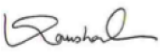
Validation report form for renewal of crediting period for CDM project activities

(Version 03.0)

BASIC INFORMATION	
Title and UNFCCC reference number of the project activity	El Molle – Landfill gas (LFG) capture project UNFCCC reference number 0170
Number and duration of the next crediting period	3rd crediting period – length: 7 years 15/12/2020 to 14/12/2027
Version number of the validation report	1.1
Completion date of the validation report	10/12/2021
Version number of PDD to which this report applies	15
Project participants	Gestión Integral de Residuos SpA (Chile) First Climate (Switzerland) AG
Host Party	Chile
Applied methodologies and standardized baselines	ACM0001: Flaring or use of landfill gas, version 19.0 Standardized baseline: N/A
Mandatory sectoral scopes	Sectoral Scope: 13 (waste handling and disposal)
Conditional sectoral scopes, if applicable	Sectoral Scope: 1 (Energy industries – renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period	149,468 tCO_2e
Name and UNFCCC reference number of the DOE	Name: KBS Certification Services Pvt. Ltd. UNFCCC reference number: E-0051
Name, position and signature of the approver of the validation report	 Kaushal Goyal Managing Director

SECTION A. Executive summary

Purpose and general description

El Molle – Landfill gas (LFG) capture project was implemented with the objective to capture and generate electricity with the landfill gas generated at the landfill of El Molle, located at Sector Camino, 7 km NE of Valparaíso city - Chile, in order to avoid emissions of methane to the atmosphere produced by the anaerobic decomposition of the dumped waste and to avoid emissions of CO_2 by the electricity supplied to the local grid. During the initial stage (1st crediting period) of the project activity, an LFG capture and flaring system, reducing uncontrolled release to atmosphere was installed. During the 2nd crediting period, it was implemented for the generation of electricity from LFG. Part of the electricity generated will be used for self-consumption and the other part will be exported to the grid. The power generation plant of 4.5 MW of capacity was installed in the place of the flare system that used to exist. The flare system has been deactivated.

The Landfill started operating in 1985 being able to receive approximately 1,440 tonnes of solid waste per day /6/ for an approximately 40 years of lifetime /9/.
Verified during the remote audit the improvement of landfill gas collection and flaring, through the installation of an active recovery system composed by:

- LFG capture system
  - Consists on a grid of horizontal trenches and vertical wells/drains
- Collection system
  - Consists on the transportation pipeline network
- Flaring station, composed by the following equipment:
  - Two blowers manufactured by Continental Industries – model 077A1.07 – serial numbers 1577A076 (blower 1) and 1577A077 (blower 2);
  - One flow meter manufactured by Endress Hauser – model Prowirl R200 – serial number K820E019000;
  - One gas analyser manufactured by Nova Analytical Systems INC – model 912A – serial number 9387;
  - One temperature meter manufactured by Endress Hauser – serial number K804381430A;
  - One pressure meter manufactured by Endress Hauser – model Cerabar S – serial number K805241509C;
  - Flare system has been deactivated.
- Power generation
  - Two electricity meters manufactured by Schneider – model ION 8650– serial number MW-15075A964-02 (main);
  - Three group generators, with 1.56 MW (nominal capacity) each one, manufactured by Caterpillar – model CG170-16 (GG1, GG2 and GG3) – serial numbers 1438176 (GG1), 1438177 (GG2) and 1438178 (GG3);
  - Diesel generator manufactured by Caterpillar – model GEP22-6 – serial number OLY00000JMMG06211.

The project was commissioned on 12/01/2016 /40/ and started commercial operation on 18/12/2015 /41/.
KBS verified the environmental license applicable to the El Molle landfill /9/ /10/ and biogas plant /8/ to operate the plant in accordance with the local Environmental agency requirements.

The project was registered as a CDM project on 02/10/2018 for a renewable 7-year crediting period, under the reference number 0170. The first crediting period of this project is from 15/12/2006 – 14/12/2013, and the second crediting period is from 15/12/2013 to 14/12/2020 and the third crediting period is from 15/12/2020 to 14/12/2027. The post registration changes (PRC 0170-002) described in the PDD version 12 of 09/07/2018 was validated by Earthood Services Private Limited /5/.
The project results in reductions of CO_2 and CH_4 emissions that are real, measurable and give long - term benefits to the mitigation of climate change.
The total emission reductions from the project are estimated to be on the average 149,468 tCO2e per year over the selected 7 year for the 3rd crediting period. The emission reduction forecast has been checked, and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

Scope of validation

The purpose of a validation is to have an independent third party assess of the updated project design document to confirm that the original project baseline is still valid or has been updated taking in account of new data where applicable. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC criteria are validated in order to confirm the correctness of the application of the approved baseline methodologies for the determination of the continued validity of the baseline or its update, and estimation of the emission reductions for the applicable crediting period.

The validation scope is defined as an independent and objective review of the updated project design document (PDD). The updated PDD is reviewed against Kyoto Protocol requirements, UNFCCC rules and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0001 (19.0).

Validation process

This report summarizes the findings from the validation of the updated PDD of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given by the CDM Validation and Verification Standard for project activities, CDM Project Cycle Procedure for project activities and CDM Project Standard for project activities version 03.0 and included 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 at the time of requesting renewal of crediting period; (b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions from the applicable crediting period. This validation opinion is also to be seen in conjunction with the validation report at the time of requesting registration for the first crediting period. The Validation Opinion is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

Conclusion

Gestión Integral de Residuos SpA has commissioned KBS Certification Services Pvt. Ltd. to perform the validation for renewal of the crediting period of the registered project activity "El Molle – Landfill gas (LFG) capture project" in Chile (hereafter called "the project"). In conclusion, it is KBS's opinion that the project meets all the relevant requirements for the renewal of the crediting period.

SECTION B. Validation team, technical reviewer and approver

B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader/ Technical Expert (1.2, 13.1) Local Expert	EI	Leiroz	Andrea	Central Office	✓	-	✓	✓

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	IR	Pednekar	Sapana	Central office
2	Technical expert to TR (1.1 & 13.1)	IR	Chaudhari	Tushar	Central office
2.	Manager Technical & Certification	IR	Chaudhari	Tushar	Central office
3.	Authorizer	IR	Goyal	Kaushal	Central office

SECTION C. Means of validation

C.1. Desk/document review

The report is based on the assessment of the project design document version 13 and subsequent versions 14 and 15 /2/, application of standard auditing techniques including but not limited to desk review, follow up

actions (e.g., remote audit, electronic (telephone or e-mail) interviews) and also the review of the applicable approved methodological and relevant tools, guidance and CDM decisions.

All the documents used for arriving validation conclusion are listed in Appendix 03 and referenced accordingly in validation report.

C.2. On-site inspection

~~**Duration of on-site site inspection**: DD/MM/YYYY~~				
~~**No.**~~	~~**Activity performed on-site**~~	~~**Site location**~~	~~**Date**~~	~~**Team member**~~
~~1.~~				

As result of the COVID-19 pandemic, taking into account the rules of relevant national and local authorities (local to the DOE offices as well as to locality of the site visits), World Health Organization (WHO) recommendations, policies of the DOE and other relevant travel restrictions and guidance (for example, a requirement to self-isolate upon return from specific countries), the DOE has skipped the on-site visit. However, as per the CDM EB, the DOE may use other standard auditing techniques for validation or verification as referred to in sections 7.1.3 and 9.1.3 of the VVS-PA /12/.
Based on the videoconference, PDD review, and the review of UNFCCC procedures and guidelines, Validation team has proceeded to skip the presential site visit due to the COVID-19 pandemic /36/. As per para 30 of CDM Validation and Verification Standard for project activities version 03.0 /12/, Validation team has used the following alternative means for its assessment and to justify that they are sufficient for the purpose of validation.
Along with desk review, audit team has conducted remote audit interview as follows:

- A complete desk review of the submitted PDD (version 13) /2/ and supportive evidences have been checked by the Validation Team.

- Validation team has performed a remote site inspection via videoconference (Skype) with PP on different topics as mentioned under section C.3 of this report.

- By taking follow up actions by conducted interview with PP, to gather information about knowledge of project design, current situation via videoconference. Cross-checked evaluation under the scope of all information and references provided in PDD. Details of interviewees, topics covered and additional information presented in the below section “C.3 – Interviews”.

Validation team has also checked the site visit requirements mentioned in the VVS for Project Activity version 03.0 /12/ and concluded that no site visit is required. The justification for not conducting the on-site visit as per VVS PA version 03.0 /12/ have been mentioned below.

VVS PA version 03.0 requirements	Validation team justification
Para 29 (b) (b) Follow-up actions (e.g. on-site inspection and telephone or e-mail interviews), including: (i) Interviews with relevant stakeholders in the host country, such as personnel with knowledge of the project design and implementation; (ii) Cross checks between the information provided by interviewed personnel (i.e. by checking sources or other interviews) to ensure that no relevant information has been omitted;	Validation team has done the follow-up actions by: 1. Teleconference with PP. Skype was used with video camera function. 2. Cross checks between information provided by interviewed personnel (i.e., by checking sources or other interviews) to ensure that no relevant information has been omitted. 3. PP presented during the videoconference all documents related to renewal of the crediting period. 4. The calculations and assumptions made in determining the CERs were reviewed and discussed with PP through videoconference.

