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

(Version 02.0)

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	Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León
Number and duration of the next crediting period	3378
Version number of the validation report for RCP	Renewed Crediting Period (2nd): 27/10/2017 – 26/10/2024
Completion date of the validation report for RCP	04/09/2018
Version number of PDD to which this report applies	version: 5 Date of Issuance: 04/09/2018
Project participants	Promotora Ambiental S.A.B. de C.V (Mexico) First Climate (Switzerland) AG (Switzerland)
Host Party	Mexico
Applied methodologies and standardized baselines	Applied methodology: ACM0001, Flaring or use of landfill gas, version 18.0
Mandatory sectoral scopes linked to the applied methodologies	Sectoral scope 13 : Waste handling and disposal Sectoral scope 1: renewable energy
Conditional sectoral scopes linked to the applied methodologies	N/A
Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period	166,305 tCO_2e
Name and UNFCCC reference number of the DOE	Applus+ certification LGAI Technological Center, S.A. (Applus+ Certification) – DOE E-0032
Name, position and signature of the approver of the validation report for RCP	Juan Sendín Caballero Applus+ Certification BU Managing Director Signature: 

SECTION A. Executive summary

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LGAI Technological Center, S.A. (hereafter referred to as Applus+ Certification) has been commissioned by Promotora Ambiental S.A.B. de C.V (hereafter referred to as the project owner or PASA) to perform a validation of the renewal of crediting period of "Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León" (Ref. No.3378) (hereinafter referred to as the project activity or the proposed project activity) in Mexico.

The scope of the validation of the renewal of crediting period is defined as an independent and objective review of the updated sections of the PDD relating to the baseline, estimated emission reductions and the monitoring plan using the most recent version of baseline and monitoring methodology applicable for the project activity. The validation opinion is finalized based on the assessment of the project design document through applying standard auditing techniques including but not limited to document reviews, follow up actions (e.g. site visit, telephone or e-mail interviews) and also the review of the applicable approved methodology and underlying formulae and calculations.

The assessment was performed in accordance with the CDM Validation and Verification Standard for project activities version 01.0 (CDM-EB93-A05-STAN) and the CDM Project Standard for project activities version 01.0 (CDM-EB93-A04-STAN) including an assessment of:

a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period of the registered CDM project activity at the time of requesting renewal of crediting period of the project activity;
b) The correctness of the application of the approved methodology and, where applicable, the approved standardized baseline for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period of the registered CDM project activity.

The objective of the project activity is to capture the landfill gas (LFG) and to flare and/or utilize it leading to GHG emissions reductions. The principal components of landfill gas (LFG) are methane (CH_4) and carbon dioxide (CO_2), both of which are greenhouse gases (GHG). The El Verde landfill was designed for municipal waste treatment with a total area of 60 ha. The landfill is divided in two macro cells, with a total area of approximately 51 ha planned for waste disposal. The remaining 9 ha include roads, buffer zone, and the administrative area. The proposed project activity covers the entire 60 ha, i.e. including future expansion as more waste is received. Currently, waste is disposed at Macrocell 2, with an approximate area of 26 hectares for waste disposal. The Macrocell 1, with 25 hectares for waste disposal, has been filled up during the first crediting period.

The project activity is operating in two phases:

• Phase 1 includes the operation of a landfill gas (LFG) collection and flare system. During the site inspection, the validation team confirmed the installation and operation of the following devices:

LFG Collection System composed by:

- ✓ Vertical wells in intermediate or closed areas
- ✓ A piping network connected extraction wells for serving the blower station
- ✓ A leachate pumping system and a condensate management system
- ✓ A two blower devices of 75HP (Serial 0808347-29238)

A John Zink Biogas LFG Flare System composed by:

- ✓ Automated enclosed ZTOF Biogas Flare (Serial 9084243)
- ✓ Automatic temperature control
- ✓ Four thermo sensors installed in the flare
- ✓ Programmable logic controller (PLC),(Serial CH-1227102434)

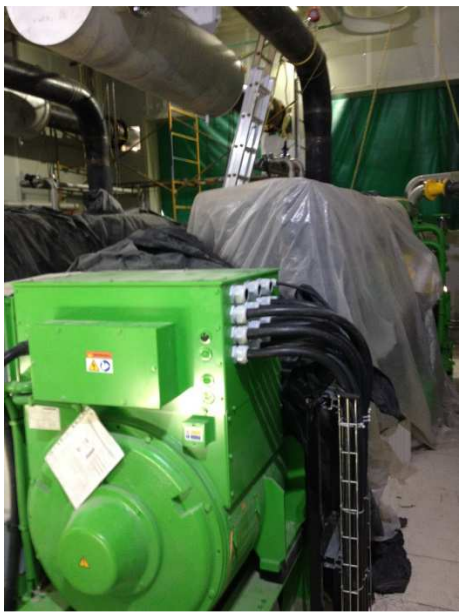
In terms of monitoring system, the Validation team confirmed the installation and operation of all monitoring devices:

- ✓ A FAU Landtec Gas Analyzer (Serial GA08966)/06)
- ✓ A Thermal Instrument Dry Gas Flow Meter (Serial 2008394)
- ✓ A FEA Landtec Flare Emission Analyzer (Serial 4299)
- ✓ A Landis Gyr Electricity Meters (Serial 40B9C408)

LFG Flare System and Blower Station

• Phase 2 consists of the power generation facility to combust the methane of the LFG. During the site inspection the validator checked that the facility is under construction and near to enter into operations with the following main equipment arrangement:

- ✓ Pre-treatment system composed at least by a chiller and a gas cleaning devices
- ✓ Two GE Jenbacher reciprocating engines, motor J 420 GS-B81 capacity 1,38 MW



GE Power Generators

According to the El Verde solid waste records/23/, the landfill began accepting waste in June 2001. By the October of 2017, more than 7,7 million of tonnes of waste have been filled. Upon completion, maximum waste depth is expected to be about 35 meters. The validator confirmed that the landfill would have accepted waste at an average rate of about 1,515 tonnes per day, which equates to some 553,000 tonnes per year. In the coming years, projecting the yearly population increase rate of 1.5%, it is expected that the landfill site can accommodate some 20 million of tonnes of waste, with an expected closure date at the end of 2030. Please note that operational lifetime of the project may be extended beyond 2030 in case there is still space available for waste disposal. In such case, PASA would require additional permits, and any disposing activity would not be undertaken until such appropriate authorizations are available.

Prior to the start of the implementation of the project activity, there was no destruction of CH_4 neither through LFG combustion nor energy generation. Therefore, the scenario existing prior to the implementation of the project activity was no methane collection or destruction leading to CH_4 release into the atmosphere. The situation before the project implementation coincides with the baseline scenario.

The project activity contributes to sustainable development of the local community, the host country and the world.

In an E-mail sent by PP to the CDM Registration and Issuance Team of UNFCCC using CDM-RENN-FORM /4/ dated 24/04/2017, the project participants expressed their intention to request a renewal of crediting period for the project activity in accordance with the CDM Project Cycle Procedure for project activities version 01.0. The secretariat confirmed the receiving of the un-validated PDD and CDM-RENN-FORM. The CDM-RENN-FORM and the updated PDD was sent to the secretariat within 270 to 180 days prior to the date of expiration of the current crediting period.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

The report and the annexed validation checklist describe a total of 3 findings which include:

- 2 Corrective Action Requests (CARs);
- 2 Clarification Requests (CLs);
- 0 Forward Action Requests (FARs).

The PP has responded these findings by modifying the project design, rectifying the PDD and providing adequate additional explanations and evidences. Applus+ Certification confirms that all the findings have been "closed out" before submitting the request for renewal of crediting period.

In summary, it is Applus+ Certification's opinion that the project activity "Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León" (Ref. No. 3378) in Mexico, as described in the PDD, version 5 dated 04/09/2018, meets all relevant UNFCCC requirements for the renewal of the crediting period. Hence Applus+ Certification submitted the request for renewal of the crediting period of the project activity.

SECTION B. Validation team, technical reviewer and approver

B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader / Technical Expert	EI	Cortes	Miguel	Applus+ Certification	x	x	x	x
2.	Team member	IR	Sitjes Cabanas	Miquel	Applus+ Certification	x	n.a.	-	-
3.	Team member	EI	Shen	Meng (Simon)	Applus+ Certification	x	n.a.	x	x

B.2. Technical reviewer and approver of the validation report for RCP

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	EI	Xue	Hanshen (Denny)	Applus+ Certification
2.	Approver	IR	Sendín Caballero	Juan	Applus+ Certification

SECTION C. Means of validation

C.1. Desk/document review

The updated PDD submitted by the Client was reviewed against the approved methodology and other relevant criteria to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done.

During the desk review, the relevant documents, including the registered and revised PDD /3/, the updated PDD /1/, the previous monitoring reports and corresponding verification reports for the 1st crediting period /21/, the latest MoC /14/, technical specifications of equipment /6//7//8//9/ and other relevant background documents were provided and assessed. The project description in the PDD for the renewable crediting period was verified from these documents by Applus+ Certification. Applus+ Certification confirmed the project design, construction, operation and monitoring plan were not changed. And the baseline scenario information defined by the applied methodology ACM0001 version 18.0 also can be confirmed against relevant national and local law and regulation /11//12//13/.

A complete list of all documents and evidence material reviewed is included in Appendix 3 to this report.

C.2. On-site inspection

The assessment team conducted site visit during 12/05/2018 to confirm the project implementation status. The subject of site visit was listed as below:

No.	Activity performed	Site location	Date	Team member
1.	- Implementation status of the project activity; - The compliance with revised PDD.	El Verde Landfill Gas Project Leon Guanajuato, Mexico	12/05/2018	Miguel Cortés

During the site inspection the validator confirmed the operation of the following project equipment

No.	Equipment	Serial	Manufacture	
1.	Flow Meter	2008394	Thermal Instruments Model 62-9/9500	
2.	Field Gas Inmission Analyser Unit	GA08966/06	CES-LANDTEC FAU	
3.	Flare Gas Emission Analyzer	4299	CES-LANDTEC FAU	

4.	enclosed ZTOF Biogas Flare with temperature control and flare control panel	9084234	John Zink Biogas	
5.	Blowers	0808346-29238	HIS 8683 8684	
6	Electricity Meter	CFE	N/A	

The validator also was able to check that Phase 2 is under installation and equipment commissioning would do into the 2018 year.

