

**GOLD STANDARD FOR THE GLOBAL GOALS (GS4GG)
REPORT**

-

**VALIDATION OF TRANSITION FROM THE CDM TO THE
GS4GG**



Project Title:	<i>Ecoparque Candeias Landfill Gas Project</i>
GS project ID:	<i>GS12047</i>
Internal ID:	<i>BELL_GS_VAL_7423</i>
Customer:	<i>Orizon Valorização de Resíduos S.A.</i>
Date:	<i>08/07/2024</i>
Revision:	<i>3.1</i>

SUMMARY			
Reference No.	Date (first version)	Version No.	Date (last version)
BELL_GS_VAL_7423	17/05/2023	3.1	08/07/2024
Client	Orizon Valorização de Resíduos S.A.		
Project Title	Ecoparque Candeias Landfill Gas Project		
Project Developer	Orizon Valorização de Resíduos S.A.		
Project Location	Jaboatão dos Guararapes, Pernambuco State, Brazil		
Contact Person	Mr Dalton Canelhas		
GS4GG Version: GS4GG Principles and Requirements, version 1.2 GS4GG Validation and Verification Standard, version 1.0 GS4GG Activity Requirements: Renewable Energy Activity Requirements version 1.4 GS4GG Rule Update - Requirements for Projects to Transition from other schemes to Gold Standard for Global Goals Applied Methodology Version: CDM baseline and monitoring methodology ACM0001 (version 19.0)			UNFCCC CDM Sectoral Scope: 1 and 13 GS4GG Scope: 2 Technical Area: 1.1 and 13.1
Initial Transition Request Form + GS4GG PDD Version: 1.0 Date: 21/03/2023		Final Transition Request Form + GS4GG PDD Version: 4.3 Date: 02/07/2024	
Estimated Annual Average SDG Impact:			
Sustainable Development Goals	SDG Impact	Estimated Annual Average	
7 Affordable and Clean Energy	Total electricity produced: Renewable	211,570 MWh	
8 Decent Work and Economic Growth	Total number of jobs	19 jobs	
13 Climate Action	Amount of GHGs emissions avoided or sequestered	702,389 tCO ₂ e (annual average)	
Selected Sustainable Development Goals (SDGs): 7; 8; 13			
Validation Summary			
LGAi Technological Center, S.A. (hereafter referred to as Applus+ Certification) was commissioned by Orizon Valorização de Resíduos S.A. to perform the GS validation (transition from the UNFCCC's Clean Development Mechanism (CDM) to Gold Standard for Global Goals (GS4GG) (from a CDM project activity to a Gold Standard (GS) project activity) for the "Ecoparque Candeias Landfill Gas Project." (formerly titled "CTR Candeias Landfill Gas Project" (UNFCCC ref. 3958) and hereby termed "proposed GS project activity"). The proposed GS project activity applies the CDM baseline and			

monitoring methodology ACM0001 - "Flaring or use of landfill gas" (version 19.0) which is the same methodology currently applied by the project activity registered under the CDM.

The project developer Orizon Valorização de Resíduos S.A. is responsible for the completion of the GS Transition Request Form + GS4GG Project Design Document (GS4GG PDD) (including project design description for the project activity to be transitioned).

The proposed GS project activity encompasses collection and destruction/utilization (as gaseous fuel for electricity generation) of landfill gas (LFG) generated at the Ecoparque Candeias landfill, which is located in the municipality of Recife, in the State of Pernambuco, Brazil. The baseline scenario for the proposed GS project activity represents the continuation of the pre-project situation at the Ecoparque Candeias landfill: LFG generated at the landfill being directly emitted into the atmosphere through the pre-project passive conventional LFG combustion/venting drains and through the surface of the landfill; with only a small share of LFG being combusted/destroyed in such passive conventional LFG venting/combustion drains.

Under conformance with Section 6.3 of the GS4GG Validation and Verification Standard, a desk review and an on-site inspection were performed in order to confirm the project design, project implementation status and to verify data reported in the completed submitted in the GS4GG Transition Request Form. Applus+ Certification confirms the following documents have been reviewed:

- a. Transition Request Form + GS4GG PDD for the proposed GS project activity;
- b. The applied CDM baseline and monitoring methodology (ACM0001 (version 19.0) + all applicable CDM methodological tools;
- c. Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;
- d. The Gold Standard for Global Goals "Principles and Requirements" Version 1.2 and all other GS regulatory documents with relevant requirements, procedures and guidance;
- e. All information and references relevant to the project activity to be transitioned resulting in estimated emission reductions.

The scope of the validation for transitioning of project activities from CDM to GS4GG is defined as an independent and objective review of the Transition Request Form + GS4GG PDD, against all applicable principles, rules, requirements, procedures and guidelines from GS4GG and from UNFCCC/CDM. The Validation Report for transitioning the project activity to GS4GG is finalized based on the assessment of the Transition Request Form + GS4GG PDD for the project activity to be transitioned by applying standard auditing techniques (as also presented in the GS4GG Audit techniques template) including but not limited to document desk review, on-site inspection, follow up actions (e.g. telephone or e-mail interviews) and also the review applicable requirements of the applied CDM baseline and monitoring methodology + applied CDM methodological tools.

The Validation Report for transitioning the project activity to GS4GG describes a total of 17 raised findings which include:

13 (thirteen) Corrective Action Requests (CARs);

0 (zero) Clarification Requests (CLs/CRs);

4 (four) Forward Action Requests (FARs).

The Project Developer (PD) has successfully addressed all raised findings by modifying/amending/correcting the Transition Request Form + GS4GG PDD for the proposed GS project activity accordingly and/or by providing adequate additional explanations and evidence. Applus+ Certification confirms that all raised findings were appropriately closed prior of submitting the request for registration/transition to Gold Standard

As a summary of the validation for transitioning, Applus+ Certification obtained sufficient evidence and a deemed appropriate documentation (including the appropriated completed Transition Request Form + GS4GG PDD) for the determination of the project's fulfillment with all stated criteria. It is

the Applus+ Certification opinion that the proposed GS project activity meets all relevant principles, rules, requirements, procedures and guidelines from GS4GG and from UNFCCC/CDM. Therefore, Applus+ Certification recommend the project for registration/transition of the proposed GS project activity by Gold Standard.

ASSESSMENT TEAM			
Team Members	Type of Resource ¹		
Lead Auditor: Mr. Marco A. Ratton	☐ IR	☒ EI	☐ OE
Technical Expert: Mr. Marco A. Ratton	☐ IR	☒ EI	☐ OE
Technical Reviewer: Mr. Simon Shen	☐ IR	☒ EI	☐ OE

Note: The same assessment team (encompassing Mr. Marco A. Ratton as Lead Auditor and Mr Simon Shen as Technical Reviewer) have performed both Validation and Verification (combined) for this project activity.

¹ IR (Internal Resource); EI (External Individual); OE (Outsourced Entity)

1. INTRODUCTION

1.1 Objective

LGAI Technological Center, S.A. (hereafter referred to as "Applus+ Certification") was commissioned by Orizon Valorização de Resíduos S.A. to perform the validation for transitioning of the project activity previously titled "CTR Candeias Landfill Gas Project" (UNFCCC ref. 3958) (and currently titled "Ecoparque Candeias Landfill Gas Project") (hereafter referred to as "proposed GS project activity") from CDM to GS4GG².

Applus+ Certification has been accredited as a Validation and Verification Body (VVB) under the GS4GG, as a Designated Operational Entity (DOE) by the UNFCCC and also meets the competence requirements as set out in ISO 14065.

The objective of the performed validation for transitioning to GS4GG is to ensure that information and data reported in the completed Transition Request Form + GS4GG PDD for the proposed GS project activity is complete, accurate and under conformance with applicable principles, rules, requirements, procedures and guidelines from GS4GG and from UNFCCC/CDM.

Under conformance with paragraph 7.2 of the GS4GG Validation and Verification Standard, as part of the Validation assessment, Applus+ Certification has assessed the eligibility of the proposed GS project activity in accordance with applicable GS4GG rules and requirements.

Moreover, as further assessed in Section 3.5, the Applus+ Certification's validation team has also confirmed that GHG emission reductions generated and/or yet to be generated by the proposed GS project activity 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.

1.2 Scope and Criteria

The validation for transition to GS4GG scope is defined as an independent and objective review of information and data made available in the completed Transition Request Form + GS4GG PDD for the proposed GS project activity. The completed Transition Request Form + GS4GG PDD is reviewed against (i) the Gold Standard for Global Goals "Principles and Requirements" (version 1.2) (and all other GS regulatory documents with relevant requirements, procedures and guidelines); (ii) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board, whenever applicable and (iii) applied CDM baseline and monitoring methodology (ACM0001 (version 19.0)) + all applicable CDM methodological tools.

The validation for transition to GS4GG is not meant to provide any consulting towards the Project Developer. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design description.

² The project activity was previously registered under the CDM as a CDM project activity with title "CTR Candeias Landfill Gas Project" (UNFCCC ref. 3958) (details available online: <https://cdm.unfccc.int/Projects/DB/ERM-CVS1283351787.62/view?cp=1>).

2. VALIDATION PROCESS

2.1 Method and Criteria

The purpose of a validation for transition to GS4GG assessment by an accredited VVB is to have an independent third-party validation opinion about the design of the project activity to be transitioned to GS4GG and its compliance with all applicable GS4GGs eligibility and/or methodological principles, rules, requirements, procedures and guidelines.