VVS PA version 03.0 requirements	Validation team justification
Para 30 It is mandatory for the DOE to conduct an on- site inspection at validation for the proposed CDM project activity if: (a) Its estimated annual average of GHG emission reductions or net anthropogenic GHG removals is more than 100,000 t CO_2 eq; or (b) There is pre-project information that is relevant to the requirements for registration of the project activity and may not be traceable after the registration.	The site visit is mandatory, since the estimated annual average is more than 100,000 t CO_2 eq. The estimated annual average of GHG emission reductions is 149,468 tCO2e which is more than 100,000 t CO_2 eq. The validation team confirmed that the baseline is still valid and the detailed assessment is mentioned under section D.3 of this report. However, for this particular project, the site visit has been skipped taking into account the rules of relevant national and local authorities (local to the DOE offices as well as to locality of the site visits), World Health Organization (WHO) recommendations, policies of the DOE and other relevant travel restrictions and guidance (for example, a requirement to self-isolate upon return from specific countries) /36/. Further, in context of the project activity, validation team confirms that there is no pre-project information that is relevant to the requirements for renewal of the CDM project activity and may not be traceable after the renewal. All the information related to “Renewal of crediting period” has been verified by validation team through a remote on-site audit via videoconference interviews. Information related to baseline, project implementation, monitoring plan was cross checked. Further, as per VVS requirement, If the site visits cannot be postponed, a proper justification should be provided by the DOE why the site visits cannot be postponed, including the demonstration of a significant impact of delaying the site visits on the DOE, or project participants or coordinating/ managing entity (e.g. commitment/ timeline as per the validation or verification contract, CER delivery commitment by project participants) reliance on applicable force majeure provisions in the validation or verification contracts, if needed. For the proposed project activity, the site visit cannot be postponed since with a delay on the renewal of the crediting period, the renewal request for project activity may no longer be submitted by KBS. The current crediting period for the project activity already expired on 14/12/2020 and the deadline for submit the renewal request is 13/12/2021. Hence, for the proposed project activity the DOE decided not to have on-sitevisit and apply the other standard auditing techniques described in paragraph 29 of VVS PA, version 03.0.

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Landeta	Laura	Consultor, Greenmind	29/11/2021	• Project description • Baseline • Emission reduction calculation • Monitoring plan • Environmental licenses	Andrea Leiroz
2.	Velandia	Edgar Ricardo	Biogas manager, Veolia	29/11/2021		Andrea Leiroz
3.	Sprovieri	João	Consultor, Beng	29/11/2021		Andrea Leiroz
4.	Varkulya	Américo	Consultor, Beng	29/11/2021		Andrea Leiroz

C.4. Sampling approach

Not applicable for this project activity.

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	-	-	-
Application and selection of methodologies and standardized baselines	-	-	-
Validity of original baseline or its update	01	-	-
Estimated emission reductions or net anthropogenic removals	01	01	-
Validity of monitoring plan	04	01	01
Crediting period	-	-	-
Project participants	-	-	-
Post-registration changes	-	-	-
Others (please specify)	-	-	-
Total	06	02	01

SECTION D. Validation findings

D.1. Compliance with PDD form

Means of validation	PDD applies the applicable CDM-PDD-FORM: Project design document form version 12.0 /15/. KBS verified that the renewal crediting period, information transferred to the later valid version of the PDD form is materially the same as that in the registered PDD /1/.
Findings	No findings have been raised.
Conclusion	Validation team confirms that final PDD is completed using the valid version of the applicable CDM-PDD-FORM: Project design document form version 12.0 /15/ in compliance with para 412 (a) (i) of VVS for PA version 03 /12/. All the information has been correctly transferred from registered PDD to the current PDD which is filled in the latest CDM PDD form available in UNFCCC website. Validation team confirms that the transfer of information from the old form to the new form is correct and materially the same as the information in the registered PDD in compliance with para 412 (a) (ii) of VVS for PA version 03 /12/. PDD is in compliance with the instruction provided in the template.

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

Means of validation	The project was originally registered based on version 02 of ACM0001 “Flaring or use of landfill gas” /30/. For the renewal of the second crediting period, the registered PDD /1/ correctly applies version 18.1 – “Flaring or use of landfill gas” /31/. For the third crediting period, the submitted revised CDM-PDD (version 15 dated 08/12/2021) /2/ correctly applies the latest version of the methodology, i.e. version 19.0 – “Flaring or use of landfill gas” /16/. Therefore, the project was validated against ACM0001 version 19.0 /16/ requirements, as described in the following sections.

Application of selected baseline and monitoring methodology

The purpose of the project activity is the implementation of a landfill gas collection system to flare the LFG at the El Molle – Landfill gas (LFG) capture project. As described in the PDD /2/, the El Molle landfill started its operations in 1985 and has an operational lifetime of 40 years /6/. During the operation of the landfill the captured LFG was only vented and partially flared in open flares and not used prior to the implementation of the project activity.

KBS confirmed that the project is currently capturing the LFG and sending it to generate electricity. At the moment, the flare is deactivated.

The methodology ACM0001 (version 19.0) /16/ is applicable to the project as this project consists of the implementation of a landfill gas collection system to flare and utilize the LFG for producing electricity at the El Molle – Landfill gas (LFG) capture project. The applied baseline methodology is justified as it has been demonstrated that the project activity ensures that:

(a) A new LFG capture system was installed in an existing SWDS;

(b) An investment was made 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.

An investment was made to increase the recovery rate (collection efficiency) and to change the use of the captured LFG since prior to the implementation of the project activity the captured LFG was only vented and partially flared in open flares.

(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;

LFG is flared and is used to generate electricity as confirmed during the remote site visit (by videoconference) and follow-up interview.

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

PP provided a declaration /11/ confirming that there is no recycle center for the organic material in the landfill. In addition, recycling of organic waste is not part of the operational procedures of the landfill. Thus, the amount of organic waste that would be recycled in the absence of the project activity will not be reduced.

The methodology 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 baseline scenario is to release the LFG to atmosphere from the SWDS, and the electricity would be generated in the grid connected power plants. For more details, please refer to step 1 of Section D.3 where KBS confirmed that the atmospheric release of the LFG is still the current practice for landfills in Chile. It is not mandatory to flare the landfill gas in Chile, according to Decree #189 /32/, which is the only law that regulates the basic sanitary and safety conditions in sanitary landfills. There are no policies or regulations in Chile that require landfill gas capture or destruction other than for technical safety issues /32/. Regarding electricity generation in existing and/or new grid-connected power plants, there are no new rules or legislations in Chile that go against the previous established baseline i.e., electricity could continue to be generated by the plants feeding the grid.

The methodology ACM0001 (version 19.0) /16/ is applicable since:

(a) The proposed project activity does not apply any other CDM approved methodology. ACM0001 is not 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 /2/;

(b) The management of the SWDS in the project activity is not changed to meet a technical or regulatory requirement during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.

The “Tool to calculate the emission factor for an electricity system” version 07.0 /22/ is used to determine the grid emission factor since the project will supply electricity to the local grid and will consume electricity from the grid for internal use.

The tool “Emissions from solid waste disposal sites” version 08.0 /19/ is used in order to calculate project’s baseline emissions for *ex-ante* estimations purposes. The actual baseline emissions will be monitored.

The “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” version 03.0 /18/ will be used since there will be consumption of fossil fuel (LPG use for flare ignition).

The tool “Project emissions from flaring” version 03.0 /21/ is used in order to establish the calculations of the methane destruction efficiency of the enclosed flare and;

The “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” version 03.0 /23/ is used in order to establish the monitoring procedures and calculations of the methane flows sent to flaring and electricity generation.

The “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” version 03.0 /20/ is used for calculating project emissions when electricity from the grid is being consumed and due to electricity generation and supplied to the grid.

The tool “Determining the baseline efficiency of thermal or electric energy generation systems” (Version 03.0) /24/ will not be used since there is no thermal energy or electricity generation units in the baseline scenario.

The “Tool to determine the remaining lifetime of equipment” (Version 01) /25/ will not be used since the project activity does not involve the replacement of existing

	equipment with new equipment or which retrofit existing equipment as part of energy efficiency improvement activities. The tool "Project and leakage emissions from transportation of freight" (Version 01.1.0) /27/ will not be used since the project activity does not involve freight transportation by road. The tool "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 07.0) /17/ will not be used to identify the baseline scenario. Since the project is renewal of the crediting period and thus, the 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) /26/ is used in order to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool "Positive lists of technologies" (version 03.0) /28/ was used to demonstrate additionality applying the simplified procedure.
Findings	No findings have been raised.
Conclusion	The compliance of those applicability conditions was confirmed during the remote audit, through the review of documentation, interviews and based on team's sectoral knowledge. The assessment of the project's compliance with the applicability criteria of ACM0001 (version 19.0) are documented in detail above. Hence use of the selected methodology is appropriate for this project activity compliance with para 412 (a) (iii) of VVS for PA version 03 /12/.

D.3. Validity of original baseline or its update

Means of validation	The following steps from 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 /26/ as per CDM-EB "Validation and Verification Standard for project activities" (version 03.0) /12/ were applied: **Step 1: Assess the validity of the current baseline for the next crediting period** The "CDM Project Standard for project activities" /13/ requires 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: **Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies** KBS has confirmed 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 re-validation /32/. **For the baseline scenario:** 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. It is not mandatory to flare the landfill gas in Chile, according to the Decree 189 /32/, which is the only law that regulates the basic sanitary and safety conditions in sanitary landfills. There are no policies or regulations in Chile that require landfill gas capture and combustion or use of LFG in Chilean sanitary landfills /32/. The environmental permit granted by the Regional Secretary of Ministry of Health /10/ to the landfill does not mention landfill gas capture and/or destruction among the mandatory applicability conditions.