The follow-up interviews through telephone, skype and email were held by the assessment team, which is focused on the issues identified during the desk review. The response from the representatives of the PP and the consultant were received to close the issued identified. The subject of interviews please refers to C.3 of the report.

Duration of on-site inspection: 12/05/2018				
No.	**Activity performed**	**Site location**	**Date**	**Team member**
1.	Project Characteristic Project Equipment Monitoring Plan Data records.	El Verde Landfill	12/05/2018	Miguel Cortes

C.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Hernández	Reynaldo	Promotora Ambiental S.A.B. de C.V	06/09/2017	- Basic information, technology of the project, etc; - Monitor Data: meter readings, control and maintenance, QA&QC systems - Status of the project activity and any modifications with respect to the	Meng (Simon) Shen
2	Cuadrat	Sergi	ClimaLoop	06/09/2017		Meng (Simon) Shen
3	Palato	Gerardo	Promotora Ambiental S.A.B. de C.V	12/05/2018		Miguel Cortes

					registered PDD. - Applicability to the latest methodology. - National and local policies and changes - Baseline of the project and its updates - The lifetime of the project activity - Emission Factors and their updates - Monitoring plan and changes.	
4	Lopez	Felipe	Promotora Ambiental S.A.B. de C.V	12/05/2018	- Project Activity Description	Miguel Cortes

C.4. Sampling approach

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Not applied.

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

Area of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form	0	1	0
Application of baseline and monitoring methodology and standardized baseline	0	0	0
Validity of original baseline or its update	1	0	0
Estimated GHG emission reductions or net anthropogenic GHG removals	0	1	0
Validity of monitoring plan	1	0	0
Crediting period	0	0	0
Project participants	0	0	0
Others (please specify)	0	0	0
Total	2	2	0

SECTION D. Validation findings

D.1. Compliance with PDD form

Means of validation	The assessment team has verified the format against the "PDD form" template to confirm whether the correct format of PDD form is used. The assessment team also confirmed the information transferred to the updated PDD against the original registered PDD to confirm whether the information transferred is materially the same
Findings	The PP of the project activity notified EB of the intention to renew the crediting period dated 24/04/2017. The latest version of "Project design document form for CDM project activities" is version 08.0" at the time. However as of the submission of the final PDD, EB has updated the PDD template to version 10.1. Thereby the assessment team issued CAR #1 requesting PP update the PDD form version. As the response, the PP has updated the PDD template version number to version 10.1. The assessment team confirmed that the correct PDD form is applied thereby

	closed out the CAR. The same information from the registered PDD has been transferred to the updated PDD.
Conclusion	The updated PDD complies with the applicable PDD form with version 10.1 and instructions therein for filling out the PDD. Information transferred to the later valid version of the PDD form is materially the same as that in the registered PDD. The Phase 1 of project activity is in operation and Phase 2 (power generation) at the time of site inspection is under construction and has not been implemented yet.

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

Means of validation	The assessment team has checked the correctness of the application of the approved methodology to determine the continued validity of the baseline or its update, and to estimate the emission reductions for the applicable crediting period of the registered CDM project activity.
Findings	The project was originally registered based on methodology ACM0001 version 10.0. The updated PDD version 5 dated 04/09/2018 applies methodology ACM0001 version 18.0. This is appropriate because the methodology ACM0001 version 18.0 is of its latest approved version applied in the original PDD submitted to EB for notifying the intention of renewal of crediting period. The updated PDD did not apply standardized baseline. The project activity correctly applied the approved consolidated baseline and monitoring methodology ACM0001 “Flaring or use of landfill gas”, version 18.0. The project applied “Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period” version 03.0.1 and below tools of their latest version: • Emissions from solid waste disposal sites (version 08.0) • Project emissions from flaring (version 02.0.0) • Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0) • Tool to calculate the emission factor for an electricity system (version 7.0) • Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) • Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (version 03) Methodology ACM0001 is applicable to project activity which: (a) Install a new LFG capture system in an existing or new (Greenfield) SWDS where no LFG capture system was or would have been installed prior to the implementation of the project activity; or (b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that: (i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and (ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available. (c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways: (i) Generating electricity; (ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or (iii) Supplying the LFG to consumers through a natural gas distribution

network.
(iv) Supplying compressed/liquefied LFG to consumers using trucks;
(v) Supplying the LFG to consumers through a dedicated pipeline;

(d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.

As described in the PDD that the purpose of the project is to install a new LFG capture system in an existing SWDS where no LFG capture system was installed prior to the implementation of the project activity. The same has been validated in the validation report for previous crediting period /21/. Through verifying with the Operation and maintenance manual for biogas flare system etc. the situation of the project operational status has not changed during the applied crediting period. So, the corresponding applicability criteria (a) set above is met by the project activity. The project activity is expected to generate electricity so the applicability criteria (c)(i) is applicable to the project activity.

The waste entering to the landfill is not managed through recycling; it is landfilled as it arrives to the landfill. Therefore, the project will not have any effect on the waste entering to the landfill. The document published by the Mexican Ministry of Environment (SEMARNAT by its original in Spanish) in 2010 named "Collection Centers Waste materials Directory from Mexico" /10/ has been verified by the assessment team to confirm that the project activity will not reduce the amount of organic waste that would be recycled in the absence of the project activity so the project meets the applicability criteria (d).

Moreover, the methodology ACM0001 is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is:

a) 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; and
b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln;
    (i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or
    (ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary.
c) In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas.
d) In the case of LFG from a Greenfield SWDS, the identified baseline scenario is atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.

The procedure to identify the baseline scenario confirms that the most plausible baseline scenario as atmospheric release of the LFG or capture of LFG and destruction through flaring (a). The validation of the validity of the baseline scenario is included in section D.3 of the report Since the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is (a), the ACM0001 is applicable to the project activity.

Methodology ACM0001 is not applicable:

a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace;
b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.

It is confirmed by the assessment team that the project activity does not apply other

approved methodology. The management of the SWDS is not changed during the crediting period to increase the methane generation.

The applicable tools are also demonstrated by the PP in the updated PDD to confirm the applicability.

- The "Emissions from solid waste disposal sites" (version 08.0) is applicable for waste disposal sites where the waste would be dumped and can be clearly identified; in this case it is clearly identified at the project site. The second applicability condition states that the tool is not applicable to hazardous wastes, and at the project site there are no hazardous wastes, thus the project activity also meets the tool's applicability conditions.

- The "Project emissions from flaring" (version 02.0.0) is used to determine $PE_{flare,y}$ as required by the ACM0001 "Flaring or use of landfill gas" (version 18.0).

- The "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) is applicable for the purpose of calculating project emissions in case where a project activity consumes electricity from the grid (Scenario A of Section I of the Tool). For the project activity, since electricity will be sourced from the grid, then the tool is applicable.

- The "Tool to calculate the emission factor for an electricity system" (version 07.0) is applicable for the purpose of calculating project and leakage emissions in case where a project activity consumes electricity from the grid or results in increase of consumption of electricity from the grid outside the project boundary. For the current project activity, since electricity will be sourced from the grid, then the tool is applicable.

- The "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) is applicable for the purpose to determine to determine the mass flow of greenhouse gases such CO_2, CH_4, N_2O, SF_6 or PFC. The mass flow of a particular greenhouse gas is calculated based on measurements of: (a) the total volume flow or mass flow of the gas stream, (b) the volumetric fraction of the gas in the gas stream and (c) the gas composition and water content. Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions, which is the case of the present project activity, and then the tool is applicable.

- The "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 03) is applicable for the purpose of calculating the project CO_2 emissions from the combustion of fossil fuels in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. For the current project activity, since the quantity of fuel combusted and its properties are monitored, then the tool is applicable.

- The "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" version 03.0.1, shall be used for the assessment of continued validity of the original baseline and its update when the renewal of the crediting period is conducted.

The assessment team has validated the documentation referred to in the PDD and verified the documentation content for verifying the justification of the applicability of the methodology and confirmed that the documentation referred to in the PDD is correctly quoted and interpreted. The assessment team has also crosschecked the information provided in the PDD with the documentation other than from the PDD based on the local and sectoral knowledge of the assessment team. Following documentation has been reviewed by the assessment team:

	- Description and diagram of LFG collection system /5/; - Description and diagram of LFG flaring system /6/; - Technical specification of LFG flaring system /7/; - Operation and maintenance manual for biogas flare system /8/; - Technical specification of fossil fuel tank, leachate pond and moisture separator /9/.
Conclusion	Applus+ Certification confirms that the application of the baseline methodology is transparent and conservative, and confirms that the chosen baseline and monitoring methodology i.e. ACM0001 version 18.0 is applicable to the project activity.

D.3. Validity of original baseline or its update

Means of validation	The assessment team has validated the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period of the registered CDM project activity at the time of requesting renewal of crediting period of the project activity, via applying the steps from the Methodological Tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" version 03.0.1.
Findings	For the second crediting period, the continued validity of the original baseline has been assessed in the updated PDD. Applus+ Certification confirms that there have been no changes in the relevant national and/or sectoral regulations on building LFG collection flaring system as well as power generation system using collected LFG since the previous crediting period. On the other hand, the baseline scenario for venting LFG to the atmosphere without collection was still valid according to methodology ACM0001 version 18.0. The information presented in the updated PDD has been validated by an initial document review of all data. Further confirmation has been made based on the review of information from similar projects and/or technologies. The sources referenced in the PDD have been quoted correctly. The information was verified against credible sources, such as the following: - Regulation of the general law for prevention and integral management of wastes /11/; - Guanajuato state law for the integral management of residues from the state and Guanajuato Municipalities /12/; - Climate Change Law in Mexico /13/. The steps from the Methodological Tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" version 03.0.1 as per CDM Validation and Verification Standard for project activities version 01.0were applied to assess the continued validity of the baseline and/or to update the baseline at the renewal of a crediting period: **<u>Step 1: Assess the validity of the current baseline for the next crediting period</u>** The CDM Validation and Verification Standard for project activities version 01.0requires assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline. The validity of the current baseline is assessed using the following Sub-steps: <u>Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies</u> In assessing the continued validity of the baseline, a change in the relevant national and/or sectoral regulations between two crediting periods has to be examined at the start of the new crediting period. If at the start of the project activity, the project

activity was not mandated by regulations, but at the start of the second or third crediting period regulations are in place that enforce the practice or norms or technologies that are used by the project activity, the new regulation (formulated after the registration of the project activity) has to be examined to determine if it applies to existing project or not.

