



**Verified Carbon
Standard**

CATANDUVA LANDFILL GAS PROJECT



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Summary:

LGAI Technological Center, S.A. (hereafter referred to as "Applus+ Certification") was commissioned by the project proponent UniCarbo Energia e Biogás Ltda. to perform the validation of the proposed VCS project activity titled "Catanduva Landfill Gas Project" as reported in the VCS Project Description document (VCS PD).

Background of the proposed VCS project activity:

The proposed VCS project activity is a landfill gas (LFG) collection and destruction/utilization initiative implemented in 01-June-2023 at the existing landfill site denominated "CGR Catanduva landfill".

The CGR Catanduva landfill represents a well-managed landfill site which is under operation since year 2013 and is in the municipality of Catanduva in São Paulo State (Southeastern region of Brazil). This landfill site was designed and has been operated by the host-country project operator CGR Centro de Gerenciamento de Resíduos Ltda.¹

The proposed VCS project activity promotes collection of LFG, destruction of collected LFG in an open flare and LFG utilization as gaseous fuel for electricity generation in engine-generator set which represent the major components of an electricity generation infrastructure with nameplate installed capacity of 2.8 MW and fueled uniquely by LFG collected².

LFG (which is rich in methane (CH₄)) has been generated at the CGR Catanduva landfill as a result of anaerobic decomposition of municipal solid waste (MSW) historically disposed of this solid waste disposal site (SWDS). About 20,200 metric tons of MSW generated and collected in the municipality of Catanduva and other municipalities in the region are monthly disposed at the CGR Catanduva landfill.

As per the project's design configuration, destruction/combustion of collected LFG occurs in the following project's methane destruction device(s):

- 1 open flare;
- 2 engine-generator set of an electricity generation infrastructure (with individual nameplate installed capacity of 1.4 MW) in which collected LFG is utilized as gaseous fuel for electricity generation. Net generated electricity is exported through the electricity grid the proposed VCS project activity is connected

¹ "Centro de Gerenciamento de Resíduos" translated into the English language as "Waste Management Center".

² As confirmed by Applus+ Certification's validation team, currently there is one engine-generator set + all ancillary devices and systems for the project's electricity generation infrastructure completely installed at the CGR Catanduva landfill, which was commissioned and started to operate on 01-June-2023. Furthermore, in accordance with the project design, an additional engine-generator is forecasted be installed in year 2025 as part of the project's gradual/phased implementation.

to (National Electricity Grid of Brazil), with minor share of generated electricity being eventually used for meeting the electricity demand for the proposed VCS project activity.

While in the absence of the proposed VCS project activity (baseline scenario), the largest share of generated LFG (rich in methane) would be otherwise directly emitted into the atmosphere (not destroyed/utilized), the proposed VCS project activity thus promotes real and permanent reduction of CH₄ emissions.

In addition, the project's grid-connected electricity generation infrastructure (promoting utilization of collected LFG as gaseous fuel for electricity generation) promotes displacement of equivalent amount of electricity that would be otherwise generated by existent grid-connected power generation facility (including fossil fuel fired power plants) and addition of new power generation sources within the National Electricity Grid of Brazil in the absence of the proposed VCS project activity (baseline scenario). Therefore, the proposed VCS project activity also promotes CO₂ emission reductions associated with generation of electricity using non-conventional renewable energy sources.

By promoting permanent and real mitigations of CH₄ and CO₂, the proposed VCS project activity is expected to promote total combined GHG emission reductions of 443,199 tCO₂e during its 1st 7-year crediting period (average annual GHG emission reductions of 63,314 tCO₂e/year).

The validation assessment performed by Applus+

The objective of the VCS validation assessment (for which this VCS Validation Report is applicable/valid to) is to have an independent third-party validation opinion of the project design, design of the project's monitoring plan, estimated emission reductions to be achieved by the proposed VCS project activity vis-à-vis applicable methodological and procedural requirements and guidance as per applicable VCS requirements (and related CDM requirements whenever applicable, in the particular case of the proposed VCS project activity applying a CDM baseline and monitoring methodology + CDM methodological tool).

The proposed project activity applies the following CDM baseline and monitoring methodology + CDM methodological tools:

- Tool 04: "Emissions from solid waste disposal sites" (version 08.1)
- Tool 05: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)
- Tool 06: "Project emissions from flaring" (version 04.0)
- Tool 08: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)
- Tool 32: "Positive lists of technologies" (version 04.0)³

Besides of the overall compliance of the proposed VCS project activity with the above-listed CDM baseline and monitoring methodology + CDM methodological tools, its compliance with applicable requirements from the VCS Standard (version 4.7), VCS Validation and Verification Manual (version 3.2), VCS Program Guide (version 4.4)

³ While this CDM methodological tool was valid until 10-March-2025, in accordance with a clarification published by the VCS (https://verra.org/wp-content/uploads/2025/03/Clarification-to-CDM-TOOL32_final.pdf), the validity/grace period for the application of this tool for new VCS projects was extended to 30-September-2025.

and UNFCCC's CDM Validation and Verification Standard for project activities (version 03.0) was also assessed as part of the performed VCS validation assessment.

Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the eligibility of the proposed project activity under VCS/VERRA and its potential generation of Verified carbon units (VCUs).

A risk-based approach has been followed to perform the VCS validation assessment. In the course of validation assessment, 4 (four) Corrective Action requests (CARs) were raised by the appointed Applus+ Certification's validation team. No Clarification Request (CL) and no Forward Action Request (FAR) were raised. The review of the description of the proposed VCS project activity as outlined in assessed completed VCS Project Description (VCS PD) document and additional documents, subsequent background investigation, conducted on-site inspections, follow-up interviews with representatives of the project proponent UniCarbo Energia e Biogás Ltda. have provided Applus+ Certification sufficient evidence to verify the fulfilment of the stated criteria of VCS and recommend the registration of the proposed VCS project activity.

The Applus+ Certification's validation team highlights that forecasted/estimated emission reductions for the proposed VCS project activity over its 1st 7-year renewable crediting period are deemed accurate and correct within reasonable limits. Based on its previous experience/expertise with other similar registered CDM/VCS project activities (also involving LFG collection and destruction/utilization), the Applus+ Certification's validation team highlights that methane generation and collection efficiency of LFG in landfills (as typically forecasted through the application of the FOD model in the context of the applied CDM baseline and monitoring methodology + the applied CDM methodological Tool 04 - "Emissions from solid waste disposal sites" (version 08.1)) have inherent high uncertainty levels (of almost 50% in some cases) and hence the amount of emission reductions, which will be achieved and determined on the basis of ex-post monitoring, might significantly vary from the ex-ante estimates of emission reductions.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center, S.A. (hereafter referred to as "Applus+ Certification") was commissioned by the project proponent UniCarbo Energia e Biogás Ltda. to perform the VCS validation assessment for the proposed VCS project activity titled "Catanduva Landfill Gas Project" (hereafter referred to as "the proposed VCS project activity").

Applus+ Certification was previously accredited as a DOE by the UNFCCC, has received the VVB ID number 034⁴ from VCS/VERRA and also meets the competence requirements as set out in the normative reference ISO 14065:2020.

The objective of the performed VCS validation assessment is to ensure that assumptions, information and figures reported in the project's VCS PD are sufficiently complete, accurate and under conformance with applicable VCS Standard (version 4.7), other applicable VCS regulatory documents and relevant UNFCCC/CDM requirements (where applicable).

Validation is a requirement for all VCS projects and is seen as necessary to, through the provision of objective evidence, provide assurance to stakeholders of the quality of the project and that the requirements for a specific intended future use or application have been fulfilled regarding the GHG claims (i.e. generation of estimated Verified Carbon Units (VCUs)).

1.2 Scope and Criteria

The VCS validation scope is defined as an independent and objective review of the project design information (as outlined in the completed VCS PD for the proposed VCS project activity). The content of the completed VCS PD is reviewed against applicable criteria and requirements from VCS/VERRA and UNFCCC/CDM (including the applied CDM baseline and monitoring methodology ACM0001 (version 19.0) plus applicable CDM methodological tools). The VCS validation assessment is based on applicable requirements and guidance from both the VCS Standard (version 4.7) and the CDM Validation and Verification standard for project activities (CDM-VVS-PA) (version 03.0).

The VCS validation assessment is not meant to provide any technical consulting or advisory services towards the project proponent and its involved representatives. However, eventually raised Requests for Clarifications (CLs) and/or Corrective Action Requests (CARs) may have provided input for improvement of the project design.

⁴ Details about the accreditation of Applus+ Certification under VCS/VERRA are available online: <https://verra.org/validation-verification/lgai-technological-center-s-a-applus/>

The assessment team has employed a risk-based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the VCS PD. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VCU.

The only purpose of the validation is its usage during the registration/issuance processes as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the validation/verification opinion, which will go beyond that purpose.

1.3 Reasonableness of Assumptions

Applus+ Certification takes into consideration that the risk of material misstatements as part of the performance of a VCS validation assessment varies with factor/elements such as (i) the complexity and subjectivity associated with the process; (ii) the availability and reliability of relevant data; (iii) quality and quantity of information and evidences; (iv) the number and significance of assumptions that are made and finally, (v) the degree of uncertainty associated with such factors/elements.

In the context of the performance of the VCS validation assessment vis-à-vis considered assumptions, under conformance with Applus+ Certification working procedures, the validation team appointed by Applus+ Certification is required to perform an evaluation/test of the overall reasonableness, completeness and accuracy of all relevant assumptions used for the description of the design of the proposed VCS project activity, the project start date, the delineation of the project boundary, the identification of the baseline scenario, assessment and demonstration of additionality, applied GHG calculation approaches and the design of the monitoring plan (based on *ex-ante* determined parameters and parameters to be monitored *ex-post*).

Such reasonability analysis is performed by the Applus+ Certification's validation team (that holds significant experience and expertise with project-based initiatives encompassing collection and destruction/utilization of LFG) by assuming related limitations and by *inter-alia* taking into consideration the following relevant aspects:

- Regional, national and international practice related to GHG mitigation/abatement measure and technology applied by the proposed VCS project activity.
- Definitions, concepts and principles of the applied baseline and monitoring methodology and methodological tools (which are assumed as being designed by being rooted in sound and widely accepted scientific principles and knowledge).
- Overall credibility of quality and reliability of data, information, facts and evidence used *inter-alia* for the identification of baseline scenario and baseline emissions (with consideration of contrary or inconsistent data, information and evidence where applicable).
- Relevance and credibility of identified stakeholders for the proposed VCS project activity.

- Regulatory, legal and operational requirements related to the measure and technologies encompassed by the proposed VCS project activity.

Also, part of its validation assessment, a risk assessment is therefore performed as part of the validation planning in order to identify (and mitigate, if applicable) potential factors and/or elements that may negatively influence the credibility and fairness of the outcomes of the assessment. In case significant risks are identified, further tests may have been considered as required in order to evaluate the reasonableness of assumptions (and/or alternative assumptions) or outcomes, if applicable.

Finally, it is also crucial to note that, as part of the technical review of the assessment, the reasonableness of the identification and eventual mitigation of such risks (as well as other relevant judgements and decisions made by the assessment team) is to be confirmed by the appointed review team (which is independent of the validation team).

In conclusion, Applus+ Certification planned and performed the Validation by obtaining objective evidence that substantiate the reasonableness of PP's assumptions and determine whether the project and its GHG statement conforms with the regulatory documents, as well as evaluates the limitations and methods that support a claim about the outcome of future activities, in accordance with the VCS Standard (version 4.7).

1.4 Summary Description of the Project

The proposed VCS project activity is a landfill gas (LFG) collection and destruction/utilization initiative currently implemented at an existent landfill site denominated CGR Catanduva landfill.

The CGR Catanduva landfill represents a well-managed landfill site which is under operation and is in the municipality of Catanduva in São Paulo State (Southeastern region of Brazil). The landfill started its Municipal Solid Waste (MSW) disposal activities in 2013.

LFG (rich in methane (CH_4)) has been generated at the CGR Catanduva landfill as a result of anaerobic decomposition of municipal solid waste (MSW) disposed in this solid waste disposal site (SWDS). About 20,200 metric tons of MSW generated and collected in the municipality of Catanduva and other municipalities have been monthly permanently disposed at the CGR Catanduva landfill.

While being implemented about 10 years after the occurred start of operation of the CGR Catanduva landfill, the proposed VCS project activity has promoted since 01-June-2023 efficient collection of LFG, destruction of collected LFG in an open flare and utilization of LFG as gaseous fuel for electricity generation in an engine-generator set which represents the main component/equipment of an electricity generation infrastructure also implemented as part of the project activity. While the currently installed 1st engine-generator set has a nameplate installed capacity of about 1.4 MW, as per the project design, an identical additional engine-

generator set is currently forecasted to be installed during the year of 2025, therefore making the project's total combined installed capacity of about 2.8 MW.

As per the project's design configuration, destruction/combustion of collected LFG occurs in the following methane destruction device(s):

- 1 open flare;
- 2 engine-generator set (with individual nameplate power generation capacity of about 1.4 MW) which are the major component/equipment of the project's electricity generation infrastructure in which collected LFG is to be utilized as gaseous fuel for electricity generation. While a minor share of net generated electricity may be used to meet electricity demand for the proposed VCS project activity, the largest share of net generated electricity is expected to be exported through the electricity grid the proposed VCS project activity is connected to (National Electricity Grid of Brazil).

The proposed VCS project activity therefore promotes real, permanent and measurable greenhouse gas (GHG) emission reductions. While in the absence of the proposed VCS project activity (baseline scenario), the largest share of generated LFG would be otherwise directly emitted into the atmosphere through the surface of the CGR Catanduva landfill and through pre-project conventional LFG venting drains (with minor share of generated LFG being combusted in the pre-project venting/combustion drains), the proposed VCS project activity thus promotes real and permanent reduction of CH₄ emissions. As appropriately outlined in Section 1.12 of the VCS PD, while the design of previously existent rudimentary venting/combustion drains was not conceived to allow continuous combustion of LFG, such drains were replaced by a new LFG collection system (composed by active LFG collection wells interconnected through a pipeline system) as part of the implementation of the project activity.

In addition, the project's electricity generation infrastructure (promoting utilization of LFG) promotes displacement of amount of electricity (equivalent to the share of electricity exported by the project activity through the electricity grid) that would be otherwise generated by existent grid-connected power generation facility (including fossil fuel fired power plants) and addition of new power generation sources within the National Electricity Grid of Brazil in the absence of the proposed VCS project activity (baseline scenario). Therefore, the proposed VCS project activity thus also promotes CO₂ emission reductions associated with generation of electricity using a non-conventional renewable energy source.

2 VALIDATION PROCESS

2.1 Method and Criteria

The purpose of a VCS validation assessment by an accredited VCS Validation and Verification Body (VVB) is to have an independent third-party assessing the design of the proposed VCS project activity and its compliance with applicable VCS eligibility and methodological requirements. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant applicable VCS criteria are all validated in order to confirm that the project design, as documented in its completed VCS PD, is sound, reasonable and meets the identified criteria.

VCS validation is a requirement for any proposed VCS project activity, and it is seen as necessary to provide assurance to stakeholders of the quality and integrity of a project-based GHG emission initiative proposed under VCS and its forecasted generation of Voluntary Carbon Units (VCUs).

The VCS validation scope is defined as an independent and objective review of information included in the completed VCS PD for the proposed VCS project activity and supporting documentation. The VCS validation assessment for a proposed VCS project activity is not meant to provide any consulting towards its project proponent(s). However, Requests for Clarification (CLs), Corrective Action Requests (CARs) eventually raised as part of the assessment may provide input for improvement of the project design and its description in the completed VCS PD.

The performed VCS validation assessment follows Applus+ Certification related applicable assessment procedures and rules which are defined under conformance with requirements, guidance and criteria specified in the latest versions of the VCS Standard (version 4.7), VCS Program Guide (version 4.4), VCS Validation and Verification Manual (version 3.2), CDM Validation and Verification Standard (for both project activities and programme of activities) (CDM-VVS-PA/PoA) (versions 03.0), CDM Accreditation Standard (CDM-AS, version 07.0) among other relevant UNFCCC/CDM requirements (if applicable).

The VCS validation assessment was conducted by following applicable regulatory documents, by considering principles and requirements of ISO 14064-3:2019 and ISO 14065:2020 standards and by using standard auditing techniques as required by the VCS Standard (version 4.7).

The performed VCS validation assessment included an on-site inspection (with physical presence of member of the Applus+ Certification's validation team). Thus, no need for the performance of a risk analysis for remote inspections (for identifying eventual risks of a material misstatement or nonconformity with the assessment criteria as established by VCS Standard (version 4.7) para. 4.1.13) was identified for the VCS validation assessment.

No Information and Communication Technology (ICT) means have been used for the conduction of this validation process other than those for the provision of documents, transferring information (electronic files) and undertake normal communications with representatives of the project proponent. Those ICT means supporting the process in this sense have been used to an

extent sufficient to cover the background necessities of the validation assessment process and have demonstrated enough effectiveness (under a level in accordance with relevant applicable regulatory requirements). While a physical on-site inspection was conducted to the project site, no virtual sites (following the definition of the IAF MD4:2025 document) were encompassed by the performed VCS validation assessment. As part of the performed validation assessment, complementary documentation was made available to the Applus+ Certification's validation team through means email communication and file transfer application/tool.

Applus+ Certification completed a strategic review and risk assessment of the project's activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project's GHG emissions and GHG emission reductions (by inter alia taking into account requirements from the methodological approaches used to estimate and/or measure/calculated GHG emissions from these sources)
- Collection and handling/control of monitoring data
- Completion of the VCS PD for the proposed VCS project activity (including inter alia the application of the selected CDM baseline and monitoring methodology + applicable CDM methodological tools, Ex-ante estimates of GHG emission reductions to be achieved by the proposed VCS project activity within its 1st 7-year renewable crediting period, design of the project's monitoring plan, stakeholder engagement and safeguards)

Based on the above, Applus+ Certification prepared a Validation Plan and applied an evidence-gathering plan designed to collect sufficient and appropriate evidence upon which to base the conclusion and to consider the inherent risk for the validation assessment. The evidence-gathering plan is based on analytical procedures and tests and considers the thresholds for materiality as per the regulatory documents applied for this Validation (5% as per the applied VCS Standard (version 4.7)).

The applied evidence-gathering plan is used by Applus+ Certification to determine the conformity of the statements made by the project proponent against the principles and requirements of the applied regulatory documents as part of the VCS validation assessment. The evidence-gathering plan designed by Applus+ Certification for the performed VCS validation assessment took into consideration the following aspects/issues:

- The selection and management of the data and information
- The processes for collecting, processing, consolidating, aggregating and reporting monitoring data and information
- Systems and processes in place to ensure the validity and accuracy of data and information
- The design and maintenance of the system to control monitoring data and information

- Systems, processes and personnel that support system in place, including activities for ensuring quality and integrity of monitoring data
- The plans/schedule and procedures for maintenance and calibration of monitoring instruments/equipment where appropriate.

In the particular context of the VCS validation assessment for the proposed VCS project activity, no sampling work was considered or performed.

The scope of the performed VCS validation assessment includes confirmation that project design information as reported in the VCS Project Description (VCS PD) are deemed complete, reasonable and under conformance with applicable methodological and procedural rules and requirements for its completion.

The performed VCS validation assessment consists of the following three phases:

- I) Desk review of the project design documentation and supporting documents (period from 10-April-2025 to 16-April-2025)
- II) On-site inspection and follow-up interviews with representatives of the project proponent (17-April-2025 and 18-April-2025).
- III) Identification (raising) and resolution of outstanding issues (raised CARs, CLs and/or FARs) (period from 18-April-2025 to 02-May-2025)
- IV) Completion of the VCS Validation Report which includes the Applus+ Certification's validation opinion (period from 22-April-2025 to 07-May-2025)
- V) Conduction of independent technical review
- VI) Conduction of final quality check and approval (issuance date of the latest version of this Validation Report)

This version of the VCS Validation Report summarizes the performed VCS validation assessment after the completion of all of its phases.

The appointed Applus+ Certification's validation team

A competent VCS validation team with relevant knowledge and experience in the specific sectoral scopes as well as measures and technologies applied by the proposed VCS project activity was appointed by Applus+ Certification. The appointment of the team also takes into account required local relevant knowledge about host country and knowledge about general requirements for validating the proposed VCS project activity design.

Prior to approving and submitting the final VCS Validation Report to VCS/VERRA, a technical review of the whole VCS validation assessment is carried out by an appointed technical review (TR) team. The TR team is composed of person(s) with proven competence in the technical area

the proposed VCS project activity falls under. Each member of the review team is independent to the VCS validation assessment.