	Regarding to the use of LFG for electricity generation: Electricity generation in existing and/or new grid-connected power plants. There are no new rules or legislations in Chile that go against the previous established baseline i.e., electricity could continue to be generated by the plants feeding the grid. The use of LFG for energy production is permitted by the legislation in Chile as verified through the operational license /8/. Thus, the electricity generation through renewable sources is in compliance with the national laws on energy production with LFG. Thus, it is concluded that no relevant national and/or sectorial policies affected the validity of the project activity baseline. The baseline remains the same as defined in the 1st and 2nd crediting periods and required regulations. **Step 1.2: Assess the impact of circumstances** There are no new national/sectoral polices/legislation/circumstances that could affect the baseline scenario during the renewal of the crediting period /32/. Based on team experience, KBS confirmed that the atmospheric release of the LFG and the electricity generated in the grid connected power plants is still the current practice for landfills in Chile. **Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested** The continuation of atmospheric release of the LFG and only destroying a small percentage to address safety and odour concerns is technically possible, since it is a simple management system that requires minor maintenance. For the electricity generation, in the absence of the project activity, the electricity would be generated by the grid connected power plants. Thus, this sub-step should not be applied since the baseline scenario identified at the validation of the project activity would be a more financial attractive scenario than the project activity without CDM. **Step 1.4: Assessment of the validity of the data and parameters** The baseline emissions for the third crediting period have been updated considering the latest version of the methodology, related applicable tools and IPCC values. **Conclusion on step 1** KBS confirms that the current baseline is valid as per methodology ACM0001 (version 19.0) /16/ for the third crediting period. This, could be confirmed through Para 22 that mention: “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” and Para 23: “If all or part of the electricity generated by the project activity is exported to the grid, the baseline scenario for all or part of the electricity exported to the grid is assumed to be electricity generation in existing and/or new grid-connected power plants”. However, the assessment of the application of the step 1.4 indicates that it should be necessary to update the data and parameters used for the calculation of emission reductions for the third crediting period. **Step 2: Update the current baseline and the data and parameters** **Step 2.1: Update the current baseline** The baseline emissions for the third crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of methodology ACM0001 /16/. **Step 2.2: Update the data and parameters** The parameters described were properly updated considering the latest versions of ACM0001 /16/ and tools /17/ - /28/.
Findings	CL 01 was raised and successfully closed. The findings are discussed in Appendix 04 of the validation report.

Conclusion	Validity of the baseline has been correctly assessed and the parameters are updated as per the Methodology Tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" /26/ in the PDD submitted for the renewal of crediting period.

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation	**Algorithms and/or formulae used to determine emission reductions** The various algorithm/formulae for calculating baseline and project emissions have been transparently documented in line with the requirements of ACM0001 version 19.0 /16/. Baseline emissions: Baseline emissions are estimated as the amount of methane that would have been destroyed/combusted during the year in project scenario ($BE_{CH4,y}$) and the net quantity of electricity produced using LFG times CO_2 emissions intensity of the baseline source of electricity displaced ($BE_{EC,y}$). No thermal energy is produced and no LFG is supplied to natural gas network as can be verified during the remote audit and in the landfill operation license /8/ and in the installation license for the electricity generation /10/. **Baseline emissions of methane from SWDS:** The methane from the El Molle landfill ($BE_{CH4,y}$) baseline emissions is given by the formula: $$BE_{CH4,y} = \left(1 - OX_{top-layer}\right) * \left(F_{CH4,PJ,y} - F_{CH4,BL,y}\right) * GWP_{CH4}$$ The fraction of methane that would be oxidized in the top layer of the SWDS in the baseline (OX_{top_layer}) of 0.1 is according to the ACM0001 recommendations /16/. As stated in the PDD /2/, there are no regulatory requirements on LFG capture and flaring. Following Table 3 of methodology ACM0001, there is no requirement to destroy methane as explained in section D3 of this report. However, during the operation of the landfill the captured LFG was only vented and partially flared in open flares and not used prior to the implementation of the project activity. Thus, there was an existing LFG capture and destruction system despite there is no obligation to destruct methane and such destruction was not monitored. As a consequence, the amount of methane in the LFG that would be flared in the baseline in year *y* ($F_{CH4,BL,y} = F_{CH4,BL,sys,y}$) is 20% of the amount of methane in the LFG which is captured in the project activity in year *y* ($F_{CH4,PJ,y}$) as resulted in the application of Case 3 in Step A.2 of the methodology ACM0001 version 19.0 /16/. $$F_{CH4,BL,y} = 0.2 \times F_{CH4,PJ,y}$$ For the *ex-ante* estimation, the amount of methane in the LFG which is flared and/or used in the project activity in year *y* ($F_{CH4,PJ,y}$) was estimated annually according the "Emissions from solid waste disposal sites*"* version 08.0 /19/. The $BE_{CH4,SWDS,y}$ (amount of methane in the LFG that is generated from the SWDS in the baseline scenario in the year y) is calculated as per the Application A of the tool considering the yearly amount of waste dumped and future entrances /6/ and the waste composition /7/ and is according to the tool "Emissions from solid waste disposal sites*"* version 08.0 /19/. The efficiency of the LFG capture system installed in the project activity (η_{PJ}) is estimated to be 75% according to a third-party study /38/. KBS has verified the calculation of $BE_{CH4,SWDS,y}$ and assumptions and evidences are correctly applied. $$BE_{CH4,SWDS,y} = \varphi_y \times (1 - f_y) \times GWP_{CH4} \times (1 - OX) \times \frac{16}{12} \times F \times DOC_{f,y}$$

$$\times MCF_y \times \sum_{x=1}^{y} \sum_{j} \left(W_{j,x} \times DOC_j \times e^{-k_j \times (y-x)} \times (1 - e^{-k_j}) \right)$$

For the *ex-post* determination, the amount of methane in the LFG which is flared and/or used in the project activity in year *y* ($F_{CH4,PJ,y}$) is determined by monitoring the quantity of methane actually flared and gas used to generate electricity. No thermal energy is produced and no methane is sent to the pipeline for feeding to the natural gas distribution network.

The amount of methane in the LFG which is destroyed by flaring in year *y* ($F_{CH4,flared,y}$) is determined based on quantity of landfill gas sent to the flare ($F_{CH4,sent\_flare,y}$) and the project emissions from flaring of the residual gas stream ($PE_{flare,y}$), calculated according to the "Project emissions from flaring", version 03.0 /21/.

$$F_{CH4,flared,y} = F_{CH4,sent_{flare},y} - \frac{PE_{flare,y}}{GWP_{CH4}}$$

Where:

$$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3}$$

The amount of methane in the LFG which is sent to the flare in year *y* ($F_{CH4,sent\_flare,y}$) is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 03.0 /23/. As described in the PDD, Option A (volume flow and volumetric fraction measured in dry basis) or Option B (volume flow on wet basis and volumetric fraction measured in dry basis) could be selected for the calculation. During the project operational monitoring, if not demonstrated that the temperature of the gaseous stream (T_t) is less than 60ºC (dry basis), then the flow measurement should be assumed to be on a wet basis and the option B should be applied instead of Option A.
The flare efficiency of the enclosed flare is determined as per Option B.1 or, if the biannual measurements are not available, Option A of the "Project emissions from flaring", version 03.0 /21/ will be used.

Baseline emissions associated with electricity generation:

The baseline emissions associated with the electricity generation in year *y* ($BE_{EC,y}$) is calculated as per the tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0 /20/.

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

Where,
$BE_{EC,y}$= Baseline emissions from electricity generation in year *y* (tCO2/yr);
$EC_{BL,k,y}$= $EG_{PJ,y}$= Net amount of electricity generated using LFG in year y(MWh/yr);
$EF_{EL,k,y}$= Emission factor for electricity generation for source k in year y (tCO2/MWh);
$TDL_{k,y}$= Average technical transmission and distribution losses for providing electricity to source k in year y. The technical transmission and distribution losses (TDLj,y) value has been assumed to be 20%, as per the tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0 /20/;
k= Sources of electricity generated identified in the selection of the most plausible baseline scenario.

Project participant choose Scenario A (Electricity consumption from the grid), Option A.1 where the combined margin emission factor of the applicable electricity system is determined using the procedures in the "Tool to calculate the emission factor for an electricity system" version 07.0 /22/.

The net amount of electricity generated using LFG in year y ($EC_{BL,k,y}$) was calculated according to the installed power of each generator of 1.5 MW, the plant load factor (92%) /39/ and the total generator working hours (8,760 hours). The net quantity of electricity is the total electricity generated minus the project internal consumption.

For the *ex-ante* estimation of emissions reduction, the electricity generated is estimated to be 1,689 MWh in the first year, 36,266 MWh in the five subsequent years and 34,677 MWh in the last year of the third crediting period, according to the CER estimation spreadsheet /3/.

The emission factor for electricity consumption for source *j* in year *y* ($EF_{EL,j,y}$) was calculated according to "Tool to calculate the emission factor for an electricity system" /22/.
KBS is able to confirm that the most recent information available by the National Energy Commission (2018, 2019 and 2020) /35/ was used to determine the baseline emission factor since the PDD was submitted on 18/11/2021 for starting the re-validation.

Operating Margin: The simple OM method was the option selected for the calculation of the operating margin (OM) applying ex-ante data vintage. This option was selected since the average share of low cost must run sources in the 5 most recent years is 43% and then less than 50% of the total electricity generation in Chile /35/.

Build Margin: The build margin (BM) emission factor will be determined applying Option 1 for data vintage. In line with Option 1, for the third crediting period, the build margin factor calculated for the second crediting period has been used.

According to the monitoring procedures established by the "Tool to calculate the emission factor for an electricity system" version 07.0 /22/, since the ex-ante option was chosen to determine OM, the emission factor will be determined once at the time of submission of the CDM-PDD to KBS for renewal of the crediting period.