At the start of the project activity, legislation in Mexico did not require landfills to collect nor utilize the gas generated hence it was not mandated by regulations. After the registration of the project activity, no new laws/policies have appeared to change such situations. However, the Climate Change Law in Mexico in the article No. 3, item II (Mitigation) literal b) states that all Municipalities with a population higher than 50 k habitants should build a LGF capture system on 2018. Considering the change, the assessment team issued CL # 1 requesting PP clarify whether the new issued law affects the validity of the baseline scenario. As the response, the PP has made proper clarification. At the start of the project activity, legislation in Mexico did not require landfills to collect nor utilize the gas generated hence it was not mandated by regulations. After the registration of the project activity, the Climate Change Law of 2012 states in article Number 3, Item II (Mitigation) literal b) that by 2018, the municipalities, in coordination with the Federative Entities and other administrative and financial institutions and with the technical support of the Secretariat of Social Development, will develop and construct the infrastructure for the management of solid waste disposal sites that does not emit methane to the atmosphere in urban centers of more than fifty thousand inhabitants, and when feasible, will implement the technology for the generation of electricity using methane gas. Considering that the Law is valid from 2018 and the start of the second crediting period of the project activity is from 27/10/2017, it is considered that the Law has no impact in the baseline scenario definition. Moreover, the legislation applies for new solid waste disposal sites which are still to be developed and constructed by 2018 hence it does not apply for existing landfills like the one in the project activity. Moreover, the PP has summarized a list of CDM LFG Projects in Mexico registered under ACM0001 from 10/10/2012 (date of validity of the Climate Change Law 2012 and entry into force). Out of the 9 latest projects listed, 6 have been registered by PASA and none of them had to face the justification. The latest of the registered projects is the CDM project “Puerto Chivos Landfill Gas Project”, which was registered on 28/11/13 (well after the date of entry into force). In the renewal of the crediting period, the Puerto Chivos’ PDD stipulates that the regulation NOM-083-SEMARNAT-2003 is considered not mandatory for the following country conditions:

- Even when it was established as a federal law, the landfills are responsibility of the municipalities, who have sovereignty in solid waste disposal. Thus, NOM-083-SEMARNAT-2003 would only be legally binding if the local authorities adopt it.
- It has never been enforced since its publication in 2003. Even the earlier norm in 1996 (where it requires the active venting of LFG for safety reasons) was not enforced.
- The common practice shows that even in the few cases of landfills where some control of LFG is sought, this consists at most of passive venting systems. An analysis of the sites where LFG recovery, flare and/or energy production are being contemplated concludes that they are using financial resources such as the CDM incentives.
- The new version of the NOM-083-SEMARNAT, valid from 2016, does not require neither the collection nor flare/utilization of the gas.

Therefore, El Verde León Landfill is not required to capture and flare LFG at the start of the second crediting period by any mandatory law. As a conclusion, currently in Mexico there are no laws or regulations mandating capture and flaring of landfill gas. The assessment team has verified that the Climate Change Law of 2012 and confirmed that:
1) the Law will be valid from year 2018 however the second crediting period of the project activity starts from 27/10/2017, thereby the law is not applicable before the starting of the second crediting period;
2) the Law requires new developed and constructed solid waste disposal sites however for existing project activity the Law is not mandatory;

	3) An investigation of existing landfills shows that passive venting systems are the most common practice in Mexico. The landfill sites with LFG recovery would requires financial support such as CDM incentives. Therefore, it could confirm that it is not mandatory to capture and flare LFG at the start of the second crediting period. As a result, the CL #1 is closed out. The fundamental elements of the baseline have not changed since the project was first registered, and the market structure, regulatory framework, and functioning remains the same. The current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period. Applus+ Certification confirms that no relevant mandatory national and/or sectoral polices applicable to the project activity came into effect after the submission of the project activity for validation. Step 1.2: Assess the impact of circumstances The assessment team confirmed that there is no impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions. Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology. This step is not the case for the renewal of the crediting period. Step 1.4: Assessment of the validity of the data and parameters There are some parameters, which were determined at the start of the first crediting period for an ex-ante estimation of GHG emission reductions which should be updated. This parameter is properly described in the following section D.4. **Conclusion on step 1:** Applus+ Certification confirms that the current baseline is still valid as per methodology ACM0001 version 18.0. **Step 2: Update the current baseline and the data and parameters** Step 2.1: Update the current baseline The baseline emissions for the second crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0001 version 18.0. This update was applied in the context of the sectoral policies and circumstances that are applicable at the time of requesting for renewal of the crediting period, which have not changed as to affect the project. More details for the updated baseline emissions for the second crediting period can be seen in section D.4. Step 2.2: Update the data and parameters

	All the parameters keep being valid for the second crediting period. More details can be seen in section D.4. The parameters described under step 1.4 were properly updated considering the latest versions of methodology ACM0001 version 18.0 etc. As per paragraphs 23 and 24 in section 5.3.1 of the ACM0001 version 18.0, the establishment and description of the baseline scenario of the project activity is considered as follows: • The baseline scenario for LFG 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. The project activity belongs to the managed and controlled landfills in Mexico where passive collection and control of LFG for safety and odour concerns is practiced and LFG is partially or completely vented to the atmosphere. In the absence of the project activity, the current practice will be continued, defining the baseline scenario. • If all or part of the electricity generated by the project activity is exported to the grid, the baseline scenario for all or the part of the electricity exported to the grid is assumed to be electricity generation in existing and/or new grid-connected power plants. If all or part of the electricity is supplied to off-grid application, the baseline electricity generation equipment is assumed to correspond to the default emission factor from Option B2 of the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".. The project activity will export all or part of the electricity generated and therefore, the baseline scenario will be electricity generation in existing and/or new grid-connected power plants.
Conclusion	Applus+ Certification confirms that there has been no change in the relevant national and/or sectoral regulations on building such project for exporting electricity to power grid since the previous crediting period. On the other hand, the baseline scenario for building such project for exporting electricity to power grid was still valid according to methodology ACM0001 version 18.0.

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation	The assessment team has verified the estimated GHG emission reductions in the updated PDD according to the applicable requirements in the CDM project standard for project activities and methodology ACM0001 version 18.0 as well as applicable methodological tools.
Findings	The calculation of the emissions reductions exactly follow the procedures described in the methodology ACM0001 version 18.0 and relevant tool. Applus+ Certification has assessed the calculation of project emissions, baseline emissions, leakage emissions and emission reductions. Corresponding calculations have been carried out based on calculation spreadsheet. The consistency of the parameters and equations presented in the updated PDD, as well as calculation spreadsheet etc., has been compared with the information and requirements presented in the methodology and respective tools. The assumptions and data used to determine the emission reductions are listed in the updated PDD and all the sources have been checked. Based on the information reviewed it is confirmed that the sources used are correctly quoted and interpreted in the PDD. The values presented in the PDD are considered reasonably based on the documentation and references reviewed and the results of the interviews. The estimation of the emission reductions are considered correct as the calculations have been reproduced by the assessment team with the attainment of the same results.

The emission reductions are calculated by the difference between baseline emissions (BE_y) and project emissions (PE_y) and leakage.

(1) Baseline emissions

Baseline emissions are determined according to equation 1 of ACM0001 version 18.0 and comprise the following sources:

a) Methane emissions from the SWDS in the absence of the project activity;
b) Electricity generation using fossil fuels or supplied by the grid in the absence of the project activity;
c) Heat generation using fossil fuels in the absence of the project activity; and
d) Natural gas used from the natural gas network in the absence of the project activity.

To estimate the baseline scenario the ACM0001 version 18.0 uses:

$$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y} \quad (1)$$

Where:

BE_y	=	Baseline emissions in year y (tCO_2e)
$BE_{CH4,y}$	=	Baseline emissions of methane from the SWDS in year y (t CO_2e/yr)
$BE_{EC,y}$	=	Baseline emissions associated with electricity generation in year y (t CO_2/yr)
$BE_{HG,y}$	=	Baseline emissions associated with heat generation in year y (t CO_2/yr)
$BE_{NG,y}$	=	Baseline emissions associated with natural gas use in year y (t CO_2/yr)

Since heat generation and natural gas network are not applicable in the project activity, baseline emissions comprise a) and b) of above.

Step A: Baseline emissions of methane from the SWDS ($BE_{CH4,y}$)

Baseline emissions of methane from the SWDS are determined as follows, based on the amount of methane that is captured under the project activity and the amount that would be captured and destroyed in the baseline (such as due to regulations). In addition, the effect of methane oxidation that is present in the baseline and absent in the project is taken into account:

$$BE_{CH4} = \left(\left(1 - OX_{top\_layer}\right) \times F_{CH4,PJ,y} - F_{CH,BL,y} \right) \times GWP_{CH4} \quad (2)$$

Where:

BE_{CH4}	=	Baseline emissions of methane from the SWDS in year *y* (t CO_2e/yr)
OX_{top_layer}	=	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)
$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr)
$F_{CH4,BL,y}$	=	Amount of methane in the LFG that would be flared in the baseline in year *y* (t CH_4/yr)
GWP_{CH4}	=	Global warming potential of CH_4 (t CO_2e/t CH_4)

The *ex-ante* estimation of the amount of methane that would have been destroyed/combusted during the year, in tonnes of methane ($F_{CH4,PJ,Y}$) has been carried using the latest version of the approved "Emissions from solid waste disposal sites" (Version 08.0), considering the following additional equation:

Step A.1.1: Ex ante estimation of $F_{CH4,PJ,y}$

$$F_{CH4,PJ,y} = \eta_{PJ} \times BE_{CH4,SWDS,y}/GWP_{CH4} \quad (3)$$

Where:

$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr)
$BE_{CH4,SWDS,y}$	=	Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year *y* (t CO_2e/yr)
η_{PJ}	=	Efficiency of the LFG capture system that will be installed in the project activity
GWP_{CH4}	=	Global warming potential of CH_4 (t CO_2e/t CH_4)

$BE_{CH4,SWDS,y}$ is determined using the methodological tool "Emissions from solid waste disposal sites" (Version 08.0). The following guidance should be taken into account when applying the tool:

- f_y in the tool shall be assigned a value of 0 because the amount of LFG that would have been captured and destroyed is already accounted for in equation 2 of this methodology;
- In the tool, *x* begins with the year that the SWDS started receiving wastes (e.g. the first year of SWDS operation); and
- Sampling to determine the fractions of different waste types is not necessary because the waste composition can be obtained from previous studies.