In particular, the project's baseline, monitoring plan, and the project's compliance with relevant applicable GS4GG criteria are all validated in order to confirm that the project design and transitioning information/details, as documented in completed Transition Request Form + GS4GG PDD, is sound, reasonable and meets the identified criteria.

The purpose of a validation for transition to GS4GG assessment by an accredited VVB also encompasses an independent third-party validation opinion about the addressing of requirements related to Sustainable Development Goals (SDGs) indicators, Safeguarding principles and Stakeholder Consultation in the context of the proposed GS project activity vis-à-vis related requirements and guidelines from GS4GG. Related information/details, as documented in completed Transition Request Form + GS4GG PDD, is assessed.

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

- Project design.
- Transition information (including assessment and completion of the Transition Request Form (Eligibility Check for Transition, Transition Project Information and Transition Checklist).
- Safeguarding Principles and Gender Equality.
- Application of the selected CDM baseline and monitoring methodology + applicable CDM methodological tools.
- Ex-ante estimates of GHG emission reductions to be achieved along the considered crediting period.
- The project's monitoring plan.
- Safeguards, QA/QC procedures, etc.

Validation for transitioning to GS4GG is a requirement for any project activity previously registered in other GHG programme (i.e. CDM) that seek to move to the issuance Gold Standard VERs (GS VERs) and it is seen as necessary to provide assurance to stakeholders about the overall quality and integrity of a project-based GHG emission initiative registered/transitioned to GS4GG.

A validation for transitioning to GS4GG assessment is conducted by Applus+ Certification by following its related applicable assessment procedures and rules which are defined under conformance with requirements, guidance and criteria specified in the GS4GG Principles and Requirements (version 1.2) and GS4GG Validation and Verification Standard (version 1.0), among other relevant GS4GG requirements. All assessment tasks which are part of a validation for transitioning to GS4GG assessment are performed by applying standard auditing techniques (as also presented in the GS4GG Audit techniques template).

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

- Project design
- Transition information (including Safeguarding Principles and Gender Equality)

- Application of the selected CDM baseline and monitoring methodology + applicable CDM methodological tools
- Ex-ante estimates of GHG emission reductions to be achieved along the considered crediting period
- The project's monitoring plan
- Safeguards, QA/QC procedures, etc.

In the particular context of the validation for transitioning to GS4GG assessment for the proposed GS project activity, no sampling work was considered or performed.

The scope of the performed validation for transitioning to GS4GG assessment includes confirmation that both transitioning information and project design information as reported in the Transition Request Form + GS4GG PDD are deemed complete, reasonable and under conformance with applicable methodological and procedural principles, rules, requirements and guidelines for its completion.

The validation for transitioning to GS4GG assessment consisted of the following three phases:

- I) Desk review of the completed Transition Request Form + GS4GG PDD for the proposed GS project activity and other project design documentation and supporting documents, when applicable.
- II) Physical on-site inspection and follow-up interviews with representatives of the Project Developer.
- III) Resolution of outstanding issues (raised findings) and the completion of the Validation Report for Transition to GS4GG, which includes the Applus+ Certification's validation opinion.

This GS Validation Report for transitioning to GS4GG summarizes the assessment after all phases of the performed Validation for Transitioning to GS4GG assessment.

The appointed Applus+ Certification's validation team

A competent validation team with relevant knowledge and experience in the specific sectoral scopes as well as measures and technologies applied by the project activity to be transitioned to GS4GG was appointed by Applus+ Certification. Furthermore, the appointment of the team considers required local relevant knowledge about host country and knowledge about general requirements for performing the assessment termed as validation for transitioning to GS4GG.

Prior to approving and submitting the final Validation Report for transitioning to GS4GG for design certification, a technical review of the whole GS4GG 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 GS project activity falls under. Each member of the review team is independent of the validation assessment.

By considering the sectoral scopes/technical area valid/applicable for the proposed GS 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. 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 four qualification levels for team members for GS4GG validation/verification assessments that are assigned by formal appointment rules are as follows:

- Leader Auditor (LA)
- Auditor (A)/ Auditor Trainee (AT)

- Technical Reviewer (TR)
- Technical Experts (TE)

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

ASSESSMENT TEAM		
Team Members	Type of Resource ³	Organization (<i>for OEs</i>)
Lead Auditor/Technical Expert/Financial Expert: Mr. Marco A. Ratton	☐ IR ☒ EI ☐ OE	NA
Technical Reviewer: Mr. Simon Shen	☐ IR ☒ EI ☐ OE	NA

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 GS4GG, 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 of conducting ISO 9001/14001 related assessments and diagnostics.

Mr. Simon Shen:

Simon Shen has a master's degree in Thermal Energy Engineering, bachelor's degree in environmental engineering. Mr. Shen has more than 6 years of work experience in CDM/GS4GG/GS project assessment and review with Applus+, apart from the years of experience working as GHG auditor and ISO 9001/14001 in TUV SUD for 3.5 years before he joined Applus+. Mr. Simon Shen has extensive experience also as former Applus+ Shanghai CDM Technical Manager.

2.2 Document Review

The completed Transition Request Form + GS4GG PDD for the proposed GS 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 aspects of the proposed GS project activity:

³ IR (Internal Resource); EI (External Individual); OE (Outsourced Entity)

- Transitioning information and project details as per the template for the Transition Request Form + GS4GG PDD
- Applicability and appropriateness of the applied CDM baseline and monitoring methodology + applied CDM methodological tools
- Compliance with relevant laws and regulations
- Correctness of the application of the selected CDM baseline and monitoring methodology + applied CDM methodological tools
- Identification of the baseline scenario and demonstration of additionality
- Design of the project's monitoring plan
- Local stakeholder consultation
- Addressing of eventually received Stakeholders' comments
- Documented evidence used for cross-checking information presented in the completed Transition Request Form + GS4GG PDD

A complete list of documentation reviewed as part of the performed GS4GG validation assessment is summarized in Section 17.

2.3 On site inspection

Activity performed as part of the on-site inspection	Site location	Date – Team member
Opening meeting for the onsite 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 Developer Orizon Valorização de Resíduos S.A. also introduced themselves and completed/signed the Applus+ Certification list of participants form for the on-site inspection.	Operation control room of the proposed GS project activity	16/05/2023 – Marco A. Ratton
Visual inspection of the infrastructure encompassed by the proposed GS project activity in order to confirm whether the general descriptions of the project design, applied technology and project location details as included in the completed Transition Request Form + GS4GG PDD for the proposed GS project activity are under conformance with all infrastructure installed and/or in place as part of the proposed GS project activity (LFG collection wells and pipeline network, LFG flaring and	Areas within the 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	16/05/2023 – Marco A. Ratton

utilization infrastructure, monitoring instruments, etc.).		
Visual inspection of the infrastructure encompassed by the proposed GS project activity in order to confirm whether the identified project boundary and the schematic flow diagram (delineating the project activity (equipment, parameters to be monitored, and GHG included in the project boundary)) as included in the completed Transition Request Form + GS4GG PDD for the proposed GS project activity is under conformance with all infrastructure installed and/or in place as part of the GS project activity (LFG collection wells and pipeline network, LFG flaring and utilization infrastructure, monitoring instruments, etc.).	Areas within the 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	16/05/2023 – Marco A. Ratton
Visual inspection of the installed infrastructure promoting electricity generation through utilization of LFG and confirmation of correctness of related information included in the Monitoring Report and Transition Request Form + GS4GG PDD for the GS project activity regarding its implementation (project design) and operation.	Project's electricity generation infrastructure comprising set of engine-generator sets + ancillary equipment and systems.	16/05/2023 – Marco A. Ratton

2.4 Interviews

On 16/05/2023 and 17/05/2023, Mr. Marco A. Ratton (appointed member of the Applus+ Certification's validation team (hereinafter termed "Applus+ Certification's validation team")) performed an on-site inspection to the proposed GS project activity with the representatives of the Project Developer. During the on-site inspection, interviews with representatives of the Project Developer were also performed. Interviewed persons and topics of the performed interview are summarized in the table below.

Interviewed Personnel	Role	Organization	Subject
Mr. Rodrigo Pedroso	Consultant	Unicarbo Energia e Biogás Ltda.	Amount and type of municipal solid waste (MSW) disposed at the Ecoparque Candeias landfill; Project description, project design and applied technology (including history of project implementation); GHG emission reduction calculations (including ex-ante estimation of emission reductions);
Mr. Jonney Mondini	CDM Manager	Orizon Valorização de Resíduos S.A.	
Mr. Vinicius Cavalcante Ferreira	Supervisor	Orizon Valorização de Resíduos S.A.	
Mr. Eduardo Fontoura Dias	Analyst	Orizon Valorização de Resíduos S.A.	