Based on 2018, 2019 and 2020 data available at the time of submission of the request for renewal of the crediting period, OM emission factor was estimated to be 0.7102 tCO_2e/MWh

And BM emission factor calculated for the second crediting period is 0.2549 tCO_2e/MWh.

As a result, the combined margin (CM) emission factor used for estimating purposes of the emission reductions in the PDD is 0.3687 tCO_2e/MWh /4/, based on 0.25:0.75 weighting between OM and BM emission factor fixed for the third crediting period /22/. The same is in line with the tools applied.

Project emissions:
Project emissions are estimated as the sum of emissions from consumption of electricity from the grid due to the project activity in year y ($PE_{EC,y}$) and emissions from consumption of fossil fuels for purpose other than electricity generation in year y ($PE_{FC,y}$). No LFG is distributed using trucks or supplied to consumers through a dedicated pipeline as can be verified during the remote site visit.

$$PE_y = PE_{EC,y} + PE_{FC,y}$$

Project emissions due to electricity consumption:

Emissions from consumption of electricity ($PE_{EC,y}$) are calculated following the "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0 /20/.

The project emission from consumption of electricity will be from two sources:

- $PE_{EC1,y}$ - Grid (Chilean interconnected electric system);

- $PE_{EC2,y}$ - Diesel generator(s) (off-grid captive power plant)

$PE_{EC1,y}$ - Project emission from electricity consumption from the grid

The project will consume electricity from the grid. Therefore, Option A.1 of the scenario A was chosen, considering $EF_{EL,j/k/l,y} = EF_{grid,CM,y}$.

$$PE_{EC1,y} = EC_{PJ1,y} \times EF_{grid,CM,y} \times (1 + TDL_y)$$

$PE_{EC1,y}$= Project emissions from electricity consumption from the grid by the project activity during the year y (tCO_2/year);
$EC_{PJ1,y}$= quantity of electricity consumed from the grid by the project activity during the year y (MWh);
$EF_{grid,CM}$ the emission factor for the grid in year y (tCO_2/MWh)
$TDL_{j,y}$= 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

For the ex-ante estimative, PP is considering that in standard operation the electricity of LFG plant will be supplied by the LFG electricity power plant. As a result, in principle, there is no electrical consumption from the grid by the LFG plant and if there will be, it will be monitored.

$PE_{EC2,y}$ - Project emission from electricity consumption from an off-grid captive power plant (diesel generator(s)

As electricity will be consumed from diesel generators (off-grid captive power plant), a conservative approach was adopted and the option B2 of the scenario B was chosen because: "The electricity consumption source is a project or leakage electricity consumption source". Therefore, the value used will be 1.3 tCO_2/MWh for project emission from diesel generator(s).

$$PE_{EC2,y} = EC_{PJ2,y} \times EF_{diesel\_generator,y} \times (1 + TDL_y)$$

Where:

$EC_{PJ2,y}$ = quantity of electricity consumed from diesel generator by the project activity during the year y (MWh);
$EF_{diesel\_generator,y}$ = the emission factor for the diesel generator in year y (tCO_2/MWh);
TDLy = 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.

For the *ex-ante* estimation of emissions reduction, PP is considering that in standard operation the electricity of LFG plant will be supplied by the LFG electricity power plant itself. As a result, in principle, there is no electrical consumption from the diesel generator by the LFG plant and if there will be, it will be monitored.
A default value for TDL_y of 20% is considered as per the tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0 /20/.

KBS confirmed that this is in accordance with provisions in table 3 of the section 7.2 of Tool 05: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0 /20/.
The parameter will be monitored annually according to the tool /20/.

Project emissions due to fossil fuel consumption:

Emissions from consumption of fossil fuels for purpose other than electricity generation ($PE_{FC,y}$) are calculated following the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 03.0 /18/.
The emissions from consumption of fossil fuel are estimated based on the amount of LPG consumed for the flare ignition times the CO_2 emission coefficient of the fuel type. The CO_2 emission coefficient $COEF_{i,y}$ is calculated as per Option B of the tool considering the weighted average net calorific value of the fuel type and the weighted average CO_2 emission factor of the fuel type.

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

Where

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

A value for $NCV_{i,y}$ of 47.3 GJ/ton and $EF_{CO2,i,y}$ of 0.0656 tCO_2/GJ is considered as per 2006 IPCC Guidelines on National GHG Inventories /34/ (at the upper limit of the uncertainty at a 95% confidence interval following the Tool). The same is in line with methodology ACM0001 /16/.

Leakage:

No leakage effects need to be accounted under the methodology used.

However, experiences with other landfills have shown that the methane generation and collection efficiency of the landfills projected by the first order decay model has an inherent uncertainty of almost 50% and hence the amount of CERs, which will be monitored *ex-post*, might vary from the projected amount. No other project emission or leakage sources contributing more than 1% and not mentioned by the methodology have been found.

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 calculated to be 149,468 tCO2e per year for the selected crediting period.

ER = 149,468 tCO2e/ year

Estimation of GHG emissions
Emission reductions are directly monitored and calculated *ex-post*, using the approach indicated in the methodology ACM0001 version 19.0 /16/.
Baseline emissions:
As explained above, baseline emissions are estimated as the amount of methane that would have been destroyed/combusted during the year in project scenario ($BE_{CH4,y}$) and the net quantity of electricity produced using LFG times CO_2 emissions intensity of the baseline source of electricity displaced ($BE_{EC,y}$).
For the *ex-ante* estimation, the amount of methane in the LFG which is flared and/or used in the project activity in year *y* ($F_{CH4,PJ,y}$) is estimated to be:

Year	$F_{CH4,PJ,y}$ (tCH_4/year)
From 15/12/2020	259
2021	6,124
2022	6,659
2023	7,175
2024	7,675
2025	8,159
2026	8,629
Until 14/12/2027	8,686

The annual estimation results are presented in the spreadsheet /3/. The $BE_{CH4,SWDS,y}$ (amount of methane in the LFG that is generated from the SWDS in the baseline scenario in the year y) is calculated as:

Year	$BE_{CH4,SWDS,y}$ (tCO_2/year)

From 15/12/2020	8,649
2021	204,144
2022	221,958
2023	239,175
2024	255,834
2025	271,971
2026	287,620
Until 14/12/2027	289,539

KBS has verified the calculation of $BE_{CH4,SWDS,y}$ and assumptions and evidences are correctly applied /3/.
For the *ex-ante* estimation, the amount of methane in the LFG that would be flared in the baseline in year *y* ($F_{CH4,BL,y}$) is estimated to be:

Year	$F_{CH4,BL,y}$ (tCH_4/year)
From 15/12/2020	52
2021	1,225
2022	1,332
2023	1,435
2024	1,535
2025	1,632
2026	1,726
Until 14/12/2027	1,737

The amount of methane in the LFG which is destroyed by flaring in year *y* ($F_{CH4,flared,y}$) is determined based on quantity of landfill gas sent to the flare ($F_{CH4,sent\_flare,y}$) and the project emissions from flaring of the residual gas stream ($PE_{flare,y}$), calculated according to the "Project emissions from flaring", version 03.0 /21/.

The amount of methane in the LFG which is sent to the flare in year *y* ($F_{CH4,sent\_flare,y}$) is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" version 03.0 /23/. As described in the PDD, Option A (volume flow and volumetric fraction measured in dry basis) or Option B (volume flow on wet basis and volumetric fraction measured in dry basis) could be selected for the calculation. The burning efficiency in the enclosed flares will be determined as per Option B.1 or Option A (in case Option B.1 is not available.) of the "Project emissions from flaring", version 03.0 /21/.
Thus, baseline emissions of methane from the SWDS are estimated as:

Year	$BE_{CH4,y}$ (tCO_2/year)
From 15/12/2020	4,541
2021	107,175
2022	116,527
2023	125,567
2024	134,313
2025	142,784
2026	151,000
Until 14/12/2027	152,008

For the *ex-ante* estimation, the net amount of electricity generated using LFG in year *y* ($EC_{BL,k,y}$) is estimated to be:

Year	Electricity generated in the plant (MWh)
From 15/12/2020	1,689
2021	36,266
2022	36,266
2023	36,266
2024	36,266
2025	36,266
2026	36,266
Until 14/12/2027	34,677

Based on 2018, 2019 and 2020 data available at the time of submission of the request for renewal of the crediting period, OM emission factor was estimated to be 0.7102 tCO_2e/MWh /35/ and BM emission factor calculated for the second crediting period is 0.2549 tCO_2e/MWh /1/. As a result, the combined margin (CM) emission factor used for estimating purposes of the emission reductions in the PDD is 0.3687 tCO_2e/MWh.
The baseline emissions associated with electricity generation was estimated as:

Year	$BE_{EC,y}$ (tCO_2/yr)
From 15/12/2020	747
2021	16,046
2022	16,046
2023	16,046
2024	16,046
2025	16,046
2026	16,046
Until 14/12/2027	15,342

Thus, the total baseline emissions are estimated in:

Year	BE_y (tCO_2/year)
From 15/12/2020	5,288
2021	123,221
2022	132,573
2023	141,613
2024	150,359
2025	158,830
2026	167,046
Until 14/12/2027	167,350

Project emissions:

Project emissions from flaring:

Based on the parameters discussed in previous sections of the report, there are no projects emissions due to flaring for the 3rd crediting period since the flare is deactivated:

Year	$PE_{flare,y}$ (tCO_2/year)
From 15/09/2020	0
2021	0
2022	0
2023	0
2024	0
2025	0
2026	0
Until 14/09/2027	0