The methane generation from the landfill in the absence of the project activity at year y ($BE_{CH4,SWDS,y}$), is calculated as per the "Emissions from solid waste disposal sites" (Version 08.0), as follows:

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot \left(1-e^{-k_j}\right) \quad (4)$$

Where:

$BE_{CH4,SWDS,y}$	=	Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO_2e)
Φ	=	Model correction factor to account for model uncertainties
f	=	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWP_{CH4}	=	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	=	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
F	=	Fraction of methane in the SWDS gas (volume fraction)
DOC_f	=	Fraction of degradable organic carbon (DOC) that can decompose
MCF	=	Methane correction factor
$W_{j,x}$	=	Amount of organic type j prevented from disposal in the SWDS in the year x (tonnes)
DOC_j	=	Fraction of degradable organic carbon (by weight) in the waste type j
k_j	=	Decay rate for the waste type j
j	=	Waste type category (index)
x	=	Year since the landfill started receiving wastes [x runs from the first year of landfill operation (x=1) to the year for which emissions are calculated (x=y)] Note: this definition represents a correction of the Tool as given in ACM0001, version 18.0.
y	=	Year for which methane emissions are calculated

Since ACM0001 version 18.0 further clarifies that "*Sampling to determine the fractions of different waste types is not necessary because the waste composition can be obtained from previous studies*", this option has been used for the project activity.

ACM0001, version 18.0 also states: "*The efficiency of the LFG capture system which will be installed in the project activity"* should be taken into account while estimating the ex-ante estimation. This is taken into consideration through the utilization of a default capture efficiency value for the total of LFG generated.

At the renewal of the crediting period, the following data should be updated according to default values suggested in the most recently published IPCC Guidelines for National Greenhouse Gas Inventories:

- Oxidation factor (*OX*);
- Fraction of methane in the SWDS gas (*F*);
- Fraction of degradable organic carbon (*DOC*) that can decompose (DOC_f);
- Methane correction factor (*MCF*);
- Fraction of degradable organic carbon (by weight) in each waste type *j* (*DOCj*);
- Decay rate for the waste type *j* (k_j).

Respectively, if the most recent IPCC Guidelines suggest different categorization of waste types, solid waste disposal sites or climate conditions, these should be applied respectively.

Determining the amounts of waste types j disposed in the SWDS ($W_{j,x}$ or $W_{j,i}$)

Since only one type of waste is disposed in the landfill site (in this case municipal solid waste) then $W_{j,x} = W_x$ and $W_{j,i} = W_i$ and the waste sampling is not required. For such reason, Application A of the Methodological Tool "Emissions from solid waste disposal sites." (version 08.0) will be used in the project activity as follows:

Since the administration of the landfill had the specific information on historic information on amounts, composition and origin of the waste in SWDS administration documents, such data is used as a more reliable data.

Step A.1.2: Ex post determination of $F_{CH4,PJ,y}$

During the crediting period, $F_{CH4,PJ,y}$ is determined as per methodology ACM0001 version 18.0, considering the sum of the quantities of methane flared and used (as applicable) in power plant(s), boiler(s), air heater(s), kiln(s) and natural gas distribution network and/or to the trucks, as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y} \quad (5)$$

Where:

$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH_4/yr)
$F_{CH4,flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring in year y (t CH_4/yr)
$F_{CH4,EL,y}$	=	Amount of methane in the LFG which is used for electricity generation in year y (t CH_4/yr)
$F_{CH4,HG,y}$	=	Amount of methane in the LFG which is used for heat generation in year y (t CH_4/yr)
$F_{CH4,NG,y}$	=	Amount of methane in the LFG which is sent to the natural gas distribution network and/or to the trucks in year y (t CH_4/yr)

Since the project activity includes electricity generation but it does not include heat generation nor use of landfill gas as natural gas, the equation (5) above can be

simplified to:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} \quad (6)$$

$F_{CH4,flared,y}$ is ex post determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" version 3.0. This is taken into account by monitoring the hours that the equipment utilizing the LFG is operating in year *y* ($Op_{j,h,y}$). $F_{CH4,flared,y}$ is determined ex post as per the following procedures a) and b), respectively:

a) Amount of methane destroyed by flaring ($F_{CH4,flared,y}$)

$F_{CH4,flared,y}$ is determined as the difference between the amount of methane supplied to the flare(s) and any methane emissions from the flare(s), as follows:

$$F_{CH4,flared,y} = F_{CH4,sent\_flare,y} - \frac{PE_{flare,y}}{GWP_{CH4}} \quad (7)$$

Where:

$F_{CH4,flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring in year y (t CH_4/yr)
$F_{CH4,sent\_flare,y}$	=	Amount of methane in the LFG which is sent to the flare in year y (t CH_4/yr)
$PE_{flare,y}$	=	Project emissions from flaring of the residual gas stream in year y (t CO_2e/yr)
GWP_{CH4}	=	Global warming potential of CH_4 (t CO_2e/t CH_4)

The amount of methane in the LFG which is destroyed by flaring in year y ($F_{CH4,sent\_flare,y}$) will be determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" version 3.0. The Option 2 of the mentioned "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" version 3.0 under the name "Simplified calculation without measurement of the moisture content" will be applied as a simple and conservative approach to determine the absolute humidity of the gaseous stream of $F_{CH4,sent\_flare,y}$ by assuming the gaseous stream is dry or saturated depending on which is the conservative situation. Since the gaseous stream flow will be measured on volume basis and the volumetric fraction of methane will be measured in dry basis, two options will be used in the project activity:

- Option A will be used in case of dry basis of the gas, demonstrating that the temperature of the gaseous stream (T_t) is less than 60ºC (333.15 K) at the flow measurement point (way b of Option A), and
- Option B will be used in case of wet basis of the gas, demonstrating that the temperature of the gaseous stream (T_t) is more than 60ºC (333.15 K) at the flow measurement point and by converting the measured volumetric flow from wet basis to dry basis.

To determine $F_{CH4,sent\_flare,y}$, the volumetric flow of landfill gas which is sent to flare will be measured on volume basis with a flowmeter which also measures the temperature of the gaseous stream (T_t). Depending on the temperature of the gaseous stream (T_t), the flowmeter will be measuring $V_{LFG,sent\_flare,y,db}$ (m³ dry gas/h) or $V_{LFG,sent\_flare,y,wb}$ (m³ wet gas/h) and Option A ($T_t > 60$ºC) or B ($T_t < 60$ºC) will be used accordantly. Therefore, the parameters $V_{LFG,sent\_flare,y,db}$ (m³ dry gas/h) or $V_{LFG,sent\_flare,y,wb}$ (m³ wet gas/h) will be measured at the same sample point.

Under normal operation conditions, the volumetric flow of landfill gas which is sent to flare will be monitored as $V_{LFG,sent\_flare,y,db}$ (m³ dry gas/h) since the temperature of the landfill gas (T_t) will be less than 60ºC at the flow measurement point most of the time. The values applied ex ante for this volumetric flow are considered to be in dry basis b) of Option A of the "Tool to determine the mass flow of a greenhouse gas in

a gaseous stream", version 3.0 since this is the expected basis of the gas under normal operating conditions. Under abnormal operating conditions, the same volumetric flow will be named as $V_{LFG,sent\_flare,y,wb}$ (m^3 wet gas/h) in case of wet basis of the gas, demonstrating that the temperature of the gaseous stream (T_t) is more than 60ºC at the flow measurement point Options B of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 3.0, and by converting the measured volumetric flow from wet basis to dry basis for calculation purposes ex post.

The ex-post determination of $PE_{flare,y}$ will be conducted using the *"Project emissions from flaring" (Version 02.0.0)*. If LFG is flared through more than one flare, then $PEf_{lare,y}$ is the sum of the emissions for each flare determined separately. To determine the flare efficiency for minute m ex-post ($\eta_{flare,m}$) in the project activity, the project participant uses the case for enclosed flares (not defined as low height flares) choosing the "Option B: Measure the flare efficiency" under normal operational conditions. In case there is a malfunction or a delay in the installation of the measurement equipment to determine the flare efficiency, "Option A: Apply a default value for flare efficiency" for enclosed flares will be used by the project participant.

The assessment team confirmed that the process of ex post determination of the $F_{CH4,PJ,y}$ has been clearly demonstrated in the updated PDD. Parameters for ex post determination of the $F_{CH4,PJ,y}$ are clearly identified and listed in the monitoring plan of the PDD. The monitoring of these parameters will be validated in below section.

Step A.2: Determination of $F_{CH4,BL,y}$

This step provides a procedure to determine the amount of methane that would have been captured and destroyed (by flaring) in the baseline due to regulatory or contractual requirements, or to address safety and odour concerns (collectively referred to as requirement in this step). The appropriate case should be identified and the corresponding instructions followed based on the four cases established in ACM0001 version 18.0.