By considering the sectoral scopes / technical area valid/applicable for the proposed VCS project activity, vis-à-vis the qualification and availability of its qualified technical team, Applus+ Certification has appointed a validation team in accordance with the appointment rules and procedures in place at Applus+ Certification that are in accordance with the ISO 14065:2020 regulatory provisions. As required by related procedures, the team composition for the validation team was approved by Applus+ Certification in order to sufficiently ensure that all required skills and expertise are covered by the appointed validation team.

The qualification levels for Assessment Team members that are assigned by aforementioned appointment rules are as presented below:

- Lead Auditor (LA).
- Auditor (A) (Validator and/or Verifier, as appropriate).
- Technical Expert (TE).
- Technical Reviewer (TR).
- Other supporting roles such as Country Expert (CE) or Financial Expert (FE) when needed.
- Any of the above-mentioned roles in training (iT, e.g. AiT for auditor in training or TeiT for Technical Expert in Training).

The members of the appointed Applus+ Certification's validation team are indicated in the below table:

Name	Qualification	Coverage of scope	Coverage of Technical Area	Host country experience
Mr. Marco A. Ratton	LA/A (VAL)/TE	Y (1 and 13)	Y (1.1 and 13.1)	Y
Mr. Denny Xue	TR / TE	Y (1 and 13)	Y (1.1 and 13.1)	N/A

Mr. Marco A. Ratton:

Marco A. Ratton is based in Brazil and has acted as a GHG auditor/assessor since year 2007. He holds vast experience with independent assessments of project-based initiatives promoting GHG emission reductions implemented in Latin America within the area of renewable energies, solid

waste management and effluent treatment and other regions under the CDM, VCS and other schemes/standards. He also has previous working experience with planning of municipal waste management, power generation using biogas as well as educational background in mechanical fabrication/manufacturing technology, economics and environmental management & policy. He has undergone extensive training on GHG validation and verification and is a qualified Expert for Sectoral Scope 13 under Technical Area “Waste management” and Sectoral Scope 1 in accordance with procedures of Applus+. He also has previous experience on conducting ISO 9001/14001 related assessments and diagnostics.

Mr. Denny Xue:

Mr. Denny Xue (master's degree in environmental engineering, Bachelor's Degree in Thermal Engineering) is a GHG auditor appointed by Applus+ Certification for performing GHG project assessments, auditing and technical reviews. He has more than 6 years of work experience in CDM/GS4GG/VCS project assessment and technical review with Applus+ Certification. Before he joined Applus+ LGAI, he worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development. Mr. Denny Xue is based in Shanghai, China. Mr. Denny Xue participates in the project's technical review team.

2.2 Document Review

The VCS PD for the proposed VCS project activity as well as supporting documents were assessed in the context of a Document Review in order to verify the overall correctness, credibility and interpretation of presented information. A further crosscheck of information provided was performed by using information from other sources as available.

The performed document desk review assessed the following documents and aspects of the proposed VCS project activity:

- General project details as per related description in the completed VCS PD.
- Applicability, appropriateness and correctness of application of the selected CDM baseline and monitoring methodology + applicable CDM methodological tools as well as related descriptions in the completed VCS PD
- Compliance with relevance laws and regulation, operating/environmental licences/permits as well as related descriptions in the completed VCS PD
- Identification of the baseline scenario and demonstration of additionality as well as related description in the completed VCS PD
- Design of the project's monitoring plan as well as related description in the completed VCS PD
- Local stakeholder consultation as well as related description in the completed VCS PD

- Addressing of eventually received Stakeholders' comments as well as related description in the completed VCS PD
- Proof of title as well as related description in the completed VCS PD
- Stakeholder engagement and safeguards as well as related description in the completed VCS PD

Documented evidence used for cross-checking information presented in the VCS PD and a list of documentation reviewed as part of the performed VCS validation assessment are summarized in Appendix 1.

2.3 Interviews

On 17-April-2025 and 18-April-2025, Mr. Marco A. Ratton (appointed member of the Applus+ Certification's validation team) conducted interviews with the representatives of the project proponent during the performed on-site visit. Interviewed persons and topics of the performed interview are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Rodrigo Pedroso	CDM/VCS Consultant	UniCarbo Energia e Biogás Ltda.	Amount and type of municipal solid waste (MSW) disposed at the CGR Catanduva landfill Project design and applied technology
Mr. José Tadeu Coletti Jr.	CGR Supervisor	CGR Centro de Gerenciamento de Resíduos Ltda.	Demonstration of additionality GHG emission reduction calculations (including ex-ante estimation of emission reductions) Application of the CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable CDM methodological tool Performed Local stakeholder consultation (LSC) process Assessment of environmental aspects, environmental licensing and legal compliance with applicable environmental legislation/regulations

Moreover, the Applus+ Certification's verification team has conducted an additional interview (in person) on 18-April-2025 with the following identified stakeholder:

- Mr. Gustavo Henrique Favero, local school teacher and representative of the charity program for vulnerable children "*Programa Beneficente Criança, Cidadão do Futuro*". Mr. Favero pointed out a set of benefits promoted by the project developer, such as regular visits of the students to the landfill, including the project activity's facilities, generation of renewable energy and protection of the environment. No negative aspects were identified.

2.4 Site Visits

On 17-April-2025 and 18-April-2025, Mr. Marco A. Ratton (appointed member of the Applus+ Certification's validation team) performed an on-site inspection of the available infrastructure of

the proposed VCS project activity. The activities performed as part of this on-site inspection are summarized below:

Activity performed on-site	Site location	Date
Opening meeting for the performed on-site inspection. During such initial meeting the Applus+ Certification's validation team was introduced. It was confirmed/outlined the objectives and scope of the on-site inspection and it was confirmed the previously planned agenda for such visit. The representatives of the project proponent UniCarbo Energia e Biogás Ltda. also introduced themselves and completed/signed the Applus+ Certification list of participants form for the onsite visit.	Operation control room of the proposed VCS project activity	17-April-2025
Visual inspection of the solid waste disposal area of the CGR Catanduva landfill in order to inter alia confirm the overall management conditions of the landfill site and also to confirm that no changes of landfill disposal and management practices/techniques have occurred (when compared to the original landfill design) in order to increase methane generation	Solid waste disposal areas of the CGR Catanduva landfill	17 and 18-April-2025

Visual inspection of the infrastructure currently encompassed by the proposed VCS project activity in order to confirm whether the general descriptions of the project design, applied technology and project location details as included in the VCS PD are under conformance with all infrastructure installed and/or in place as part of the project activity (LFG collection wells and pipeline network, LFG flaring infrastructure, electricity generation infrastructure, monitoring instruments, etc.)	Areas within the CGR Catanduva landfill covered by the project's LFG collection infrastructure + area where the project's LFG destruction infrastructure is installed + operation control room of the project activity	17 and 18-April-2025
Assessment of the identified baseline scenario, by confirming that the currently implemented active LFG collection system was only recently implemented (starting during the year of 2023) as part of the operation of the proposed VCS project activity.	Waste disposal areas of the landfill	17 and 18-April-2025

2.5 Resolution of Findings

As per Applus+ Certification's working procedures applicable for VCS validation assessments, whenever a non-conformance arises, the Applus+ Certification's validation team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- The project proponent has made mistakes that will influence the ability of the proposed VCS project activity to achieve real, measurable, verifiable and additional GHG emission reductions;
- The applicable VCS rules and requirements have not been met;
- There is a risk that GHG emission reductions cannot be monitored or calculated.

The Applus+ Certification's validation team shall raise a Clarification Request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM or VCS requirements have been met.

Forward action request (FAR) is raised as part of the VCS validation assessment in order to identify issues related to the occurred or yet to occur implementation of the proposed VCS project

activity that require or may require review during the 1st periodic VCS verification assessment of the proposed VCS project activity. No FAR is to be raised for issues related to the conformance of the proposed VCS project activity with any specific VCS rules or requirement as a requisite for its registration under VCS/VERRA.

While as per applicable working procedures for VCS validation assessments, all CARs and CLs raised as part of the performed VCS validation assessment shall be resolved prior to having the Applus+ Certification's validation team stating its validation opinion for the VCS validation assessment.

4 (four) CARs were raised by the Applus+ Certification's validation team as part of the performed VCS validation assessment. No CLs or FARs were raised.

The description of such CARs and CL as well as responses from representatives of the project proponent and related assessment by the Applus+ Certification's validation team are included in Appendix I.

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Project design document and Monitoring report	-	-	-
Description of project activity	-	CAR 2 CAR 3 CAR 4	-
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline	-	CAR 1	-
- Deviation from methodology	-	-	-
- Clarification on applicability of methodology, tool and/or standardized baseline	-	-	-
- Demonstration of additionality	-	-	-
- Emission reductions	-	-	-
- Monitoring plan	-	-	-
Stakeholders' consultation process	-	-	-

Public comments	-	-	-
Others (related to double counting)	-	-	-
Total	0	4	0

2.5.1 Forward Action Requests

No Forward Action Request (FAR) was raised as an outcome of the performed VCS validation assessment.

3 VALIDATION FINDINGS

3.1 Project Details

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Audit history	The Applus+ Certification's validation team has confirmed the correctness of audit history details as outlined in the completed VCS PD by inter alia assessing the project's database containing available historic measurement records of LFG related parameters (thus confirming that the proposed VCS project activity indeed started to generate emission reductions (by combusting LFG in the high temperature open flare and also destroying/utilizing LFG as gaseous fuel) on 01-June-2023. This date is correctly assumed as the date when the proposed VCS project activity began promoting GHG emission reductions and it is therefore selected as the project start date. This selection is in conformance with related definition presented in Section 3.8 of the VCS Standard. The crediting period for the proposed VCS project activity is also correctly determined as the period from 01-June-2023 to 31-May-2030
Sectoral scope	The Applus+ Certification's validation team has confirmed that the sectoral scopes presented in the VCS PD (1 and 13) are under conformance with the definitions from the VCS/VERRA program details and the UNFCCC.

AFOLU project category, if applicable	The proposed VCS project activity is not an AFOLU project activity.
Project activity type	The Applus+ Certification's validation team has confirmed that the project type details presented in the VCS PD (Energy (renewable/non-renewable and waste handling and disposal) are under conformance with related definitions from VCS/VERRA program details and are also in accordance with project's webpage under the VCS/VERRA Registry (https://registry.verra.org/app/projectDetail/VCS/VCS/5436)
General eligibility of the project to participate in the VCS Program	The Applus+ Certification's validation team has confirmed that the proposed VCS project activity is not excluded from Table 1 of Section 2.1.3 of the VCS Standard (version 4.7). The Applus+ Certification's validation team has also confirmed that the proposed VCS project activity was open for public comment during the period from 14-February-2025 to 16-March-2025, with the initial version of the VCS PD being made available at the VERRA/VCS online platform (https://registry.verra.org/app/projectDetail/VCS/5436). Applus+ Certification has also confirmed, through assessment of an email communication received by the project proponent from VCS/VERRA, that the proposed VCS project activity was successfully listed on the project pipeline with a status of "under validation" on 18-March-2025. A sequential email communication from VCS/VERRA also dated 18-March-2025 confirmed that no comments were received during the public comment period. The opening meeting with the project proponent was conducted by the Applus+ Certification validation team on 17-April-2025, thus also meeting the requirement from Section 4.1.5. of the VCS Standard. While the project start date was confirmed by the Applus+ Certification validation as being correctly selected as 01-June-2023, the Validation assessment deadline for the proposed VCS project activity is 31-May-2025 (2 years after the project start date, in accordance with Section 3.8.1 of the VCS Standard).

	Applus+ Certification also confirms that the applied methodology (CDM baseline and monitoring methodology ACM0001 (version 19.0), which is confirmed as being eligible and active under the VCS) does not include any restriction on project scale and/or capacity limits and that the proposed VCS project activity is not a fragmented part of a larger project or activity that would otherwise exceed such limits.
AFOLU project eligibility, if applicable	The proposed VCS project activity is not an AFOLU project activity.
Transfer project eligibility, if applicable	The Applus+ Certification's validation team checked publicly information and registration details valid for the REC/VER registries/programs below and confirmed that the proposed VCS project activity has not previously sought registration in such REC/VER registries/programs (and therefore was not rejected/registered by such REC/VER registries/programs either). The following websites were assessed by the Applus+ Certification's validation team: ○ UNFCCC Clean Development Mechanism (CDM) (http://cdm.unfccc.int/) ○ The Gold Standard for the Global Goals (GS4GG) (http://www.goldstandard.org/) ○ The International REC Standard (https://www.irecstandard.org/) ○ Global Carbon Council (GCC) (https://www.globalcarboncouncil.com/) ○ CERCARBONO (Certified Carbon Standard) (https://www.cercarbono.com/) ○ Brazilian REC initiative (https://recbrazil.com.br/)
Project design	The proposed VCS project activity encompasses the promotion of collection and destruction/utilization of landfill gas (LFG) (rich in methane) at the designed, licensed and built MSW area of an existent landfill site through collection LFG and its destruction in an open flare and utilization as gaseous fuel in 2 engine-generator sets which represent the major

	components of an electricity generation infrastructure with total nameplate installed capacity of 2.8 MW⁵. LFG has been generated at the CGR Catanduva landfill as a result of anaerobic decomposition of municipal solid waste (MSW) disposed in this solid waste disposal site (SWDS). This landfill site was designed and has been operated by the project operator CGR Centro de Gerenciamento de Resíduos Ltda. through the application of best practice techniques for permanent disposal of MSW in well-managed landfill site. Applus+ validation team has confirmed, during the conducted onsite visit, that the project design as described in the VCS PD is correct, complete and under full conformance with applicable VCS requirements and eligibility criteria.
Project ownership	As sufficiently outlined and supported by documented evidence which are listed in Section 1.8 of the VCS PD, the company/enterprise CGR Centro de Gerenciamento de Resíduos Ltda. has the ownership and/or property/utilization rights for the infrastructure encompassed by the proposed VCS project activity. As confirmed by the Applus+ Certification's validation team, the following documented evidence confirms that CGR Centro de Gerenciamento de Resíduos Ltda. holds legal right to control and operate the proposed VCS project activity: - Constitution/registration document for the company/enterprise CGR Centro de Gerenciamento de Resíduos Ltda. (latest version of the company/enterprise registration document "Contrato Social CGR Centro de Gerenciamento de Resíduos Ltda – CNPJ/ME nº 10.330.104/0001-18), dated 04-April-2024. The ownership and/or property/utilization rights for both the CGR Catanduva landfill and the proposed VCS project activity were also checked by the Applus+ Certification's validation

⁵ As confirmed by Applus+ Certification's validation team, currently there is one engine-generator set + all ancillary devices and systems for the project's electricity generation infrastructure completely installed at the CGR Catanduva landfill. Such electricity generation infrastructure was commissioned and started to operate on 01-June-2023. Furthermore, in accordance with the project design, an additional engine-generator is forecasted be installed in year 2025 as part of the project's gradual/phased implementation.

	team through assessment of the valid environmental license/permit for the CGR Catanduva landfill as well as assessment of the valid environmental licenses/permits for the project's electricity generation infrastructure⁶. The company UniCarbo Energia e Biogás Ltda. is appointed as the VCS project developer, in accordance with the VCS Deed of representation, dated 01-February-2025.
Project start date	The start date of the proposed VCS project activity is 01-June-2023, which is the date of start of continuous operations of the proposed VCS project activity (as confirmed by the Applus+ Certification's validation team through assessment of available project's operation registries and control records).
Project crediting period	The proposed VCS project activity applies a 7-year renewable crediting period. The Applus+ Certification's validation team confirms that the crediting period start date and end date for the proposed VCS project activity are correctly indicated in the VCS PD as being as follows: Start date of 7-year crediting period: 01-June-2023 End date of 7-year crediting period: 31-May-2030
Project scale	As the ex-ante estimated of annual average GHG emission reductions to be achieved by the proposed VCS project activity within its 7-year renewable crediting period is correctly determined as 63,314 tCO_{2e} per year (which is within the range "less than or equal to 300,000 tonnes tCO_{2e} per year"), the proposed VCS project activity thus falls in the category "Project". Related information is confirmed by the Applus+ Certification's validation team as being correctly added in the VCS PD.
Likelihood of achieving estimated GHG emission reduction or removals	Based on its experience/expertise with other similar registered CDM/VCS project activities (also involving LFG collection and destruction/utilization), the Applus+ Certification's validation

⁶ Latest operational license for the CGR Catanduva landfill (license with ref./No 14009984, issued by CETESB – Companhia Ambiental do estado de São Paulo in the name of the company CGR CATANDUVA – CENTRO DE GERENCIAMENTO DE RESÍDUOS LTDA.

Latest operational license for the infrastructure for promoting LFG utilization for generating electricity (license with ref./No. 1400621, issued by CETESB – Companhia Ambiental do estado de São Paulo).

	team highlights that methane generation and collection efficiency of LFG in landfills (as typically forecasted through the application of the FOD model in the context of the selected methodology and the CDM methodological tool 04 - “Emissions from solid waste disposal sites” (version 08.1)) has an inherent high uncertainty level (of almost 50% in some cases) and hence the amount of emission reductions, which will be determined on the basis of ex-post monitoring, might significantly vary from the forecasted amount. Nonetheless, the Applus+ Certification validation team was able to confirm, during the conducted on-site visit, that equipment installed as part of the project activity (including LFG flaring and electricity generation infrastructure, monitoring instruments, the project’s database, etc.) have high reliability in operational terms and will also provide the proposed VCS project activity with capability of safely store and report related monitoring data. The Applus+ Certification validation team has also confirmed that the operational staff of the proposed VCS project activity has received relevant training for operational and monitoring aspects of the proposed VCS project activity as well data handling and management, which will thus allow the calculations of baseline emissions and project emissions with a high reliability and correctness.
Technologies and measures implemented by the project activity or activities	Technology employed by the proposed VCS project activity encompasses the implementation and operation of appropriate LFG collection, LFG flaring and electricity generation infrastructure (promoting utilization of collected LFG) at the CGR Catanduva landfill, with the following major components/systems being part of the proposed VCS project activity: - LFG collection system composed by set of vertical LFG collection wells installed across the landfill site, - LFG transportation pipeline network - 1 high temperature open flare. The design and construction of the high temperature open flare currently installed and under operation as part of the proposed VCS project activity was confirmed by Applus+ Certification’s validation team as being

	under conformance with the following technical design and operational aspects: ○ Combustion of LFG under controlled, safe and efficient (with very low CH₄ fugitive emissions) conditions are guaranteed by the utilization of high temperature open flare. ○ Use of best practice safety devices for the flare (such as flame detector and slam shut valve). - 2 engine-generator sets + all ancillary devices/systems/controls what form the project's electricity generation infrastructure fully fueled by LFG. The engine-generator sets have a nameplate power generation capacity of about 1.4 MW each. The engine-generator set is assembled under a container-based modular power generation package set design with container-based packaging including all required ancillary equipment (electrical and electronic controls, cooling fan, coolant radiator, control & safety systems, etc.). As per the design of the proposed VCS project activity, electricity demand for the proposed VCS project activity is met by consumption of grid-sourced electricity and/or by electricity sourced by the project's electricity generation infrastructure.
Implementation schedule of the project activity or activities	Through assessment of available related project's operation monitoring registries, control and operation records, the Applus+ Certification's validation team has confirmed that the project activity started its continuous operations on 01-June-2023 (initially with the high temperature open flare and with the engine-generator set as the only methane destruction devices). Moreover, the Applus+ Certification's validation team has also confirmed, during the conducted on-site visit and performed interviews, that a 2nd engine-generator set is currently forecasted to be installed during the year of 2025.
Project location	As confirmed by the Applus+ Certification's validation team, the completed VCS PD for the proposed VCS project activity correctly/sufficiently includes the following information as the address/location for the proposed VCS project activity:

	<i>The landfill hosting the project activity is the CGR Catanduva landfill, which is located aside the margins of the Estrada Municipal CTV 020, S/N, Fazenda Santa Fé, Catanduva (city), São Paulo (State), Brazil. The project's geographical coordinates are as follows:</i> <i>o Latitude: -21 °07'23.69"S (-21.123247)</i> <i>o Longitude: 48 °55'41.65" W (-48.928236)</i>
Conditions prior to project initiation	The CGR Catanduva landfill started its MSW disposal activities in year 2013. While prior to the occurred implementation and starting of operations of the proposed VCS project activity (pre-project situation) at the CGR Catanduva landfill, the conditions were verified as being no LFG management has occurred (with methane emissions into atmosphere occurring through the surface of the landfill and through set of pre-project existent LFG conventional venting/combustion drains (with minor share of generated LFG being combusted in such venting/combustion drains) and no utilization of LFG for electricity generation (electricity generation (in equivalent amount to the amount to be generated by the proposed VCS project activity) assumed as occurring in existent grid-connected electricity generation sources within the National Electricity Grid of Brazil respectively, these conditions are correctly derived and also confirmed as being reflected in the identified baseline scenario for the proposed VCS project activity (identification performed under full conformance with the applied CDM baseline and monitoring methodology ACM0001 (version 19.0) and CDM methodological Tool 32 - "Positive lists of technologies" (version 4.0)) as outlined in Section 3.4 (Baseline Scenario).
Project compliance with applicable laws, statutes and other regulatory frameworks	The Applus+ Certification's validation team was able to sufficiently confirm that demonstration of meeting of applicability conditions of the applied CDM baseline and monitoring methodology ACM0001 (version 19.0) by the proposed VCS project activity as well as the determination of baseline emissions indeed include the identification and sufficient demonstration of compliance of the design and construction for proposed VCS project activity with all and/or any eventually existent and applicable local, regional and

national regulations, laws related to management of LFG in landfills as appropriately claimed in Section 1.14 of the VCS PD.