Project emissions are estimated as the sum of emissions from flaring ($PE_{flare,y}$), emissions from consumption of electricity due to the project activity in year y ($PE_{EC,y}$) and emissions from consumption of fossil fuels for purpose other than electricity generation in year y ($PE_{FC,y}$).
The emissions from electricity consumption from the grid are estimated based on the amount of electricity consumed by the project activity ($EC_{PJ,1,y}$) times the grid emission factor and transmission and distribution losses.
A value for $EF_{EL,j,y}$ of 0.3687 tCO_2e/MWh /35/ and for TDL_y of 20% is considered as per "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0 /20/.
The amount of electricity consumed by the project activity, considering that the power plant will be able to supply both the requirements of the power plant and the blowers required to collect the LFG, is estimated to be:

Year	$EC_{P1,y}$ (MWh)
From 15/12/2020	0
2021	0
2022	0
2023	0
2024	0
2025	0
2026	0
Until 14/12/2027	0

The emissions from electricity consumption from the diesel generator are estimated based on the amount of electricity consumed by the project activity ($EC_{PJ,2,y}$) times the emission factor from the diesel generator and transmission and distribution losses.
A value for $EF_{EL,j,y}$ of 1.3 tCO_2e/MWh and for TDL_y of 20% is considered as per "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" version 03.0 /20/.
The amount of electricity consumed by the project activity is estimated to be:

Year	$EC_{P2,y}$ (MWh)
From 15/12/2020	0
2021	0

2022	0
2023	0
2024	0
2025	0
2026	0
Until 14/12/2027	0

Thus, project emissions from consumption of electricity are estimated as:

Year	$PE_{EC,y}$ (tCO_2/year)
From 15/12/2020	0
2021	0
2022	0
2023	0
2024	0
2025	0
2026	0
Until 14/12/2027	0

The emissions from consumption of fossil fuels for purpose other than electricity generation ($PE_{FC,y}$) are estimated based on the amount of LPG consumed for the flare ignition times the CO_2 emission coefficient of the fuel type. The CO_2 emission coefficient $COEF_{i,y}$ is calculated as per Option B of the tool considering the weighted average net calorific value of the fuel type and the weighted average CO2 emission factor of the fuel type.

A value for $NCV_{i,y}$ of 47.3 GJ/ton and $EF_{CO2,i,y}$ of 0.0656 tCO_2/GJ is considered as per 2006 IPCC Guidelines on National GHG Inventories /34/ (at the upper limit of the uncertainty at a 95% confidence interval following the Tool), respectively. The amount of LPG consumed by the project activity is estimated to be 0 kg/year.

Year	$PE_{FC,y}$ (tCO_2/year)
From 15/12/2020	0
2021	0
2022	0
2023	0
2024	0
2025	0
2026	0
Until 14/12/2027	0

Thus, the total project emissions are estimated in:

Year	PE_y (tCO_2/yr)
From 15/12/2020	0
2021	0
2022	0

	2023: 0 2024: 0 2025: 0 2026: 0 Until 14/12/2027: 0 Leakage emissions: No leakage effects need to be accounted under the methodology used. The project activity is estimated to result in 149,468 tCO2e per year of emission reductions annually throughout the 7-year renewable crediting period.
Findings	CAR 01 and CL 02 were raised and successfully closed. The findings are discussed in Appendix 04 of the validation report.
Conclusion	The assessment team confirms that: • 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, leakage and emission reductions; • All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD. It is KBS's opinion, that the project participants are able to implement the monitoring plan in compliance with para 412 (a) (iv) of VVS for PA version 03 /12/.

D.5. Validity of monitoring plan

Means of validation	The project applies the approved monitoring methodology ACM0001 (version 19.0) –Flaring or use of landfill gas /16/. The project monitoring plan is in compliance with the monitoring methodology ACM0001 (version 19.0) /16/. Parameters determined ex-ante The following parameters are made available *ex-ante*: According to ACM0001 version 19.0 /16/: - The fraction of methane that would be oxidized in the top layer of the SWDS in the baseline (OX_{top_layer}) of 0.1 is according to the ACM0001 /16/; - The GWP_{CH4} (global warming potential - GWP) of 25 t $CO_2e/t\ CH_4$ (is in accordance with Standard for application of the global warming potentials to clean development mechanism project activities for the second commitment period of the Kyoto protocol /29/ /34/; - The $\eta_{P,J}$ (efficiency of the LFG captured system that will be installed in the project activity) of 75% is correctly applied according to third party study /38/. According "Emissions from solid waste disposal sites" version 08.0 /19/: - The φ (default value for the model correction factor to account for model uncertainties), the value correctly applied 0.75 for the SWDS located in boreal and temperate climate according mean annual temperature (13.4°C), mean annual precipitation (25 mm) and potential evapotranspiration (41.82) – dry climate /33/. Value chosen is according to the "Emissions from solid waste disposal sites" version 08.0 /19/ and was confirmed by KBS; - OX (oxidation factor), value correctly applied 0.1 for solid waste disposal sites that are covered with oxidizing material such as soil or other material, KBS has verified during the remote audit conducted that it is covered with soil; - F (fraction of methane in the SWDS gas), the value correctly applied 0.5 according to "Emissions from solid waste disposal sites" version 08.0 /19/;

- $DOC_{f,default}$ (default value for the fraction of degradable organic carbon (DOC) in MSW that can decompose in the SWDS), the value correctly applied 0.5 according to the "Emissions from solid waste disposal sites" version 08.0 /19/;
- $MCF_{default}$ (methane correction factor), value correctly applied 1.0 is used for anaerobic managed solid waste disposal sites that have controlled placement of waste as per IPCC 2006 Guidelines /34/;
- DOC_j (fraction of degradable organic carbon (by weight) in the waste type *j*), values correctly applied for wet waste according to IPCC 2006 Guidelines /34/. The values applied are:

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

- k_j (decay rate for the waste type j): values applied according mean annual temperature (13.4°C), mean annual precipitation (25 mm) and potential evapotranspiration (41.82) – dry climate. Climate data was confirmed by KBS /33/. The values used are:

Waste type *j*		**k_j (1/yr)**
Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04
	Wood, wood products and straw	0.02
Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05
Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco.	0.06

- f_y: Fraction of methane captured at the SWDS and flared, combusted or used in another manner. Value 0 is correctly applied as per recommendations of ACM0001 version 19.0 /16/;
- Waste composition: The fraction of waste type is according to the landfill study done by a third-party company /7/. The values were verified by KBS and are:

Composition of waste	
A) Wood and wood products	0.00%
B) Pulp, paper and cardboard (other than sludge)	8.00%
C) Food, food waste, beverages and tobacco (other than sludge)	72.00%
D) Textiles	0.00%
E) Garden, yard and park waste	0.00%
F) Glass, plastic, metal, other inert waste	20.00%
TOTAL	**100.00%**

According to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" version 03.0 /23/:

- MM_i: The molecular mass of greenhouse gas methane is 16.04 kg/kmol is according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /23/ application criteria as the methane is the greenhouse

gas considered and the remaining gases are pure nitrogen for simplification.

- R_u: The universal ideal gases constant used is 8,314 Pa.m^3/kmol.K is according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /23/.
- MM_k: The molecular mass of gas k is according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /23/.

Compound	Structure	Molecular mass (kg/kmol)
Nitrogen	N_2	28.01

- MM_{H2O}: The molecular mass of water is 18.0152 kg/kmol is according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /23/.

According to the "Project emissions from flaring" version 03.0 /21/:

- $SPEC_{flare}$: The estimated manufacturer's flare specifications for temperature is 1,200°C (maximum), for flow rate is 10,000 Nm^3/h (maximum).
- P_{ref}: The atmospheric pressure at reference conditions is 101,325 Pa is according to the "Project emissions from flaring" /21/.
- T_{ref}: The temperature at reference conditions is 273.15 K is according to the "Project emissions from flaring" /21/.

According to the "Tool to calculate the emission factor for an electricity system" version 07.0 /22/:

- $EF_{grid,CM,y}$ (CO_2 emission factor of the Chilean grid) the value correctly applied 0.3687 tCO2e/MWh based on information available at National Energy Commission /35/.

Parameters monitored ex-post:

The monitoring plan allows for collection and archiving of the following key parameters related to the determination of emission reductions resulting from the project activity:

According to ACM0001 version 19.0 /16/:

- Management of SWDS will be monitored annually;
- $O_{pj,h}$: Operation of the equipment that consumes the LFG: Operation of the flare will be measured every minute by flame detector and temperature meter while for electricity generated data will be measured based on energy meters readings. No value is expected for the purpose of *ex-ante* emission reduction calculations. The calibration is not applicable since it is a device integrated with the operational software at the landfill gas plant.

  $EG_{PJ,y} = EC_{BL,k,y}$: Amount of electricity generated using LFG by the project activity in year *y* will be measured continuously by an electricity meter. The electricity meter will be calibrated according to manufacturer's specification. The values applied for the purpose of calculating *ex-ante* emission reduction were verified by KBS and are correct. The electricity generation readings will be double checked by the electricity distribution company.