For the project activity, Case 3 "No requirement to destroy methane exists and a LFG capture system exists" is applicable. The environmental authority in Mexico does not request the landfill to burn a specified amount LFG. Considering this, the ratio of the destruction efficiency of the baseline system to the destruction efficiency of the system used in the project activity was estimated using the guidance of ACM0001 version 18.0. The procedure to determine the amount of methane that would have been captured and destroyed (by flaring) in the baseline due to regulatory or contractual requirements has been followed as per the Case 3. Therefore, in this situation:

$$F_{CH4,hist,y} = \frac{F_{CH4,BL,x-1}}{F_{CH4,x-1}} \cdot F_{CH4,PJ,y} \quad (5)$$

The value of the parameter $F_{CH4,\ BL,\ x-1}$ has been determined as 0 since there is not an existing LFG capture system. Therefore $F_{CH4,BL,y}$ is considered as 0.

An *ex ante* estimate of $F_{CH4,PJ,y}$ is required to estimate baseline emission of methane from the SWDS in order to estimate the emission reductions of the proposed project activity in the CDM-PDD. $BE_{CH4,SWDS,y}$ is determined using the methodological tool "Emissions from solid waste disposal sites" (Version 08.0).

The methane emissions avoided during the year from preventing waste disposal at the solid waste disposal in the site have been calculated applying the inputs values.

Parameter title	Data	Source
OX_{top_layer}	0.1	Emissions from solid waste disposal sites,

		version 08.0
φ	0.75	Emissions from solid waste disposal sites, version 08.0
F	0.5	2006 IPCC Guidelines for National Greenhouse Gas Inventories
f	0	Emissions from solid waste disposal sites, version 08.0
η_{PJ}	50%	ACM0001 "Flaring or use of landfill gas" version 18.0
OX	0.1	Emissions from solid waste disposal sites, version 08.0
DOC_f	0.5	2006 IPCC Guidelines for National Greenhouse Gas Inventories
MCF	0.8	2006 IPCC Guidelines for National Greenhouse Gas Inventories
DOC_j	See below	2006 IPCC Guidelines for National Greenhouse Gas Inventories
k_j	See below	2006 IPCC Guidelines for National Greenhouse Gas Inventories
$EF_{EL,j,y} = EF_{grid, CM, y} = EF_{EL,k,y}$	0.458 tCO_2/MWh	SEMARNAT guidance (http://www.semarnat.gob.mx/sites/default/files/documentos/cicc/aviso_factor_de_emision_electrico_2015.pdf)
$\eta_{flare,m}$	0.9	Project emissions from flaring, version 02.0.0
TDL_y	20%	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation version 3.0
GWP_{CH4}	25	UNFCCC
D_{CH4}	0.0007168	2006 IPCC Guidelines for National Greenhouse Gas Inventories

Data of DOC_j:

Waste type	DOC_j wet waste
Wood and wood products	43
Pulp, paper and cardboard (other than sludge)	40
Food, food waste, bevarages and tobacco (other than sludge)	15
Textiles	24
Garden, yard and park waste	20
Glass, plastic, metal, other inert waste	0

Data of k_j:

Waste type	k_j
Pulp, paper and cardboard	0.06
Wood & Straw (excluding lignin)	0.03
Garden/Park Waste (organic putrescible)	0.10
Food, food waste, sewage sludge, beverages and tobacco	0.185

Data of W_x:

The amount of solid waste is increased by 1.5% per year as per the Main Results of the Census Survey 2015 Guanajuato.
http://seieg.iplaneg.net/seieg/doc/Principales_Resultados_EI_2015_1452885251.p

df

Year	Waste Input from data (tonnes)	Accumulated	Source
Total	22.981.384	22.981.384	
2002	481.745	1.393.880	LF Information
2003	474.763	1.868.643	LF Information
2004	473.501	2.342.143	LF Information
2005	485.080	2.827.223	LF Information
2006	464.226	3.291.449	LF Information
2007	467.422	3.758.871	LF Information
2008	460.966	4.219.837	LF Information
2009	445.123	4.664.960	LF Information
2010	451.293	5.116.253	LF Information
2011	470.264	5.586.517	LF Information
2012	493.950	6.080.466	LF Information
2013	525.991	6.606.457	LF Information
2014	544.790	7.151.247	LF Information
2015	552.853	7.704.100	LF Information
2016	561.146	8.265.246	LF Information
2017	569.563	8.834.809	LF Information
2018	578.107	9.412.916	LF Information Calculation
2019	586.778	9.999.695	LF Information Calculation
2020	595.580	10.595.275	LF Information Calculation
2021	604.514	11.199.788	LF Information Calculation
2022	613.581	11.813.370	LF Information Calculation
2023	481.745	1.393.880	LF Information Calculation
2024	474.763	1.868.643	LF Information Calculation
2025	622.785	12.436.155	LF Information Calculation
2026	632.127	13.068.282	LF Information Calculation
2027	641.609	13.709.891	LF Information Calculation
2028	651.233	14.361.124	LF Information Calculation
2029	661.001	15.022.125	LF Information Calculation
2030	670.917	15.693.042	LF Information Calculation
2031	680.980	16.374.022	LF Information Calculation
2032	691.195	17.065.217	LF Information Calculation
2033	701.563	17.766.780	LF Information Calculation
2034	712.086	18.478.866	LF Information Calculation
2035	722.768	19.201.634	LF Information Calculation
2036	733.609	19.935.243	LF Information Calculation
2037	744.613	20.679.857	LF Information Calculation
2038	755.782	21.435.639	LF Information Calculation
2039	767.119	22.202.758	LF Information Calculation
2040	778.626	22.981.384	LF Information Calculation

The composition of the wastes are source from LF information:

Composition	Waste composition
Glass, plastic, metal, other inert waste	26.56%
Pulp, paper, cardboard (other sludge)	22.63%
Textiles	13.52%
Wood and wood products	1.52%
Garden, yard and park waste	6.28%
Food, food waste, beverages and tobacco (other than sludge)	29.47%

The next table contains the $F_{CH4,PJ,y}$ values obtained from the application of the equation (5) of the ACM0001 Version 18.0. The calculation process has been included in the ER spreadsheet which has been verified by the assessment team

as correct.

Period			$F_{CH4,PJ,y}$ (tonnes of CH_4)
Period Year	Start Date	End Date	
1	27/10/2017	26/10/2018	5.967
2	27/10/2018	26/10/2019	6.208
3	27/10/2019	26/10/2020	6.459
4	27/10/2020	26/10/2021	6.668
5	27/10/2021	26/10/2022	6.887
6	27/10/2022	26/10/2023	7.102
7	27/10/2023	26/10/2024	7.332
Total			**46,623**
Annual average			**6,660**

Step B: Baseline emissions associated with electricity generation ($BE_{EC,y}$)

As stated in step B of the PDD that the project will not generate electricity. However, according to the project design, the project will start the electricity generation from the 2nd year of this crediting period. The assessment team issued CAR #2 requesting PP revise the description with including the calculation process of the $BE_{EC,y}$. As the response, the PP revised the description by including the calculation of the baseline emissions associated with electricity generation in year y ($BE_{EC,y}$) using the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 3.0. The assessment team confirmed that the description of the calculation process is appropriately described. Meanwhile, since in the PDD, the baseline emissions associated with electricity generation has already been taken into account, the change of description does not affect the BE calculation result. The assessment team closed the CAR.

The baseline emissions associated with electricity generation in year *y* ($BE_{EC,y}$) have been calculated using the Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation version 3.0 considering the electricity capacity to be installed. The estimated electricity generated during year y is calculated with the installed capacity and the expected operational hours in year y. TDL_y is also considered according to the tool.

$$BE_{EC,y} = \sum_{k} EC_{BL,k,y} \times EF_{EF,k,y} \times (1 + TDL_{k,y}) \quad (6)$$

Where:

$EC_{BL,k,y}$ = Quantity of electricity that would be consumed by the baseline electricity consumer *k* in year *y* (MWh/yr)
$EF_{EF,k,y}$ = Emission factor for electricity generation for source *k* in year *y* (t CO_2/MWh)
$TDL_{k,y}$ = Average technical transmission and distribution losses for providing electricity to source *k* in year *y*

The assessment team confirmed the data of electricity generation is estimated appropriately. The accurate data will be monitored during crediting period.

Year Period	Installed capacity (MW)	Operational hours (h)	$EC_{BL,k,y}$ (MWh)	TDL_y	$EF_{EF,k,y}$ (tCO_2/MWh)	$BE_{EC,y}$ (tCO_2)
	A	B	C=A*B	D	E	F=C*E*(1+D)
1	0	0	0	20%	0.458	0

2	4.149	8,000	33,192	20%	0.458	18,242
3	4.149	8,000	33,192	20%	0.458	18,242
4	4.149	8,000	33,192	20%	0.458	18,242
5	4.149	8,000	33,192	20%	0.458	18,242
6	4.149	8,000	33,192	20%	0.458	18,242
7	5.532	8,000	44,256	20%	0.458	24,323

The following table summarizes the results:

Period			$BE_{EC,y}$ (tonnes of CO_2)
Period Year	**Start Date**	**End Date**	
1	27/10/2017	26/10/2018	0
2	27/10/2018	26/10/2019	18,242
3	27/10/2019	26/10/2020	18,242
4	27/10/2020	26/10/2021	18,242
5	27/10/2021	26/10/2022	18,242
6	27/10/2022	26/10/2023	18,242
7	27/10/2023	26/10/2024	24,323
Total			**115,533**
Annual average			**16,505**

Step C: Baseline emissions associated with heat generation ($BE_{HG,y}$)

Since the project will not generate heat, the baseline emissions associated with heat generation in year y ($BE_{HG,y}$) are 0.

Step D: Baseline emissions associated with natural gas use ($BE_{NG,y}$)

Since the project will not use LFG in natural gas distribution, the baseline emissions associated with natural gas generation in year y ($BE_{NG,y}$) are 0.

Finally, the following tables below contains the BE_y values obtained from the application of the equation (1) for the ACM0001 version 18.0:

Period			$BE_{,y}$ (tCO_2e)
Period Year	**Start Date**	**End Date**	
1	27/10/2017	26/10/2018	134.259
2	27/10/2018	26/10/2019	157.932
3	27/10/2019	26/10/2020	163.579
4	27/10/2020	26/10/2021	168.264
5	27/10/2021	26/10/2022	173.209
6	27/10/2022	26/10/2023	178.033
7	27/10/2023	26/10/2024	189.286
Total			**1,164,562**
Annual average			**166,366**

Applus+ Certification confirms that all data sources and assumptions are appropriate and calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions.