Mr. Rodrigo Santos da Silva	Engineering Assistant	Orizon Valorização de Resíduos S.A.	Application of the CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable CDM methodological tools; Local stakeholder consultation (LSC) process; Assessment of environmental aspects, environmental licensing and legal compliance with applicable environmental legislation/regulations; Assessment of compliance with specific Gold Standard Requirements (e.g. safeguarding principles and gender equality); Project ownership Ownership of GS VERs to be issued by the proposed GS project activity; Confirmation of non-existence of ODA related to the implementation and operation of the proposed GS project activity; Monitoring plan (including the safeguarding principles indicators selected by the Project Developer); Completion of the Transition Request Form + GS4GG PDD for the proposed GS project activity; Description and monitoring of related SDGs;
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Moreover, on 23/02/2024 the Applus+ Certification's validation team has performed two additional interviews (via Google meet application) with the following representatives of local neighborhoods⁴:

- Mrs. Luclecia Gomes Cavalcante, resident of the "Sítio Campina" Community. Mrs. Cavalcante emphasized about the support the project developer Orizon Valorização de Resíduos S.A. provides her community during floodings with water trucks and other basic services.
- Mr. André Luiz Batista da Silva, secretary at the public Municipal School "Alícia Cahú", located in the "Sítio Campina" Community. Mr. Silva mentioned the significant improvements the implementation of the Ecoparque Candeias landfill brought when

⁴ As confirmed by the Applus+ Certification's validation team through online assessment of lists of organizations and groups of individuals related to solid waste available in the region of influence of the Ecoparque Candeias landfill (including the cities of Recife and Jaboatão dos Guararapes), currently, there are no groups of waste scavengers, former waste scavengers or any organization representing these individuals which could be invited to the conducted stakeholder meeting.

compared to the time the already closed dumpsite termed “Muribeca”⁵ was the only SWDS available in the region. He also mentioned that the project developer Orizon Valorização de Resíduos S.A. has a lasting partnership with the School “Alícia Cahú”, promoting activities for students (e.g. guided visits to the landfill, environmental week with speeches and educational games).

- Mr. Rodrigo Santos da Silva, resident of the neighborhood “Ponte dos Carvalhos”.

Moreover, the interviewees informed the Applus+ Certification’s validation team that the occurrence of the physical meeting for the stakeholder consultation process was known amongst most of the local residents. They also pointed out a set of benefits promoted by the GS project activity in the region (including reduction of odor and generation of employment opportunities). In summary, the environmental, social and economic benefits of the GS project activity were announced by all the interviewees, with no negative aspects being identified.

2.5 Resolution of Findings

As per Applus+ Certification’s working procedures applicable for the GS4GG validation assessment, whenever a non-conformance arises or insufficient information is identified in project documentation, the Applus+ Certification’s validation team shall raise a Corrective Action Request (CAR) and/or a Clarification Request (CL) respectively.

A CAR is issued, where:

- a) Non-compliance with the monitoring plan or methodology is found in project documentation and/or selected methodological or monitoring choices/options are not appropriately selected, applied or documented in project documentation by the Project Developer, or if the evidence provided to prove conformity is insufficient or incorrect.
- b) Details about the implementation, operation and monitoring of the GS project activity are not sufficiently documented and/or justified by the Project Developer.
- c) Mistakes and/or errors have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions to be achieved by the proposed GS project activity.

The Applus+ Certification’s validation team shall raise a Clarification Request (CL) if project related information is insufficient or not clear enough to determine whether the applicable CDM or GS4GG requirements are sufficiently met.

As per applicable working procedures valid for GS4GG validation, all CARs and CLs raised during validation shall be resolved prior to submitting a request for registration/transition of a GS project activity.

The objective of this phase of the validation is to resolve the requests for corrective actions (CARs) and clarification (CLs) and any other outstanding issues which need to be clarified for Applus+ Certification’s positive conclusion on the project design. As an outcome of the performed

⁵ As confirmed by the Applus+ Certification’s validation team, the Muribeca solid waste dumpsite was operated by the municipality of Jabotão dos Guararapes (therefore not under the responsibility of the PD Orizon Valorização de Resíduos S.A.). The operations of this particular solid waste dumpsite are confirmed as being ended in year 2008. There was and there is no operational and/or management relations the Ecoparque Candeias landfill towards this particular solid waste dump site. As confirmed by the Applus+ Certification’s validation team, footnotes were appropriately included in the completed GS4GG TRF + PDD (Section TRF.1) with sufficient details about the previously existent situation of solid waste scavengers at the Muribeca dumpsite.

certification (validation) assessment for transition to GS4GG, 14 (fourteen) CARs were raised and no (zero) CL was raised.

The description of the raised CARs, responses/measures from representatives of the Project Developer and assessment by the Applus+ Certification's validation team for the provided responses/measures are included in Appendix I.

No Forward Action Request (FAR) was raised as there are no missing steps or open issues from the validation phase that will need to be addressed in the context of future verification assessments.

2.6 Quality control

As part of Applus+ Certification internal quality control system, after the completion of the assessment by the appointed validation team (including completion of the final draft Validation Report for Transitioning to GS4GG (Draft FVR)), all the relevant documentation is submitted to a qualified independent technical review team.

The technical review team is appointed to review the content of the completed draft version of the Validation Report for Transitioning to GS4GG. The technical review team assesses whether all the reporting requirements have been fulfilled in both the PDD and draft version of the Validation Report for Transitioning to GS4GG and whether all raised outstanding issues (CARs and/or CLs) were satisfactorily addressed by the project developer. The technical review team either accepts or rejects elements of the draft version of the Validation Report for Transitioning to GS4GG completed by the appointed validation team. All comments and notes made by the technical review team are taken into consideration and, if applicable, incorporated in the final version of the Validation Report. The final Validation Report for Transitioning to GS4GG (after resolutions of all findings) is then submitted to the head of operations of Applus+ for final review and approval.

3. PURPOSE AND GENERAL DESCRIPTION OF PROPOSED PROJECT

3.1 Type and scale

The proposed GS project activity is correctly identified as a large-scale project (in section A.4 of the completed Transition Request Form + GS4GG PDD for the proposed GS project activity). The proposed GS project activity applies the CDM large-scale methodology ACM0001 (version 19.0). The Applus+ Certification's validation team confirmed that the proposed GS project activity fulfills all the requirements of the ACM0001 (version 19.0) (i.e. scale, applicability, baseline, additionality and monitoring).

The proposed GS project activity encompasses collection of LFG, flaring of LFG and utilization of LFG as gaseous fuel for electricity generation. The proposed GS 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.

3.2 Design aspects of the proposed GS project activity

As confirmed by the Applus+ Certification's validation team, the completed Transition Request Form + GS4GG PDD for the proposed GS project activity correctly includes the following information as address/location for the proposed GS project activity:

"The project site is located in the Municipality of Jaboatão dos Guararapes in the Recife Metropolitan Area. Several poor communities are located in the vicinity of the project. The landfill is strategically situated close to three major cities in the state of Pernambuco: Recife, Jaboatão dos Guararapes and Cabo de Santo Agostinho. Due to its central location, the landfill will potentially provide services to a metropolitan area of 3.8 million inhabitants. The site, which is located at coordinates Latitude: - 8.164258; Longitude: -34.985286."

The proposed GS project activity encompasses the promotion of collection and destruction/utilization of landfill gas (LFG) (rich in methane) at the Ecoparque Candeias landfill site through collection of LFG and its destruction in high temperature enclosed flare and utilization as gaseous fuel in engine-generator sets of an electricity generation infrastructure (with final total combined nameplate installed capacity of about 28.52 MW).

Under conformance with the originally conceived design of the proposed GS project activity, the project's infrastructure is confirmed by the Applus+ Certification's team as encompassing the following currently installed (and/or yet to be installed) main equipment:

- Active LFG collection system encompassing set of LFG collection wells installed across the landfill site;
- 1 high temperature enclosed flare for which main specifications, as appropriately outlined in Section A.3 of the Transition Request Form + GS4GG PDD, are summarized as follows:

LFG combustion flaring equipment	Characteristics/specifications
Flare 1	Manufacturer: Biotecnogás s.r.l. Model: 2500HT Min. LFG flaring capacity (for continuous operation): Flow rate of 500 Nm ³ /h Max. LFG flaring capacity (for continuous operation): Flow rate of 2,500 Nm ³ /h

- Set of 20 engine-generator sets manufactured by INNIO Jenbacher, 4 series with about 1.42 MW of nameplate installed capacity (uniquely fuelled by LFG) with total combined nameplate installed capacity of 28.52 MW.

LFG (which is rich in methane (CH₄)) has since year 2007 been generated at the Ecoparque Candeias 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 Developer Orizon Valorização de Resíduos S.A. through the application of best practice techniques for permanent disposal of MSW in well-managed landfill site.

The proposed GS project activity promotes real, permanent and measurable greenhouse gas (GHG) emission reductions. While in the absence of the proposed GS project activity (baseline scenario, which represents the common practice in Brazil), generated LFG would be otherwise directly emitted into the atmosphere (not destroyed/utilized), the proposed GS project activity

thus promotes real and permanent reduction of CH₄ emissions. In addition, project's grid-connected electricity generation (using LFG as gaseous fuel) 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 GS project activity (baseline scenario). Therefore, the proposed GS project activity thus also promotes CO₂ emission reductions associated with generation of electricity using non-conventional renewable energy sources.

As confirmed by Applus+ Certification's validation team during the performed desk review and on-site inspection and correctly indicated in the completed Transition Request Form + GS4GG PDD for the proposed GS project activity, the design of project activity is summarized as follows:

- Implementation/operation of an active LFG collection system composed by set of LFG collection wells installed across the landfill site;
- Utilization of collected LFG as gaseous fuel for electricity generation, with generated electricity being exported through the electricity grid the project activity is connected to.
- Flaring of the excess captured LFG to avoid any methane emissions.

As indicated in the Transition Request Form + GS4GG PDD for the proposed GS project activity, the project activity currently comprises the operation of one high enclosed flare for LFG destruction. It is important to note that the project's electricity generation infrastructure is currently already installed and under operation.