According to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 03.0 /23/:

- $V_{t,db}$: Volumetric flow of the gaseous stream in time interval *t* on a dry basis (m^3/h). The flow will be measured with a flow meter. There will be a flow meter installed for each component of the project i.e., for flare line and electricity generators line. The flow will be measured continuously and data will be hourly aggregated. The flow meter will be calibrated according to manufacturer's recommendations. No values are expected for *ex-ante* estimation of the emission reduction since the parameter is not used for *ex-ante* calculations. This parameter may be monitored only in case Option A is used;

	- $V_{t,wb}$: Volumetric flow of the gaseous stream in time interval *t* on a wet basis (m^3/h). The flow will be measured with a flow meter. There will be a flow meter installed for each component of the project i.e., for flare line and electricity generators line. The flow will be measured continuously and data will be hourly aggregated. The flow meter will be calibrated according to manufacturer's recommendations. No values are expected for *ex-ante* estimation of the emission reduction since the parameter is not used for *ex-ante* calculations. This parameter may be monitored only in case Option B is used; - $v_{i,t,db}$: Volumetric fraction of greenhouse gas *i* in a time interval *t* in a dry basis the value correctly applied 50% according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 03.0 /23/. The methane gas fraction will be measured continuously by an on-site gas analyser and data will be hourly aggregated. The equipment will be calibrated according to manufacturer's recommendations. The calibration involves a zero check with an inert gas (nitrogen) and verification with a bottled standard gas. This parameter may be monitored only in case Option A is used; - $v_{i,t,wb}$: Volumetric fraction of greenhouse gas *i* in a time interval *t* in a wet basis the value correctly applied 50% according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 03.0 /23/. The methane gas fraction will be measured continuously by an on-site gas analyser and data will be hourly aggregated. The equipment will be calibrated according to manufacturer's recommendations. The calibration involves a zero check with an inert gas (nitrogen) and verification with a bottled standard gas. This parameter may be monitored only in case Option B is used; - T_t: temperature of the gaseous stream in time internal *t*. The temperature of the landfill gas will be measured by an instrument with recordable electronic signal in order to guarantee that gas temperature at the point of flow measurement is not above 60°C, as per the conditions to adopt dry basis calculations. Nonetheless, temperature will be monitored continuously. The equipment will be calibrated according to manufacturer's recommendations. - P_t: Pressure of the gaseous stream in time interval *t*. The pressure of the gaseous stream will be measured by an instrument with recordable electronic signal. The equipment will be calibrated according to manufacturer's recommendations. No values are expected for *ex-ante* estimation of the emission reduction since the parameter is not used for *ex-ante* calculations. - Status of biogas destruction device: Operational status of biogas destruction devices. Continuous monitoring and documenting may be undertaken by recording the energy production from methane captured or the operation of the flare by means of a flame detector to demonstrate the actual destruction of methane; - $P_{H2O,t,Sat}$: Saturation pressure of H_2O at temperature T_t in time interval t. This parameter is solely a function of the gaseous stream temperature T*t* and can be found at reference [1] of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 03.0 /23/ for a total pressure equal to 101,325 Pa. According to the "Project emissions from flaring", version 03.0 /21/: - $F_{CH4,EG,t}$: Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t will be measured biannually by a third party accredited entity. Measures of the mass flow of methane in the exhaust gas carried out according to an appropriate international standard (USEPA). The time period t over which the mass flow is measured must be at least one hour. The average flow rate to the flare during the time period t must be greater than the average flow rate observed for the previous six months The accuracy and uncertainty characteristics of the monitoring equipment will be under responsibility of the third party accredited entity.

	- $T_{EG,m}$: Temperature in the exhaust gas of the enclosed flare in minute *m* will be measured once per minute by thermocouple type N, as per the tool recommendations /21/. No value is expected for the purpose of *ex-ante* emission reduction calculations. The thermocouple will be replaced or calibrated yearly. - $Flame_m$: Flame detection of flare in the minute *m* will be measured once per minute by an ultra violet flame detector. No value is expected for the purpose of *ex-ante* emission reduction calculations. No calibration is required as per manufacturer's specification. - $Maintenance_y$: Maintenance events completed in year *y* will be measured daily and kept in a maintenance log for two year beyond the life of the flare. No value is expected for the purpose of *ex-ante* emission reduction calculations. The dates should be compared to the maintenance schedule to check that maintenance events were completed within the minimum time between maintenance events specified by the manufacture. According to "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", version 03.0 /20/: - $TDL_{j,y}$: Average technical transmission and distribution losses for providing electricity to source *j* in year *y*. The default value is chosen as per "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" /20/. The parameter will be monitored annually according to the same tool. - $EG_{EC1,y} = EC_{PJ,1,y}$: Quantity of electricity consumed from the grid by the project activity during the year *y* will be measured continuously by an electricity meter. The electricity meter will be calibrated according to manufacturer's specification. Monthly electrical bills charged to the project will be monitored and can be considered as the actual energy consumption for the project. The values applied for the purpose of calculating ex-ante emission reduction were verified by KBS and are correct. - $EG_{EC2,y} = EC_{PJ,2,y}$: Quantity of electricity consumed from diesel generator by the project activity during the year *y* will be measured continuously by an electricity meter. The electricity meter will be calibrated according to manufacturer's specification. Monthly electrical bills charged to the project will be monitored and can be considered as the actual energy consumption for the project. The values applied for the purpose of calculating ex-ante emission reduction were verified by KBS and are correct. According to "Tool to calculate the emission factor for an electricity system" version 07.0 /22/: - $EF_{grid,OM-adj,y}$: The operating margin emission factor will be determined ex-post based on the most recent information available by the National Energy Commission /35/ ; the detailed calculations of the combined margin emission factor are described in section D.4. According to "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 03.0 /18/: - $FC_{i,j,y}$: Quantity of LPG combusted in pilot flames of flares during the year *y* will be measured continuously by invoices of LPG suppliers. The values applied for the purpose of calculating ex-ante emission reduction were verified by KBS and are correct. - $NCV_{i,y}$: Weighted average net calorific value of fossil fuel *i* in year y is 47.3 GJ/ton as per IPCC 2006 /34/. Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or

	c) should have ISO17025 accreditation or justify that they can comply with similar quality standards. - $EF_{CO2,i,y}$: Weighted average CO_2 emission factor of LPG in year y is 0.0656 tCO_2/GJ as per IPCC 2006 /34/. Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. Management system and quality assurance Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports and calibration are defined in the PDD. The monitoring plan contains all necessary parameters described in accordance with the monitoring methodology. The monitoring plan, including data management and QA/QC procedures, will give opportunity for real measurements of achieved emission reductions, which can hence be reported *ex-post* and verified. The application of the monitoring methodology is transparent and KBS considers the project participants able to implement the monitoring plan.
Findings	CL 03, CL 04, CL 05, CL 06 and CAR 02, were raised and successfully closed. The findings are discussed in Appendix 04 of the validation report. FAR 01 was raised and shall be checked during subsequent verification.
Conclusion	It is KBS's opinion, that the project participants are able to implement the monitoring plan in compliance with para 412 (a) (iv) of VVS for PA version 03 /12/.

D.6. Crediting period

Means of validation	The third crediting period starts from 15/12/2020, in line with the end of the second crediting period which ends on 14/12/2020.
Findings	No findings have been raised.
Conclusion	KBS confirmed that the third crediting period of the registered CDM project activity commences on the day immediately after the expiration of the current crediting period in compliance with para 412 (a) (v) of VVS for PA version 03 /12/.

D.7. Project participants

Means of validation	The involved parties are Chile as the host Party and Switzerland as Annex I Party. The project participants are Gestión Integral de Residuos SpA of Chile and First Climate (Switzerland) AG of Switzerland. The Project participants are listed in section A.4 of the PDD and the information is consistent with the contact details in Appendix 1 of the PDD. KBS verified the Modalities of Communication statement provided at the UNFCCC website /37/ and confirmed that the name of the project participants included after the registration of the project activity is in accordance with the document assessed.
Findings	No findings have been raised.
Conclusion	KBS verified that the project participants included in the updated PDD are consistent with the names of the project participants in the project view page and are the same as 2nd crediting period in compliance with para 412 (a) (vi) of VVS for PA version 03 /12/. The project participant First Climate (Switzerland) AG of Switzerland was included after the registration of the project activity and confirmed at UNFCCC website /37/.

D.8. Post-registration changes

Type of post-registration changes (PRCs)	Confirmation (Y/N)	Validation report for PRCs	
		Version	Completion date
Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents[1]	N	NA	NA
Corrections	N	NA	NA
Change to the start date of the crediting period	N	NA	NA

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

Inclusion of a monitoring plan	N	NA	NA
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents	N	NA	NA
Changes to the project design	N	NA	NA
Changes specific to afforestation and reforestation project activities	NA	NA	NA

SECTION E. Internal quality control

Following the completion of the assessment process and a recommendation by the assessment team, the validation opinion prepared by Team Leader is independently reviewed by internal Technical Reviewer. TR reviews if all the KBS procedures have been followed and all conclusions are justified in accordance with applicable standards, procedures, guidance and CDM decisions. The TR either is qualified for the technical area within the CDM sectoral scope(s) applicable to project activity or is supported by qualified independent technical expert at this stage.

The Technical Reviewer will either accept or reject the recommendation made by the assessment team. The findings can be raised at this stage and PP must resolve them within agreed timeline.

The opinion recommended by Technical Reviewer will be confirmed by Manager Technical & Certification and finally authorized by the Managing Director on behalf of KBS as final validation opinion. The Technical Reviewer and Manager T&C maybe be same person.

SECTION F. Validation opinion

KBS Certification Services Pvt. Ltd. has been contracted by 'Gestión Integral de Residuos SpA' to perform a re-validation of the CDM registered project 'El Molle – Landfill gas (LFG) capture project (UNFCCC Ref #0170) in Chile for renewal of crediting period.

The validation was performed in accordance with the UNFCCC criteria for the Clean Development Mechanism, latest version of Validation and Verification Standard for project activities and related Standards/Guidance and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The CDM project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change. In our opinion, the project meets all relevant UNFCCC, CDM criteria and all relevant host country criteria.

.

The review of the project design documentation and the subsequent follow-up interviews have provided validation team with sufficient evidence to determine the validity of the original baseline and/or its update through an assessment. The project design document (dated 08/12/2021) correctly applies large scale methodology ACM0001 version 19.0. It is demonstrated that the project's baseline scenario is not changed and also all necessary parameters are updated correctly for the 3rd crediting period.