(2) Project emissions

To estimate the project emissions, the ACM0001 version 18.0, considers the emissions from consumption of electricity in the project case and the fact that

possible CO_2 emissions coming from other fuels than the recovered methane (contained in the landfill gas), should be accounted for as project emissions. The general equation for project emissions in the project activity is as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y} \quad (7)$$

Where

$PE_{EC,y}$ = Emissions from consumption of electricity due to the project activity in year *y* (t CO_2/yr). The project emissions from electricity consumption ($PE_{EC,y}$) will be calculated following the latest version of "*Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation*" version 03.0.

$PE_{FC,j,y}$ = Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year *y* (t CO_2/yr). The project emissions from fossil fuel combustion ($PE_{FC,j,y}$) will be calculated following the latest version of "*Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*" version 03.

$PE_{EC,y}$ will be calculated using the "*Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0,* as follows:

The project emissions from consumption of electricity are calculated based on the quantity of electricity consumed, an emission factor for electricity generation and a factor to account for transmission losses, as follows:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad (8)$$

Where:

$PE_{EC,y}$ = Are the project emissions from electricity consumption by the project activity during the year y (tCO_2 / yr)

$EC_{PJ,y}$ = Is the quantity of electricity consumed by the project activity during the year y (MWh)

$EF_{EL,i,y}$ = Is the emission factor for the grid in year y (tCO_2/MWh)

$TDL_{j,y}$ = Are the average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site

When the project does not generate electricity in the first project stage, the assumption made was that the electricity needed for the operation of the project activity will be supplied by the national grid. When the project generates electricity, there is a net export of electricity to the grid (scenario A). For these reasons, the emissions coming from the electricity use are deducted from the overall emissions reductions (this means that only emissions reductions for the net electricity generation are claimed).

For scenario A: Electricity consumption from the grid option A1 was chosen for the determination of the emission factors for electricity generation ($EF_{EL,j/k/l,y}$). The combined margin emission factor of the applicable electricity system is estimated using the procedures of the latest approved version of the. "*Tool to calculate the emission factor for an electricity system" version 07.0* ($EF_{EL,j,y} = EF_{grid,CM,y}$).

Period			$PE_{EC,y}$ (tCO_2)
Period Year	**Start Date**	**End Date**	
1	27/10/2017	26/10/2018	61

2	27/10/2018	26/10/2019	61
3	27/10/2019	26/10/2020	61
4	27/10/2020	26/10/2021	61
5	27/10/2021	26/10/2022	61
6	27/10/2022	26/10/2023	61
7	27/10/2023	26/10/2024	61
Total			**427**
Annual average			**61**

$PE_{FC,y}$ will be calculated using the "*Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 03, as follo*ws:

CO_2 emissions from fossil fuel combustion in process j are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (9)$$

Where:

$PE_{FC,j,y}$ = CO_2 emissions from fossil fuel combustion in process *j* during the year *y* (tCO_2/yr)

$FC_{i,j,y}$ = Is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr)

$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2 / mass or volume unit); **i** are the fuel types combusted in process *j* during the year *y*

The CO_2 emission coefficient $COEF_{i,y}$ will be calculated using option B based on net calorific value and CO_2 emission factor of the fuel(s) type(s) used. Option A cannot be applied because the necessary data is not available.

The type(s) of fossil fuel(s) to be used will depend on the choice of the developer (i.e. natural gas, fuel oil, diesel, etc.), and the corresponding emission factors will be taken from the IPCC default values, in case there is no data available.

Period			**$PE_{FC,y}$ (tCO_2)**
Period Year	**Start Date**	**End Date**	
1	27/10/2017	26/10/2018	0
2	27/10/2018	26/10/2019	0
3	27/10/2019	26/10/2020	0
4	27/10/2020	26/10/2021	0
5	27/10/2021	26/10/2022	0
6	27/10/2022	26/10/2023	0
7	27/10/2023	26/10/2024	0
Total			**0**
Annual average			**0**

The project emissions in the project activity are calculated as per equation (21) of the ACM0001 version 18.0, with the following results:

Period			**$PE_{,y}$ (tCO_2)**
Period Year	**Start Date**	**End Date**	
1	27/10/2017	26/10/2018	61

2	27/10/2018	26/10/2019	61
3	27/10/2019	26/10/2020	61
4	27/10/2020	26/10/2021	61
5	27/10/2021	26/10/2022	61
6	27/10/2022	26/10/2023	61
7	27/10/2023	26/10/2024	61
Total			**427**
Annual average			**61**

Applus+ Certification confirms that all data sources and assumptions are appropriate and calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions.

(3) Leakage

According to the methodology, the project activity leakage does not take into account.

(4) Emission reductions

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 166,305 tCO_2e per year for the selected 7 years crediting period. Total emission reductions during the second crediting period are estimated to be 1,164,132 tCO_2e.

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
1	134.259	61	0	134.198
2	157.932	61	0	157.871
3	163.579	61	0	163.518
4	168.264	61	0	168.202
5	173.209	61	0	173.148
6	178.033	61	0	177.971
7	189.286	61	0	189.224
Total	**1,164,562**	**427**	**0**	**1,164,132**
Total number of crediting years	7 years			
Annual average over the crediting period	**166,366**	**61**	**0**	**166,305**

Conclusion

Applus+ Certification is able to confirm the following:

- All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources;
- All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD;
- All values used in the PDD are considered reasonable in the context of the proposed CDM project activity;
- The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, and leakage emissions;
- All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

D.5. Validity of monitoring plan

<table>
<tr><td>Means of validation</td><td>The assessment team has verified the monitoring plan in the updated PDD according to the applicable requirements in the Project Standard, and methodology ACM0001 version 18.0 as well as applicable methodological tools.</td></tr>
<tr><td>Findings</td><td>The project applies methodology ACM0001 version 18.0. The original monitoring plan was updated based on ACM0001 version 18.0 requirements.
<table>
<tr><th>Parameters</th><th>Description</th><th>Measurement method and QA/QC procedures</th><th>Assessment conclusion</th></tr>
<tr><td>Management of SWDS</td><td>Management of SWDS</td><td>Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity.
Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications.
The parameter is measured annually.</td><td>Consistent with methodology /tool</td></tr>
<tr><td>$\rho_{reg,y}$</td><td>Fraction of LFG that is required to be flared due to a requirement in year y</td><td>Information of the host country's regulatory requirements relating to LFG, contractual requirements, or requirements to address safety and odour concerns is monitored annually.</td><td>Consistent with methodology /tool</td></tr>
<tr><td>$V_{LFG,total,y,db}$</td><td>Volumetric flow of total landfill gas which is sent to flare and used for electricity generation in year y on a dry basis</td><td>The parameter is monitored by flow meter continuously. Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required. No separate monitoring of temperature and pressure is necessary since flow meters that automatically express LFG volumes in normalized cubic meters will be used.
The measurement method will be based in the thermal principle of the thermal mass flow meter. The readings will be gathered automatically by an automatic data collection system.
The accuracy of the measurement equipment will be 1% full scale.
The responsible person/entity for the measurement will be the project participant.
The calibration will be carried out yearly or at the frequency required by the manufacturer</td><td>Consistent with methodology /tool</td></tr>
</table></td></tr>
</table>

			following the recommended procedures.	
	$V_{LFG,sent\_flare,y,db}$	Volumetric flow of landfill gas which is sent to flare in year y on a dry basis	The parameter is monitored by flow meter continuously. Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required. No separate monitoring of temperature and pressure is necessary since flow meters that automatically express LFG volumes in normalized cubic meters will be used. The measurement method will be based in the thermal principle of the thermal mass flow meter. The readings will be gathered automatically by an automatic data collection system. The accuracy of the measurement equipment will be 1% full scale. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the manufacturer following the recommended procedures.	Consistent with methodology /tool
	$V_{LFG,EL,y,db}$	Volumetric flow of landfill gas which is used for electricity generation in year y on a dry basis	The parameter is monitored by flow meter continuously. Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required. No separate monitoring of temperature and pressure is necessary since flow meters that automatically express LFG volumes in normalized cubic meters will be used. The measurement method will be based in the thermal principle of the thermal mass flow meter. The readings will be gathered automatically by an automatic data collection system. The accuracy of the measurement equipment will be 1% full scale. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the manufacturer following the recommended procedures.	Consistent with methodology /tool

	$t_{O2,h}$	Volumetric fraction of O_2 in the exhaust gas of the flare in the hour h	Oxygen concentration in the exhaust gas will be measured at least once per hour using a continuous gas analyser, and data records will be kept during the crediting period and two years after. Data will be aggregated daily/monthly/yearly. The accuracy of the meter will be ± 0.2 to 1% Full Scale. Its calibration frequency would be 12 months. Extractive sampling analysers with water and particulates removal devices are to be used. The point of measurement (sampling point) is in the upper section of the flare (80% of total flare height). Sampling is conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes).	Consistent with methodology /tool
	$fv_{CH4,FG,h}$	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h	Methane concentration in the exhaust gas will be measured at least once per hour using a continuous gas analyser, and data records will be kept during the crediting period and two years after. Data will be aggregated daily/monthly/yearly. Measured at least once per hour using a continuous gas analyser. The accuracy of the meter will be ± 0.2 to 1% Full Scale. Its calibration frequency would be 12 months. Extractive sampling analysers with water and particulates removal devices are to be used. The point of measurement (sampling point) is in the upper section of the flare (80% of total flare height). Sampling is conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes).	Consistent with methodology /tool
	$Maintenance_y$	Maintenance events completed in year y	Record the date when maintenance events were completed in year y. Records of maintenance logs must include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or needing to be replaced, source of replacement parts, serial numbers and calibration certificates.	Consistent with methodology /tool
	T_t	Temperature of the gaseous stream in time interval t	The parameter is measured by a flow meter (thermal meter has been integrated in the flow meter). Data will be recorded electronically, and will be kept	Consistent with methodology /tool