While the so far occurred implementation and starting of operations of the proposed VCS project activity is also confirmed by the Applus+ Certification's validation team as being under conformance with applicable laws and regulations (LFG destruction and utilization is not regionally or nationally forbidden), the pre-project situation at the Catanduva landfill up to year 2023 (LFG being directly emitted into the atmosphere through the surface of the landfill and through the previously existent pre-project conventional LFG passive venting/combustion drains (with minor share of generated LFG being combusted in such venting/combustion drains) is also confirmed as being under compliance with all applicable laws and regulatory framework for landfill operation and management of solid waste in Brazil.

The Applus+ Certification's validation team also verified that the design, construction and operational aspects for the CGR Catanduva landfill were previously analysed through the conduction of an Environmental Impact Assessment (EIA) with construction and operations of this particular landfill (without the proposed VCS project activity being implemented and without any LFG management in place) being later approved and regularly inspected by the local competent environmental authority, which regular issues all the relevant environmental license/permit for CGR Catanduva landfill occurring and being approved.

In summary, the whole infrastructure for the proposed VCS project activity is also confirmed by the Applus+ Certification's validation team as being approved by competent environmental authority, with the following environmental licenses/permits being issued:

- Latest operational license for the CGR Catanduva landfill (license with ref./No 14009984, issued by CETESB – Companhia Ambiental do estado de São Paulo /15/.
- Latest operational license for the infrastructure for promoting LFG utilization for generating electricity

	(license with ref./No. 1400621, issued by CETESB – Companhia Ambiental do estado de São Paulo) ^{/16/}. The above-summarized environmental license/permit documents were made available and assessed by the Applus+ Certification’s validation team.
Double counting and participation under other GHG programs	The proposed VCS project activity for which operations stated in 01-June-2023 was not previously registered and has not previously seek registration under any other GHG programs. The proposed VCS project activity was therefore not been previously rejected by any other GHG programs either. The proposed VCS project activity is currently seeking registration only under VCS program. Applus+ Certification checked the registry/database for Program of Renewable Energy Certificates (RECs) in Brazil (I-REC Brazil) and confirmed that the proposed VCS project activity is not accredited / registered under I-REC Brazil program. The Applus+ Certification’s validation team also checked publicly information and registration details valid for the REC/VER registries/programs below and also confirmed that the proposed VCS project activity has not previously seek registration in such REC/VER registries/programs (and therefore was not rejected by such REC/VER registries/programs either): ○ UNFCCC Clean Development Mechanism (CDM) (http://cdm.unfccc.int/) ○ The Gold Standard for the Global Goals (GS4GG) (http://www.goldstandard.org/) ○ The International REC Standard (https://www.irecstandard.org/) ○ Global Carbon Council (GCC) (https://www.globalcarboncouncil.com/) ○ CERCARBONO (Certified Carbon Standard) (https://www.cercarbono.com/) ○ Brazilian REC initiative (https://recbrazil.com.br/)

No double claiming with emissions trading programs or binding emission limits	The Applus+ Certification's validation team was also able to confirm that the GHG emission reductions generated and/or yet to be generated by the proposed VCS project activity have not and will not be used for compliance with any emissions trading program or used to meet binding limits on GHG emissions in any compliance or voluntary GHG emission trading program or other binding limit mechanism. Currently there is not any compliance or voluntary GHG emission trading program or other binding limit mechanism in the host-country Brazil for which GHG emission reductions promoted by the proposed VCS project activity would be eligible under.
No double claiming with other forms of environmental credit	The Applus+ Certification's validation team was able to confirm that the GHG emission reductions generated and/or yet to be generated by the proposed VCS project activity will not be used with other forms of environmental credit/tax incentive. Currently there is not any environmental credit/tax incentive in the host-country Brazil for which GHG emission reductions promoted by the proposed VCS project activity would be eligible under.
Supply chain (Scope 3) emissions double claiming	The Applus+ Certification's validation team has confirmed that the project proponent UniCarbo Energia e Biogás Ltda. is not a buyer or seller of a product whose emissions footprint is changed by the proposed VCS project activity.
Sustainable development contributions	As confirmed also confirmed by the Applus+ Certification's validation team and as appropriately outlined in Section 1.18 of the completed VCS PD, the proposed VCS project activity is expected to contribute towards the following Sustainable Development Goals (SDGs): <i>SDG 7 – Affordable and clean energy (Ensure access to affordable, reliable, sustainable and modern energy for all:</i> Clean Electricity Production: The proposed VCS project activity contributes to the generation of clean and renewable electricity, helping to diversify the energy mix and reduce dependence on fossil fuels.

	<i>SDG 8 – Decent work and economic growth (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all):</i> Job Creation: The proposed VCS project activity will create job opportunities, particularly in the operation and maintenance of the LFG capture and destruction/utilization infrastructures. <i>SDG 13 - Climate Change Mitigation (Take urgent action to combat climate change and its impacts):</i> Reduction of Greenhouse Gas Emissions: The proposed VCS project activity encompasses collection of LFG, flaring of LFG and utilization of LFG as gaseous fuel for electricity generation. The proposed VCS project activity therefore promotes mitigation of methane emissions to the atmosphere and also displaces equivalent amount of electricity that would be otherwise generated by existent grid-connected power generation facility (including fossil fuel fired power plants) and addition of new power generation sources within the National Electricity Grid of Brazil. It is the Applus+ Certification's validation team's opinion that the proposed VCS project activity contributes towards Sustainable Development in its host-country Brazil.
Additional information relevant to the project	<i>Leakage management:</i> As assessed by the Applus+ Certification's validation team, there are no sources of leakage to be considered nor leakage effects (i.e., leakage sources and leakage emissions) to be considered by project-based initiatives applying the CDM baseline and monitoring methodology ACM0001 (version 19.0) (+ applicable CDM methodological tools). <i>Commercially sensitive information:</i> As assessed by Applus+ Certification's validation team, there is no commercially sensitive information to be excluded from the VCS PD, thus not applicable. <i>Further information:</i>

As assessed by Applus+ Certification's validation team, there is no additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that may have a bearing on the eligibility of the project, the net GHG emission reductions or the quantification of net GHG emission reductions for the proposed VCS project activity, thus not applicable.

3.2 Safeguards and Stakeholder Engagement

3.2.1 Stakeholder Engagement and Consultation

3.2.1.1 Stakeholder Identification

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder identification	The stakeholder identification was confirmed by the Applus+ Certification's validation team as being conducted by the project proponent UniCarbo Energia e Biogás Ltda. during the month of March-2024, thus more than a month prior to the later occurred stakeholder physical meeting (21-May-2024). As indicated in Section 2.1.1 of the completed VCS PD and confirmed by the Applus+ Certification's validation team through visualization of records of the comment invitations previously sent to different stakeholders (via email), the following local stakeholders were invited to the conducted consultation, therefore meeting related applicable requirements: - Catanduva Mayor's office – Mayor of Catanduva; - City Council; - Environmental agency of São Paulo state (CETESB); - Municipal Secretaries of Catanduva; - Public Ministry – State public prosecutor; - Local scavenger's cooperative – Cooperative representative; - City Hall / Mayor's office from the municipality of Catanduva; - Representatives of local communities. The Applus+ Certification validation team also was able to confirm that local inhabitants in the region of influence of the CGR Catanduva

	landfill and proposed VCS project activity were also invited to the conducted consultation through invitation flyers which were distributed in local communities. It is the opinion of the Applus+ Certification's validation team that the project proponent UniCarbo Energia e Biogás Ltda. has correctly identified stakeholder that are somehow impacted by the proposed VCS project activity by sufficiently considering the significance of populations and how they may be affected by the proposed VCS project activity.
Legal or customary tenure/access rights	By taking into account the project type, design and location (including economic & social conditions and aspects in the region of influence of the landfill where the proposed VCS project activity is implemented), the Applus+ Certification's validation team is of the opinion that, as appropriately outlined in the VCS PD, there are no legal or customary tenure/access rights to territories and resources, including collective and/or conflicting rights held by stakeholders which would need to be considered. While an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
Stakeholder diversity and changes over time	As confirmed by the Applus+ Certification's validation team, Section 2.1.1 of the VCS PD appropriately describes the different groups of stakeholders identified for the VCS project activity. The Applus+ Certification's validation team has also assessed a spreadsheet with information about all the stakeholder which participated in the previously conducted stakeholder consultation meeting, which confirms the information included in the VCS PD about diversities of the three identified stakeholder groups. By taking into account the project type, design and location (including economic & social conditions and aspects in the region of influence of the landfill where the proposed VCS project activity is implemented),

	the Applus+ Certification's validation team is of the opinion that, as appropriately outlined in the VCS PD, there are no changes expected to occur over time on the social, economic and cultural diversity within stakeholder groups to be considered.
Expected changes in well-being	As confirmed by the Applus+ Certification's validation team through assessment of (i) the previously issued and approved Environmental Impact Assessment (EIA) Report for the construction and operation of the CGR Catanduva landfill (which addresses the influence of the construction and operation of this landfill over social-economical regional aspects), (ii) the environmental licenses/permits previously issued by Companhia Ambiental do Estado de São Paulo (CETESB) (environmental authority for São Paulo State) for both the landfill and the project activity, there are no negative impacts or relevant risks for the general well-being of local stakeholders which could be caused or triggered by the occurred implementation of the proposed VCS project activity (which does not adversely affect the operational conditions of the CGR Catanduva landfill and does not adversely affect the social-economical aspects of region of influence of this landfill under any circumstance). In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
Location of stakeholders	As confirmed by the Applus+ Certification's validation team through assessment of (i) the previously issued and approved Environmental Impact Assessment (EIA) Report for the construction and operation of the CGR Catanduva landfill, (ii) the environmental licenses/permits previously issued by Companhia Ambiental do Estado de São Paulo (CETESB) (environmental authority for São Paulo State) for both the landfill and the proposed VCS project activity, by also taking into account the nature of the project activity, it is reasonable to assume that the occurred implementation of the project activity per se is not expected to cause any negative impacts over local stakeholders. It is

	Applus+ Certification's validation team opinion that location of stakeholders was correctly described in Section 2.1.1. of the VCS PD in conformance with applicable VCS requirements. In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
Location of resources	As confirmed by the Applus+ Certification's validation team through assessment of (i) the previously issued and approved Environmental Impact Assessment (EIA) Report for the construction and operation of the CGR Catanduva landfill, (ii) the environmental licenses/permits previously issued by Companhia Ambiental do Estado de São Paulo (CETESB) (environmental authority for São Paulo State) for both the landfill and the proposed VCS project activity, by also taking into account the nature of the project activity, it is reasonable to assume that there are no territories or resources owned by local stakeholders nor to which they have customary access. In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.

3.2.1.2 Stakeholder Consultation and Ongoing Communication

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder engagement process	The Applus+ Certification's validation team confirmed that the project proponent UniCarbo Energia e Biogás Ltda. has sufficiently identified,

	informed and established engagement process with male and female stakeholders for the proposed VCS project activity in order to seek the provisions of inputs, suggestions, concerns and feedback about the so far occurred implementation and operation of the proposed VCS project activity. As confirmed by the Applus+ Certification's validation team, e-mails were sent to the identified stakeholders on 23-April-2024 inviting them to participate in the meeting held on 21-May-2024. Such e-mail invitations were made available and assessed by the Applus+ Certification's validation team. As assessed by the Applus+ Certification's validation team, a stakeholder consultation was proposed for the VCS project activity: - Conduction of a physical meeting for local stakeholders' consultation related to the implementation and operation of the VCS project activity (on 21-May-2024) - Stakeholder feedback round (which will last until the end of the lifetime of the project activity, with selected stakeholders being invited and encouraged to present any comments or complains about the project activity periodically).
Consultation outcome	The Applus+ Certification's validation team has confirmed, through assessment of evaluation forms which were distributed amongst the meeting's participants, that no concerns about any potential negative impact related to the so far occurred implementation/operation of the project activity were raised by the participants of the organized local stakeholder consultation (LSC) meeting. Details about a channel of future communication between the stakeholders and the project proponent UniCarbo Energia e Biogás Ltda. were included in the presentation material shown during the performed meeting (as assessed by the Applus+ Certification's validation team through review of the content of such presentation material). It is the opinion of the Applus+ Certification's validation team that the project proponent UniCarbo Energia e Biogás Ltda. conducted a stakeholder consultation for the implementation of the proposed VCS project activity in a sufficiently inclusive, culturally appropriate, and respectful of local knowledge manner. Furthermore, it is also confirmed that implemented procedure for stakeholder consultation includes a deemed acceptable process for receiving, hearing, responding and attempting to resolve grievances

	within a reasonable time period and taking into account culturally appropriate conflict resolution methods.
Ongoing communication	Ongoing channels of communication were confirmed as being established by the project proponent UniCarbo Energia e Biogás Ltda. and presented to the stakeholders during the conducted LSC meeting. As outlined in Section 2.1.2 of the VCS PD and confirmed by the Applus+ Certification validation team through assessment of the slide presentation shown to stakeholders during the conducted meeting, the project proponent will maintain open channels of communication with stakeholders through phone. WhatsApp application and email communication. Moreover, a grievance book was also made available at the central office of the CGR Catanduva landfill for any stakeholders to present their complaints and questions, as confirmed by Applus+ Certification's validation team during the conducted on-site visit. It is the opinion of the Applus+ Certification's validation team that the project proponent UniCarbo Energia e Biogás Ltda. sufficiently demonstrated all actions taken in respect of both the stakeholder consultation and ongoing communications (for future VCS verification assessments). Established mechanisms for ongoing communication with stakeholders allow stakeholders to raise concerns about potential impacts during project implementation and operation.
Stakeholder input	As confirmed by the Applus+ Certification validation team, the project proponent UniCarbo Energia e Biogás Ltda. has established a written procedure (which was assessed by the Applus+ Certification validation team) for addressing any potential concerns raised by local stakeholders, with responsible personnel and their contact information also being made available. It was also confirmed that there were no negative inputs so far from stakeholders regarding the implementation/operation of the proposed VCS project activity. Furthermore, there are no changes in the project design that require updates to the local stakeholders.

3.2.1.3 Free, Prior, and Informed Consent

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Obtaining consent	As confirmed by Applus+ validation, CGR Centro de Gerenciamento de Resíduos Ltda. is the only owner of the infrastructure encompassed by the proposed VCS project activity is located. Moreover, by taking into account the nature of the proposed VCS project activity and its implementation location (a well-managed landfill owned by private party), Applus+ Certification's validation team has therefore confirmed that there are no risk of indigenous people or local communities sharing access rights to the area of where the project activity is implemented, with no legal or customary tenure/access rights being applicable. In summary, there is no disrespect by the project proponent UniCarbo Energia e Biogás Ltda. and the project operator CGR Centro de Gerenciamento de Resíduos Ltda. to stakeholders' rights to participate in and/or in terms of consenting to consultation as part of project design and implementation. The project proponent UniCarbo Energia e Biogás Ltda. and the project operator CGR Centro de Gerenciamento de Resíduos Ltda. have respected stakeholders' rights to participate in and consent to consultation as part of project design, its implementation and its so far occurred continuous operation.
Outcome of FPIC discussion	Not applicable as explained above.

3.2.1.4 Grievance Redress Procedure

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Development process	The Applus+ Certification's validation team has confirmed, by assessing the written procedure for addressing stakeholder's grievances, that the development process was correctly described in Section 2.1.4. of the VCS PD in conformance with applicable VCS requirements. It is the opinion of the Applus+ Certification's validation team that the project proponent UniCarbo Energia e Biogás Ltda. developed a sufficient complete grievance redress procedure to address disputes with stakeholders that may arise during project planning and

	implementation. Such a procedure sufficiently included processes for receiving, hearing, responding and attempting to resolve grievances within a reasonable time period, taking into account culturally appropriate conflict resolution methods. The procedure and documentation of disputes resolved through the procedure was confirmed by the Applus+ Certification's validation team as being made publicly available.
Grievance redress procedure	The assessment for addressing stakeholder's grievances is described above.

3.2.1.5 Public Comments

Comments received	Actions taken by the project proponent	Evidence gathering activities, evidence checked, and assessment conclusion
The proposed VCS project activity was open for comments for the period from 14-February-2025 to 16-March-2025. No comments were received during such period nor after through the available channels of communication.	-	-

3.2.2 Risks to Local Stakeholders and the Environment

3.2.2.1 Management Experience

The Applus+ Certification validation's team has confirmed, during conducted interviews with representatives of the project operator CGR Centro de Gerenciamento de Resíduos Ltda., that the management team of the CGR Catanduva landfill (and the VCS project activity) have previous experiences with operation of other landfills in Brazil.

Information included in Section 2.2.1 of the VCS PD regarding management experience of the operators of the project activity was confirmed by Applus+ Certification's validation team after assessing the following evidence: degree certification and training certificates regarding the operation of the LFG power plant /20/ /11/.

Moreover, the project proponent Unicarbo Energia e Biogás Ltda. is an organization with vast experience in the development and operation of LFG project activities.

3.2.2.2 Risk Assessment

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Natural and human-induced risks to stakeholders' wellbeing	As confirmed by the Applus+ Certification's validation team through assessment of (i) the previously issued and approved Environmental Impact Assessment (EIA) Report for the construction and operation of the CGR Catanduva landfill (which addresses the influence of the construction and operation of this landfill over social-economical regional aspects), (ii) the environmental licenses/permits previously issued by Companhia Ambiental do Estado de São Paulo (CETESB) (environmental authority for São Paulo State) for both the landfill and the project activity, there are no negative impacts or relevant risks for the general well-being of local stakeholders which could be caused or triggered by the occurred implementation of the proposed VCS project activity (which does not adversely affect the operational conditions of the CGR Catanduva landfill and does not adversely affect the social-economical aspects of region of influence of this landfill under any circumstance). In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
Risks to stakeholder participation	By considering the type and design of the proposed VCS project activity (project-based LFG recovery and destruction/utilization initiative) as well as the social and economic context of the location of the project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that there are no risk to local stakeholder participation.

Working conditions	As appropriately outlined in the VCS PD, there are rigid procedures implemented at both the CGR Catanduva landfill and the project activity, as can be demonstrated at the company's guidelines "Programa de Controle Médico de Saúde Ocupacional" (translated as "Medical Control Program of Occupational Health") ^{/37/}, "Programa de Gerenciamento de Riscos" (translated as "Risk Management Program") ^{/38/} and "Laudo Técnico das Condições Ambientais do Trabalho" (translated as "Technical Report on Environmental Working Conditions") ^{/38/} which were assessed by the Applus+ Certification's validation team. These programs and procedures are in conformance with national Labor regulations. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) having good working conditions being ensured for employees, collaborators and external parties as part of the operation of its companies. In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
Safety of women and girls	By taking into account the type, design of the proposed VCS project activity as well as the social and economic context of the location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that there are no women and girls in the local community for which risks related to safety would need to be identified and/or for which related mitigation measures would need to be implemented due to the project design, its occurred implementation and so

	far occurred continuous operation. The following disclaimer is appropriately outlined in the VCS PD regarding women's rights: <i>"The law N° 7.353⁷ of 1985 established the National Council on Women's Rights, which advocated successfully on behalf of including gender conscious legislation in the updated constitution of 1988."</i>
Safety of minority and marginalized groups, including children	By taking into account the type, design and location of the proposed VCS project activity (incl. the social and economic context of such location), the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that there are no children, and minority and marginalized groups in the local community for which risks would need to be identified and/or for which related mitigation measures would need to be implemented due to the project design, its occurred implementation and so far occurred continuous operation. The following disclaimer is appropriately outlined in the VCS PD regarding the protection of children: <i>"Brazil has published laws for the protection of children⁸, which also includes employment regulations."</i>
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials, and chemical pesticides and fertilizers)	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that there are no identified impacts (caused by pollutant emissions to air, discharges to water, noise and vibration, generation of waste, or the release of hazardous materials) to be mitigated due to the project design, its occurred implementation and so far occurred continuous operation.

