters presented in the monitoring plan of the currently registered PDD have been updated with different names and descriptions depending where are they measured for better understanding and clarification of the monitoring system. These new parameters names have been updated in the Section B.7.1 of the updated PDD with the new presentation of the monitored parameters. These changes have been explained in Appendix 7. Summary of post-registration changes as a correction.	
Documentation provided by project participant	
200717_PDD_Zone 3_PRC	
DOE assessment	Date: 31/07/2020 05/10/2020
The names of some monitoring parameters were corrected and a PRC Correction is being requested to validate the change. Nevertheless, it was verified that the PP made a change in the beginning of Section A.3, as it was written that the project activity would use "open flares" and effectively it is using "enclosed flares" as written right below in the same section and throughout the PDD (including specific parameters used for the monitoring of enclosed flares. It is not clear why this was not considered as a PRC to be requested. CL remains open	
Project participant response	Date: 30/10/2020
Appendix 7 has been updated indicating, as correction, that it was an editorial mistake that has been corrected in this version of the PDD as in the rest of the original PDD the flare system was defined as "enclosed flare" since always the project had enclosed flare.	
Documentation provided by project participant	
PDD – v. 3	
DOE assessment	Date: 08/12/2020
The Correction is now considered as a PRC and it is correctly reported at Appendix 7 of the PDD. CAR is closed	

CL ID	02	Section no.	D.4	Date: 22/06/2020
Description of CL				
<i>Regarding the change to the start date of the crediting period of the registered CDM project activity, it was not described if there were changes that occurred to the project activity that would result in a less conservative baseline and what were the substantive progress has been made by the project participants to start the project activity.</i>				
Project participant response				Date: 08/07/2020
The original start date stated in the registered PDD as crediting period start date (01/03/2013) was delayed and the starting date when the project initiated its operation was in 26/07/2014 that match with the first date when the raw data records are available. The commissioning date of the main project equipment were the following: Engine 1: 22/03/2015 Engine 2: 02/06/2017 Engine 3: 02/06/2017 Engine 4: 02/06/2017 Thus, the original crediting period (01/03/2013 – 28/02/2020) has been changed to 26/07/2014 – 25/07/2021. This delay is due to the fact that the first acquisitions of the biogas collection and use equipment were made in 07/04/2014, due to the procedures required by the Ministry of Energy and Mines (MEN as per its Spanish acronym) of the Republic of Guatemala for renewable energy projects of less than 5 MW considered Generators of Renewable Distribution (GDR as per its Spanish acronym). The General Directorate of Energy (DGE as per its Spanish acronym) of the MEN establishes that the project be developed in three phases, planning, execution and commercial operation. During the planning phase, the respective studies and procedures are prepared to obtain the approval of the renewable energy project before the MEN and the National Electric Energy Commission (CNEE as per its Spanish acronym), period in which equipment cannot be imported until the DGE and the MEN issue the project approval resolution. During this period, it was required to expand the environmental impact study including a list of tariff items of equipment necessary for the collection, thermal oxidation of biogas and generation of electrical energy, in				

such a way that the processes of procedures before the regulatory entities caused a delay in the start of the project execution. The execution stage was completed in 6 months.

Evidence of this delay is the "Resolution No 1175-2014/DIGARN/UCA/RMHH/aetf" issued on 27/03/2014 by the Environmental Quality Unit of the General Direction of Environmental Management and Natural Resources of the Ministry of Environment and Natural Resources of the Government of Guatemala.

During this delay in the starting date of operation, there was not changes in the baseline emissions as the quantity of waste received by the landfill remained the same as per the Authorization Letter of the municipality of Guatemala to receive an average of 3,300 tons per day for the Zone 3 Landfill.

Additionally, no changes in the technical requirements and normative for landfill operation occurred in terms of biogas destruction as the current applicable technical normative "No DRPSA-004-2018" issued on 02/05/2018 by the Ministry of Public Health and Social Assistance. General Direction of Regulation, Surveillance and Health Control. Department of Regulation of Health and Environment Programs only oblige to include a collection and control system for the biogas generated in its Article 10 and 17.

According the normative, this collection and control system must include, as minimum:

- Design of the System to foresee protection measures for the works to collect the generated gases
- Design of the system that guarantees the effective collection of the gases generated, so that the methane concentration in the areas destined for final disposal does not exceed, at any time, when percent.
- Projected location of the works that do not represent a sanitary risk in relation to other hydro sanitary systems or sources of water supply for human consumption.
- It is not intended to use the system to combine and / or dilute leachates and / or wastewater
- The hydraulic capacity of the system has been designed according to the determined maximum flow rates.
- The system has an appropriate and pertinent operation manual
- The system has an appropriate and pertinent maintenance manual

Considering this, the recovery, destruction and/or use of the biogas generated in the landfill site is not recommended neither required by the current technical normative applicable.