The total emission reductions from the project are estimated to be 1,046,273 tCO_2e for the 3rd crediting period of 15/12/2020 to 14/12/2027, averaging 149,468 tCO2e annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achievable given the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design, and it is validation team's opinion that the project participants are able to implement the monitoring plan.

In summary, it is validation team's opinion that the CDM project activity "El Molle – Landfill gas (LFG) capture project" (UNFCCC Ref #0170) in Chile meets all relevant UNFCCC requirements for the renewal of the crediting period. Hence KBS requests the renewal of the crediting period of the project.

Appendix 1. Abbreviations

Abbreviations	Full texts
BE	Baseline Emissions
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CM	Combined Margin
CO_2	Carbon dioxide
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
KBS	KBS Certification Services Pvt. Ltd.
LFG	Landfill Gas
OM	Operating Margin
PDD	Project Design Document
PE	Project Emissions
PP	Project Participant
PRC	Post registration change
PS	Project Standard
PCP	Project Cycle Procedure
RCP	Renewal of Crediting period
SWDS	Solid Waste Disposal Site
QA/QC	Quality Assurance/Quality Control
tCO_{2e}	Tonnes of CO_2 equivalents
T&C	Technical & Certification
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation & Verification Standard

Appendix 2. Competence of team members and technical reviewers

Personnel Name:		**Andrea Leiroz**	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☐
Technical Reviewer	☐	Local Expert	☒
Area(s) of Technical Expertise			
Sectoral Scope		**Technical Area**	
Energy industries (renewable/non-renewable sources)		TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	

	TA 1.2: Energy generation from renewable energy sources
Waste handling and disposal	TA 13.1. Solid waste and wastewater TA 13.2. Manure
Approved by (Manager C & T)	Sanjay Kandari
Approval date:	17/12/2018

Personnel Name:		**Sapana Pednekar**	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☐
Technical Reviewer	☒	Local Expert (India)	☒
Area(s) of Technical Expertise			
Sectoral Scope		**Technical Area**	
Energy industries (renewable/non-renewable sources)		TA 1.2: Energy generation from renewable energy sources	
Approved by (Manager C & T)		Shikha Sharma	
Approval date:		18/11/2021	

Personnel Name:		**Tushar Chaudhari**	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☒
Technical Reviewer	☒	Local Expert (India)	☒
Area(s) of Technical Expertise			
Sectoral Scope		**Technical Area**	
Energy Industries (renewable/non-renewable sources)		TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	
Energy industries (renewable/non-renewable sources)		TA 1.2: Energy generation from renewable energy sources	
Energy demand		TA 3.1. Energy Demand	
Waste Handling and Disposal		TA 13.1 Waste Handling and Disposal	
Approved by		Manager Competency & Training	
Approval date:		02/09/2020	

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
/1/	Gestión Integral de Residuos SpA	CDM-PDD for Project activity "El Molle – Landfill gas (LFG) capture project" in Chile for the second crediting period.	Version 12 of 09/07/2018	UNFCCC Website
/2/	Gestión Integral de Residuos SpA	CDM-PDD for Project activity "El Molle – Landfill gas (LFG) capture project" in Chile for the third crediting period.	Version 13 of 18/11/2021 Version 14 of 02/12/2021 Version 15 of 08/12/2021	Project participant
/3/	Gestión Integral de Residuos SpA	Emission reduction spreadsheet for the project activity "El Molle – Landfill gas (LFG) capture project" in Chile: El Molle 3rd CP CER Spreadsheet v4 2021 10 27 JAS and El Molle 3rd CP CER Spreadsheet v5 2021 12 02 JAS AV.	Version 4 of 27/10/2021 Version 5 of 02/12/2021 Version 6 of 08/12/2021	Project participant
/4/	Gestión Integral de Residuos SpA	Grid emission factor calculation spreadsheet. El Molle - Emission factor SEN_2020 2019 2018 – AV.xlsx	-	Project participant
/5/	Earthood Services Private Limited	Validation opinion on changes in PDD for Project activity "El Molle – Landfill gas (LFG) capture project" in Chile for the second crediting period.	Version 1.0 of 11/07/2018	UNFCCC Website
/6/	Gestión Integral de Residuos SpA	Waste quantities in landfill. Internal reports with historical waste data and estimates.	-	Project participant
/7/	SGS	Waste composition in landfill. Report DIAGNÓSTICO DE LA SITUACIÓN POR COMUNA Y POR REGIÓN EN MATERIA DE RSD Y ASIMILABLES. 4.7_region_de_valparaiso_agosto_2018.pdf	03/07/2018	
/8/	Commission of Environmental Assessment	Environmental Approval: Approval of Environmental Impact Declaration, with attachment (12/11/2014) and complementary attachment (09/03/2015). Document: 20150407-RCA-Resolución Exenta 126-2015-Central Generación.pdf	07/04/2015	Project participant
/9/	Commission of Environmental Assessment	Environmental license for the landfill #271/2008.	24/03/2008	Project participant
/10/	Regional Secretary of Ministry of Health	Environmental license: Amendment 30/08/2013 of Operation license of the landfill – Resolution 2651.	30/08/2013	Project participant
/11/	Gestión Integral de Residuos SpA	Declaration confirming that there is no recycle center for the organic material in the landfill and that recycling of organic waste is not part of the operational procedures.	20/05/2021	Project participant
/12/	CDM Executive Board	Clean Development Mechanism Validation and Verification Standard for project activities.	Version 03.0 of 09/09/2021	UNFCCC Website

No.	Author	Title	References to the document	Provider
/13/	CDM Executive Board	Clean Development Mechanism Project Standard for project activities.	Version 03.0 of 09/09/2021	UNFCCC Website
/14/	CDM Executive Board	Clean Development Mechanism Project Cycle Procedure for project activities.	Version 03.0 of 09/09/2021	UNFCCC Website
/15/	CDM Executive Board	CDM-PDD-FORM: Project design document form.	Version 12.0 of 08/10/2021	UNFCCC Website
/16/	CDM Executive Board	Large-scale Consolidated Methodology ACM0001: Flaring or use of landfill gas.	Version 19.0 of 14/06/2019	UNFCCC Website
/17/	CDM Executive Board	TOOL02: Methodological tool: Combined tool to identify the baseline scenario and demonstrate additionality.	Version 07.0 of 22/09/2017	UNFCCC Website
/18/	CDM Executive Board	TOOL03: Methodological tool: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion.	Version 03.0 of 22/09/2017	UNFCCC Website
/19/	CDM Executive Board	TOOL04: Methodological tool: Emissions from solid waste disposal sites.	Version 08.0 of 04/05/2017	UNFCCC Website
/20/	CDM Executive Board	TOOL05: Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation.	Version 03.0 of 22/09/2017	UNFCCC Website
/21/	CDM Executive Board	TOOL06: Methodological tool: Project emissions from flaring.	Version 03.0 of 28/03/2019	UNFCCC Website
/22/	CDM Executive Board	TOOL07: Methodological tool: Tool to calculate the emission factor for an electricity system.	Version 07.0 of 31/08/2018	UNFCCC Website
/23/	CDM Executive Board	TOOL08: Methodological tool: Tool to determine the mass flow of a greenhouse gas in a gaseous stream.	Version 03.0 of 27/11/2015	UNFCCC Website
/24/	CDM Executive Board	TOOL09: Methodological tool: Determining the baseline efficiency of thermal or electric energy generation systems.	Version 03.0 of 12/06/2020	UNFCCC Website
/25/	CDM Executive Board	TOOL10: Methodological tool: Tool to determine the remaining lifetime of equipment.	Version 01 of 16/10/2009	UNFCCC Website
/26/	CDM Executive Board	TOOL11: 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 of 02/03/2012	UNFCCC Website
/27/	CDM Executive Board	TOOL12: Methodological tool: Project and leakage emissions from transportation of freight.	Version 01.1.0 of 23/11/2012	UNFCCC Website
/28/	CDM Executive Board	TOOL 32: methodological tool: Positive lists of technologies.	Version 03.0 of 27/05/2021	UNFCCC Website
/29/	CDM Executive Board	Standard for application of the global warming potentials to clean development mechanism project activities and programmes of activities for the second commitment period of the Kyoto protocol.	Version 01.0, EB69, annex 3	UNFCCC Website
/30/	CDM Executive Board	Large-scale Consolidated Methodology ACM0001: Flaring or use of landfill gas.	Version 02 of 29/09/2005	UNFCCC Website