⁷ http://www.planalto.gov.br/ccivil_03/leis/1980-1988/L7353.htm

⁸ https://www.planalto.gov.br/ccivil_03/leis/l8069.htm

3.2.3 Respect for Human Rights and Equity

3.2.3.1 Labor and Work

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Discrimination	As appropriately outlined in its completed VCS PD, it is reasonable to assume that the proposed VCS project activity complies with principles of the National Council on Women's Rights, formed in 1975, which advocated successfully on behalf of including gender conscious legislation in the updated Brazilian Federal Constitution of 1988. The Applus+ Certification's validation team conducted an investigation in a Brazilian web portal which lists legal procedural consultation and initiated court cases (https://www.jusbrasil.com.br/) in order to check whether the project operator CGR Centro de Gerenciamento de Resíduos Ltda. is involved in any prosecuting cases or court cases involving discrimination issues. No case was found involving CGR Centro de Gerenciamento de Resíduos Ltda. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) not to have any kind of discrimination being promote by employees, collaborator and external parties as part of the operation of its companies.
Sexual harassment	As appropriately outlined in its completed VCS PD, it is reasonable to assume that the proposed VCS project activity complies with principles of the National Council on Women's Rights, formed in 1975, which advocated successfully on behalf of including gender conscious legislation in the updated Brazilian Federal Constitution of 1988. The Applus+ Certification's validation team conducted an investigation in a Brazilian web portal which lists legal procedural consultation and initiated court cases (https://www.jusbrasil.com.br/) in order to check whether the project operator CGR Centro de Gerenciamento de Resíduos Ltda. is involved in any prosecuting cases or court cases involving sexual harassment issues. No case was found involving CGR Centro de Gerenciamento de Resíduos Ltda. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) not to have any kind of sexual harassment being promote by employees, collaborator and external parties as part of the operation of its companies.
Equal pay for equal work	CGR Centro de Gerenciamento de Resíduos Ltda. has a corporate policy not to have any kind of disparity being regarding payment policies for employees, collaborator and external parties as part of the operation of its companies.

	In summary, it is sufficiently confirmed that the project design, its implementation and its so far occurred continuous operation provide equal pay for equal work in project design, implementation and operation.
Gender equity in labor and work	As appropriately outlined in the VCS PD, gender equality in Brazil is a right protected by the Brazilian Federal Constitution⁹. The Applus+ Certification's validation team conducted an investigation in a Brazilian web portal which lists legal procedural consultation and initiated court cases (https://www.jusbrasil.com.br/) in order to check whether the project operator CGR Centro de Gerenciamento de Resíduos Ltda. is involved in any prosecuting cases or court cases involving gender equality offenses. No case was found involving CGR Centro de Gerenciamento de Resíduos Ltda. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) not to have any kind of discrimination and sexual harassment being promote by employees, collaborator and external parties as part of the operation of its companies. In summary, it is sufficiently confirmed that the project design, its implementation and its so far occurred continuous operation provide equal opportunities (in the context of gender both in terms of employment and general project consultation) and also potentially provide equal pay for equal work in project design, implementation and operation.
Forced labor	As confirmed by Applus+ Certification's validation team and as correctly outlined in Section 2.3.1 of the VCS PD, the operation of the proposed VCS project activity requires skilled and trained employees. Under conformance with applicable national regulations, CGR Centro de Gerenciamento de Resíduos Ltda. does not employ and are not complicit in any form of forced labor. The proposed VCS project activity complies with applicable national legislation which prohibits the violation of the human rights principle and actively enforces the compliance of such principle. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) not to have any kind of forced labor as part of the operation of its companies. In summary, it is sufficiently confirmed that the project operator CGR Centro de Gerenciamento de Resíduos Ltda. prohibits the use of forced labor in project design and implementation.

⁹ https://www.planalto.gov.br/ccivil_03/constituicao/constituicao.htm

Child labor	As confirmed by Applus+ Certification's validation team and as correctly outlined in Section 2.3.1 of the VCS PD, the operation of the proposed VCS project activity requires skilled and trained employees. Under conformance with applicable national regulations, CGR Centro de Gerenciamento de Resíduos Ltda. does not employ and are not complicit in any form of child labor. The proposed VCS project activity complies with applicable national legislation which prohibits the violation of the human rights principle and actively enforces the compliance of such principle. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) not to have any kind of child labor as part of the operation of its companies. In summary, it is sufficiently confirmed that the project operator CGR Centro de Gerenciamento de Resíduos Ltda. prohibits the use of child labor in project design and implementation.
Human trafficking	As confirmed by Applus+ Certification's validation team and as correctly outlined in Section 2.3.1 of the VCS PD, the operation of the proposed VCS project activity requires skilled and trained employees. Under conformance with applicable national regulations, CGR Centro de Gerenciamento de Resíduos Ltda. does not employ and are not complicit in any form of human trafficking. The proposed VCS project activity complies with applicable national legislation which prohibits the violation of the human rights principle and actively enforces the compliance of such principle. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) not to have any kind of human trafficking as part of the operation of its companies. In summary, it is sufficiently confirmed that the project operator CGR Centro de Gerenciamento de Resíduos Ltda. prohibits the use of victims of human trafficking in project design and implementation.

3.2.3.2 Human Rights

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion
Not applicable.	As appropriately outlined in the VCS PD, human rights principles in Brazil are protected by the legislation (as per

	Brazilian Federal Law No. 12.986 of 2014¹⁰). This national legislation is under conformance with principles and rationale of the International Bill of Human Rights and universal instruments relating to human rights, The Applus+ Certification's validation team conducted an investigation in a Brazilian web portal which lists legal procedural consultation and initiated court cases (https://www.jusbrasil.com.br/) in order to check whether the project operator CGR Centro de Gerenciamento de Resíduos Ltda. is involved in any prosecuting cases or court cases involving human rights offenses. No case was found involving CGR Centro de Gerenciamento de Resíduos Ltda. Furthermore, for CGR Centro de Gerenciamento de Resíduos Ltda. it is a corporate policy (with controls being implemented) not to have any kind of discrimination and sexual harassment being promote by employees, collaborator and external parties as part of the operation of its companies. In summary, it is sufficiently confirmed that human rights have been respected as part of the project design, its implementation and its so far occurred continuous operation. It is also sufficiently confirmed that the project operator CGR Centro de Gerenciamento de Resíduos Ltda. has respected human rights as set out in the International Labour Organization's Declaration on Fundamental Principles and Rights at Work as part of project design, its implementation and so far occurred continuous operation.
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3.2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion
Not applicable.	As confirmed by Applus+ Certification's validation team through assessment of the previously performed Environmental Impact Assessment (EIA) for the construction of the CGR Catanduva landfill, there are no sites of cultural heritage in the area of influence of this landfill site.

¹⁰ https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l12986.htm

	As confirmed by the Applus+ Certification's validation team, there are no identified indigenous people for which respect would need to be recognized and for which protection of the rights would need to be ensured in line with applicable international human rights law, and the United Nations Declaration on the Rights of Indigenous People and ILO Convention 169 on Indigenous and Tribal Peoples as part of the project design, its implementation and its so far occurred continuous operation. Furthermore, as also confirmed by the Applus+ Certification's validation team, there are no cultural heritages to be preserved and/or protected consistent with indigenous people practices and/or UNESCO Cultural Heritage conventions as part of the project design, its implementation and its so far occurred continuous operation. In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
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3.2.3.4 Property Rights

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion
Not applicable.	As confirmed by the Applus+ Certification's validation team through assessment of (i) the previously issued and approved Environmental Impact Assessment (EIA) Report for the construction and operation of the CGR Catanduva landfill (which addresses legal aspects such as property rights), (ii) the environmental licenses/permits previously issued by Companhia Ambiental do Estado de São Paulo (CETESB) (environmental authority for São Paulo State) for both the landfill and the proposed VCS

	project activity, there are no issues related to property rights which could be caused or triggered by the previously occurred construction of the CGR Catanduva landfill and/or later occurred implementation of the proposed VCS project activity (which does not adversely affect the operational conditions of the CGR Catanduva landfill and does not adversely affect the social-economical and legal aspects of region of influence of this landfill under any circumstance). Therefore, it is the opinion of the Applus+ Certification's validation team that the issue of property rights was appropriately addressed/justified in Section 2.3.4. of the VCS PD and under conformance with applicable VCS requirements. In summary, there are no property rights to be recognized, respected, supported and where feasible, for which measures to help secure such rights would be required as part of the project design, its implementation and its so far occurred continuous operation. In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
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3.2.3.5 Benefit Sharing

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Process used to design the benefit sharing plan	As appropriately outlined in Section 2.3.5 of the VCS PD, the proposed VCS project activity does not impact property rights. There are no people that were relocated and/or had to be compensated due to the design of the proposed VCS project activity, its implementation and its so far occurred continuous operation.
Summary of the benefit sharing plan	As appropriately outlined in Section 2.3.5 of the VCS PD, the proposed VCS project activity does not impact property rights. There are no people that were relocated and/or had to be compensated due to the design of the

	proposed VCS project activity, its implementation and its so far occurred continuous operation. In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.
Approval and dissemination of benefit sharing plan	As appropriately outlined in Section 2.3.5 of the VCS PD, the proposed VCS project activity does not impact property rights. There are no people that were relocated and/or had to be compensated due to the design of the proposed VCS project activity, its implementation and its so far occurred continuous operation. In summary, while an Environmental Impact Assessment (EIA) was confirmed as being previously undertaken as part of the process to obtain the environmental license/permit for the CGR Catanduva landfill, the content of the related Environmental Impact Assessment (EIA) sufficiently confirms the above-mentioned information. Moreover, Applus+ Certification's validation team has confirmed that all infrastructure encompassed by the proposed VCS project activity was previously approved by the environmental agency as seen in the issued environmental license.

3.2.4 Ecosystem Health

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Impacts on biodiversity and ecosystems	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that there are no negative impacts on biodiversity and ecosystems (for which risks and/or mitigation measures would need to be implemented) due to the project design, its occurred implementation and so far occurred continuous operation.

	As also appropriately outlined in the VCS PD, in general, the identified environmental aspects for the proposed VCS project activity are positive (with no relevant negative environmental impact being identified) While there is no relevant negative environmental aspect/impact for the proposed VCS project activity, the currently valid environmental license/permit valid/applicable for the CGR Catanduva landfill site (including infrastructure for collection and destruction of LFG) does not define or require any regular monitoring of potentially relevant negative environmental aspect/impact. The Applus+ Certification's validation team confirmed, through assessment of related licensing documentation that, as appropriately outlined in Sections 1.11 and 1.14 of the VCS PD and above assessed in Section 3.2.1, both the CGR Catanduva landfill and the infrastructure encompassed by the proposed VCS project activity were granted with valid environmental licensing/permits issued by the local environmental authority. It is also relevant to note that all the possible environmental impacts caused by the construction of the landfill were previously identified (with mitigation measures being presented, where necessary) in the Environmental Impact Assessment (EIA) for the construction of the landfill, as established by National and local requirements. While the implementation of the project activity per se does not have any impact over the construction/operation of the landfill, such impacts should not be considered as impacts that may be caused by the project activity as confirmed by Applus+ Certification's validation team after assessing the environmental license for the project activity.
Soil degradation and soil erosion	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that the project design, its occurred implementation and so far occurred continuous operation do not contribute in any manner for soil degradation and soil erosion by converting natural non-degraded ecosystems, or drain or degrade the hydrological functions of a natural, non-degraded ecosystem.
Water consumption and stress	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that the project design, its occurred

implementation and so far occurred continuous operation do not promote any water consumption and stress by converting natural non-degraded ecosystems, or drain or degrade the hydrological functions of a natural, non-degraded ecosystem.

3.2.4.1 Rare, Threatened, and Endangered species

Risk identified	Evidence gathering activities, evidence checked, and assessment conclusion
Species and habitat	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that there are no habitat adversely affected by the project design, its occurred implementation and so far occurred continuous operation. As confirmed by the Applus+ Certification's validation team, the proposed VCS project activity and the CGR Catanduva landfill are not located in areas in or adjacent to, habitats for rare, threatened, or endangered species.
Areas needed for habitat connectivity	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that there are no areas needed for habitat connectivity affected by the project design, its occurred implementation and so far occurred continuous operation. As confirmed by the Applus+ Certification's validation team, the proposed VCS project activity and the CGR Catanduva landfill are not located in areas in or adjacent to, habitats for rare, threatened, or endangered species.

3.2.4.2 Introduction of Species

Species introduced	Evidence gathering activities, evidence checked, and assessment conclusion
Not applicable.	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that the project design, its implementation and its so far occurred continuous operation do not result in planting or

	introduction of species (including invasive species) or allow an invasive species to thrive.
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Existing invasive species	Evidence gathering activities, evidence checked, and assessment conclusion
Not applicable.	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that the project design, its implementation and its so far occurred continuous operation do not result in planting or introduction of species (including invasive species) or allow an invasive species to thrive.

Evidence gathering activities, evidence checked, and assessment conclusion	
Invasive species	By taking into account the type, design and location of the VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that the project design, its implementation and its so far occurred continuous operation do not result in planting or introduction of species (including invasive species) or allow an invasive species to thrive.

3.2.4.3 Ecosystem conversion

Risks Identified	Evidence gathering activities and evidence checked
Ecosystem conversion	By taking into account the type, design and location of the proposed VCS project activity, the Applus+ Certification's validation team is of the opinion (based on its expertise and experience with similar/comparable project-based initiatives also implemented in the country Brazil) that it is deemed reasonable and acceptable to assume that the project design, its implementation and its so far occurred continuous

operation do not promote any ecosystem conversion or allow ecosystem conversion to occur.

3.3 Application of Methodology

3.3.1 Title and Reference

The completed VCS PD applies the latest version of the CDM baseline and monitoring methodology ACM0001 (version 19.0). As confirmed by the Applus+ Certification's validation team, ACM0001 (version 19.0) currently represents the latest version of ACM0001. Thus, the selection of ACM0001 (version 19.0) for completing the VCS PD (of a proposed VCS project activity promoting collection and destruction/utilization of LFG) is confirmed as being correct.

The Applus+ Certification's validation team had also checked the current list of valid CDM standardized baselines as outlined in the applicable section of the UNFCCC CDM website and confirmed that there is no standardized baseline applicable to the proposed VCS project activity hosted in Brazil.

The following CDM methodological tools are also applied:

- Tool 04: "Emissions from solid waste disposal sites" (version 08.1)
- Tool 05: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)
- Tool 06: "Project emissions from flaring" (version 04.0)
- Tool 08: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)
- Tool 32: "Positive list of technologies" (version 04.0)

The Applus+ Certification's validation team also confirmed that the selected CDM baseline and monitoring methodology and all applicable CDM methodological tools were correctly applied with respect to the following:

- Meeting of applicability conditions/criteria (assessment details included in Section 3.3.2)
- Delineation of project boundary and selection of emission sources and Greenhouse gases (GHGs) (assessment details included below in this Section 3.3.3)
- Baseline identification (assessment details included in Section 3.3.4)
- Algorithms and/or formulae used to determine emission reductions (assessment details included in Section 3.3.6)

- Monitoring plan (including selection and definition of ex-ante determined parameters and parameters monitored ex-post and monitoring approaches for such parameters (assessment details included in Section 3.3.8))

Assessment of meeting of applicability conditions/criteria for the selected CDM baseline and monitoring methodology + applicable CDM methodological tools:

The VCS PD for the proposed VCS project activity was completed in full conformance with the selected CDM baseline and monitoring methodology + applicable CDM methodological tools. As outlined in Section 3.2 of the VCS PD, all applicability criteria/requirements for this CDM baseline and monitoring methodology and applicable CDM methodological tools are demonstrated to be sufficiently met. Details for the assessment performed by the Applus+ Certification's validation team of how such applicability criteria/requirements are met are summarized in Section 3.3.2.

As confirmed by the Applus+ Certification's validation team, the applied CDM baseline and monitoring methodology and applicable CDM methodological tools represent the current latest version of such methodological sources and/or the latest version at the time of starting of the validation assessment.

3.3.2 Applicability

While details and explanations about how the applicability criteria/requirements of ACM0001 (version 19.0) + applicable CDM methodological tools are confirmed by the Applus+ Certification's validation team as being appropriately and sufficiently included in 3.2 of the VCS PD for the project activity, related assessment details are summarized in the table below:

Methodology ID	Applicability condition	Assessment and conclusion
ACM0001 (version 19.0)	<i>"The methodology is applicable under the following conditions:</i> (a) <i>Install a new LFG capture system in a new or existing SWDS¹¹ where no LFG capture system was installed prior to the implementation of the proposed VCS project activity; or</i> (b) <i>Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that:</i> (i) <i>The captured LFG was vented or flared and not used prior to the implementation of the proposed VCS project activity; and</i> (ii) <i>In the case of an existing active LFG capture system for which the</i>	As confirmed by the Applus+ Certification's team, ACM0001 (version 19.0) represents the latest valid version of the ACM0001 baseline and monitoring methodology, it thus represents the CDM baseline and monitoring methodology to be applied in the VCS PD of a proposed project-based initiative promoting LFG collection and destruction/utilization. Applicability criteria (b-i) is correctly regarded as fulfilled, as the considered project design encompasses the installation of an active LFG capture active system in an existing SWDS by replacing the previously existent passive LFG collection system, which was composed by a set of rudimentary LFG venting/combustion drains . While the proposed VCS project activity encompasses flaring and utilization (as gaseous fuel for electricity) of collected LFG, condition (c.i) is thus also met. As also appropriately outlined and justified in the VCS PD, no change in the current practice of landfilling of MSW at the CGR Catanduva landfill has occurred (and no changes are

¹¹ SWDS stands for "Solid Waste Disposal Site". In the particular case of the proposed VCS project activity, the considered SWDS is the CGR Catanduva landfill.

		amount of LFG cannot be collected separately from the project system after the implementation of the proposed VCS 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.	expected to occur) after the occurred implementation and starting of operations of the proposed VCS project activity either. With or without the proposed VCS project activity, no recycling of the organic fraction of the solid waste, neither aerobic treatment of solid waste, nor incineration of solid waste have occurred or are expected to occur at the CGR Catanduva landfill. Recycling of organic matter, aerobic treatment and incineration of solid waste is sufficiently demonstrated in the VCS PD not to be common practice in Brazil and in the region of influence of the CGR Catanduva landfill.
	(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	As part of validation assessment, in order to confirm the applicability of the selected CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable CDM methodological tools, interviews were conducted with representatives of the project proponent and it was confirmed that the design and/or operation of the CGR Catanduva landfill site is not expected to be changed under any aspect. By taking into account the content/rationale for the applicability condition (d) and based on assessment of detailed information made	

		<i>through a natural gas distribution network.</i> (iv) <i>Supplying compressed/liquefied LFG to consumers using trucks;</i> (v) <i>Supplying the LFG to consumers through a dedicated pipeline;</i> <i>(d) Do not reduce the amount of organic waste that would be recycled in the absence of the proposed VCS project activity."</i>	available in the VCS PD regarding how the condition (d) is met + assessment of credible documented information/evidence, it is the opinion of the Applus+ Certification's validation team that the VCS PD sufficiently justifies the plausibility and correctness of related information made available. Therefore, the Applus+ Certification's validation team is of the opinion that it is sufficiently justified and demonstrated that the implementation and starting of operations of the proposed VCS project activity has not represented (and it is not expected to represent) any driver or incentive for the promotion of any kind of reduction in the amount of organic waste that would be recycled at the CGR Catanduva landfill and/or at any other existent or potential (hypothetical) waste treatment or utilization facility under the area of influence of this particular landfill in the absence of the proposed VCS project activity (baseline scenario). The prevailing waste management practices pertinent to organic solid waste recycling in the region attended by the CGR Catanduva landfill were also assessed by the Applus+ Certification's validation team.
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		As verified, detailed information (including aspects, facts and statistics related to recycling of organic fraction of MSW in the region of influence of the CGR Catanduva landfill and in other regions of Brazil) are included in the related documented evidence assessed by the Applus+ Certification's validation team which are appropriately referred in the VCS PD. Such data sources confirm the non-existence of any facility with relevant scale/size to promoting utilization or recycling of organic fraction of solid waste (such as a solid waste composting plant) in the region of the project site. The Applus+ Certification's validation team also assessed the amount of organic waste currently being recycled or utilized in the region and whether such amount is to be potentially negatively impacted by the implementation and starting of operations of the proposed VCS project activity. Available and credible statistical data and information sources were assessed by the Applus+ Certification's validation team (including both related sources indicated in the VCS PD as well as other credible sources selected by the validation team). Assessed data and information sufficiently confirm the suitability and plausibility of all
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		related argumentation and explanations which are made available in the VCS PD. Furthermore, based on assessment of related construction and design documentation for the CGR Catanduva landfill and also based on interview conducted with representative of the project proponent UniCarbo Energia e Biogás Ltda. the Applus+ Certification's validation team was also able to confirm that no initiative involving recycling of organic fraction of MSW (or any other type of solid waste) is currently expected to be implemented at the CGR Catanduva landfill or in any other site by the host-country project proponent or by any other party. Furthermore, by also taking into account the applicable regulatory framework and typical business environment for waste management services (as a public service) in Brazil, it is also the understanding and opinion of the Applus+ Certification's validation team (based on its sectoral expertise and performed assessment of related sectoral literature), that the implementation and starting of operations of the proposed VCS project activity has not represented (and they are not expected to represent) any potential incentive or
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		driver for the promotion of eventual changes in existent regional policies, rules and practices involving recycling of organic fraction of solid waste in the region (if even existent in the future) by any administration of municipality(ies) in the region, by any other public entity or by any other relevant solid waste recycling practitioner. As a conclusion, it is sufficiently demonstrated that under no circumstance the implementation and starting of operations of project activity would per se represent a real driver or incentive to have any party reducing or even preventing the volume of organic solid waste stream that would be eventually recycled within the area of influence of the CGR Catanduva landfill under the baseline scenario (absence of the proposed VCS project activity). In summary, it is sufficiently demonstrated in the VCS PD that condition (d) of the above-quoted applicability criteria is sufficiently met.
	<i>“The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is</i> (a) <i>Atmospheric release of LFG or capture of</i>	Applicability condition (a) is fulfilled since, as confirmed by the Applus+ Certification’s validation team, the baseline scenario is confirmed to be directly identified as the release of largest share of generated LFG into the