Documentation provided by project participant

- Resolution No 1175-2014/DIGARN/UCA/RMHH/aetf of 27/03/2014.(Pag 154)
- Authorization Letter of the municipality of Guatemala to receive an average of 3,300 tons per day for the Zone 3 Landfill.
- No DRPSA-004-2018" issued on 02/05/2018 by the Ministry of Public Health and Social Assistance. General Direction of Regulation, Surveillance and Health Control. Department of Regulation of Health and Environment Programs
- Main equipment commissioning certificates
- Bank account with evidence of the transference confirmation of the first payment performed on 07/04/2014 to initiate the well drilling works in the landfill for the biogas collection.

DOE assessment

Date: 31/07/2020

The change is necessary as the required procedures of the host country (Guatemala) to authorize importation of equipment for renewable energy projects of less than 5 MW took more time than expected. As per the requirements, equipment cannot be imported until the General Directory of Energy (DGE) and the Ministry of Energy and Mines (MEN) issue the resolution of approval of the project that happened only on 27/03/2014.

No changes occurred to the project activity that would result in a less conservative baseline, as it is assumed to be the atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons. Since LFG is also used in the project activity for generating electricity, the baseline scenario is also assumed to be the electricity that would be generated in the grid or in captive fossil fuel fired power plants.

In addition, it was demonstrated that substantive progress has been made by the project participants to start the project activity, as the delay has happened because of administrative and legal requirements, which were prompt accomplished by the PPs and all arrangements have been made to execute the import and installation of equipment as soon as the authorizations was issued. In fact, the PPs have started the negotiation and effectively performed the purchase of the equipment prior to the issuance of the resolution, demonstrating their real intention and assuming financial risks with more delays.

The change is being requested as a PRC Change to the start date of the crediting period.

CAR is closed

Table 2. CARs from this validation

CAR ID	01	Section no.	D.1	Date:	22/06/2020
Description of CAR					
The ER calculations are not considering the value of GWP_{CH_4} for the 2 nd commitment period.					

Project participant response	Date: 17/07/2020
The ex-ante ERs calculation has been updated in the PDD v2 and the ERs calculation spreadsheet using the updated value for the global warming potential for CH ₄ (25) applicable for the second commitment period.	
Documentation provided by project participant	
<ul style="list-style-type: none"> - PDD version 2 - Updated biogas model version 2 (ERs calculation spreadsheet) 	
DOE assessment	Date: 31/07/2020 05/10/2020
The ER calculations were revised considering the value of GWPC _{H4} for the 2 nd commitment period. Nevertheless, at Tab "1_ER calculation" – column M: project emissions are taking into consideration two flares, but just one flare is effectively installed. CAR remains open	
Project participant response #2	Date: 13/11/2020
The possibility to install 2 flares were considered in the original PDD but by the time being only one enclosed flare has been installed due it is sufficient as per the volume of biogas currently generated by the landfill. However, the PP wants to maintain the possibility to implement a second enclosed flare if it is needed as it was established in the PDD. The change considering one flare instead the possibility of two flares has been deleted and now the PDD remains considering two flares as in the original PDD, considering as expected date of installation for the second flare the year 2025. About the ex-ante ERs calculations, two enclosed flares are considered just as it was done during the validation and registration of the project as it is the most conservative option due that the project emissions calculated ex-ante are higher considering two flares.	
Documentation provided by project participant	
PDD – v. 3	
DOE assessment #2	Date: 08/12/2020
The consideration of two flares from the start of project operation is not conservative. CAR remains open	
Project participant response #3	Date: 13/11/2020
The ex-ante ERs calculations spreadsheet, Tab "1_ER calculation" – column M has been updated to consider only the project emissions due to electricity consumption for one flare until 2025 when is expected the second flare will be installed. Considering this change, the estimated ERs/year have been slightly increased from 167,171 tCO ₂ to 167,210 tCO ₂ . The ex-ante annual ERs have been updated as well in the financial study (sheet "1_Inputs and evidences", cells B31 to B45).	
Documentation provided by project participant	
PDD – v. 4	
DOE assessment #3	Date: 09/12/2020
It was clarified that there is a plan to install a second flare in 2025. Therefore, the information was revised at the PDD and at the ER calculations. CAR is closed	