As per the design of the proposed GS project activity, electricity demand of the project activity is to be met by consumption of grid-sourced electricity, by electricity generated in the installed backup off-grid generator (fueled by diesel) and/or by electricity sourced by the project's electricity generation infrastructure.

As outlined in the completed Transition Request Form + GS4GG PDD for the proposed GS project activity, the expected operational lifetime for the project's LFG collection and destruction/utilization infrastructure is 21 years which is confirmed by Applus+ Certification as a reasonable expected infrastructure lifetime. However, as appropriately outlined in the Transition Request Form + GS4GG PDD, related equipment and infrastructure lifetime may even exceed 21 years if required service and maintenance is performed correctly and in case the GS project activity is always operated as per recommendation and requirements set by manufacturers/suppliers of equipment/instruments.

The 20-year lifetime of equipment is defined in both the Transition Request Form + GS4GG PDD and previously validated CDM PDD.

The Ecoparque Candeias landfill was designed and has been operated under conformance with its related design, construction, operational and management specifications and requirements (as specified in the latest environmental license/permit (Ref./No. 00086.2/2021) issued by Secretaria Municipal de Desenvolvimento Urbano e Meio Ambiente of municipality Jaboatão dos Guararapes (environmental authority for the municipality of Jaboatão dos Guararapes) authorizing the project implementer Orizon Valorização de Resíduos S.A. to keep on operating the Ecoparque Candeias landfill site). Applied design and operational pattern represents the best available practices for landfill construction and operation in Brazil.

The whole management and operation plan of the Ecoparque Candeias landfill has been approved and has been regularly monitored by the competent environmental authority of Pernambuco State, as indicated in the currently valid operational/environmental license for this particular landfill.

As confirmed by the Applus+ Certification's validation team during the performed on-site inspection and also through assessment of the operational license/permit for the landfill, the

Ecoparque Candeias landfill can be regarded as a well-designed and well-managed landfill as per the common practices for MSW landfilling in Brazil and/or comparable countries. As established by the valid environmental and operational permits, disposed MSW is constantly covered and levelled with the use of heavy equipment (excavators, compacting equipment, etc.). Furthermore, safety requirements are defined and addressed as part of the operation of the landfill.

In summary, Applus+ Certification's validation team was able to confirm that description of the proposed GS project activity as per the completed Transition Request Form + GS4GG PDD for the proposed GS project activity is accurate, complete and provides an understanding of the proposed project as per GS4GG Validation and Verification Standard (version 1.0) and also GS4GG Principles and Requirements (version 1.2). As confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change.

3.3 Name and designation of the Project Developer and other entities involved in the project activity

The Applus+ Certification's validation team was able to confirm that details of the project proponent (as correctly reported in the Transition Request Form + GS4GG PDD) are as follows:

Organization name	Orizon Valorização de Resíduos S.A.
Contact person	Dalton Canelhas
Title	Director
Address	Av. Das Nações Unidas, Torre Oeste, Cidade Monções
Telephone	+55 (11) 5103 5300

Details for the other entity so far directly involved in the design, implementation, operation and GS4GG registration/monitoring for the proposed GS4GG project activity (as correctly reported in the Transition Request Form + GS4GG PDD) are as follows:

Organization name	Unicarbo Energia e Biogás Ltda.
Role in the project	General carbon technical & commercial consulting and advisory services
Contact person	Mr. Nuno Barbosa
Title	Managing Director
Address	Av Iraí 79, 72A, São Paulo – SP, Brazil – 040082-000
Telephone	+ 55 (11) 9 8596 0950

As sufficiently outlined the Transition Request Form + GS4GG PDD for the proposed GS project activity, Orizon Valorização de Resíduos S.A. has the ownership and/or property/utilization rights for both the Ecoparque Candeias landfill and the infrastructure encompassed by the proposed GS project activity, which was confirmed by the Applus+ Certification's validation team through assessment of the valid operational license for the Ecoparque Candeias landfill (Ref./No.

00086.2/2021) and installation license for the project's electricity generation infrastructure (Ref./No. IN034300), issued by Agência Estadual de Meio Ambiente do Estado de Pernambuco (CPRH) (environmental authority for the Pernambuco State) and Secretaria Municipal de Desenvolvimento Urbano e Meio Ambiente (environmental authority for the Jaboatão dos Guararapes municipality), respectively.

3.4 Project Boundary

The Applus+ Certification's validation team assessed the previously registered CDM PDD for the project activity (previously termed as "CTR Candeias Landfill Gas Project" (UNFCCC ref. 3958)) and confirmed that the previously selected GHG emission sources are correct and appropriately justified. Moreover, Applus+ Certification has also confirmed that, under conformance with applicable related guidance for the completion of the GS4GG form "Transition Request – Project", Section B.3 of the Transition Request Form + GS4GG PDD for the proposed GS project activity is appropriately left in blank since there are no changes in the project boundary when compared to the previously registered CDM PDD.

In summary, the identified project boundary is confirmed by the Applus+ Certification's validation team as being under compliance with the applied CDM baseline and monitoring methodology + applicable CDM methodological tools.

The Applus+ Certification's validation team was also able to confirm 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.

Moreover, it was also confirmed by the Applus+ Certification's validation team that all main GHG emission sources, the physical delineation of the project activity, and other relevant project and baseline emission sources covered in the applied methodology are correctly included within the project boundary for the purpose of calculating project and baseline emissions for the proposed project activity as outlined in the Transition Request Form + GS4GG PDD for the proposed GS project activity.

It is relevant to note that, as confirmed by the Applus+ Certification's validation team, while the demonstration of additionality and identification of baseline scenario of the project activity were already assessed during the Validation phase for the Project under the CDM and by also considering that the situation in Brazil regarding LFG management has not changed (non-existence of national or local policies/regulations that deal with LFG management), such assessments are thus not included in this Validation Report for Transitioning to GS4GG. Further details are included in Sections 4 and 5.

As confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change.

3.5 Eligibility of the project under the Gold Standard for Global Goals

The Applus+ Certification's validation team has assessed the eligibility of the GS project activity under GS4GG vis-à-vis applicable GS4GG rules as per both GS4GG Principles and Requirements (version 1.2) and the GS4GG Renewable Energy Activity Requirements (which include, inter alia, types of eligible projects, location of the project, project boundary and project scale, host country requirements, etc.) and confirmed that the proposed GS project activity fully meets the required eligibility criteria for transitioning to GS4GG and issuing GS VERs as per such GS4GG rules and requirements.

Moreover, Applus+ Certification's validation team has confirmed that the project activity is one of the eligible project types for issuance of Gold Standard VERs as per Section 2.4 of GHG Emission

Reduction and Sequestration Product Requirements. Applus+ Certification has also confirmed that, as correctly outlined in the Transition Request Form + GS4GG PDD, as a LFG utilization project, the proposed GS project activity meets the criteria from paragraph 1.3.1 of Annex A of the GS4GG Renewable Energy Activity Requirements.

Participation under other GHG programs

While the proposed GS project activity was previously registered under the CDM, it has only issued CERs under the CDM up to 31/12/2020, thus the proposed GS project activity will only be eligible to request GS VERs from 01/01/2021 onwards.

Applus+ Certification checked the registry/database for Program of Renewable Energy Certificates (RECs) in Brazil (I-REC Brazil) and confirmed that the proposed GS 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 GS 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):

- The Verified Carbon Standard (VCS) (<https://registry.verra.org/app/search/VCS/All%20Projects>)
- The International REC Standard (<https://www.irecstandard.org/>)
- Global Carbon Council (GCC) (<https://www.globalcarboncouncil.com/>)
- CERCARBONO (Certified Carbon Standard) (<https://www.cercarbono.com/>)

Other forms of credit

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 GS project activity 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 no 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 GS project activity would be eligible under.

Deviation Request previously sent to the GS4GG:

The Applus+ Certification's validation team has confirmed that the latest version of the completed Transition Request Form + GS4GG PDD correctly refers to a previously submitted Deviation Request (submitted by project developer to GS4GG in June/2022 (and that received a response/position from GS4GG on 14/07/2022)). The submitted Deviation Request includes inquire/claim about the eligibility of the project activity for transitioning from the CDM to the GS4GG. As part of the response to such Deviation Request, the following issues were presented to the project developer by GS4GG as requiring further actions:

1. *Demonstrate compliance with applicable requirements as per the GS4GG Principles and Requirements and transition requirements along with the applicable activity requirement.*

As assessed by the Applus+ Certification's validation team in this Section and other relevant Sections throughout this Validation Report, Section A.1.1 of the Transition

Request Form + GS4GG PDD sufficiently demonstrates that the project activity indeed meets all relevant requirements for transitioning from the CDM to the GS4GG.

2. Demonstrate:

- a) that the project faces a serious risk of discontinuation without carbon revenue.*
- b) additionality demonstration as per the design change rules. Where available, project additionality shall apply the actual financial data to justify how carbon revenue will alleviate the risk of discontinuation.*

Details about the assessment and demonstration of additionality of the project activity and its risk of discontinuation without carbon revenues are sufficiently presented in Sections B.5. and B.5.2. of the completed Transition Request Form + GS4GG PDD, respectively. It is relevant to note that this Deviation Request was submitted to the GS4GG (prior to the submission of the documentation for preliminary review) in order to determine/claim the eligibility of the project activity for transitioning from the CDM to the GS4GG (since it was previously registered under the CDM before year 2016).

As confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change that would require assessment of any potential adverse impact over its previously demonstrated additionality despite of noticed relative increase of ex-ante estimates of GHG emission reductions along the GS crediting period as reported in the completed Transition Request Form + GS4GG PDD vis-à-vis figures made available in the CDM PDD for the same period.⁶

⁶ The Applus+ Certification's validation team confirms that the occurred increase in the estimated GHG emissions reductions to be generated by the project activity within the GS4GG (when compared to the values presented in the registered PDD of the project activity under the CDM which occurred mainly due to an increase to the ex-ante determined parameter GWP_{CH_4} (as explicitly indicated in the response to the next Comment #9)) does not promote any adverse impact over the previously demonstrated additionality of the project activity since the previously conceived design of the project activity was not changed. As confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change when compared to the previously conceived project design (as outlined in all versions of the CDM PDD for the project activity). The higher value for the ex-ante determined parameter GWP_{CH_4} considered in the completed GS4GG TRF + PDD (when compared to ex-ante selected value for the same parameter in the CDM PDD) indeed results in higher estimation of GHG emission reductions to be achieved by the project activity within its considered GS crediting period.

The Applus+ Certification's validation has also confirmed that the occurred increase in the estimation of GHG emission reductions to be achieved by the GS project activity (when compared to the values presented in the registered CDM PDD of the project activity under the CDM) is indeed mainly due to the change of the value for the ex-ante determined parameter "Global Warming Potential for methane" (GWP_{CH_4}) from 25 tCO_2e/tCH_4 to 28 tCO_2e/tCH_4 in the completed GS4GG TRF + PDD (when compared to the registered CDM PDD for the 2nd 7-year crediting period (for the period from 01/01/2021 onwards)). The selection of the higher value of GWP_{CH_4} is indeed under conformance with applicable GS4GG rules.

Moreover, as also confirmed by the Applus+ Certification's validation team, the value used for the CO_2 emission factor for the National Electricity Grid of Brazil (the electricity grid the project activity is connected to) in the particular context of ex-ante estimation of emission reductions to be achieved by the project activity within its GS crediting period (value for operating margin emission factor ($EF_{grid,OM,y}$) selected as the value calculated by the CDM Designated National Authority DNA of Brazil for year 2022) is indeed more appropriate and up-to-date than the value for $EF_{grid,OM,y}$ previously considered for ex-ante estimates of emission reductions in the registered CDM PDD (value applicable for year 2018), with baseline emissions for generation of electricity (through utilization of collected landfill gas (LFG) as gaseous fuel for electricity

3. Ensure that continuity in the Project's monitoring activities is maintained and that PD is able to justify that no monitoring gaps exist (especially for SDG parameters) within the Monitoring Period(s). However, if gap(s) exist, the project shall justify that conservative approach(es) have been applied in line with section 3 of the Deviation Approval Requirements and Procedures (version 1.1) and overarching GS principles (as applicable).

The Applus+ Certification's validation team has confirmed there are no monitoring gaps applicable for the project activity.

4. Document the deviation request, its implications, and GS' decision in the appropriate section of the GS PDD and Monitoring Report (for the relevant MP).

As assessed by the Applus+ Certification's validation team, details about Deviation Request are sufficiently and transparently included in Section A.1.1. of the Transition Request Form + GS4GG PDD.

Furthermore, as also part of the response to the Deviation Request, the following Forward Action Request (FAR) was raised to Applus+ Certification (validating VVB):

FAR:

The validating VVB, through appropriate means at its disposal, validate the Project's compliance with the above-mentioned conditions and provides its opinion in the Validation Report.

As detailed above, the project developer has sufficiently and reasonably addressed all raised issues as a response to the Deviation Request with detailed information/details being sufficiently included in the latest version of the Transition Request Form + GS4GG PDD as confirmed by the Applus+ Certification's validation team.

Regarding the risk of discontinuation of the operation of the project activity without carbon revenues, the Applus+ Certification's validation team has assessed the revised information included in the Transition Request Form + GS4GG PDD along with a revised complementary financial analysis spreadsheet (file name "*Complementary Financial Analysis DEV277.xls*") provided by the project developer (which contains all the financial details for investments, costs and revenues of the project activity and that will also be submitted to the GS4GG along with the revised documents). Related documented evidence provided by the PD to support the information included in both the Transition Request Form + GS4GG PDD and the financial analysis spreadsheet were also made available and assessed by the Applus+ Certification's validation team. Assessed related documented evidence include the following:

- Purchase Invoices for related project's equipment/instruments
- Invoices of related tax and duties for related equipment purchase (including import taxes)
- Service orders

generation) being slightly affected.

- Invoices of hiring of contractors for implementing and commissioning the project's infrastructure
- Emission reductions purchase agreements (ERPAs) for the commercialization of Certified Emission Reductions (CERs) previously issued under the CDM
- Invoices/receipts for the commercialization of electricity generated by the project activity

As a conclusion, the Applus+ Certification's validation team verified that the provided evidence sufficiently confirms that the project activity remains financially unattractive even considering CER revenues obtained so far and therefore demand carbon revenues under GS4GG to achieve financial sustainability. As also confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change.

4. BASELINE SCENARIO

As confirmed by the Applus+ Certification's validation team, the baseline scenario for the proposed GS project activity is correctly identified in the Transition Request Form + GS4GG PDD as follows:

"Outcome of Step 1b: Three realistic and credible alternative scenarios to the project activity are in compliance with mandatory legislation and regulations. The alternatives scenarios remain the same:

- *Scenario 1 (LFG1 + E1);*
- *Scenario 2 (LFG1 + E3);*
- *Scenario 4 (LFG2 + E3);*

LFG1: The project activity implemented without being registered as a CDM project activity (i.e. capture and flaring or use of LFG);

LFG2: 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;"

(...)

Alternative Scenario 4

The alternative scenario 4 (atmospheric release of the landfill gas) is the continuation of the current practice, which is in compliance with all applicable regulations and policies; and was deemed the most plausible alternative to the project activity. As explained above, the alternative scenario 4 does not generate any revenues, but only expenditures.

E1: Electricity generation from LFG, undertaken without being registered as CDM project activity;

E3: Electricity generation in existing and/or new grid-connected power plants;"

The Applus+ Certification's validation team assessed the previously occurred identification of the baseline scenario for the proposed GS project activity (in the context of the previously performed validation of CTR Ecoparque Candeias Landfill Gas Project under the CDM.

As appropriately and sufficiently reported in the Transition Request Form + GS4GG PDD, the identification of the baseline scenario for the proposed GS project activity was previously performed by following applicable guidance of the CDM baseline and monitoring methodology ACM0001 (version 19.0) as outlined in the CDM PDD valid for the 2nd 7-year crediting period and assessed in the Validation Report of Renewal of 7-year crediting period under the CDM. While the baseline scenario for the proposed GS project activity has not changed since the project's validation for renewal of 7-year crediting period, no further assessment of the baseline scenario is required and therefore no related assessment is presented in this Validation Report for Transition to GS4GG.

As also confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change.

5. DEMONSTRATION OF ADDITIONALITY

The additionality of the project activity under the CDM was previously demonstrated and assessed (with related validation assessment by Designated Operational Entity (DOE) in charge of performing the CDM validation of the project activity. Assessment details about the demonstration of additionality of the project activity are indicated in the CDM Validation Report (document available online: <https://cdm.unfccc.int/Projects/DB/ERM-CVS1283351787.62/view?cp=1>).

As appropriately and sufficiently outlined in Section D.4 of the CDM PDD for the currently expired 1st 7-year crediting period of the project activity under the CDM (with such information being correctly also reported in Section B.5 of the Transition Request Form + GS4GG PDD for the proposed GS project activity), the assessment and demonstration of additionality for the GS project activity is performed by directly following applicable stepwise approach and guidance of the CDM methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0).

The Applus+ Certification's validation team was able to confirm that, while the applicable requirements of the CDM methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) are demonstrated as being sufficiently met, it is thus correctly assumed that the proposed project activity is additional.

Moreover, under conformance with the GS4GG Transition Request Form (version 1.0), it was not required to carry out any additional assessment for demonstration of additionality over and above what has been previously performed for registration of the project activity under the CDM. As the proposed GS project activity falls into a category that is deemed additional (Waste Handling & Disposal), the above-mentioned is thus applicable for the proposed GS project activity as per GS4GG rules.⁷

In summary, the previously performed assessment and demonstration of the additionality for the project activity under the CDM is confirmed by the Applus+ Certification's validation team as being correctly determined as per applicable CDM rules, guidance and procedures valid at the time of its CDM registration in year 2011.

⁷ The GS4GG Emissions Reduction & Sequestration Project Requirement states the following:

"Gold Standard CDM and JI Projects are not required to carry out additional assessment for demonstration of additionality over and above what has been done for registration/determination with the CDM EB/JISC unless the Project falls into a category that is deemed non-Additional in an applicable GS4GG Activity Requirement. In such cases the relevant Activity Requirement shall take precedence."

As confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change (for which adverse impact over the previously demonstrated additionality of the project activity would need to be assessed).

It is also important to note that there are no design changes to the project activity when compared to the PDD registered under the CDM and therefore there is no need to reassess the additionality of the project activity as per design change rules.