	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 (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	atmosphere (with small share of LFG being combusted in the pre-project passive LFG venting/combustion drains in the absence of the proposed VCS project activity). The proposed VCS project activity encompasses generation of electricity using collected LFG as gaseous fuel. Therefore, applicability condition (b - i) is an applicable alternative. Applicability conditions (b – ii), (c) and (d) are not applicable either, since the project design does not encompass heat generation, supply of LFG to the end-user(s) through natural gas distribution network, trucks or dedicated pipeline and since the CGR Catanduva landfill does not represent a Greenfield SWDS.
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	<i>natural gas.”</i> (d) <i>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.</i>	
	Non applicability condition: <i>This methodology is not applicable:</i> (a) <i>In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace;</i> (b) <i>If the management of the SWDS in the project activity is deliberately changed</i>	Condition (a) is not applicable since, although LFG captured by the proposed VCS project activity is expected to displace fossil fuels for heat generation, the purpose of the VCS project activity is not to implement energy efficiency measures at a kiln or glass melting furnace. Moreover, no baseline and monitoring methodology other than ACM0001 (version 19.0) is applied. Condition (b) is not applicable either as no quantitative or qualitative changes in the operation of the CGR Catanduva landfill has so far occurred and/or are expected to occur as a direct or indirect result of the occurred implementation and starting of operations of the proposed VCS project activity. As appropriately outlined in the

	during the crediting in order to increase methane generation compared to the situation prior to the implementation of the proposed VCS project activity.	VCS PD, with or without the implementation of the proposed VCS project activity, no recycling of the organic fraction of the waste, aerobic waste treatment or waste incineration are expected to occur. In fact, recycling of waste, waste aerobic treatment and waste incineration are not common practices in Brazil. During the performed validation assessment, interviews were conducted with representatives of the project proponent UniCarbo Energia e Biogás Ltda. and it was confirmed that this project proponent do not intend or plan to change the operation or design of the CGR Catanduva landfill site under any aspect. Moreover, as claimed by the project proponent and described in the VCS PD, the operational conditions and the previously conceived design of the CGR Catanduva landfill are not expected to change in the future. It is important to note that as per monitoring requirements for the monitoring parameter “Management of the SWDS”, the design and operational conditions of the solid waste disposal site (SWDS) will be annually monitored on the basis of different sources, including inter alia:
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		- Original construction and operational design of the CGR Catanduva landfill; - Technical specifications and requirements for the management of the CGR Catanduva landfill; - Applicable local or national regulations dealing with management and operation of existing landfills. - As required by ACM0001 (version 19.0), any occurred or planned relevant change in terms of management of the landfill is to be reported and justified as part of the monitoring process for the proposed VCS project activity.
Tool 04 (version 08.1)	<i>"The tool can be used to determine emissions for the following types of applications:</i> <i>(a) Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. "ACM0001:</i>	As confirmed by the Applus+ Certification's team, the CDM methodological tool "Emissions from solid waste disposal sites" (version 08.1) represents the latest valid version of the "Emissions from solid waste disposal sites" methodological tool after assessing https://cdm.unfccc.int/methodologies/PAmethodologies/to

	<i>Flaring or use of landfill gas”). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex-ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS);</i> <i>(b) Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex-ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in 0 when calculating baseline emissions.</i>	ols/am-tool-04-v6.0.1.pdf/history_view. Also, it thus represents the CDM methodological tool to be applied in the VCS PD of a proposed project-based initiative promoting LFG collection and destruction/utilization. Applicability criteria (a) is correctly regarded as fulfilled, as the considered project design encompasses the mitigation of methane emissions from a specific existing SWDS as confirmed by Applus+ validation team during the conducted onsite visit. As part of validation assessment, in order to confirm the applicability of the CDM methodological tool “Emissions from solid waste disposal sites” (version 08.1), an interview was conducted with representative of the project proponent UniCarbo Energia e Biogás Ltda. and it was confirmed that the design and/or operation of the CGR Catanduva landfill site is not expected to be changed under any aspect. Also, Applus+ validation team assessed ACM0001 (version 19.0) and confirms that it represents the CDM methodological tool to be applied in the VCS PD of the proposed project activity.
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	<i>These two types of applications are referred to in the tool for determining parameters.</i> <i>In the case that: (a) different types of residual waste are disposed or prevented from disposal; or that (b) both MSW and residual waste(s) are prevented from disposal, then the tool should be applied separately to each residual waste and to the MSW”.</i>	As a conclusion, it is Applus+ validation team’s opinion that the proposed VCS project activity, as described in the VCS PD, completely fulfills the applicability conditions of the CDM methodological tool “Emissions from solid waste disposal sites” (version 08.1).
Tool 05 (version 03.0)	<i>“If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption:</i> <i>(a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer;</i> <i>(b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power</i>	As confirmed by the Applus+ Certification’s team, the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) represents the latest valid version of the “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” methodological tool after assessing https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-05-v1.pdf/history_view. Also, it thus represents the CDM methodological tool to be applied in the VCS PD of a proposed project-based initiative promoting electricity generation/consumption. Scenario A is correctly regarded as applicable, as the considered project design encompasses the electricity

	<i>plant(s) is/are not connected to the electricity grid; or</i> <i>(c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.</i>	consumption from the grid and grid sourced electricity generated by the proposed VCS project activity as confirmed by Applus+ validation team during the conducted onsite visit. Moreover ACM0001 (version 19.0) establishes that the consumption of electricity by the proposed VCS project activity is to be accounted for project emissions, also the net electricity generated is to be accounted for the determination of baseline emissions. Also, Applus+ validation team assessed ACM0001 (version 19.0) and confirms that it represents the CDM methodological tool to be applied in the VCS PD of the proposed project activity. As a conclusion, it is Applus+ validation team's opinion that the proposed VCS project activity, as described in the VCS PD, completely fulfills the applicability conditions of the CDM methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0).
Tool 06 (version 04.0)	<i>"This tool is applicable to the flaring of flammable greenhouse gases where:</i> <i>(a) Methane is the component with the highest concentration</i>	As confirmed by the Applus+ Certification's team, the CDM methodological tool "Project emissions from flaring" (version 04.0) represents the latest valid version of the

	<i>in the flammable residual gas; and</i> <i>(b) The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).</i> <i>The tool is not applicable to the use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. In the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare and these shall be followed by the project participant.</i>	“Project emissions from flaring” methodological tool after assessing https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf/history_view. Also, it thus represents the CDM methodological tool to be applied in the VCS PD of a proposed project-based initiative promoting LFG destruction/utilization. Methane is the component with the highest concentration in LFG and no auxiliary fuel is required to make the flammability of LFG enough to be combusted, as confirmed by Applus+ validation team during the conducted onsite visit. Also, Applus+ validation team assessed ACM0001 (version 19.0) and confirms that it represents the CDM methodological tool to be applied in the VCS PD of the proposed project activity. As a conclusion, it is Applus+ validation team’s opinion that the proposed VCS project activity, as described in the VCS PD, completely fulfills the applicability conditions of the CDM methodological tool “Project emissions from flaring” (version 04.0).
Tool 08 (version 03.0)	<i>“Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or</i>	As confirmed by the Applus+ Certification’s team, the CDM methodological tool “Tool to determine the mass flow of a

	<i>exhaust gases are measured for the determination of baseline or project emissions.</i>	greenhouse gas in a gaseous stream” (version 03.0) represents the latest valid version of this methodological tool after assessing https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v1.pdf/history_view. Also, Applus+ validation team assessed ACM0001 (version 19.0) and confirms that it represents the CDM methodological tool to be applied in the VCS PD of the proposed project activity. As a conclusion, it is Applus+ validation team’s opinion that the proposed VCS project activity, as described in the VCS PD, completely fulfills the applicability conditions of the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0).
Tool 32 (version 04.0)	<i>“The use of this methodological tool is not mandatory for the project participants of a CDM project activity or CDM PoA for demonstrating their additionality.</i> <i>This methodological tool shall be applied in conjunction with a small-scale or large-scale methodology which refers to this tool.</i>	As confirmed by the Applus+ Certification’s team, the CDM methodological tool “Positive list of technologies” (version 04.0) represents the latest valid version of the “Positive list of technologies” methodological tool after assessing https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-32-v1.pdf/history_view. According to the technologies listed in the referred CDM

		methodological tool, the proposed VCS project activity fulfills this requirement as it represents a proposed project-based initiative promoting LFG flaring and electricity generation (with nameplate capacity below 10 MW), as confirmed by Applus+ validation team during the conducted onsite visit. Also, Applus+ validation team assessed ACM0001 (version 19.0) and confirms that it represents the CDM methodological tool to be applied in the VCS PD of the proposed project activity. As a conclusion, it is Applus+ validation team's opinion that the proposed VCS project activity, as described in the VCS PD, completely fulfills the applicability conditions of the CDM methodological tool "Positive list of technologies" (version 04.0).
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3.3.3 Project Boundary

Under conformance with the applied CDM baseline and monitoring methodology ACM0001 (version 19.0), the boundary for the proposed VCS project activity is correctly identified in the completed VCS PD as the site where LFG is captured and combusted (destroyed and/or utilized). Since the electricity demand of the proposed VCS project activity may be also met by imports of grid-sourced electricity from the National Electricity Grid of Brazil and share of generated electricity is expected to be exported through such electricity grid, the project proponent has correctly included this particular electricity grid as the spatial boundary for the proposed VCS project activity.

All GHG emission sources and GHG gases included in the project boundary are correctly outlined in Section 3.3 of the VCS PD as summarized below:

GHG emission sources included in the project boundary:

Source		Gas	Included?	Assessment and conclusion
Baseline	Emissions from decomposition of waste at the SWDS site.	CO ₂	No	CO ₂ emissions from decomposition of organic waste are not accounted (since the CO ₂ is also released under the project activity).
		CH ₄	Yes	Methane in LFG is generated as a result of anaerobic decomposition of the organic fraction of the municipal solid waste (MSW) disposed in the CGR Catanduva landfill since it started to operate.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from electricity generation	CO ₂	Yes	CO ₂ emissions due to generation of electricity (in equivalent amount of electricity to be generated by the proposed VCS project activity) that would otherwise occur under the baseline scenario (absence of the proposed VCS project activity) in existing grid-connected electricity generation sources (and addition of new power generation sources) (within the electricity grid the project activity is connected to) are accounted.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	No	Excluded as no emissions from GHG other than CO ₂ are considered in the context of determination of baseline emissions from electricity generation by the proposed VCS project activity.

Source		Gas	Included?	Assessment and conclusion
Project	Emissions from consumption of grid-sourced electricity by the proposed VCS project activity	CO ₂	Yes	Consumptions of grid-sourced electricity by the project activity represent emissions from consumption of electricity due to the operation of the proposed VCS project activity for which, as established by ACM0001 (version 19.0), CO₂ emissions represent important emission sources in the particular case of the proposed VCS project activity. While flaring LFG rich in CH₄ promotes CO₂ emissions, such emissions are not accounted for since combusted LFG is regarded as originated from biogenic (natural) source.
		CH ₄	No	Minor fugitive CH₄ emissions are expected to occur from flaring (residual CH₄ in the exhaust gas of the flare) as part of the normal operation of the proposed VCS project activity. It is however important to note that as per ACM0001 (version 19.0), such emissions are to be considered in the context of the calculation of baseline emissions.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	No	Excluded as no emissions from consumption of grid-sourced electricity by the proposed VCS project activity other than CO₂ are considered in the context of determination of project emissions from electricity generation by the proposed VCS project activity.
		CO ₂	No	Excluded for simplification. Emissions are negligible.
		CH ₄	Yes	May be an important emission source.

Source	Gas	Included?	Assessment and conclusion
Emissions from flaring ¹²	N ₂ O	No	Excluded for simplification. Emissions are negligible.
	Other	No	No emissions from GHG other than CO ₂ are considered in the context of determination of project emissions from flaring

The selected emission sources and GHGs are confirmed by the Applus+ Certification's validation team as being correct and are appropriately justified for the proposed VCS project activity in its completed VCS PD.

No leakage emissions are considered as leakage emissions are not required to be accounted as per applied CDM baseline and monitoring methodology.

In summary, the identified project boundary is confirmed by the Applus+ Certification's validation team as being under compliance with the selected CDM baseline and monitoring methodology + applicable CDM methodological tools. The definition of the project boundary is sufficiently justified in the completed VCS PD.

The Applus+ Certification's validation team also confirms that there are no GHG emission sources, which are not addressed by the applied methodology, and which are expected to contribute more than 1% of the overall expected annual average emission reductions.

It was also confirmed by the Applus+ Certification's validation team that all main GHG emission sources, the physical delineation of the CDM project activity, and other relevant project and baseline emission sources covered in the applied methodology are included within the project boundary for the purpose of calculating project and baseline emissions for the proposed VCS project activity.

The identified project boundary and the selected sources and gases are correctly justified in the VCS PD.

¹² As appropriately outlined in the VCS PD, in accordance with ACM0001 (version 19.0), the parameter "project emissions from flaring" ($PE_{flare,y}$) is accounted for the determination of baseline emissions (and not used for the determination of project emissions despite of being termed as "project emissions" from flaring).

3.3.4 Baseline Scenario

The validation team appointed by Applus+ Certification assessed the correctness and appropriateness of the identification of the baseline scenario for the proposed VCS project activity.

As appropriately and sufficiently outlined in Section 3.4 of the VCS PD for the proposed VCS project activity, the identification of the baseline scenario for the proposed VCS project activity is performed by following applicable guidance of the CDM baseline and monitoring methodology ACM0001 (version 19.0) (i.e Simplified procedures (as described in section 5.3.1 of the referred methodology) + applicable guidance from the CDM methodological tool “Positive lists of technologies” (version 4.0).

As further demonstrated in the VCS PD, in accordance with the *Simplified procedures to identify the baseline scenario* of ACM0001 (version 19.0) and by applying guidance from the methodological Tool “Positive lists of technologies” the baseline scenario for methane emissions for the proposed VCS project activity is directly identified as the atmospheric release of generated LFG (with no share of generated LFG being captured and combusted). Moreover, the baseline scenario for electricity generation is directly identified as electricity generation occurring in existing and/or new grid-connected power plants.

The CDM methodological Tool “Positive lists of technologies” directly defines that project activities at new or existing landfills (greenfield or brownfield) are deemed automatically additional if it is demonstrated that, prior to the implementation of the project activity, LFG was only vented and/or flared (in the case of brownfield projects) or would have been only vented and/or flared (in the case of greenfield projects) but not utilized for energy generation).

The identified baseline scenario valid for the proposed VCS project activity is therefore confirmed by the Applus+ Certification’s validation team as being correctly determined as per applicable guidance of the selected CDM baseline and monitoring methodology and the CDM methodological tool “Positive lists of technologies” (version 4.0).

Moreover, the Applus+ Certification’s validation team has confirmed, during the conducted on-site visit (through visual observation and assessment of historical images of the landfill area), which confirmed that, along the pre-project situation up to year 2023 (prior to the implementation of the proposed VCS project activity), there was no infrastructure available to promote efficient collection and active destruction/utilization of LFG (with only passive and conventional LFG venting drains).

3.3.5 Additionality

The Applus+ Certification's validation team assessed the correctness and appropriateness of the demonstration of the additionality for the proposed VCS project activity.

As appropriately and sufficiently outlined in Section 3.5 of the VCS PD, the assessment and demonstration of additionality for the proposed VCS project activity is performed by directly following applicable guidance of one of the valid options of the CDM baseline and monitoring methodology ACM0001 (version 19.0) (i.e Simplified procedures (as described in section 5.3.1 of the referred methodology)) + applicable guidance from the CDM methodological tool "Positive lists of technologies" (version 4.0).

As per the CDM methodological Tool "Positive lists of technologies", project activities at new or existing landfills (greenfield or brownfield) are deemed automatically additional if it is demonstrated that, under the project activity any of the following conditions are met:

- (a) The LFG is used to generate electricity in one or several power plants with a total nameplate capacity that equals or is below 10 MW;
- (b) The LFG is used to generate heat for internal or external consumption;
- (c) The LFG is flared.

The Applus+ Certification's validation team was therefore able to confirm that, while the above-mentioned applicable requisites of the CDM methodological tool "Positive lists of technologies" (version 4.0) are demonstrated as being met (collected LFG will be flared and/or used for generating electricity in a power plant with total nameplate capacity below 10 MW), it is deemed correct to directly assume that the proposed VCS project activity is additional.

In summary, the assessment and demonstration of the additionality for the proposed VCS project activity is confirmed by the Applus+ Certification's validation team as being correctly determined as per applicable guidance of the selected CDM baseline and monitoring methodology and the CDM methodological tool "Positive lists of technologies" (version 4.0).

As also confirmed by the Applus+ Certification's validation team and appropriately outlined in the VCS PD, there are no regional or national legal/regulatory requirements in force in Brazil establishing LFG to be collected and destroyed/utilized in landfills as a requirement. The following regulatory legislations/policies and technical publications (including facts, statistics and description of practices for solid waste management in the country Brazil) were assessed by the Applus+ Certification's validation team:

- *Política Nacional de Resíduos Sólidos* ("Brazilian National Policy on Waste Management") (as established by Decree No. 7,404/10 published on 23-December-2010). Available online at: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm

- “*Panorama dos Resíduos Sólidos no Brasil – 2024*” (title translated into English language as “Outlook of Solid Waste Sector in Brazil – year 2024”. Available online at: <https://www.abrema.org.br/panorama>)
- “*Diagnóstico do Manejo de Resíduos Sólidos Urbanos – 2019*” (title translated into English language as “Diagnostics of Urban Solid Waste Management - 2019”). Available online at: <https://www.gov.br/mdr/pt-br/assuntos/saneamento/snis/diagnosticos-anteriores-do-snis/residuos-solidos-1/2019>
- *Plano Nacional de Resíduos Sólidos - “PLANARES”* (“National Solid Waste Plan”), established by Decree No. 11,043/2022, published in on 14-April-2022, Available online at: https://www.gov.br/mma/pt-br/aceso-a-informacao/acoes-e-programas/agendaambientalurbana/lixao-zero/plano_nacional_de_residuos_solidos-1.pdf

The Applus+ Certification’s validation team confirmed that the assessed regulatory legislations/policies “Brazilian National Policy on Waste Management” and “National Solid Waste Plan” (from year 2010 and year 2022 respectively) are mere policy documents that defines general directives for better and more appropriate practices for solid waste management in the country. These policy instruments do not require, specify or make mandatory any LFG management involving collection and destruction (combustion) of LFG in landfill sites located in Brazil. These assessed regulatory legislations/policies are therefore confirmed by the Applus+ Certification’s validation team as not representing a regulatory requirement defining or making compulsory the existence/installation of LFG capture and destruction systems in landfills. In summary, these regulatory legislations/policies do not have any impact over the identified baseline scenario for the proposed VCS project activity.

It is thus the Applus+ Certification’s validation team opinion that information presented in Section 3.5 of the VCS PD sufficiently demonstrates the project meets regulatory surplus requirements of the VCS Standard.