			during the crediting period and two years after. The readings will be gathered automatically by an automatic data collection system. The accuracy of the measurement equipment will be 1% full scale. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the manufacturer following the recommended procedures.	
	P_t	Pressure of the gaseous stream in time interval t	The parameter should be continuously measured by a pressure meter. Data will be recorded electronically, and will be kept during the crediting period and two years after. The readings will be gathered automatically by an automatic data collection system. The accuracy of the measurement equipment will be 1% full scale. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the manufacturer following the recommended procedures.	Consistent with methodology /tool
	$v_{CH4,t,db}$	Volumetric fraction of CH4 in a time interval t on a dry basis	A continuous gas analyser operating in dry-basis is used. Volumetric flow measurement should always refer to the actual pressure and temperature. The measurement method will be based in the NDIR (Non Dispersed Infrared) method of the continuous gas analyzer. The readings will be gathered automatically by an automatic data collection system. The accuracy of the measurement equipment will be 2% full scale. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the manufacturer following the recommended procedures.	Consistent with methodology /tool
	$EC_{BL,k,y}$	Net quantity of electricity generated	Calculated from the by the difference between the gross quantity of electricity generated	The validation team issued

	using LFG	using LFG ($EL_{LFG,y}$), which will be monitored and the amount of electricity consumed by the project activity ($EG_{EC,y}$). The exports and imports readings will be gathered automatically by an electricity meter and the project participant will be receiving the corresponding bills, which will be used as the monitoring data source. The accuracy of the measurement equipment will be 1% of maximum reading. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the electricity company.	CL2 requesting PP how the parameter will account during power generation scenario. As the response, the PP has renamed and corrected the parameter definition. Thereby closed out the CL2
$EG_{EC,y}$	Amount of electricity consumed by the project activity in year y	Electricity meter is used to measure the parameter continuously. The measurement method will be based in the principle that the electricity reading is the power accumulated over a period divided by the duration of such period. The readings will be gathered automatically by an electricity meter and the project participant will be receiving the corresponding bills, which will be used as the monitoring data source. The accuracy of the measurement equipment will be 1% of maximum reading. The responsible person/entity for the measurement will be the project participant. The calibration will be carried out yearly or at the frequency required by the electricity company.	Consistent with methodology /tool
$Op_{engine,h}$	Operation of the engine that consumes the LFG	For the engine using the LFG, the plant is operating in hour h by monitoring the product generated by the engine (i.e Net quantity of electricity generated using LFG). The method to determine the operation of the engine that consumes the LFG would be: • $Op_{engine,h}$=0 when no net quantity of electricity is generated using LFG in the hour h. • $Op_{engine,h}$=1 when net quantity of electricity is generated	Consistent with methodology /tool

			using LFG in the hour h.	
	$Op_{flare,h}$	Operation of the flare that consumes the LFG	For the enclosed flare using the LFG, the plant is operating in hour h by monitoring, at least, the flame detection system. The flame detection system is used to ensure that the equipment is in operation since the control system of the equipment ensures that the enclosed flare will stop if no flame is detected. The method to determine the operation of the enclosed flare using the LFG would be: • $Op_{flare,h}$ =0 when flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); • $Op_{flare,h}$=1 when flame is detected continuously in hour h (instantaneous measurements are made at least every minute).	Consistent with methodology /tool
	$Flame_m$	Flame detection of flare in the minute m	Measured using a Ultra Violet detector or Infra-Red or both. The flame detection system is used to ensure that the equipment is in operation since the control system of the equipment ensures that the enclosed flare will stop if no flame is detected. The method to determine whether the flame is on or off would be: • Flame off: when flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); • Flame on: when flame is detected continuously in hour h (instantaneous measurements are made at least every minute).	Consistent with methodology /tool
	$PE_{EC,y}$	Project emissions from electricity consumption by the project activity during the year y	The calculation procedures and methods will be defined according to the case presented during the crediting period for the project activity, according to one of the following possible scenarios: a) Electricity consumption from the grid; or b) Electricity consumption from (an) off-grid captive power plant(s); or c) Electricity consumption from the grid and (a) captive power plant(s).	Consistent with methodology /tool

	$FC_{i,j,y}$	Quantity of fuel type i combusted in process j during the year y	Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.	Consistent with methodology /tool
	$T_{EG,m}$	Temperature in the exhaust gas of the enclosed flare in minute m	Measure the temperature of the exhaust gas in the flare by appropriate temperature measurement equipment (i.e thermocouple). Measurements outside the operational temperature specified by the manufacturer may indicate that the flare is not functioning correctly and may require maintenance. Flare manufacturers must provide suitable monitoring ports for the monitoring of the temperature of the flare. These would normally be expected to be in the middle third of the flare although there might be several monitoring ports to measure the different temperatures along the flare stack. The measurement method will be based in the thermoelectric principle of the thermocouple. The	Consistent with methodology /tool

			readings will be gathered automatically by an automatic data collection system. The accuracy of the measurement equipment will be 1.1ºC. The responsible person/entity for the measurement will be the project participant. The calibration or replacement will be carried out yearly or at the frequency required by the manufacturer following the recommended procedures.	

Applus+ Certification confirms that the monitoring plan contains all necessary parameters which have been clearly described in PDD and that the means of monitoring described in the plan complies with the requirements of the methodology.

In the updated PDD, the functions such as data collection, aggregation, verification, calculation, archiving, as well as the maintenance of equipment etc. have been defined. Quality assurance and quality control procedures for recording, maintaining and data archiving etc. will be ensured according to CDM EB rules. The calibration of the meter will be implemented as per national standard. An emergency treatment process has been defined in PDD when the meter is in malfunction. Data management and quality control system are quoted in PDD. The monitoring staffs will be trained based on the training program described in PDD.

Conclusion	The procedures described in PDD have been recognized by the assessment team through document review and interviews with the relevant personnel. The information together with a physical inspection allows the assessment team to confirm that the proposed monitoring plan is feasible within the project design. The major parameters to be monitored have been discussed with the PPs, especially regarding the location of the meters, the data management and in general the quality assurance and quality control procedures to be implemented in the context of the project. It's Applus+ Certification's opinion that the project participants are able to implement the monitoring plan and the emission reductions achieved can be reported ex-post for verification.

D.6. Crediting period

Means of validation	The assessment team verified the renewed crediting period according to the requirements in the CDM Project Standard for project activities version 01.0.
Findings	This is the second crediting period. As per CDM Validation and Verification Standard for project activities version 01.0, the next crediting period of the registered CDM project activity commences on the day immediately after the expiration of the current crediting period. Thereby the crediting period starts from 27/10/2017 to 26/10/2024.
Conclusion	Correct crediting period has been applied in the updated PDD.

D.7. Project participants

Means of validation	The assessment team checked the names of the project participants included in the updated PDD with the registered PDD. The assessment team has also confirmed the PP via verifying the MoC made public available at UNFCCC website.
Findings	As indicated in the updated PDD sent by PP to EB for request for renewal of crediting period, the PP was Promotora Ambiental S.A.B. de C.V (Mexico) and First Climate (Switzerland) AG (Switzerland). The assessment team confirmed with the latest MoC submitted by PP and the MoC made public available at UNFCCC

	website, and confirmed that the PP indicated in the PDD is correct.
Conclusion	The updated PDD correctly indicated the name of PP which is in line with MoC made public available at UNFCCC website.

D.8. Post-registration changes

Type of post-registration changes (PRCs)	Confirmation (Y/N)	Validation report for PRCs	
		version	**Completion date**
Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline	N	N.A.	N.A.
Corrections	N	N.A.	N.A.
Inclusion of a monitoring plan to a registered project activity	N	N.A.	N.A.
Permanent changes from registered monitoring plan, monitoring methodology or standardized baseline	N	N.A.	N.A.
Changes to the project design of a registered project activity	N	N.A.	N.A.
Types of changes specific to afforestation and reforestation project activities	N.A.	N.A.	N.A.

SECTION E. Internal quality control

As final step of a validation of the final documentation including the validation opinion and the checklist have to undergo an internal quality control by the technical review committee, i.e. each report has to be finally approved either by the head of the technical review committee or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one.

After confirmation of the PP the validation opinion and relevant documents are submitted to the EB through the UNFCCC web-platform.

SECTION F. Validation opinion

Applus+ Certification has performed a validation of renewal of crediting period of the “Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León” (Ref. No.3378). The validation was performed on the basis of the updated sections of the PDD relating to the baseline, estimated emission reductions and the monitoring plan using the most recent version of baseline and monitoring methodology applicable for the project activity. The final validation opinion was finalized in accordance with the CDM Validation and Verification Standard for project activities version 01.0 and the CDM Project Standard for project activities version 01.0 including the assessment of:

a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period of the registered CDM project activity at the time of requesting renewal of crediting period of the project activity;
b) The correctness of the application of the approved methodology and, where applicable, the approved standardized baseline for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period of the registered CDM project activity.

The review of the project design documentation and the subsequent follow-up interviews have provided Applus+ Certification with sufficient evidence to determine the validity of the original

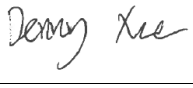
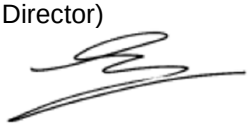
baseline. The project correctly applies the latest baseline and monitoring methodology ACM0001, "Flaring or use of landfill gas" version 18.0. Applus+ Certification is able to confirm:

i) The updated PDD complies with the valid version of the applicable PDD form and instructions therein for filling out the PDD;
ii) Information transferred to the latest valid version of the PDD form is materially the same as that in the registered PDD;
iii) The baseline and monitoring methodology was applied in accordance with the applicable requirements in the Project Standard;
iv) The baseline, the estimated GHG emission reductions, and the monitoring plan in the updated PDD comply with the applicable requirements in the Project Standard, and the valid version of the methodology that is applicable to the registered CDM project activity;
v) The next crediting period of the registered CDM project activity commences on the day immediately after the expiration of the current crediting period;
vi) The names of project participants in the updated PDD are consistent with the latest MoC made public available at UNFCCC website.

Applus+ Certification is also confirm that there is no proposed post-registration change for the second crediting period when submitting the request for renewal of crediting period of the registered CDM project activity to EB.