It is crucial to note that, under conformance with applicable rules for demonstration of additionality, carbon revenues (revenues from commercialization of CERs issued by project activity under the CDM) are not considered in the investment analysis previously performed as part of the demonstration of additionality for the project activity under the CDM. The CDM methodological tool "Investment Analysis" (to which the applied CDM methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" refers to) explicitly states the following:

"The use of investment analysis to demonstrate additionality is intended to assess whether or not a reasonable investor would or not decide to proceed with a particular project activity without the benefits of the CDM."

Therefore, Applus+ confirms that the occurred increase in the estimated GHG emissions reductions to be generated by the project activity within the GS4GG (when compared to the values presented in the registered PDD of the project activity under the CDM which occurred mainly due to an increase to the ex-ante determined parameter GWP_{CH_4} does not promote any adverse impact over the previously demonstrated additionality of the project activity since the previously conceived design of the project activity was not changed. As confirmed by the Applus+ Certification's validation team, the design of the project activity seeking transition to GS4GG does not include any design change when compared to the previously conceived project design (as outlined in all versions of the CDM PDD for the project activity). The higher value for the ex-ante determined parameter GWP_{CH_4} considered in the completed GS4GG TRF + PDD (when compared to ex-ante selected value for the same parameter in the CDM PDD) indeed results in higher estimation of GHG emission reductions to be achieved by the project activity within its considered GS crediting period.

6. DEMONSTRATION OF PRIOR CONSIDERATION

As confirmed by the Applus+ Certification's validation team, while the Ecoparque Candeias Landfill Gas Project is not a non-CER retroactive project neither a project undergoing Design Changes to include new technologies/measures, no demonstration of Prior Consideration (in the context of the project's validation under the GS4GG) is necessary. Section B.5.1 of the Transition Request Form + GS4GG PDD for the proposed GS project activity correctly includes the same information presented in the registered CDM PDD about Prior Consideration.

7. START DATE, CREDITING PERIOD TYPE AND DURATION

Project start date

As confirmed by the Applus+ Certification's validation team, the start date of the proposed GS project activity is correctly indicated as 29/09/2011 in the Transition Request Form + GS4GG PDD

for the proposed GS project activity. This date also represents the start date of the project activity (formerly titled “CTR Candeias Landfill Gas Project”) under the CDM.

Start and end date of the crediting period

The proposed GS project activity applies renewable crediting periods under GS4GG. The Applus+ Certification’s validation team confirmed that the crediting period start date and end date for the proposed GS project activity is correctly indicated in its Transitioning Request Form + GS4GG PDD by appropriately taking into account the previously selected and validated start of the crediting period for the project activity (formerly titled “CTR Candeias Landfill Gas Project”) under the CDM. Moreover, the Applus+ Certification’s validation team has confirmed that the applied crediting period is in accordance with paragraph 10.1.1 of the GS4GG GHG Emissions Reduction & Sequestration Product Requirement (which refers to the GS4GG Renewable Energy Activity Requirements, which indicates a maximum of 3 Certification Renewal Cycles, totaling 15 years)).

Applus+ Certification has also confirmed that the definition of the crediting period for the transition of the project activity to the GS4GG has been altered in order to address comments raised during the Preliminary Review phase and during the 1st round of comments of the Design Review phase.

Start date of crediting period under the GS4GG: 01/01/2021

End date of crediting period under GS4GG: 28/09/2023

It is relevant to note that, while the project activity has already issued CERs under the CDM for the period from 29/09/2011 to 31/12/2020, the proposed GS project activity will only issue GS VERs for the period from 01/01/2021 to 28/09/2023 within the 1st GS renewable crediting period.

8. **SAFEGUARDING PRINCIPLES ASSESSMENT**

The safeguarding principles regarded as relevant to the proposed GS project activity and their proposed mitigation measures (as outlined in the Transition Request Form + GS4GG PDD for the proposed GS project activity) are summarized and assessed below:

Assessment Questions/Requirements	Applus+ Certification’s validation team’s assessment of the proposed mitigation measures
1. Human Rights	
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights	As appropriately outlined in the Transition Request Form + GS4GG PDD, human rights principles in Brazil are protected by the legislation (as per Brazilian Federal Law No. 12.986 of 2014 ⁸). The Applus+ Certification’s validation team conducted a background research in a Brazilian web portal which contains legal procedural consultation (https://www.jusbrasil.com.br/) to check whether the project developer is involved in any prosecuting cases on human rights issues and no result was found involving Orizon Valorização de Resíduos S.A.

⁸ https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l12986.htm

2. The Project shall not discriminate with regards to participation and inclusion	As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
2. Gender Equality	
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women 2. Projects shall apply the principles of non-discrimination, equal treatment, and equal pay for equal work 3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks 4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)	As appropriately outlined in the Transition Request Form + GS4GG PDD, gender equality is protected by the Brazilian Constitution⁹. The Sustainability Report for year 2021 of the project developer Orizon Valorização de Resíduos S.A. (issued in 2022) is presented as evidence that the project concept and design (as indicated in the Transition Request Form + GS4GG PDD) covers the overall societal context from a gender perspective. The Applus+ Certification's validation team conducted background research on a Brazilian web portal which contains legal procedural consultation (https://www.jusbrasil.com.br/) to check whether the project developer is involved in prosecuting cases on gender issues and no result was found related gender issues involving Orizon Valorização de Resíduos S.A. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
3. Community Health, Safety & Working Conditions	
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community.	Potentially relevant. The Applus+ Certification's validation team reviewed the latest issued version of the Annual Sustainability Report of Orizon Valorização de Resíduos S.A.¹⁰. This report was confirmed as including the company's Occupational Health and Safety Assessment Series (OHSAS) Policy. Assessment of the report also allowed the Applus+ Certification's validation team to confirm that the project developer is committed to provide appropriate and comprehensive information, safety work procedures, instructions, and training to ensure all personnel (employees/collaborators) are fully aware of the organization's safety work practices and enable them to meet their performance objectives. Necessary health and safety principles, measures and requirements are also confirmed as being so far considered, taken and in place

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

¹⁰ The latest and previous versions of the Annual Sustainability Report of Orizon Valorização de Resíduos S.A. (*Relatório Anual de Sustentabilidade*) (Annual Sustainability report) prepared by Orizon Valorização de Resíduos S.A. are made publicly available online (<https://ri.orizonvr.com.br/sustentabilidade/relatorio-anual-de-sustentabilidade/>)

	respectively during the construction and operation phases of the proposed GS project activity. As also confirmed by the Applus+ Certification's Team, training sessions related to health, safety and working conditions have been regularly performed by employees/collaborators prior and during the operation of the proposed GS project activity. The number of employees/collaborators with competence development related training is also confirmed as being correctly considered in the Transition Request Form + GS4GG PDD for the proposed GS project activity as a parameter to be monitored ex-post. As also reasonably outlined in the in the Transition Request Form + GS4GG PDD for the proposed GS project activity, there are no perceived health risks to the local communities due to the proposed GS project activity. Based on its expertise and experience with similar project-based initiatives and also by taking into account involved technology and GHG abatement measures, it is the opinion of the Applus+ Certification's validation team that assuming that the implementation and operation of the proposed GS project activity as not posing health risks to the local communities is deemed reasonable and acceptable. The so far occurred partial/phased implementation of the proposed GS project activity and its start of operations does not promote any or additional health risks to the local communities (when compared to the situation at the Ecoparque Candeias landfill in the absence of the proposed GS project activity). More appropriate management of LFG resulted by the implementation and operation of the proposed GS project activity actually result in better air conditions in the region/area surrounding the landfill site, thus positively affecting and minimizing risks related to health conditions of local communities. Also based on its expertise and experience with similar project-based initiatives and also by taking into account involved technology and GHG abatement measures, it is the opinion of the Applus+ Certification's validation team that assuming that the implementation and operation of the proposed GS project activity potentially improves air conditions in the region/area surrounding the landfill site. As a conclusion, it is opinion of the Applus+ Certification's validation team that the health, safety and working conditions related measures proposed and incorporated by the project developer Orizon Valorização de Resíduos S.A. as part of the implementation and operation of the project activity are deemed sufficient to mitigate the risks associated to potential negative impact
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	related to this safeguarding principle/requirement in question.
4.1 Sites of Cultural and Historical Heritage	
Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture?	The Applus+ Certification's validation team has assessed the EIA Report for the construction of the Ecoparque Candeias landfill and confirmed that the project area does not include any sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
4.2 Forced Eviction and Displacement	
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	The Applus+ Certification's validation team has assessed the EIA Report for the construction of the Ecoparque Candeias landfill and confirmed that the landfill did not require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial). The same is applicable to the proposed GS project activity, as its infrastructure was built inside the area of the landfill. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
4.3 Land Tenure and Other Rights	
a. Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership? b. For Projects involving land use tenure, are there any uncertainties with regards to land tenure, access rights, usage rights or land ownership?	As appropriately outlined in the Transition Request Form + GS4GG PDD, the proposed GS project activity does not require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
4.4 Indigenous People	
Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	The Applus+ Certification's validation team has assessed the EIA Report for the construction of the Ecoparque Candeias landfill and confirmed that there were no indigenous people present in or within the area of influence of the proposed GS project activity and that