3.3.6 Quantification of GHG Emission Reductions and Carbon Dioxide Removals

The Applus+ Certification’s validation team assessed the appropriateness and correctness of the application of related algorithms/formulae for the approach for determining emission reduction to be achieved by the proposed VCS project activity along its 1st 7-year renewable crediting period vis-à-vis applicable requirements of the applied CDM baseline and monitoring methodology (ACM0001 (version 19.0) and applicable CDM methodological tools.

While as per ACM0001 (version 19.0), no leakage emissions are required to be accounted, GHG emissions reductions (ER_y) to be achieved by the proposed VCS project activity during its 1st 7-year renewable crediting period are thus correctly defined (in tCO₂e) as the difference between baseline emissions (BE_y) and project emissions (PE_y). Assessment details for the applied approaches for the determination of BE_y and PE_y are presented below:

Assessment of the determination of baseline emissions:

As established by selected CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable CDM methodological tools and correctly outlined in Section 4.1 of the VCS PD, in the particular case of the proposed VCS project activity baseline emissions are directly and correctly determined as follows by taking into account the proposed VCS project activity does not encompass utilization of LFG for heat purpose and/or supply of LFG to consumer(s) (through natural gas distribution network, dedicated pipeline or by using trucks):

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

Where:

BE_y	Baseline emissions in year y (in tCO ₂ e/yr)
$BE_{CH4,y}$	Baseline emissions of methane from the SWDS in year y (in tCO ₂ e/yr)
$BE_{EC,y}$	Baseline emissions associated with electricity generation in year y (in tCO ₂ e/yr)

The determination of baseline emissions correctly applies the stepwise procedure which is established by ACM0001 (version 19.0) as follows:

Assessment of the determination of baseline emissions of methane from the SWDS ($BE_{CH4,y}$):

Baseline emissions of methane from the CGR Catanduva landfill ($BE_{CH4,y}$) are correctly assumed to be determined ex-post based on the amount of methane that is captured under the project scenario and the amount of methane that is assumed as being captured and destroyed in the baseline scenario (absence of the proposed VCS project activity). In addition, the effect of methane oxidation in the top layer section of the landfill in the baseline scenario (absent in the project) is also correctly taken into account as required by ACM0001 (version 19.0).

$BE_{CH4,y}$ is thus calculated (in tCO₂e/yr) as follows:

$$BE_{CH4,y} = ((1 - OX_{top_layer}) * F_{CH4,PJ,y} - F_{CH4,BL,y}) * GWP_{CH4} \quad (2)$$

Where:

OX_{top_layer}	Fraction of methane in the LFG that would be oxidized in the top layer of the considered SWDS in the baseline (dimensionless). As correctly outlined in Section 4.1 the VCS PD, OX_{top_layer} is correctly ex-ante determined as 10% (default values as per ACM0001 (version 19.0)). Further related assessment details are included in Section 3.3.8.
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$F_{CH_4,PJ,y}$	Amount of methane in the LFG which is flared and/or used in the project activity in year y (in tCH_4/yr). $F_{CH_4,PJ,y}$ is determined ex-post by following the stepwise approach of ACM0001 (version 19.0) as assessed below under the sub-section “Ex post determination of $F_{CH_4,PJ,y}$ ”.
$F_{CH_4,BL,y}$	Amount of methane in the LFG that would be flared in the baseline in year y (in tCH_4/yr). $F_{CH_4,BL,y}$ is also determined by following the stepwise approach of ACM0001 (version 19.0) as assessed below under the sub-section “Assessment of the determination of $F_{CH_4,BL,y}$ ”:
GWP_{CH_4}	Global Warming Potential of CH_4 . GWP_{CH_4} is correctly ex-ante determined (estimated) as $28 tCO_2e/tCH_4$. Selected value represents the GWP value for the GHG CH_4 as per the IPCC 5 th assessment report (AR5). Further related assessment details are included in Section 3.3.8.

Assessment of the ex post determination of $F_{CH_4,PJ,y}$:

As assessed by the Applus+ Certification’s validation team, during the 1st 7-year renewable crediting period of the proposed VCS project activity, $F_{CH_4,PJ,y}$ will be determined ex-post (in $tCH_4/year$) as the quantity of methane destroyed by the project’s methane destruction device(s) (high temperature open flare and engine-generator set(s)) as follows:

$$F_{CH_4,PJ,y} = F_{CH_4,flared,y} + F_{CH_4,EL,y} \quad (3)$$

Where:

$F_{CH_4,EL,y}$	Amount of methane which is used for electricity generation in year y (in tCH_4).
$F_{CH_4,flared,y}$	Amount of methane in the LFG which is destroyed by flaring in year y (in tCH_4/yr). $F_{CH_4,flared,y}$ is determined as the difference between the amount of methane supplied to the flare and any methane emissions from the flare, as follows:

$$F_{CH_4,flared,y} = F_{CH_4,sent_flare,y} - (PE_{flare,y} / GWP_{CH_4}) \quad (4)$$

Where:

$F_{CH_4,sent_flare,y}$	Amount of methane in the LFG which is sent to the flare in year y (in tCH_4/yr)
$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year y (in tCO_2e/yr)

Assessment of the determination of $F_{CH_4, sent_flare, y}$:

As established by ACM0001 (version 19.0) and as appropriately outlined in the VCS PD, $F_{CH_4, sent_flare, y}$ is correctly determined by following applicable guidance of the CDM methodological tool “Tool to determine the mass flow of greenhouse gas in a gaseous stream” (version 03.0). In the context of the application of such methodological tool for the ex-post determination of $F_{CH_4, sent_flare, y}$ the following set of defined requirements are also correctly regarded as applicable:

- The gaseous stream the tool shall be applied to is the LFG stream delivery pipeline to the high temperature open flare. $F_{CH_4, sent_flare, y}$ is thus calculated as the mass flow of methane to the flare.
- CH₄ is the greenhouse gas for which the mass flow should be determined.
- The flow of the gaseous stream should be measured on a continuous basis.
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (applicable equations in the CDM methodological tool).

Assessment of the determination of $F_{CH_4, EL, y}$:

As established by ACM0001 (version 19.0) and as appropriately outlined in the VCS PD, $F_{CH_4, EL, y}$ is determined directly using applicable guidance of the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0), by applying the following requirements defined in ACM0001 (version 19.0):

- The gaseous stream the CDM methodological tool shall be applied to is the stream of collected LFG which is sent to each engine-generator set of the electricity generation facility.
- CH₄ is the greenhouse gas for which the mass flow is determined.
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 or 17 in the tool).
- The mass flow should be calculated on an hourly basis for each hour h in year y .
- The mass flow calculated for hour h is 0 if the engine-generator set is not working in hour h ($O_{pj, h}$ = equipment not working), the accumulated hourly values are then summed to a yearly unit basis.

As confirmed by the Applus+ Certification’s validation team, by considering that the collected LFG is assumed to be on a wet basis, applicable guidance from Option C of the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) is correctly applied for the ex-post determination of $F_{CH_4, sent_flare, y}$ and $F_{CH_4, EL, y}$ as follows:

Application of Option C of the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) for the determination of $F_{CH_4, sent\ flare, y}$ and $F_{CH_4, EL, i}$:

$$F_{i,t} = V_{t,wb,n} * v_{CH_4,t,wb} * \rho_{CH_4,n} \quad (5)$$

Where:

$F_{i,t}$	Mass flow of greenhouse gas methane in the gaseous stream in time interval t (in kg gas/h)
$V_{t,wb,n}$	Volumetric flow of the gaseous stream (LFG) in time interval t on a wet basis at normal conditions (in m ³ wet gas/h).
$v_{CH_4,t,wb}$	Volumetric fraction of methane in the gaseous stream (LFG) in time interval t on a wet basis (in m ³ gas /m ³ wet gas). $v_{CH_4,t,wb}$ is correctly indicated in the VCS PD as being ex-post determined/monitored along the 1 st 7-year renewable crediting period of the proposed VCS project activity. Further related assessment details for monitoring of $v_{CH_4,t,wb}$ ex-post are included in Section 3.3.8.
$\rho_{CH_4,n}$	Density of methane in the gaseous stream at normal conditions (in kg gas i /m ³ wet gas i). Parameter $\rho_{CH_4,n}$ will be determined as follows:

$$\rho_{CH_4,n} = P_n * MM_{CH_4} / R_u * T_n \quad (6)$$

Where:

P_n	Absolute pressure at normal conditions (in Pa). P_n is correctly indicated in the VCS PD as being ex-ante determined as 101,325 Pa. Further related assessment details are included in Section 3.3.8.
T_n	Temperature at normal conditions (in K). T_n is correctly indicated in the VCS PD as being ex-ante determined as 273.15 K. Further related assessment details are included in Section 3.3.8.
MM_{CH_4}	Molecular mass of greenhouse gas methane (in kg/kmol). For the considered GHG (CH ₄), MM_{CH_4} is correctly indicated in the VCS PD as being ex-ante determined as 16.04 kg/kmol. Further related assessment details are included in Section 3.3.8.
R_u	Universal ideal gases constant (in Pa.m ³ /kmol.K). R_u is ex-ante determined as 8,314 Pa.m ³ /kmol.K. Further related assessment details are included in Section 3.3.8.

As also appropriately outlined in the VCS PD, the following equation should be used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

$$V_{t,wb,n} = V_{t,wb,j} * (T_n / T_t) * (P_t / P_n) \quad (7)$$

Where:

$V_{t,wb,n}$	Volumetric flow of the considered gaseous stream (LFG) in a time interval t on a wet basis at normal conditions (in m^3 wet gas/h)
$V_{t,wb,j}$	Volumetric flow of LFG stream j in time interval t on a wet basis (in m^3 wet gas/h). $V_{t,wb,t}$ is correctly indicated in the VCS PD as being ex-post determined/monitored along the 1 st 7-year renewable crediting period of the proposed VCS project activity. Further related assessment details for monitoring of $V_{t,wb,t}$ ex-post are included in Section 3.3.8.
P_t	Pressure of the gaseous stream in time interval t (in Pa). P_t is correctly indicated in the VCS PD as being ex-post determined/monitored along the 1 st 7-year renewable crediting period of the proposed VCS project activity. Further assessment details for the ex-post determination/monitoring of P_t ex-post are included in Section 3.3.8.
T_t	Temperature of the gaseous stream in time interval t (in K). T_t is correctly indicated in the VCS PD as being ex-post determined/monitored along the 1 st 7-year renewable crediting period of the proposed VCS project activity. Further assessment details for the ex-post determination/monitoring of T_t ex-post are included in Section 3.3.8.
P_n	Absolute pressure at normal conditions (in Pa). P_n is correctly indicated in the VCS PD as being ex-ante determined as 101,325 Pa. Further related assessment details are included in Section 3.3.8.
T_n	Temperature at normal conditions (in K). T_n is correctly indicated in the VCS PD as being ex-ante determined as 273.15 K. Further related assessment details are included in Section 3.3.8.

Assessment of the determination of $PE_{flare,y}$ (in the context of the determination of $F_{CH4,flared,y}$):

As correctly outlined in the VCS PD, $PE_{flare,y}$ is to be determined using the selected methodological approaches as per latest version of the CDM methodological tool “Project emissions from flaring” (version 04.0). Project emissions from flaring residual gas ($PE_{flare,y}$) are determined based on the flare efficiency ($\eta_{flare,m}$) and the mass flow of methane to the flare ($F_{CH4,RG,m}$). The application of this methodological tool is to encompass the following steps:

STEP 1: Determination of the methane mass flow of the residual gas:

This first step requires that applicable guidance of the methodological “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” is applied to determine the mass flow of methane in the residual gaseous stream in minute m ($F_{CH_4,m}$). Furthermore, $F_{CH_4,m}$ shall be used to determine the mass of methane in kilograms directed to the flare in minute m ($F_{CH_4,RG,m}$).

As appropriately outlined in the VCS PD, the following requirements are correctly considered:

- The gaseous stream tool shall be applied to the residual gas.
- The flow of the gaseous stream shall be measured continuously.
- CH_4 is the greenhouse gas i for which the mass flow should be determined.
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 and 17 in the CDM methodological tool).
- The time interval t for which mass flow should be calculated is every minute m .

STEP 2: Determination of the flare efficiency:

According to the applicable guidance of the CDM methodological tool “Project emissions from flaring” (version 04.0), for the determination of combustion efficiency for the open, the default value must be applied as follows:

“Open flare

In the case of open flares, the flare efficiency in the minute m $\eta_{flare,m}$ is 50% when the flame is detected in the minute m ($Flame_m$), otherwise $\eta_{flare,m}$ is 0%”.

STEP 3: Calculation of project emissions from flaring

According to the applicable guidance of the CDM methodological tool “Project emissions from flaring” (version 04.0), Project emissions from flaring ($PE_{flare,y}$) are calculated as the sum of emissions for each minute m in year y as follows:

$$PE_{flare,y} = GWP_{CH_4} * \sum_{m=1}^{525,600} F_{CH_4,RG,m} * (1 - \eta_{flare,m}) * 10^{-3} \quad (8)$$

Where:

$PE_{flare,y}$	Project emissions from flaring of the residual gas in year y (in tCO_2e)
GWP_{CH_4}	Global warming potential of methane valid for the commitment period (in tCO_2e/tCH_4). GWP_{CH_4} is correctly ex-ante determined as 28 tCO_2e/tCH_4 . Selected value represents the GWP value for the GHG CH_4 as per the IPCC 5 th assessment report (AR5). Further related assessment details are included in Section 3.3.8.

$F_{CH_4, RG, m}$ Mass flow of methane in the residual gas in the minute m (in kg)

$\eta_{flare, m}$ Flare efficiency in minute m

As assessed by the Applus+ Certification's validation team, the application of the 3-step approach is correctly outlined in the VCS PD.

Assessment of the ex-ante determination of $F_{CH_4, PJ, y}$:

As established by ACM0001 (version 19.0), the ex-ante estimation of emission reductions for the whole 1st 7-year renewable crediting period of the proposed VCS project activity are correctly calculated and reported in both the VCS PD and the emission reduction calculation spreadsheet based on the application of the multi-phased first order decay (FOD) model as per applicable guidance of the "Emissions from solid waste disposal sites" (version 08.1). In accordance to ACM0001 (version 19.0), in the particular context of the ex-ante estimations of emission reductions to be achieved by the proposed VCS project activity within its 1st 7-year renewable crediting period, the amount of methane in the LFG which is flared and/or used in the project activity in year y ($F_{CH_4, PJ, y}$) is determined (in tCO₂e) as follows:

$$F_{CH_4, PJ, y} = \eta_{PJ} * BE_{CH_4, SWDS, y} / GWP_{CH_4} \quad (9)$$

Where:

$BE_{CH_4, SWDS, y}$ Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (in tCO₂e/yr). $BE_{CH_4, SWDS, y}$ was determined by correctly applying guidance of the CDM methodological tool "Emissions from solid waste disposal sites" (version 08.1) where "Application A - "The CDM project activity mitigates methane emissions from a specific existing SWDS" of such methodological tool is selected. The calculation of values for $BE_{CH_4, SWDS, y}$ correctly takes into account the different types of waste j with respectively different decay rates k_j and different fractions of degradable organic carbon (DOC _{j}). By correctly applying the multi-phased FOD model, in the context of the ex-ante estimation of emission reduction, baseline emissions of methane are calculated based on the actual and projected waste streams $W_{j, x}$ disposed in each year x . The Applus+ Certification's validation team confirmed that values for applicable ex-ante determined parameters and values for occurred and project MSW disposal streams are correctly applied and under conformance with its sources.

η_{PJ} Efficiency of the LFG capture system that will be installed in the project activity. η_{PJ} is appropriately ex-ante determined as 0.50 (50%), which corresponds to the default value as per ACM0001 (version 19.0). Further related assessment details are included in Section 3.3.8.

Assessment of the determination of $F_{CH_4, BL, y}$:

As required by ACM0001 (version 19.0), the amount of methane assumed as being captured and destroyed in the baseline scenario (absence of the proposed VCS project activity) ($F_{CH_4, BL, y}$) due to eventually applicable regulatory or contractual requirements and/or to address eventually existent applicable safety and other concerns (which are collectively referred to as “requirement” under this step) is correctly determined by following the applicable approach through selection of one of the four cases of the applied CDM baseline and monitoring methodology as outlined in the table below:

Situation at the start of the proposed VCS project activity	Requirement to destroy methane?	Existing LFG capture and destruction system?
Case 1	No	No
Case 2	Yes	No
Case 3	No	Yes
Case 4	Yes	Yes

Source: ACM0001 (version 19.0)

Assessment of the non-existence of regulatory requirements (of contractual and/or non-regulatory and/or non-contractual natures) to destroy methane (as per the applicable definition of “requirement” of ACM0001 (version 19.0):

Non-existence of regional or national regulatory and/or contractual requirements related to LFG management in the region of the project site:

As confirmed by the Applus+ Certification’s validation team, from the time the CGR Catanduva landfill was built until nowadays there has been no applicable/valid legally binding regional or national obligation to capture and destroy the LFG at this particular landfill.

As per the design and construction of the CGR Catanduva landfill, its currently valid operational licensing requirements as well as per day-to-day MSW disposal practice in place at this particular landfill site (since the period of its starting of operations), no share LFG has ever been required to be combusted. As argued by the representative of the project proponent UniCarbo Energia e Biogás Ltda., venting of LFG through previously existent pre-project conventional passive LFG venting drains has been enough to address related operational safety concerns (i.e. reduction of pressure and volume of LFG in the inner section of the landfill in order to minimize the risk and

explosions, fire and instability in the landfill cells). Although it is acknowledged that in the absence of the project activity a small and non-defined share of generated LFG would be expected to be collected and vented and/or destroyed through combustion in a set of existent pre-project conventional passive LFG venting/combustion drains in order to appropriately address safety and odor concerns under the baseline scenario (absence of the project activity).

As per the applied methodological approach for the determination of $F_{CH_4, BL, y}$ defined by ACM0001 (version 19.0), besides of legal requirements, any existing non-regulatory and/or non-contractual requirement to destroy LFG in the landfill would be required to be regarded as an "existing requirement to destroy methane". Due to that, in the particular context the proposed VCS project activity, as appropriately outlined in the VCS PD, it is thus correctly assumed that there is not any non-regulatory requirement to destroy methane either. The following disclaimer is thus confirmed to be correctly and appropriately added in the VCS PD:

"Requirement to destroy methane: No".

By taking this assumption into account, Case 2 and Case 4 (Requirement to destroy methane? = Yes) from the cases above-summarized are thus automatically regarded as not applicable cases for the determination of $F_{CH_4, BL, y}$. This is deemed reasonable and correct.

Thus, in the context of the assessment of the valid cases for the determination of $F_{CH_4, BL, y}$, the remaining possibly valid alternatives (cases) (after the confirmation of non-existence of any requirement to destroy methane) are thus Case 1 and Case 3 (Requirement to destroy methane? = No).

Assessment of the non-existence of "LFG capture and destruction system" at the CGR Catanduva landfill (as per the applicable definition of Existing LFG capture and destruction system" and "existing LFG capture and destruction" of ACM0001 (version 19.0)):

As confirmed by the Applus+ certification's validation team, in the context of the completion of the completed VCS PD applying ACM0001 (version 19.0), it is correctly assumed that, under the baseline scenario (absence of the project activity), a very small and not defined fraction of methane generated at the CGR Catanduva landfill was destroyed through combustion (very reduced share of generated LFG being combusted through use of conventional passive LFG venting/combustion drains). By taking into consideration construction and design aspects of the CGR Catanduva landfill, the Applus+ Certification's validation team has confirmed that a very small fraction of methane was combusted (in order to address any eventually existing operational requirement of destroying methane for, for example, addressing safety and/or odor concerns) prior to the occurred implementation and starting of operations of the proposed VCS project activity, thus, it is reasonably assumed that, under the baseline scenario, the pre-project existent set of LFG venting drains would be kept and would even be eventually be expended (addition of new similar drains as a result of forecasted growth of surface with disposed MSW at the landfill) in order to have LFG combusted through use of conventional passive LFG venting/combustion

drains. This conventional solution promoting LFG venting and based on passive LFG venting drains is correctly acknowledged as representing an *existent LFG capture destruction system* as appropriately outlined in the completed VCS PD for the proposed VCS project activity.

By correctly taking into account the definition of "LFG capture system" and "existing LFG capture system" as per ACM0001 (version 19.0), it is therefore also correctly assumed that there has been an *"existing LFG capture system"* at the CGR Catanduva landfill prior to the occurred implementation and starting of operations of the proposed VCS project activity and no LFG capture system would be implemented.

Therefore, like occurred for Case 1 and Case 2 (*Existing LFG capture and destruction system? = No*) is thus correctly demonstrated not to be an applicable case for the project activity either¹³.