Given that the project is implemented as designed and the underlying assumptions do not change, the project is likely to achieve the estimated amount of annual emission reductions of 166,305 tCO_2e and a total estimated emission reductions of 1,164,132 tCO_2e over the 2nd renewable crediting period as specified within the final PDD.

In summary, it is Applus+ Certification's opinion that the project activity "Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León" (Ref. No.3378) in Mexico, as described in the PDD, version 5 dated 04/09/2018, meets all relevant UNFCCC requirements for the renewal of the crediting period. Hence Applus+ Certification submitted the request for renewal of the crediting period of the project activity

Role	**Signature**
Team Leader	Mr. Miguel Cortés 
Technical Reviewer	Mr. Denny Xue 
Approver	Mr. Juan Sendín Caballero (Applus+ Certification BU Managing Director) 

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
AM	Approved Methodology
AMS	Approved Methodology Small Scale
Applus+ Certification	LGAI Technological Center, S.A. (Applus+ Certification)
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CL	Clarification Request
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
IRR	Internal Rate of Return
KP	Kyoto Protocol
MP	Monitoring Plan
NGO	Non-Governmental Organization
OM	Operational Margin
PCP	Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PS	Project Standard
UNFCCC	United Nations Framework Convention for Climate Change
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers

The curricula vitae of the DOE's validation team members are provided below:

Mr. Miguel Cortés holds a Bachelor Science Degree on Civil and Environmental Engineering, being specialized on Hydric Resources. He has worked as CDM and environmental consultant for different industries of multidisciplinary sectors world widely. Miguel counts with several years of CDM experience, working and being qualified as Lead Auditor and Technical Reviewer for different DOE's world widely. Furthermore, he has focused his professional CDM portfolio career within LATAM, developing projects in Argentina, Mexico, Panama, Colombia and Chile among others.

Mr. Hanshen (Denny) Xue (Master Degree in Environmental Engineering, Bachelor Degree in Thermal Engineering) is an Auditor appointed by Applus+ LGAI for the GHG project assessment. He is based on Shanghai. He has 1.5 years of work experiences in CDM project development. Before he joined Applus+ LGAI, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

Meng (Simon) Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ Certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ Certification, he had been worked for TÜV SÜD as a GHG Validator/Verifier and ISO 9001/14001 Lead Auditor for 3.5 years.

Miquel Sitjes Cabanas (B. Sc. degree in Chemistry 1975, Universidad de Barcelona – Spain). He has 15 years of experience in a Spanish chemical group company specialized in the manufacturing of raw chemical products, where he worked as the Manager of Quality Control, Production Manager and Environmental Manager. He also worked in the Spanish pharmaceutical industry for 7 years as Quality, Manufacturing and Environmental Manager. He has been working in the Applus+ Certification Technological Centre since 1999 to 2018: he started working there as an auditor (quality, environment, CDM, VCS, greenhouse gas verification and others) and since 2006 to 2018 he has been the Systems Certification Technical Manager.

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
/1/	Promotora Ambiental S.A.B. de C.V	Project Design Document version 1 Project Design Document version 2 Project Design Document version 3 Project Design Document version 4 Project Design Document version 5	24/04/2017 14/10/2017 19/02/2018 21/06/2018 04/09/2018	Others
/2/	Promotora Ambiental S.A.B. de C.V	ER spreadsheet version 5	04/09/2018	Others
/3/	Promotora Ambiental S.A.B. de C.V	Registered and revised PDD, version 13.0	01/07/2013	Others
/4/	Promotora Ambiental S.A.B. de C.V	Intention of renewing crediting period notification form CDM-RENN-FORM	24/04/2017	PP
/5/	Promotora Ambiental S.A.B. de C.V	Description and diagram of LFG collection system		PP
/6/	Promotora Ambiental S.A.B. de C.V	Description and diagram of LFG flaring system		PP
/7/	Promotora Ambiental S.A.B. de C.V	Technical specification of LFG flaring system		PP
/8/	John Zink Company LLC	Operation and maintenance manual for biogas flare system		Others
/9/		Technical specification of fossil fuel tank, leachate pond and moisture separator etc.		Others
/10/	Mexican Ministry of Environment	Collection Centers Waste materials Directory from Mexico	2010	Others
/11/		Regulation of the general law for prevention and integral management of wastes		
/12/		Guanajuato state law for the integral management of residues from the state and Guanajuato Municipalities		
/13/		Climate Change Law in Mexico http://www.profepa.gob.mx/innovaportal/file/6583/1/ley_general_de_cambio_climatico.pdf		
/14/	Promotora Ambiental S.A.B. de C.V	MoC	16/06/2017	PP
/15/	UNFCCC website	CDM Validation and Verification Standard for project activities version 01.0		Others
/16/	UNFCCC website	CDM Project Cycle Procedure for project activities version 01.0		Others
/17/	UNFCCC website	CDM Project Standard for project activities version 01.0		Others
/18/	UNFCCC website	Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period version 03.0.1		Others
/19/	UNFCCC website	ACM0001 Flaring or use of landfill gas version 18.0		Others
/20/	UNFCCC website	Tool to calculate the emission factor for an electricity system version 7 Emissions from solid waste disposal sites (version 08.0) Project emissions from flaring (version		Others

		02.0.0) Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0) Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (version 03)		
/21/	UNFCCC website	Information of the registered project activity on UNFCCC website http://cdm.unfccc.int/Projects/DB/SGS-UKL1265732335.87/view		Others
/22/	IPCC	2006 IPCC Guidelines for National Greenhouse Gas Inventories		Others
/23/	Promotora Ambiental S.A.B. de C.V	El Verde landfill Solid Waste Plant records 2017 year.		

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

Table 1. CL from this validation

CL ID	1	**Section no.**	D.3	**Date:** 02/10/2017
Description of CL				
The climate change law in Mexico in the article No. 3, item II (Mitigation) literal b) states that all Municipalities with a population higher than 50 k habitants should build a LGF capture system on 2018. Please clarify that the Law has no impact in the baseline scenario definition. Please provide deep analysis of the same in the section B.4 of the PDD. *http://www.profepa.gob.mx/innovaportal/file/6583/1/ley_general_de_cambio_climatico.pdf*				
Project participant response				**Date:** 22/10/2017
At the start of the project activity, legislation in Mexico did not require landfills to collect nor utilize the gas generated hence it was not mandated by regulations. After the registration of the project activity, the Climate Change Law of 2012 states in article Number 3, Item II (Mitigation) literal b) that by 2018, the municipalities, in coordination with the Federative Entities and other administrative and financial institutions and with the technical support of the Secretariat of Social Development, will develop and construct the infrastructure for the management of solid waste disposal sites that does not emit methane to the atmosphere in urban centers of more than fifty thousand inhabitants, and when feasible, will implement the technology for the generation of electricity using methane gas. Considering that the Law is valid from 2018 and the start of the second crediting period of the project activity is from 27/10/2017, it is considered that the Law has no impact in the baseline scenario definition. Moreover, the legislation applies for new solid waste disposal sites which are still to be developed and constructed by 2018 hence it does not apply for existing landfills like the one in the project activity.				
Documentation provided by project participant				
Revised PDD.				
DOE assessment				**Date:** 23/10/2017
The assessment team has verified that the Climate Change Law of 2012 and confirmed that:1) the Law will be valid from year 2018 however the second crediting period of the project activity starts from 27/10/2017, thereby the law is not applicable before the starting of the second crediting period; 2) the Law requires new developed and constructed solid waste disposal sites however for existing project activity the Law is not clear. Therefore, it could confirm that it is not mandatory to capture and flare LFG at the start of the second crediting period. As a result, the CL #1 is closed out.				

CL ID	2	**Section no.**	D.5	**Date:** 12/05/2018
Description of CL				
The parameter $EL_{LFG,y}$ is not consistent with the procedure defined in the PDD Step B: Baseline emissions associated with electricity generation ($BE_{EC,y}$) *Please clarify how the parameter will account the total power generation to the grid in consistency to the Tool Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" Version 03.0. Please adjust and correct parameters definitions where is necessary.*				
Project participant response				**Date:** 21/06/2018
The parameter $EL_{LFG,y}$ has been renamed as $EC_{BL,k,y}$ as per the Tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" Version 03.0				
Documentation provided by project participant				
Revised PDD.				
DOE assessment				**Date:** 21/06/2018
The assessment team confirmed the PP has renamed and corrected the parameter definition and monitoring procedure for electricity generation and consumption by the project power plant to the grid in consistency with the Tool's requirements. A bi-directional meter will install by PPs. As a result, the CL #02 is closed				

Table 2. CAR from this validation

CAR ID	1	**Section no.**	D.1	**Date:** 06/09/2017
Description of CAR				

Before finalizing the validation of the renewal of crediting period, UNFCCC has updated the PDD format to version 10.1. Please apply the latest version of PDD format.
Project participant response **Date:** 13/09/2017
The updated PDD has been applied the latest version of PDD format of version 10.1. Please refer to the updated PDD.
Documentation provided by project participant
Revised PDD.
DOE assessment **Date:** 16/09/2017
The assessment team confirmed that the PDD format has been updated to version 10.1 which is the latest version of template available at UNFCCC website. Thereby the CAR is closed out.

CAR ID	2	**Section no.**	D.4.	**Date:** 06/09/2017
Description of CAR				
As stated in step B of the PDD that the project will not generate electricity. However, according to the project design, the project will start the electricity generation from the 2nd year of this crediting period. Please revise the description with including the calculation process of the $BE_{EC,y}$.				
Project participant response				**Date:** 13/09/2017
The PP revised the description by including the calculation of the baseline emissions associated with electricity generation in year y ($BE_{EC,y}$) using the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 3.0.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 16/09/2017
The assessment team confirmed that the description of the calculation process is appropriately described. Meanwhile, since in the PDD, the baseline emissions associated with electricity generation has already been taken into account, the change of description does not affect the BE calculation result. The assessment team closed the CAR.				

Table 3. FAR from this validation

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

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Document information

Version	*Date*	*Description*
02.0	31 October 2017	Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0).
01.0	23 March 2015	Initial publication.

Decision Class: Regulatory
Document Type: Form
Business Function: Renewal of crediting period
Keywords: crediting period, project activities, validation report