	and that the project is not located on land/territory claimed by indigenous people. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
5. Corruption	
The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	As confirmed by the Applus+ Certification's validation team, there is no governmental subsidy to the proposed GS Project activity. Therefore, the project does not involve and is not complicit in corruption nor is it not prone to entrusted power abuse or corruption. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
6.1 Labour Rights	
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions 2. Workers shall be able to establish and join labour organisations 3. Working agreements with all individual workers shall be documented and implemented and include: a) Working hours (must not exceed 48 hours per week on a regular basis), AND b) Duties and tasks, AND c) Remuneration (must include provision for payment of overtime), AND d) Modalities on health insurance, AND e) Modalities on termination of the contract with provision for voluntary resignation by employee, AND f) Provision for annual leave of not less than 10 days per	The Applus+ Certification's validation team has confirmed, based on its local knowledge and through assessment of related documentation and records, the appropriateness of the information presented in the Transition Request Form + GS4GG PDD for the proposed GS project activity regarding applicable Labour laws and how the project developer will comply with such laws and requirements along the project implementation and operation phases. As also appropriately outlined in the Transition Request Form + GS4GG PDD, all direct employees of the proposed GS project activity are protected by the Brazilian Federal set of labour regulations denominated Consolidation of Labour Laws (CLT) which represents the regulatory framework that regulates labour relations in Brazil. The principles and standards embodied in the International Labour Organization (ILO) fundamental conventions are also followed. It is imperative to note that, as a practice in Brazil, compliance with labor law and working conditions are subject to government regular inspection/surveillance. While the rights to establish and join labour organizations or unions are protected by Brazilian Labour Laws, the proposed GS project activity has to fully respects the employees' rights (in accordance with all labour related laws endorsed in Brazil) as also

year, not including sick and casual leave. 4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion) The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures	appropriately outlined in the Transition Request Form + GS4GG PDD. As also confirmed by the Applus+ Certification's validation team, in order to have the project developer Orizon Valorização de Resíduos S.A. meeting applicable related requirements from Brazilian Labour Law, working agreements between the company and individual workers employed by the proposed GS project activity and by the Ecoparque Candeias landfill are documented and implemented, including working hours, duties and tasks, remuneration, modalities on health insurance, modalities on termination of contract, provision for annual leave, etc. Based on its local country expertise, the Applus+ Certification's validation team is able to confirm that the employment model applied by the project developer Orizon Valorização de Resíduos S.A. with employees, or the proposed GS project activity is locally, nationally and culturally appropriate. It is also confirmed that Orizon Valorização de Resíduos S.A. does not employ and is not complicit in any form of child labour for the proposed GS project activity, the Ecoparque Candeias landfill and/or any other site or infrastructure operated by the company. As also confirmed by the Applus+ Certification's Team, training sessions related to health, safety and working conditions have been regularly performed by employees/collaborators prior and during the operation of the proposed GS project activity. The number of employees/collaborators with competence development related training is also confirmed as being correctly considered in the Transition Request Form + GS4GG PDD for the proposed GS project activity as a parameter to be monitored ex-post. As a conclusion, it is opinion of the Applus+ Certification's validation team that the health, safety and working conditions related measures proposed and incorporated by the project developer Orizon Valorização de Resíduos S.A. as part of the implementation and operation of the project activity are deemed sufficient to mitigate the risks associated to potential negative impact related to this safeguarding principle/requirement in question.
6.2 Negative Economic Consequences	
1. Does the project cause negative economic consequences during and after project implementation?	As confirmed by Applus+ Certification's validation team through interviews with representatives of the project developer Orizon Valorização de Resíduos S.A., the proposed GS Project activity supplies job opportunities to local people, thus representing an incentive to local economy. As an LFG collection and utilization project, there are no potential risks involved to the local economy.

	As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
7.1 Emissions	
Will the Project increase greenhouse gas emissions over the Baseline Scenario?	The proposed GS project activity will reduce emissions of methane and will also reduce emissions of CO₂ from the displacement of electricity generated by fossil fuel fired power plants (by electricity generated by the proposed GS project activity). As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
7.2 Emissions	
Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	Electricity generated by the proposed GS project activity will be supplied to the National Electricity Grid of Brazil. During periods when the electricity generation facility is not operational, the electricity demand of the proposed GS project activity will be supplied either from electricity from the National Electricity Grid of Brazil or from electricity generated by a backup captive off-grid generator fuelled by diesel. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
8.1 Impact on Natural Water Patterns/Flows	
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	Based on its expertise and experience with similar project-based initiatives and also by taking into account involved technology and GHG abatement measures (LFG collection and destruction/utilization), it is the opinion of the Applus+ Certification's validation team that the proposed GS project activity does not have any impacts on natural water patterns/flows. Moreover, as outlined in the Transition Request Form + GS4GG PDD, the operational license for the Ecoparque Candeias landfill includes parameters and conditions related to pre-existing pattern of watercourses, groundwater and/or the watershed(s) which have to be periodically monitored by the project developer Orizon Valorização de Resíduos S.A. As per the previously performed EIA for the construction of the Ecoparque Candeias landfill, the occurred implementation and operation of the landfill do not pose risk of ground-water contamination.

	As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
8.2 Erosion and/or Water Body Instability	
a. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? b. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?	As an LFG collection and utilization project, the proposed GS project activity does not have any erosion and/or water body instability impacts. The Applus+ Certification's validation team has assessed the EIA Report for the construction of the Ecoparque Candeias landfill, which confirmed that the landfill's area of influence is not susceptible to excessive erosion and/or water body instability. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.1 Landscape Modification and Soil	
Does the Project involve the use of land and soil for production of crops or other products?	As an LFG collection and utilization project, the proposed GS project activity does not have impacts on landscape modification and soil. The Applus+ Certification's validation team has assessed the EIA Report for the construction of the Ecoparque Candeias landfill, which confirmed that landscape and soil modifications occurring as a consequence of the implementation of the Ecoparque Candeias landfill would be limited to the area established for landfilling activities, with the effects on the surrounding areas being negligible. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.2 Vulnerability to Natural Disaster	
Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	As an LFG collection and utilization project, the proposed GS project activity does not have effects on natural disasters such as wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.3 Genetic Resources	

Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?	As an LFG collection and utilization project, the proposed GS project activity does not have any involvement with genetically modified organisms or GMOs. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.4 Release of pollutants	
Could the Project potentially result in the release of pollutants to the environment?	Aside from its large content of methane (CH₄), LFG generated by the decomposition of MSW might contain traces of air pollutants such as SO_x and NO_x which do not pose risk to the environment to their low concentrations. By combusting LFG generated at the Ecoparque Candeias landfill, the proposed GS Project activity thus reduces the amount of pollutants released to the atmosphere. Moreover, as confirmed the Applus+ Certification's validation team, the installation/operational license for the project's electricity generation infrastructure contains a requirement which establishes that emission of pollutants by the engine-generators need to be periodically monitored. Based on its expertise and experience with similar project-based initiatives and also by taking into account involved technology and GHG abatement measures (LFG collection and destruction/utilization), it is the opinion of the Applus+ Certification's validation team that the proposed GS project activity actually results in mitigation of emissions of air pollutants. As per the previously performed EIA for the construction of the Ecoparque Candeias landfill, the occurred implementation and operation of the landfill do not pose risk of relevant local air pollution within the region it is implemented. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle. Furthermore, the project is equipped with all systems and control to prevent any leakage of collected LFG directly into the atmosphere. In summary, the proposed GS project activity does not result in the release of pollutants to the environment. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.5 Hazardous and Non-Hazardous Waste	
Will the Project involve the manufacture, trade, release, and/ or use of hazardous	As an LFG collection and utilization project, the proposed GS project activity does not involve the manufacture,

and non-hazardous chemicals and/or materials?	trade, release, and/or use of hazardous and non-hazardous chemicals and/or materials. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.6 Pesticides and Fertilisers	
Will the Project involve the application of pesticides and/or fertilizers?	As an LFG collection and utilization project, the proposed GS project activity does not involve the application of pesticides and/or fertilizers. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.7 Harvesting of forests	
Will the Project involve the harvesting of forests?	The Applus+ Certification's validation team has confirmed, through interviews performed with representatives of the project developer Orizon Valorização de Resíduos S.A. and also through assessment of the installation/operational license for the project's electricity generation infrastructure, that the area where the project's infrastructure was installed did not have any forests. Moreover, the Applus+ Certification's validation team has assessed the EIA Report for the construction of the Ecoparque Candeias landfill, which demonstrates that occurred harvesting of small amount of vegetation (for the construction of the landfill) did not have any significant environmental impact in the area. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.8 Food	
Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	As an LFG collection and utilization project, the proposed GS project activity does modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.9 Animal husbandry	

Will the Project involve animal husbandry?	As an LFG collection and utilization project, the proposed GS project activity does not involve animal husbandry. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.10 High Conservation Value Areas and Critical Habitats	
Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	The Applus+ Certification's validation team has confirmed, through assessment of the EIA Report for the construction of the Ecoparque Candeias landfill, that the project activity and the Ecoparque Candeias landfill did not physically affect or alter High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.
9.11 Endangered Species	
a. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? Does the Project potentially impact other areas where endangered species may be present through transboundary affects?	Applus+ Certification's validation team has confirmed, through assessment of the EIA Report for the construction of the Ecoparque Candeias landfill, that there are no endangered species identified as potentially being present within the Project boundary (including those that may route through the area), and that the proposed GS Project activity does not potentially impact other areas where endangered species may be present through transboundary affects. As a conclusion, it is opinion of the Applus+ Certification's validation team that no mitigation measures are applicable for this safeguarding principle.