The following disclaimer is thus confirmed to be appropriately added in the completed VCS PD:

"Existing LFG capture and destruction system: YES".

Thus, the only remaining case applicable for the proposed VCS project activity in terms of *"existence of LFG capture and destruction system"* is Case 3 (*"Requirement to destroy methane? = No"* and *"Existing LFG capture and destruction system? = Yes"*).

Assessment of LFG management at the CGR Catanduva landfill prior to the occurred implementation and starting operations of the proposed VCS project activity (which corresponds to the identified baseline scenario for the proposed VCS project activity):

As confirmed by the Applus+ Certification's validation team, it is assumed that under the absence of the project activity (baseline scenario) and during the whole period encompassed by the period from year 2013 (when the CGR Catanduva landfill started its operations) to nowadays, LFG would remain being freely and directly emitted into the atmosphere (with very small share of generated methane being destroyed in conventional passive LFG venting/combustion drains) through the surface of the landfill.

Based on its sectoral expertise, the Applus+ Certification's validation team also confirms that direct venting/combusting LFG through conventional passive LFG venting drains and through the surface of the landfill has been a practice in several others landfills and dump sites in Brazil and other countries in Latin America (where no requirements for destruction of LFG exist).

¹³ The Applus+ Certification's validation team confirmed that as per ACM0001 (version 19.0), "LFG capture system" and "Existing LFG capture system" are defined as follows:

"Existing LFG capture system - a system that has been in operation in the last calendar year prior to the start of the operation of the VCS project activity;

LFG capture system - a system to capture LFG. The system may be passive, active or a combination of both active and passive components. Passive systems capture LFG by means of natural pressure, concentration, and density gradients. Active systems use mechanical equipment to capture LFG by providing pressure gradients. Captured LFG can be vented, flared or used;"

In summary, the Applus+ Certification's validation team is of the opinion that, as presented in the completed VCS PD for the proposed VCS project activity, Case 3 is correctly selected as the only applicable case for the determination of $F_{CH4,BL,y}$.

Assessment of application of methodological guidance valid for Case 3:

As correctly outlined in the completed VCS PD for the project activity, by directly applying the applicable guidance of ACM0001 (version 19.0) for Case 3 in the particular context of the CGR Catanduva landfill (where there is no monitored or historical data on the amount of methane that would be flared in the baseline or that was captured in the year prior to the occurred implementation and start of operation of the project situation) under the baseline scenario (absence of the project activity), $F_{CH4,BL,y}$ is correctly and directly determined (in tCH_4) as follows:

$$F_{CH4,BL,y} = (0.2 \text{ or } 20\%) * F_{CH4,PJ,y} \quad (10)$$

Assessment of determination of $BE_{EC,y}$:

By correctly following the applicable guidance of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", baseline emissions for electricity generation by the proposed VCS project activity ($BE_{EC,y}$), are correctly presented in the VCS PD as being determined as follows:

$$BE_{EC,y} = EC_{BL,y} * EF_{EL,k,y} * (1 + TDL_{k,y}) \quad (11)$$

Where:

$EC_{BL,y}$ Net amount of electricity generated using LFG in year y (in MWh). $EC_{BL,y}$ is correctly indicated in the VCS PD as being ex-post determined/monitored as per the provisions of the CDM methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) along the 1st 7-year renewable crediting period of the proposed VCS project activity.

The Applus+ Certification's validation team was able to confirm that, as appropriately outlined in the VCS PD, in accordance with ACM0001 (version 19.0) the parameter $EC_{BL,y}$ from the CDM methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" is equivalent to the parameter $EG_{PJ,y}$ from ACM0001 (version 19.0). Further related assessment details for monitoring of $EC_{BL,y}$ ex-post is included in Section 3.3.8.

In the particular context of the ex-ante estimation of emission reductions to be achieved by the proposed VCS project activity within the 1st 7-year renewable crediting period, annual values for $EC_{BL,y}$ (which are presented in the emission reductions calculation spreadsheet) are estimated as follows:

Year	$EC_{BL,y}$ (MWh)
2023 (from 01-June-2023 to 31-December-2023)	6,225
2024	10,618
2025	21,236
2026	21,236
2027	21,236
2028	21,236
2029	21,236
2030 (from 01-January-2030 to 31-May-2030)	8,785
TOTAL	131,808

 $EF_{EL,k,y}$

CO₂ Emission factor for electricity generation. $EF_{EL,k,y}$ is determined as per applicable guidance from the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” valid for Scenario A (Electricity consumption from the grid), Option A.2 is thus analyzed for the determination of $EF_{EL,k,y}$ as follows:

Option A.2: $EF_{EL,k,y}$ is to be directly determined as 0.25 tCO₂/MWh (applicable conservative default value of the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0)).

 $TDL_{k,y}$

Average technical transmission and distribution losses for providing electricity to the grid. In the particular context of the ex-ante estimation of emission reductions to be achieved by the proposed VCS project activity within the 1st 7-year renewable crediting period, $TDL_{k,y}$ is estimated as 3% (applicable value for

generated electricity exported through the electricity grid the project activity is connected to ($TDL_{grid,export,y}$)).

Assessment of the determination of project emissions

In the particular case of the proposed VCS project activity, $PE_{EC,y}$ is correctly determined as follows:

$$PE_y = PE_{EC,y} \quad (12)$$

Where:

$PE_{EC,y}$ Project emissions due to the consumption of electricity by the project activity. Assessment details for the determination of $PE_{EC,y}$ is included below.

Assessment of the determination of project emissions due to the consumption of electricity by the project activity ($PE_{EC,y}$):

In the particular case of the proposed VCS project activity, $PE_{EC,y}$ is determined as follows:

$$PE_{EC,y} = PE_{EC,grid,y} \quad (13)$$

Where:

$PE_{EC,grid,y}$ Project emissions from consumption of grid electricity due to the project activity in year y .

By correctly following applicable guidance of the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0), $PE_{EC,grid,y}$ is correctly determined as follows:

$$PE_{EC,grid,y} = EC_{PJ,grid,y} * EF_{EL,j,y} * (1 + TDL_{jy}) \quad (14)$$

Where:

$EC_{PJ,grid,y}$ Quantity of grid-sourced electricity consumed by the project activity in year y . As correctly indicated in the VCS PD, $EC_{PJ,grid,y}$ is defined as being ex-post determined/monitored as per the provisions of the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) along the 1st 7-year renewable crediting period of the proposed VCS project activity. Further related assessment details for monitoring of $EC_{PJ,grid,y}$ ex-post is included in Section 3.3.8. In the particular context of the ex-ante estimation of emission reductions

to be achieved by the proposed VCS project activity within the 1st 7-year renewable crediting period, $EC_{PJ,grid,y}$ is estimated as 219 MWh per year. This value is appropriately assumed based on the expected nominal power output for the main electrical equipment installed as part of the proposed VCS project activity (e.g installed centrifugal blower(s) + ancillary equipment) and also by assuming that such equipment will work continuously (24 hours a day) under full power during the whole period.

$TDL_{j,y}$ Average technical transmission and distribution losses for grid-sourced electricity consumed by the project activity in year y . $TDL_{j,y}$ is correctly indicated in the VCS PD as being ex-post determined/monitored as per the provisions of the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) along the 1st 7-year renewable crediting period of the proposed VCS project activity. In the particular context of the ex-ante estimation of emission reductions to be achieved by the proposed VCS project activity within the 1st 7-year renewable crediting period, the value for $TDL_{j,y}$ is assumed as being 20% (applicable value for electricity imported by the proposed VCS project activity through the electricity grid the proposed VCS project activity is connected to ($TDL_{grid,import,y}$))

$EF_{EL,j,y}$ CO₂ emission factor for grid-sourced electricity in year y (in tCO₂/MW). $EF_{EL,j,y}$ is determined by following applicable guidance of the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) where Option A.2 is determined as follows:

Option A.2: $EF_{EL,grid,y}$ is directly determined as 1.3 tCO₂/MWh (applicable conservative default value of the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0)).

Assessment of the determination of leakage emissions

In accordance with ACM0001 (version 19.0), leakage emissions are not considered for the determination of emission reductions to be achieved by the proposed VCS project activity.

As part of its assessment, the Applus+ Certification’s validation team confirms that, as highlighted in the VCS PD, it was not identified project emission or leakage which would contribute to more than 1% of the emission reductions to be achieved by the proposed VCS project activity other than the ones covered by the selected CDM baseline and monitoring methodology (ACM0001 (version 19.0)).

Assessment of ex-ante estimation of emission reductions to be achieved by the proposed VCS project activity during its 1st 7-year renewable crediting period:

The ex-ante estimation of emission reductions to be achieved by the proposed VCS project activity during its 1st 7-year renewable crediting period (as calculated in the emission reductions calculation spreadsheet and summarized in the VCS PD) was assessed by the Applus+ Certification's validation team. The performed assessment included checking of input parameters and formulas contained in the spreadsheet cells for estimating baseline and project emissions along its 1st 7-year renewable crediting period. The Applus+ Certification's validation team was also able to confirm that all assumptions and data used for estimating GHG emission reductions to be achieved by the proposed VCS project activity within its 1st 7-year renewable crediting period are appropriately listed in the VCS PD.

Furthermore, formulas, parameters and values are complete, accurate and transparent.

Baseline emissions are correct and reasonably ex-ante estimated to be (on annual average) as being 63,656 tCO₂e per year over the 1st 7-year renewable crediting period of the proposed VCS project activity.

By correctly taking into account the estimated annual amount of grid-sourced electricity to be consumed by the proposed VCS project activity within its 1st 7-year renewable crediting period, the ex-ante estimated project emissions (PE_y) are determined as 342 tCO₂ per year.

As confirmed by the Applus+ Certification's validation team, emission reductions (ER_y) to be achieved by the proposed VCS project activity are correctly ex-ante estimated as the difference of ex-ante estimation of baseline emissions and ex-ante estimation of project emissions. ER_y are correctly estimated to be (on average) 63,314 tCO₂e per year over the 1st 7-year renewable crediting period of the proposed VCS project activity.

Detailed calculation of ex-ante estimation of both baseline and project emissions, as provided in the emission reduction calculation spreadsheet (which is enclosed to the VCS PD) are deemed correct and can be reproduced using data and parameter values provided in VCS PD and supporting files submitted to the Applus+ Certification's validation team.

The selection and determination of all used factors and parameters are deemed reasonable and acceptable (as further assessed in Section 3.3.8). In summary, the GHG calculations are complete and transparent.

The Applus+ Certification's validation team, however, highlights that forecasted/estimated emission reductions for the proposed VCS project activity over its 1st 7-year renewable crediting period are deemed accurate and correct within reasonable limits. Based on assessment of other similar registered CDM/VCS project activities (also involving LFG collection and destruction/utilization), the Applus+ Certification's validation team highlights that methane generation and collection efficiency of LFG in landfills (as typically forecasted through the application of the FOD model in the context of the selected methodology and the CDM

methodological tool “Emissions from solid waste disposal sites” (version 08.1)) has an inherent high uncertainty level (of almost 50% in some cases) and hence the amount of emission reductions, which will be determined on the basis of ex-post monitoring, might significantly vary from the forecasted amount.

Summary of ex-ante determination of emission reductions:

As correctly reported in the VCS PD, ex-ante annual estimates of emission reduction to be achieved by the proposed VCS project activity along its 1st 7-year renewable crediting period starting on 01-June-2023 and ending on 31-May-2030 are correctly summarized as follows:

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2023 (from 01-June-2023 to 31-December-2023)	32,640	201	0	32,439
2024	58,225	342	0	57,883
2025	61,309	342	0	60,967
2026	63,393	342	0	63,051
2027	65,284	342	0	64,942
2028	67,030	342	0	66,688
2029	68,666	342	0	68,324
2030 (from 01-January-2030 to 31-May-2030)	29,047	142	0	28,905
Total	445,594	2,395	0	443,199

In summary, the Applus+ Certification’s validation team confirmed that calculations for ex-ante estimates of emission reductions to be achieved by the proposed VCS project activity along its 1st 7-year renewable crediting period, as reported in the VCS PD, are deemed complete and transparent.

3.3.7 Methodology Deviations

As confirmed by the Applus+ Certification's validation team, no methodology deviation is applied for the proposed VCS project activity.

3.3.8 Monitoring Plan

As outlined in Section 5.1 of the VCS PD, the following *ex-ante* determined parameters are correctly defined and used for the *ex-ante* estimation of emission reduction to be achieved by the proposed VCS project activity within its 1st 7-year renewable crediting period and/or for the ex-post determination of baseline and/or project emissions for the proposed VCS project activity along the crediting period. The selection and definition of applicable values for the ex-ante determined parameters summarized below are verified to be under full conformance with the applied CDM baseline and monitoring methodology ACM0001 (version 19.0) + the following applicable CDM methodological tools:

- Tool 04 - Emissions from solid waste disposal sites (version 08.1)
- Tool 05 - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0)
- Tool 06 - Project emissions from flaring (version 04.0)
- Tool 08 - Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0)

Assessment details for parameters determined *ex-ante*¹⁴

Parameter / data	Unit	Value applied	Source of used data/ Applus+ assessment opinion
Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline (OX _{top_layer})	-	0.1	The default value as per ACM0001 (version 19.0) is correctly selected and indicated in the VCS PD. In summary, the parameter and its selected value are correctly reported and are determined under consistency with the

¹⁴ The table includes all *ex-ante* determined parameters which are presented in Section 5.1 of the VCS PD. In accordance with applicable guidance for completing the VCS PD form, data that are calculated with equations provided in the applied CDM baseline and monitoring methodology and default values specified in the applied methodology and applicable methodological tools are not included in the table and in Section 5.1 of the VCS PD. This is deemed correct.

			selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Global warming potential of CH ₄ (GWP _{CH4})	tCO ₂ e/ tCH ₄	28	As confirmed by the Applus+ Certification's validation team, the selected value represents the GWP value for the GHG CH₄ as per the IPCC 5th assessment report (AR5). In summary, the parameter and its selected value are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Efficiency of the LFG capture system that will be installed in the proposed VCS project activity (η_{PJ})	-	0.50	As confirmed by the Applus+ Certification's validation team, selected value corresponds to the default value as per ACM0001 (version 19.0). In summary, the parameter and its selected value are correctly reported and are determined appropriately determined (under consistency with the selected CDM baseline and monitoring methodology).
Universal ideal gases constant (R_u)	Pa.m ³ /kmol.K	8,314	Default values as per the CDM methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" are
Molecular mass of greenhouse gas i (MM _i)	kg/kmol	16.04 (CH ₄)	
Molecular mass of gas k (MM _k)	kg/kmol	28.01 (N ₂)	

Molecular mass of water (MM_{H_2O})	kg/kmol	18.0152	correctly applied in the VCS PD. In summary, the parameters and their selected values are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Total pressure at normal conditions (P_n)	Pa	101,325	
Temperature at normal conditions (T_n)	K	273.15	
Default value for the model correction factor to account for model uncertainties ($\phi_{default}$) (as appropriately outlined in the VCS PD, $\phi_{default}$ is equivalent to ϕ_y)	-	0.75	Values are correctly selected according to the CDM methodological tool “Emissions from solid waste disposal sites” (version 08.1) (default value for Application A) (based on the climate conditions valid for the location of the proposed VCS project activity and/or technical design aspects of the CGR Catanduva landfill).
Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (OX)	-	0.1	
Fraction of methane in the SWDS gas (volume fraction) (F)	-	0.5	
Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS ($DOC_{f,default}$)	Weight fraction	0.5	In summary, the parameters and their selected values are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Methane correction factor ($MCF_{default}$)	-	1.0	

Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j)	-	Assessment details are presented below under “Additional assessment details for the ex-ante determined parameter $MCF_{default}$, DOC_j , k_j and w_j ”	
Decay rate for the waste type j (k_j)	1/yr		
Weight fraction of the waste type j (W_j)	-		
CO ₂ emission factor for grid-sourced electricity in year y ($EF_{EL,j,y}$)	tCO ₂ / MWh	1.3 (for consumption of grid-sourced electricity by the project activity)	Applicable default values are correctly selected as per the CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0).
CO ₂ emission factor for electricity generation in year y ($EF_{EL,k,y}$)	tCO ₂ / MWh	0.25 (for electricity exported by the project activity through the electricity grid)	In summary, the parameter and its selected values are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Additional assessment details for the ex-ante determined parameter $MCF_{default}$, DOC_j , k_j and w_j :

Assessment of the suitability of ex-ante determined value for parameter $MCF_{default}$:

By taking into account the current and forecasted MSW disposal and management practice at the CGR Catanduva landfill and also by assessing the operational requirements as established in the valid operational and environmental license (permit) for this particular landfill), the Applus+ Certification’s validation team was able to confirm that MSW has been disposed in the landfill site with depths greater than 5 meters and appropriate MSW landfilling measures have been systematically undertaken. Such operational aspects are expected to continue being applied/performed throughout the whole landfill operational lifetime (i.e. effective mechanical compacting, leveling and covering of disposed MSW).

The Applus+ Certification’s validation team was thus able to conclude that the selected value for the ex-ante determined parameter $MCF_{default}$ (equal to 1.0) is deemed acceptable, reasonable

and under conformance with applicable guidance of the CDM methodological tool “Emissions from solid waste disposal sites” (version 08.1).

The Applus+ Certification’s validation team has also assessed the results of a technical analysis published by the Environmental agency of São Paulo state (CETESB) ¹⁵, which presents an evaluation of the quality of the CGR Catanduva landfill by considering aspects such as proper isolation of the landfill cells, dimensions of the operational MSW disposal areas, waste compaction, waste coverage, soil waterproofing, leachate drainage and treatment, groundwater monitoring, geotechnical monitoring, presence of scavengers, among others. The results of this analysis also confirm that the CGR Catanduva meets all the requirements for the application of the 1.0 value for the parameter MCF_{default} (for a well-managed SWDS).

In summary, the parameter and its selected values are correctly reported and are determined in consistency with the project site conditions, selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Assessment of the suitability of ex-ante determined values for parameters DOC_j , k_j and w_j :

As established by the CDM methodological tool “Emissions from solid waste disposal sites” (version 08.1), default IPCC values were correctly selected for the parameters Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j) and for Weight fraction of the waste type (W_j), moreover, 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories values ^{/39/} were selected for the parameter Decay rate for the waste type j (k_j) by taking into account the available statistics and meteorological data valid for the region where the CGR Catanduva landfill is located. The selected values for DOC_j , k_j and w_j for the different fractions of solid waste types are presented in the table below. Furthermore, the values were confirmed by the Applus+ Certification’s validation team to be deemed appropriate and correct and in accordance with both the IPCC 2006 Guidelines for National Greenhouse Gas Inventories and the IPCC 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (since the default values for these parameters were not changed in the 2019 IPCC Refinement). Values of mean temperatures (23.3°C) and precipitation (1,444 mm) data for the region where the CGR Catanduva landfill is located were also correctly taken into account for the determination of values of k_j as required by the CDM methodological Tool 04 - “Emissions from solid waste disposal sites” (version 08.1).

Composition of disposed MSW (w_j) and ex-ante selected values for the parameter DOC_j and k_j

¹⁵ Available online: https://sistemasinter.cetesb.sp.gov.br/mapa_ugrhis/iqr/CATANDUVA/2022/CATANDUVA.pdf

Waste type j	Fraction of degradable organic carbon (by weight) in the waste type j (DOC _j)	Decay rate for the waste type j (k_j) (in 1/yr)	Weight fraction of the waste type j (w_j)
Wood and wood products	43%	0.035	0%
Pulp, paper and cardboard (other than sludge)	40%	0.07	12.4%
Food, food waste, beverages and tobacco (other than sludge)	15%	0.4	54.1%
Textiles	24%	0.07	1.7%
Garden, yard and park waste	20%	0.17	3.3%
Glass, plastic, metal, other inert waste	0%	0	28.5%

In summary, the parameters and their selected values are correctly reported and are determined in consistency with the project site conditions, selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Conclusion about the assessment of the selection of ex-ante determined (fixed) parameters as per the VCS PD:

In summary, the selection and report of all ex-ante determined (fixed) parameters in the VCS PD is deemed reasonable, complete and transparent. The rationale/justification for selected values for all ex-ante determined (fixed) parameters is sufficiently provided in the VCS PD. Supporting evidence for the selected values was made available to the Applus+ Certification's validation team. Referred data sources were also verified by the validation team.