CAR ID	02	Section no.	D.7	Date: 22/06/2020
Description of CAR				
It was verified during the virtual audit that the installed capacity of the engines used for electricity generation is not in accordance with the registered PDD.				
Project participant response				Date: 08/07/2020
<p>The change to the project design is a decrease in the electricity generation capacity specified in the registered PDD – at the registered PDD, the capacity is 4.8 MW and the change decreases the capacity to 4.242 MW.</p> <p>The decision for this decrease occurred after the investment decision and validation of the project activity. It was taken due to a commercial decision. Therefore, instead of four engines of 1.2 MW each as it was planned as per registered PDD, it was implemented one engine of 1,059 kW on 22/03/2015 and three engines of 1,061 kW (each) on 02/06/2017.</p> <p>The models of electricity generation engines finally installed are the following:</p> <p>1 unit of JGC 320 GS-B.L BOREALIA GUATEMALA with an electricity output of 1059 kW.</p> <p>3 units of JGC 320 GS-L.L TS JGC 320 C81 480V with an electrical output of 1061 kW.</p> <p>Due the difference between the capacity of the engines, the financial analysis has been updated considering the real purchase price and the generation of the equipment finally installed. As can be seen in the section B.5 of the updated PDD, the project still complies with the financial additionality requirements and the IRR of the project scenario without CERs revenues (0.72%) is below the benchmark established for Guatemala (12.5%).</p>				
Documentation provided by project participant				
- 200717_PDD_Zone 3_PRC				

<ul style="list-style-type: none"> - Financial study Zone 3 v2 (PRC) - Contrato INBIO COBRA Final con firmas - Costo Financiero Implementación Generación - FACTURAS MOTORES FASE II INDUSTRIAS DE BIOGAS - INDUSTRIAS DE BIOGAS - INVERSION FASE I 	
DOE assessment	Date: 31/07/2020 05/10/2020
<p>The change to the project design is a decrease in the capacity specified in the registered PDD – at the registered PDD, the capacity is 4.8 MW and the change decreases the capacity to 4.242 MW.</p> <p>The decision for this decrease occurred after the investment decision and validation of the project activity and it was taken due to the availability of the equipment in the market. Therefore, instead of four engines of 1.2 MW each, it was implemented one engine of 1,059 kW on 22/03/2015 and three engines of 1,061 kW (each) on 02/06/2017.</p> <p>The change is being requested as a PRC Change to the project design and a new financial analysis has been performed to demonstrate that the project continues additional (refer to section D.7 above for the assessment).</p> <p>Nevertheless, there are some revisions that are still missing:</p> <ol style="list-style-type: none"> tables in Section B.5 still have the information about the old additionality assessment; it is still not clear if the project will have one or two flares and what is the impact of this in the additionality assessment; Common Practice Analysis was not revised; at the Excel calculation, the installed capacity is not consistent with the sum of the capacity of all four engines. <p>CAR remains open</p>	
Project participant response #2	Date: 13/11/2020
<ol style="list-style-type: none"> Section B.5 of the updated PDD has been adjusted excluding information of the original financial analysis provided during the validation. Only the values of the updated financial assessment are considered now. The PP has decided to maintain the possibility to install the second flare if needed so the changes from two flares to one flare in the PDD have been deleted. Thus, additionality and financial assessment remain without changes. Common practice analysis has been revised in the new version of the PDD using as new start date 07/04/2014, the new date when the project proponent committed with the payment and acquisition of the well drilling works, needed to start with the construction of the biogas collection system, as per the delay in the start date due the PRC. The value of F is still 0 demonstrating that Zone 3 was not common practice in Guatemala during the year 2014. The value of the total installed capacity has been updated in cell H4 of the financial analysis excel spreadsheet (1,059 and 3 x 1,061 being equal to 4,242 kW). However, this cell is not used in the calculations of the financial analysis as the previous value of 4.8 MW is used as agreed in order to be conservative. This total value of installed capacity has been corrected as well in Annex 7 and section B.5 of the revised PDD. 	
Documentation provided by project participant	
<ul style="list-style-type: none"> • PDD – v. 3 • Financial study Zone 3 v5 (PRC) 	
DOE assessment #2	Date: 08/12/2020
<ol style="list-style-type: none"> the additionality assessment in Section B.5 still considers the installed capacity of the project the non-updated value, i.e. 4.8 MW; it is clear now that there is one installed flare but a planned installation of a second one; the Common Practice Analysis was revised and updated with the new values used in the additionality assessment; the installed capacity used in the Excel calculations was correctly revised. <p>CAR remains open</p>	
Project participant response #3	Date: 09/12/2020
<p>Financial Assessment and Section B.5 has been updated considering now the current installed capacity (4.242 MW) for the generation equipment. The new equity IRR has been decreased to -4.12% in the Alternative scenario I = LFG1+E1.</p>	
Documentation provided by project participant	
<ul style="list-style-type: none"> • PDD – v. 4 • Financial study Zone 3 v7 (PRC) 	
DOE assessment #2	Date: 10/12/2020
<p>The additionality assessment in Section B.5 considers the installed capacity of the project the updated value, i.e. 4.242 MW.</p>	

CAR is closed

Table 3. FARs from this validation
Not applicable

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none">• Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN);• Make editorial improvements.
02.0	31 October 2017	Revision to align with the requirements in 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: Registration Keywords: post-registration change, project activities, validation report		