No.	Author	Title	References to the document	Provider
/31/	CDM Executive Board	Large-scale Consolidated Methodology ACM0001: Flaring or use of landfill gas.	Version 18.1 of 04/05/2017	UNFCCC Website
/32/	National Congress of Chile	Basic sanitary and safety conditions in sanitary landfills. Decree #12305. Available at: https://www.bcn.cl/leychile/navegar?idNorma=268137	05/01/2008	Chilean Government Website
/33/	Chile's Meteorological Directorate - Climate Services	Mean annual temperature, precipitation and potential evapotranspiration for Valparaíso region. Available at: https://climatologia.meteochile.gob.cl/application/requerimiento/producto/RE3002 https://climatologia.meteochile.gob.cl/application/informacion/listadoDeComponentesDeUnElemento/330007/152 https://climatologia.meteochile.gob.cl/application/requerimiento/producto/RE2009	-	Project participant
/34/	Intergovernmental Panel on Climate Change (IPCC)	Fourth Assessment Report: Climate Change 2007. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter2-1.pdf.	Assessed on 07/12/2021	IPCC Website
/35/	National Energy Commission (CNE)	Carbon Emission Factor for the National Grid. Available at: https://www.cne.cl/en/normativas/electrica/consulta-publica/electricidad/ Generacion_Bruta.xlsx Capacidad_Instalada_Generacion.xlsx	-	CNE Website
/36/	CDM Executive Board	CDM Executive Board agrees to relax mandatory site visits by DOEs for a period of three months (23 March to 23 June 2020) because of COVID-19. The Executive Board of the Clean Development Mechanism (CDM) agreed on 23 June 2020 to, on an exceptional basis, considering the COVID-19 pandemic, to extend the period in which CDM Designated Operational Entities (DOEs) may apply alternative measures of validation/verification to mandatory on-site inspections until 31 December 2020. The Executive Board of the Clean Development Mechanism (CDM), as its 108th meeting, agreed to further extend the period in which DOEs may apply alternative measures of validation/verification to mandatory on-site inspections until 30 June 2021. The Executive Board of the Clean Development Mechanism (CDM), as its 110th meeting, agreed to further extend the period in which DOEs may	23/03/2020 23/06/2020 14/12/2020 27/05/2021	UNFCCC Website

No.	Author	Title	References to the document	Provider
		apply alternative measures of validation/verification to mandatory on-site inspections until 31 December 2021.		
/37/	CDM Executive Board	UNFCCC website for the project activity: https://cdm.unfccc.int/Projects/DB/DNV-CUK1134475476.36/view.		UNFCCC Website
/38/	BiothermicaTechnologies Inc.	Efficiency of the LFG capture system: third-party report – LFG Collection and Valorization at El Molle Landfill Site, Valparaíso, Chile.	12/06/2004	Project participant
/39/	Stericycle	Electric Generation Plant Operation Summary.	-	Project participant
/40/	Finning CAT	Group generators commissioning date: • EL MOLLE-PROTOCOLOS GENERADOR Nº1.PDF; • EL MOLLE-PROTOCOLOS GENERADOR Nº2.PDF; • EL MOLLE-PROTOCOLOS GENERADOR Nº3.PDF.	12/01/2016	Project participant
/41/	National Electric Coordinator (CNE)	Group generators commercial operation starting date: reporte_centrales.xlsx. Available at: https://infotecnica.coordinador.cl/instalaciones/centrales?id_propietario=373.	-	CNE website

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

Table 1. CL from this validation

CL ID	01	**Section no.**	D.3	**Date:** 30/11/2021
Description of CL				
PDD – Section B.4: The assessment of the relevant mandatory national and/or sectoral polices applicable to the project activity which came into effect after the submission of the project activity for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period is not transparent.				
Project participant response				**Date:** 02/12/2021
This section has been revised in order to contextualize relevant mandatory national and/or sectoral polices applicable to the project activity.				
Documentation provided by project participant				
Revised PDD.				
DOE assessment				**Date:** 02/12/2021
KBS verified that section B.4 of the PDD was revised and an assessment of the relevant mandatory national and/or sectoral polices applicable to the project activity was provided. This CL is closed.				

CL ID	02	**Section no.**	D.4	**Date:** 30/11/2021
Description of CL				
As stated in the ERs spreadsheet, the amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t) is defined as per internal report of the landfill. Provide evidence to justify the same.				
Project participant response				**Date:** 02/12/2021

Evidences sent to DOE https://we.tl/t-swSa2nY1ls
Documentation provided by project participant
Internal reports.
DOE assessment **Date:** 02/12/2021
KBS verified the internal reports provided by PP and confirmed the values applied. This CL is closed.

CL ID	03	**Section no.**	D.5	**Date :** 30/11/2021
Description of CAR				
As stated in the PDD, the efficiency of the LFG captured system that will be installed in the project activity is 75%. Provide evidence to justify the same.				
Project participant response				**Date :** 02/12/2021
Evidences sent to DOE https://we.tl/t-swSa2nY1ls				
Documentation provided by project participant				
Third party study.				
DOE assessment				**Date:** 02/12/2021
KBS verified the evidence provided and confirmed the efficiency of the LFG captured system applied in the PDD. This CL is closed.				

CL ID	04	**Section no.**	D.5	**Date:** 30/11/2021
Description of CL				
Regarding to the parameter waste composition, it was identified an inconsistency between the evidence provided during the remote audit and the choice of data or measurement methods and procedures reported in the PDD.				
Project participant response				**Date:** 02/12/2021
Amended in the PDD				
Documentation provided by project participant				
Revised PDD.				
DOE assessment				**Date:** 02/12/2021
The choice of data or measurement methods and procedures was correctly revised in the PDD. This CL is closed.				

CL ID	05	**Section no.**	D.5	**Date:** 30/11/2021
Description of CL				
PDD – Section B.7.1: Information provided for "QA/QC procedures" is not transparent for the following parameters: • ACM0001 - Amount of electricity generated using LFG by the project activity in year y ($EG_{PJ,y}$ = $EC_{BL,k,y}$); • Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation - Quantity of electricity consumed from the grid by the project activity during the year y ($EG_{EC1,y}$ = $EC_{PJ,1,y}$) and Quantity of electricity consumed from diesel generator by the project activity during the year y ($EG_{EC2,y}$ = $EC_{PJ,2,y}$). Moreover, the years reported in tables under "Value(s) applied" are not according to the third crediting period.				
Project participant response				**Date:** 02/12/2021
Amended accordingly in the PDD				
Documentation provided by project participant				
Revised PDD.				
DOE assessment				**Date:** 02/12/2021
Information provided for "QA/QC procedures" was correctly revised in the PDD. Moreover, the years reported in tables under "Value(s) applied" are according to the third crediting period. This CL is closed.				

CL ID	06	**Section no.**	D.5	**Date:** 30/11/2021
Description of CL				
As stated in the PDD, the Weighted average net calorific value of fossil fuel *i* in year y ($NCV_{i,y}$) is 46.4 GJ/ton as per Chilean Database. Provide evidence to justify the same.				
Project participant response				**Date:** 02/12/2021
NCV amended to consider IPCC 2006 Table 2.1 data.				
Documentation provided by project participant				

Revised PDD.
DOE assessment **Date:** 02/12/2021
The revised PDD was checked and the weighted average net calorific value of LPG from IPCC was applied. This CL is closed.

Table 2. CAR from this validation

CAR ID	01	**Section no.**	D.4	**Date :** 30/11/2021
Description of CAR				
PDD – Section B.6.1: It is stated under Step 3: Selected a method to determine the operating margin (OM) that: "The data vintage chosen for the calculation of the OM emission factor is the ex-ante option. In order to calculate the emission factor, a weighted average for the generation values over a 3 year period were used based on the most recent data available (2014, 2015 and 2016) at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emission factor during the crediting period". However, the calculation of the operating margin CO2 emission factor is not following the recommendations of the "Tool to calculate the emission factor for an electricity system".				
Project participant response				**Date :** 02/12/2021
The Emission Factor calculation has been entirely recalculated according to the applicable tool requirements, considering OM 2018 2019 and 2020, most recent data from Chilean Electrical Coordinator				
Documentation provided by project participant				
Revised PDD and ERs spreadsheet.				
DOE assessment				**Date:** 02/12/2021
The PDD was correctly revised as per recommendations of the "Tool to calculate the emission factor for an electricity system". KBS is able to confirm that the most recent information available by the National Energy Commission (2018, 2019 and 2020) was used to determine the baseline emission factor since the PDD was submitted on 18/11/2021 for starting the validation. The simple OM method was the option selected for the calculation of the operating margin (OM) applying ex-ante data vintage. This option was selected since the average share of low cost must run sources in the 5 most recent years is 43% and then less than 50% of the total electricity generation in Chile. This CAR is closed.				

CAR ID	02	**Section no.**	D.5	**Date :** 30/11/2021
Description of CAR				
Regarding to the parameters φ (default value for the model correction factor to account for model uncertainties) and k_j (decay rate for the waste type j) the following issues were identified: • Identified inconsistency between the values applied for determination of the potential evapotranspiration and evidence provided during the remote audit; • The calculation of the ratio MAP/PET is not following the recommendations of the tool "Emissions from solid waste disposal sites".				
Project participant response				**Date :** 02/12/2021
MAP and PET parameters have been revised and sources evidenced in the Emission Reduction calculation spreadsheet sent to DOE https://we.tl/t-swSa2nY1ls				
Documentation provided by project participant				
Revised PDD.				
DOE assessment				**Date:** 02/12/2021
Regarding to the parameters φ (default value for the model correction factor to account for model uncertainties) and k_j (decay rate for the waste type j) the following issues were verified: • The values applied for determination of the potential evapotranspiration were correctly revised; • The calculation of the ratio MAP/PET was revised and is following the recommendations of the tool "Emissions from solid waste disposal sites". This CAR is closed.				

Table 3. FAR from this validation

FAR ID	01	**Section no.**	D.5	**Date:** 30/11/2021
Description of FAR				

Regarding to the parameter $SPEC_{flare}$, as there is no flare yet installed at the project activity, the technical specifications of the flare are estimated. Therefore, the manufacturer's flare specifications shall be verified when the flare is effectively installed to certify that the same is within the range set at the PDD.	
Project participant response	**Date:** DD/MM/YYYY
.	
Documentation provided by project participant	
DOE assessment	**Date:** DD/MM/YYYY
.	

- - - - -

Document information

Version	*Date*	*Description*
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM validation and verification standard for project activities" (CDM-EB93-A05-STAN) and version 02.0 of the "CDM project cycle procedure for project activities" (CDM-EB93-A06-PROC); • Make editorial improvements.
02.0	31 October 2017	Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0).
01.0	23 March 2015	Initial publication.

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