In summary, the description of all ex-ante selected (fixed) parameters and their selected values are reported in consistency with the project site conditions, selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

The parameters to be monitored ex-post are correctly indicated in the VCS PD as required by ACM0001 (version 19.0) + the following applicable CDM methodological tools:

- Tool 04: "Emissions from solid waste disposal sites" (version 08.1)

- Tool 05: “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0)
- Tool 06: “Project emissions from flaring” (version 04.0)
- Tool 08: “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0)

The VCS PD correctly and sufficiently includes in its Section 5.2 and 5.3 details about all parameters to be monitored *ex-post* along the 1st 7-year renewable crediting period of the proposed VCS project activity for which related assessment is included in the table below:

Parameter monitored ex-post	Assessment details
Management of SWDS	As appropriately outlined in the VCS PD, the design and operational conditions of the CGR Catanduva landfill will be annually monitored on the basis of different sources such as: Original design of the landfill vis-a-vis eventual changes. Technical specifications for the management of the CGR Catanduva landfill vis-a-vis eventual related eventual changes. Applicable local or national regulations. As required by ACM0001 (version 19.0), the design and operational conditions of the CGR Catanduva landfill should be demonstrated not to be modified in order to ensure that no practice to increase methane generation are to occur prior or after the implementation of the proposed VCS project activity. As established by ACM0001 (version 19.0), any change in the management of the landfill after the implementation of the proposed VCS project activity will be justified by referring to technical or regulatory specifications. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline

	and monitoring methodology and/or applicable CDM methodological tool(s).
Volumetric flow of LFG stream j in time interval t on a wet basis ($V_{t,wb,j}$)	As appropriately outlined in the VCS PD, continuous measurements will be recorded/reported at least with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb,j}$)	As appropriately outlined in the VCS PD, continuous measurements will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Temperature of the LFG stream in time interval t (T_t)	As appropriately outlined in the VCS PD, measurements for T_t will be recorded and reported in °C. Recorded/ reported data will be converted to Kelvin (K) (in order to also being recorded/ reported in K). Continuous measurements will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.

	In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Pressure of the LFG stream in time interval t (P_t)	As appropriately outlined in the VCS PD, depending on installed measurement instrument, measurements for P_t will be recorded and reported in mbar. Recorded/reported data will be converted into Pascal (in order to be also recorded and reported in Pa). Continuous measurements will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Amount of grid electricity consumed by the project activity during the year y ($EC_{PJ,grid,y}$)	As appropriately outlined in the VCS PD, continuous measurements will be aggregated manually or automatically. Accumulated measurement records will be recorded and reported at least with an at least once a month frequency. Measurement records will be cross-checked against available electricity consumption receipts/invoices issued by the local electricity distribution company. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. As also outlined in the VCS PD, in the context of the ex-ante estimation of emission reductions to be achieved by the proposed VCS project activity, it is considered that the project's electricity demand will be met entirely by imports of grid-sourced electricity and that the project activity will consume 149 MWh of grid-sourced electricity per year.

	In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Amount of electricity generated using LFG by the project activity in year y ($EC_{BL,y}$)	As appropriately outlined in the VCS PD, continuous measurements will be aggregated manually or automatically. Accumulated measurement records will be recorded and reported at least with an at least once a month frequency. Measurement records will be cross-checked against available electricity consumption receipts/invoices issued by the local electricity distribution company. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. As also outlined in the VCS PD, in the context of the ex-ante estimation of emission reductions to be achieved by the proposed VCS project activity, annual values for $EC_{BL,y}$ are estimated as 6,225 MWh/yr in 2023, 10,618 MWh/yr in 2024, 21,236 MWh/yr from years of 2025 to 2029 and 8,785 MWh/yr in 2030, by taking into account the expected performance of the project's electricity generation infrastructure (first engine-generator set installed and starting operations on 01-June-2023 with the second engine-generator set expected to be installed in year 2025). In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Operation of the equipment that consumes LFG (open flare and engine-generator sets of the electricity generation infrastructure) ($Op_{j,h}$)	As appropriately outlined in the VCS PD, for each equipment unit j using the LFG monitor that the plant is operating in hour h by the monitoring any one or more of the following three parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based

	on manufacturer's specifications of the combustion equipment. Document and justify the location and minimum threshold in the VCS PD. (b) Flame. Flame detection system is used to ensure that the equipment is in operation. (c) Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnaces. This option is not applicable to brick kilns. $Op_{j,h} = 0$ when: (a) One of more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); (c) No products are generated in the hour h. Otherwise, $OP_{j,h} = 1$ In the particular case of the proposed VCS project activity, the equipment that consumes LFG are the open flare and the engine-generator set(s) of the electricity generation infrastructure. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Flame detection of flare in the minute m ($Flame_m$)	As appropriately outlined in VCS PD, detection of flame in the flare will be performed by appropriate ultra-violet and/or infra-red flame detector(s) with detection data being recorded with an every-minute frequency as a minute that the flame was on, otherwise recorded as a minute that the flame was off. Calibration events in related monitoring instrument(s) are

	also indicated as required to be performed under frequency as per manufacturer specifications. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Average technical transmission and distribution losses for grid-sourced electricity consumed by the proposed project activity (TDL_{j,y})	As appropriately outlined in the VCS PD, annual value is to be determined and should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses in the grid should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project proponent or be based on references from utilities, network operators or other official documentation. As an alternative, applicable default values as per the CDM methodological tools “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” may be selected. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Average technical transmission and distribution losses for providing electricity to the grid (TDL_{k,y})	As appropriately outlined in the VCS PD, annual value is to be determined and should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses in the grid should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project proponent or be based on references from utilities, network operators or other official documentation. As an alternative, applicable default values

	as per the CDM methodological tools “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” may be selected. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the VCS PD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Operational status of biogas destruction device(s) (Status of biogas destruction device(s))	As appropriately outlined in the completed VCS PD for the proposed VCS project activity, continuous measurements will be performed. Monitoring parameter “Status of biogas destruction device” it is thus correctly regarded as applicable to consider the same monitoring procedure as the one applied for parameter $Flame_m$ in the particular case of high temperature open flare. Monitoring and documenting are to be undertaken through continuous monitoring of by recording the operational status of the flare (by means of a flame detector) or engine-generator set in order to demonstrate the occurrence of methane destruction in these particular types of installed biogas destruction device(s). Emission reductions will not accrue for periods in which the underlying destruction device(s) (high temperature open flare) is/are not operational. In summary, both the parameter description and its monitoring approach are appropriately selected/defined and reported in the completed VCS PD for the proposed VCS project activity under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

3.4 Non-Permanence Risk Analysis

Not applicable for the proposed VCS project activity. Through the collection and destruction/utilization of LFG, the proposed VCS project activity promotes destruction of methane, thus generating permanent GHG emission reductions.

4 VALIDATION OPINION

4.1 Validation Summary

LGA Technological Center, S.A. (Applus+ Certification) performed the VCS validation assessment for proposed VCS project activity titled “Catanduva Landfill Gas Project”. The proposed VCS project activity is located in Catanduva - SP, Brazil

The VCS validation assessment was performed in order to independently assess whether the project confirms the qualification criteria and requirements of the Voluntary Carbon Standard (VCS), including the baseline and monitoring methodology applied.

The VCS validation assessment was performed in accordance with applicable requirements of VCS Program Guide (version 4.4), VCS Standard (version 4.7) and the CDM Validation and Verification Standard for Project Activity (CDM-VVS-PA) (version 03.0) and included performance of assessment of the following issues:

- Evaluation of the correctness of the application of the selected CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable CDM methodological tools.
- Assessment of calculations and reporting of estimates of emission reductions to be achieved by the proposed VCS project activity during its 1st 7-year renewable crediting period as outlined in the VCS PD.
- Evaluation of the correctness of the identification of the baseline scenario and assessment and demonstration of additionality
- Assessment of the design of the monitoring plan for the proposed VCS project activity
- Assessment of all VCS requirements related to safeguards and local stakeholder engagement.

A risk-based approach has been followed to perform the VCS validation assessment. The review of the project description and additional documents related to the applied CDM baseline and monitoring methodology; background investigation, on-site inspection and follow-up interviews with representatives of the project proponent have provided LGA Technological Center S.A. (Applus+ Certification) with sufficient evidence for positive validation opinion as per the requirement of VCS.

The performed desk-review of the VCS PD and the subsequently performed follow-up interview with representatives of the project proponent UniCarbo Energia e Biogás Ltda. have provided the validation team appointed by Applus+ Certification sufficient information and evidence to determine/confirm to the qualification criteria and requirements of the Voluntary Carbon Standard.

The Applus+ Certification's validation team also confirmed that the VCS PD correctly applies the selected CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable CDM methodological tools. The Applus+ Certification's validation team also assessed a spreadsheet with calculations of *ex-ante* estimations of emission reductions to be achieved by the proposed VCS project activity during its 1st 7-year renewable crediting period. Such a spreadsheet is enclosed with the VCS PD and was confirmed to be correctly elaborated.

The validation team appointed by Applus+ Certification is of the opinion that the proposed VCS project activity has the potential to achieve GHG emission reductions during its 1st 7-year renewable crediting period as per ex-ante estimates of emission reductions reported in the VCS PD (version 2.1, dated 23-October-2025). As verified by the Applus+ Certification's validation team, all explanations and justifications provided by the project proponent regarding information and assumptions included in the VCS PD are deemed reasonable and acceptable.

It is thus the opinion of Applus+ Certification that the proposed VCS project activity meets all the relevant requirements of its registration under VCS/VERRA. Hence, Applus+ Certification recommends the registration of the proposed VCS project activity.

It is relevant to note that achievement of GHG emission reductions as a result of the implementation and operation of the proposed VCS project activity during its 1st 7-year renewable crediting period are fully dependent on measures to be taken under responsibility of the project proponent. Nonetheless, Applus+ Certification has confirmed that ex-ante estimates of emission reductions to be achieved by the proposed VCS project activity during the 1st 7-year crediting period were correctly calculated under conformance with applicable guidance of the CDM baseline and monitoring methodology ACM0001 (version 19.0) and applicable CDM methodological tools as follows:

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2023 (from 01-June-2023 to 31-December-2023)	32,439
2024	57,883
2025	60,967
2026	63,051
2027	64,942
2028	66,688

2029	68,324
2030 (from 01-January-2030 to 31-May-2030)	28,905
Total estimated ERs	443,199
Total number of crediting years	7
Average annual ERs	63,314

4.2 Validation Conclusion

The VCS validation assessment was performed in order to independently assess whether the proposed VCS project activity as described in its completed VCS Project Description document (VCS PD) meets applicable qualification criteria and requirements of the Voluntary Carbon Standard (VCS) and also includes the criteria and requirements of the applied CDM baseline and monitoring methodology.

The validation team appointed by Applus+ Certification is of the opinion that the proposed VCS project activity has the potential to achieve GHG emission reductions during its 1st 7-year renewable crediting period as per ex-ante estimates of emission reductions reported in the VCS PD (version 2.1, dated 23-October-2025). As verified by the Applus+ Certification's validation team, all explanations and justifications provided by the project proponent regarding information and assumptions included in the VCS PD are deemed reasonable and acceptable.

It is thus the opinion of Applus+ Certification that the proposed VCS project activity meets all the relevant requirements of its registration under VCS/VERRA. Hence, Applus+ Certification recommends the registration of the proposed VCS project activity.

Applus+ Certification has confirmed that ex-ante estimates of emission reductions to be achieved by the proposed VCS project activity during the 1st 7-year crediting period were correctly calculated as per the applicable guidance of ACM0001 (version 19.0) and applicable CDM methodological tools as follows:

Crediting period: From 01-June-2023 to 31-May-2030

Validated estimated GHG emission reductions and carbon dioxide removals for the project crediting period:

Vintage period	Estimated baseline emissions (tCO ₂ e)	Estimated project emissions (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated reduction VCU (tCO ₂ e)	Estimated removal VCU (tCO ₂ e)	Estimated total VCU (tCO ₂ e)
01-Jun-2023 to 31-Dec-2023	32,640	201	0	32,439	0	32,439
01-Jan-2024 to 31-Dec-2024	58,225	342	0	57,883	0	57,883
01-Jan-2025 to 31-Dec-2025	61,309	342	0	60,967	0	60,967
01-Jan-2026 to 31-Dec-2026	63,393	342	0	63,051	0	63,051
01-Jan-2027 to 31-Dec-2027	65,284	342	0	64,942	0	64,942
01-Jan-2028 to 31-Dec-2028	67,030	342	0	66,688	0	66,688
19-Oct-2029 to 25-Sep-2029	68,666	342	0	68,324	0	68,324
01-Jan-2030 to 31-May-2030	29,047	142	0	28,905	0	28,905
Total	445,594	2,395	0	443,199	0	443,199

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

Section	Information	Justification	Assessment method and conclusion
-	-	-	-

APPENDIX 2: <REFERENCE LIST>

1. VCS project description (VCS PD) for the proposed VCS project activity (all versions)
2. Estimated ER calculation spreadsheet for the proposed VCS project activity (all versions)
3. VCS standard (version 4.7)
4. VCS Program Guide (version 4.4)
5. UNFCCC CDM Validation and Verification Standard for project activities (version 03.0)
6. CDM baseline and monitoring methodology ACM0001 - Flaring or use of landfill gas (version 19.0)
7. CDM methodological tool “Emissions from solid waste disposal sites” (version 08.1)
8. CDM methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0)
9. CDM methodological tool “Project emissions from flaring” (version 04.0)
10. CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0)
11. Safety, health and environment management:
Training certificates on Regulatory Standards: NR11 - Transportation, delivery, storage and transport of materials in work environments, NR12 - Machinery and Equipment Safety and NR31 - Safety and health in rural work
12. CDM methodological tool “Positive lists of technologies” (version 04.0)
13. Pictures and notes of conducted Local Stakeholder Consultation (LSC) audience/meeting at a meeting room located at the CGR Catanduva landfill on 21-May-2024.
14. Constitution/registration document for the company/enterprise CGR Centro de Gerenciamento de Resíduos Ltda. (latest version of the company/enterprise registration document “Contrato

Social CGR Centro de Gerenciamento de Resíduos Ltda – CNPJ/ME nº 10.330.104/0001-18), dated 04-April-2024.

15. Latest version of environmental license/permit (with ref./No. 14009984) issued by Companhia Ambiental do Estado de São Paulo (CETESB) (environmental authority for São Paulo State) authorizing the company/enterprise (project operator) CGR CATANDUVA – CENTRO DE GERENCIAMENTO DE RESÍDUOS LTDA to operate the CGR Catanduva landfill site.
16. Latest version of environmental license/permit with ref./No. 1400624) issued by Companhia Ambiental do Estado de São Paulo - RS (CETESB) authorizing to operate infrastructure promoting utilization of LFG as gaseous fuel for electricity located within the geographical limits of the CGR Catanduva landfill site.
17. Available project's operation registries and control records for the proposed VCS project activity
18. Environmental Impact Assessment (EIA) for the CGR Catanduva landfill
19. List of valid CDM standardized baselines (as outlined in the applicable section of the UNFCCC CDM website)
20. Jenbacher Training Center
Training certificates regarding the operation of the LFG power plant, dated 05-May-2023
21. Technical paper “*Measuring landfill gas collection efficiency using surface methane concentration*” (published by Raymond L. Huitric and Dung Kong, from the Solid Waste Management Department of the Los Angeles County Sanitation Districts)
22. Historical records for disposal of Municipal Solid Waste (MSW) at the CGR Catanduva landfill (period 2013 – 2024)
23. Operational manual for the LFG flaring station (including the high temperature open flare) elaborated by the company ENC Energy Brasil Participações S.A.
24. Sheet with technical specification details for the engine-generator set Type 4, J 420 series engine-generator set manufactured by GE Jenbacher GmbH & Co OHG
25. Minutes and attendance list for performed Local Stakeholder Consultation (LSC) audience/meeting for the proposed VCS project activity occurred at the CGR Catanduva landfill on 21-May-2024

26. Brazilian Federal Law 12.305/10
27. “Panorama dos Resíduos Sólidos no Brasil – 2024” (title translated into English language as “Outlook of Solid Waste Sector in Brazil – year 2024”)
28. Greenhouse Gases Emissions National Inventory (published by the Brazilian Ministry of Technology and Science in 2010)
29. Diagnóstico do Manejo de Resíduos Sólidos Urbanos – 2017” (title translated into English language as “Diagnostics of Urban Solid Waste Management - 2017”)
30. Regulation of the National Policy on Waste Management, published by “Tauil & Chequer Advogados” (year 2011)
31. Brazilian Solid Waste Plan (PLANARES), published by “Tauil & Chequer Advogados” (year 2022)
32. Website for the UNFCCC Clean Development Mechanism (CDM) (<http://cdm.unfccc.int/>)
33. Website for The Gold Standard for the Global Goals (GS4GG) (<http://www.goldstandard.org/>)
34. Website for The International REC Standard (<https://www.irecstandard.org/>)
35. Website for Global Carbon Council (GCC) (<https://www.globalcarboncouncil.com/>)
36. E-mail invitations sent to the identified Local Stakeholders to participate on the physical meeting conducted at the CGR Catanduva landfill on 21-May-2024. E-mails sent on 23-April-2024.
37. CGR Centro de Gerenciamento de Resíduos Ltda.
“Programa de Controle Médico de Saúde Ocupacional” (translated as “Medical Control Program of Occupational Health”)
38. CGR Centro de Gerenciamento de Resíduos Ltda.
“Programa de Gerenciamento de Riscos” (translated as “Risk Management Program”)
CGR Centro de Gerenciamento de Resíduos Ltda.
“Laudo Técnico das Condições Ambientais do Trabalho” (translated as “Technical Report on Environmental Working Conditions”)

39. Intergovernmental Panel on Climate Change (IPCC):

2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Available online:

<https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/>

APPENDIX 3: <CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUESTS (CAR/CL/FAR)>

CAR ID	CAR 1	Date: 22-April-2025
Description of CAR		
Information regarding the identification of the baseline scenario and also the determination of the amount of methane that would be destroyed through flaring of LFG in the baseline scenario (absence of project activity) (calculation parameter $F_{CH_4,BL,y}$) is not appropriately presented in Section 1.1 of the initial version of the VCS PD vis-à-vis assessed related evidence and received explanations.		
Project proponent response		Date: 02-May-2025
As a response to the raised CAR, information regarding calculation parameter $F_{CH_4,BL,y}$ is now corrected in the revised version of the VCS PD.		
Documentation provided by project proponent		
-		
VVB assessment		Date: 07-May-2025
As confirmed by the Applus+ Certification's validation team, related amendments included in the revised version of the VCS PD sufficiently address the raised CAR. This CAR is thus closed.		

CAR ID	CAR 2	Date: 22-April-2025
Description of CAR		
Information regarding the valid operational licenses (environmental permits) for the infrastructure promoting LFG utilization as gaseous fuel for generation of electricity is not correctly presented in Section 1.8 of the initial version of the VCS PD.		
Project proponent response		Date: 02-May-2025
As a response to the raised CAR, information regarding the valid operational licenses (environmental permits) for the infrastructure promoting LFG utilization as gaseous fuel for generation of electricity is now corrected in the revised version of the VCS PD.		

Documentation provided by project proponent	
-	
VVB assessment	Date: 07-May-2025
As confirmed by the Applus+ Certification's validation team, related amendments made in the revised version of the VCS PD sufficiently address the raised CAR. This CAR is thus closed.	

CAR ID	CAR 3	Date: 22-April-2025
Description of CAR		
Section 4.1 of the initial version of the VCS PD does not include deemed completed and correct information regarding an installed high temperature enclosed flare.		
Project proponent response		Date: 02-May-2025
As a response to the raised CAR, information regarding the high temperature enclosed flare is now corrected in the revised version of the VCS PD.		
Documentation provided by project proponent		
-		
VVB assessment		Date: 07-May-2025
As confirmed by the Applus+ Certification's validation team, related corrections made in the revised version of the VCS PD sufficiently address the raised CAR. This CAR is thus closed.		

CAR ID	CAR 4	Date: 22-April-2025
Description of CAR		
Section 4.2 of the initial version of the VCS PD does not include deemed complete and correct information regarding the determination of project emissions due to the consumption of diesel by a backup captive off-grid electricity generator (fueled by diesel).		
Project proponent response		Date: 02-May-2025
As a response to the raised CAR, information regarding the determination of project emissions due to the consumption of diesel by a backup captive off-grid electricity generator (fueled by diesel) is now corrected in the revised version of the VCS PD.		
Documentation provided by project proponent		

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WB assessment	Date: 07-May-2025
As confirmed by the Applus+ Certification's validation team, related corrections made in the revised version of the VCS PD sufficiently address the raised CAR. This CAR is thus closed.	

CL ID	-	Date:
Description of CL		
No CL was raised as part of the validation assessment.		
Project proponent response		Date:
-		
Documentation provided by project proponent		
-		
VVB assessment		Date:
-		

FAR ID	-	Date:
Description of FAR		
No FAR was raised as part of the validation assessment.		
Project proponent response		Date:
-		
Documentation provided by project proponent		
-		
VVB assessment		Date:
-		