9. GENDER SENSITIVITY ASSESSMENT

As assessed by Applus+ Certification's validation team, the proposed GS project activity demonstrates overall compliance and alignment with GS4GG Gender equality requirements & guidelines (version 1.1) by following the presented steps:

9.1 Step 1: Basic context

The Sustainability Report for year 2021 of the company Orizon Valorização de Resíduos S.A. (issued in 2022) is presented as evidence that the project concept and design (as indicated in the Transition Request Form + GS4GG PDD) covers the overall societal context from a gender perspective.

Question 1: Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?

The Applus+ Certification's validation team was able to confirm the overall appropriateness of the related answer provided in the Transition Request Form + GS4GG PDD for the proposed GS project activity based on inputs received during conducted interviews with representatives of the Project Developer Orizon Valorização de Resíduos S.A. and during the on-site inspection and also through assessment of the latest Annual Sustainability Report (year 2021 issue) of the company Orizon Valorização de Resíduos S.A.

Question 2: Explain how the project aligns with existing country policies, strategies and best practices?

The Applus+ Certification's validation team conducted background gender research on a Brazilian web portal which contains legal procedural consultation (<https://www.jusbrasil.com.br/>) to check whether the Project Developer is involved in prosecuting cases on gender issues and no result was found related gender issues involving Orizon Valorização de Resíduos S.A.

The Applus+ Certification's validation team was able to confirm the overall appropriateness of the answer provided in the Transition Request Form + GS4GG PDD for the proposed GS project activity based on inputs received during conducted interviews with representatives of the Project Developer Orizon Valorização de Resíduos S.A. and during the on-site inspection and also through assessment of the latest Annual Sustainability Report (year 2021 issue) of Orizon Valorização de Resíduos S.A.

9.2 Step 2: Apply Gold Standard safeguarding principles

Question 3: Is an Expert required for the Gender Safeguarding Principles & Requirements?

The Applus+ Certification's validation team was able to confirm the overall appropriateness of the answer provided in the Transition Request Form + GS4GG PDD for the proposed GS project activity based on inputs received during conducted interviews with representatives of the Project Developer Orizon Valorização de Resíduos S.A. and during the on-site inspection and also through assessment of the latest Annual Sustainability Report (year 2021 issue) of Orizon Valorização de Resíduos S.A. As appropriately outlined in the Transition Request Form + GS4GG PDD, no Expert was required for addressing Gender Principles & Requirements.

9.3 Step 3: Conduct stakeholder consultation

Question 4: Is an Expert required to assist with Gender issues at the Stakeholder Consultation?

The Applus+ Certification's validation team confirmed the appropriateness of the answer provided in the Transition Request Form + GS4GG PDD during conducted interviews during the on-site inspection and also through assessment of the latest Annual Sustainability Report of Orizon Valorização de Resíduos S.A.

10. CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS

The contribution to sustainable development goals (SDG) of the proposed project GS activity are summarized and assessed below:

SDG GOAL	Assessment of methodological choices/approaches for estimating the SDG outcome
SDG 7 – Affordable and Clean Energy	Measurement Method: User should provide details of quantity of net electricity generation that is produced and fed into the grid and/or consumed internally as a result of the implementation of the project activity. Relevant SDG Target: 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix. Corresponding indicator: Total electricity produced: Renewable (annual average) - 211,570 MWh Baseline situation: The Applus+ Certification's validation team confirmed that, as correctly outlined in the Transition Request Form + GS4GG PDD, there would be infrastructure for promoting efficient collection and utilization of LFG in the absence of the project activity and thus no electricity would be generated by using LFG. Corresponding indicator: Total electricity produced in the baseline situation: Renewable (annual average) - 0 MWh
SDG 8 – Decent Work and Economic Growth	Measurement Method: The project shall disclose the following information i. Total number of employees by employment contract (permanent and temporary), by gender.

	ii. Total number of employees by employment type (full-time and part-time), by gender. Relevant SDG Target: 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value. Corresponding indicator: Total number of jobs: 17 jobs in 2021 22 jobs in 2022 20 jobs in 2023 Baseline situation: The Applus+ Certification's validation team confirmed that, as correctly outlined in the Transition Request Form + GS4GG PDD, since there would be infrastructure for promoting efficient collection and utilization of LFG in the absence of the project activity, no jobs would be created in the baseline situation Corresponding indicator: Total number of jobs (0)
SDG 13 – Climate Action	Measurement Method: To quantify total GHGs emission reductions (ERs) avoided or sequestered, the project shall use an applicable GHG quantification methodology. The project shall use the validated and/or verified number of emission reductions units as provided in registered project design document or monitoring report, as applicable. Relevant SDG Target: 13.2: Integrate climate change measures into national policies, strategies and planning Corresponding indicator: Emission reductions in tCO₂e (702,389 tCO₂e/year)

11. **STAKEHOLDER CONSULTATION**

The Applus+ Certification's validation team confirmed that, as required by applicable GS4GG requirements (including GS4GG Stakeholder Consultation and Engagement Requirements), the project developer Orizon Valorização de Resíduos S.A. has sufficiently identified, informed and established engagement process with male and female Stakeholders for the proposed GS project activity to be transitioned from the CDM to GS4GG in order to seek the provisions of inputs, suggestions, concerns and feedback about the occurred implementation and operation of the project activity.

As assessed by the the Applus+ Certification's validation team, 2-round Stakeholder consultation was performed under conformance with applicable GS4GG requirements:

- Conduction of a physical and virtual local stakeholders' consultation related to the implementation and operation of the GS project activity.
- Stakeholder feedback round (period from 01/10/2022 to 01/12/2022)

As also confirmed by the Applus+ Certification's validation team, satisfactorily identified local relevant stakeholder were initially invited for comments and positions with invitations being sent by e-mail. Relevant Stakeholders were sufficiently identified by Orizon Valorização de Resíduos S.A. as being personnel of the landfill site, local villagers and regional and national government officials with invitations being submitted in August 2022 and with related documented evidence being made available to the Applus+ Certification's validation team. Detailed information about the people invited to the meeting (including the categories which they represent, in accordance with "Gold Standard – Stakeholder Procedure"), as presented in the latest version of the Stakeholder Consultation Report, was assessed by the Applus+ Certification's validation team and sufficiently demonstrate that the relevant GS4GG requirements for the Local Stakeholder Consultation were considered by the project developer.

As also confirmed by the Applus+ Certification's validation team, the performed Local Stakeholder Consultation (LSC) audience/meeting took place at a meeting room located at the Ecoparque Candeias landfill on 30/09/2022. This is appropriately indicated in both the completed Transition Request Form + GS4GG PDD for the proposed GS project activity and the assessed Stakeholder Consultation Report.

Finally, the Applus+ Certification's validation team was also able to confirm (through assessment of both the invitation e-mail sent to local stakeholders and assessment of the presentation material shown during the performed LSC) that all parties involved in the implementation and operation of the proposed GS project activity were sufficiently presented/listed to the stakeholders. Moreover, design and operation details of the GS project activity were also presented (including technological considerations and related environmental, economic and social impacts) and discussed among participants of the LSC meeting under a deemed transparent manner with a non-technical summary of the proposed GS project activity (including information of the project design, applied technology, objectives, scale, duration and timeline + economic, social and environmental potential impacts + contributions to SDGs being made available).

The Applus+ Certification's validation team has also confirmed, through assessment of evaluation form which was distributed amongst the LSC participants, that no concerns about negative related to the implementation/operation of the project activity were raised by the participants of the organized LSC meeting. Details about a channel of future communication between the stakeholders and the Project Developer Orizon Valorização de Resíduos S.A. were included in the presentation material shown during the performed meeting LSC meeting and registered in Minutes. The Applus+ Certification's validation team visited the main office at the entrance of the Ecoparque Candeias landfill during the conducted on-site visit and confirmed that the grievance book was made available in such office and that it is accessible to any stakeholder to include their comments.

No feedback comments were received by the project developer Orizon Valorização de Resíduos S.A. Furthermore, the Applus+ Certification's validation team has assessed the Stakeholder Consultation Report completed by the project developer in order to document all steps taken to sufficiently meet the applicable requirements for the performed Stakeholder Consultation. The Stakeholder Consultation Report was confirmed as being previously submitted to GS4GG as part of preliminary review stage for the proposed GS project activity.

Moreover, the Applus+ Certification's validation team has confirmed that a feedback round was established for the period from 01/10/2022 to 01/12/2022, thus complying with the following requirement from the GS4GG "Stakeholder Consultation and Engagement Requirements":

"3.1.3 / The Stakeholder consultation shall comprise of a minimum of two rounds of consultations including one mandatory physical meeting and one stakeholder feedback round lasting for at least one month."

As also confirmed by the Applus+ Certification's validation team and appropriately indicated in Section E.1 of the Transition Request Form + GS4GG PDD, the weblink for the project's page under the GS website (which contained the initial version of the PDD submitted for the preliminary review stage) was included in the slide presentation show during the conducted physical meeting.

In summary, the Applus+ Certification's validation team was able to confirm that a Stakeholder Consultation for the proposed GS project activity was well and sufficiently organized and appropriately conducted by the project developer Orizon Valorização de Resíduos S.A. under conformance with applicable GS4GG requirements.

12. APPROVAL AND AUTHORISATION

The Applus+ Certification's validation team has confirmed that the proposed project GS activity does not require any approval and/or authorization by any national authority in the host country Brazil. As also confirmed by Applus+ Certification, the proposed GS project activity is not being implemented/registered under the Article 6 of the Paris Agreement. Finally, as also confirmed by Applus+ Certification, the previously included CDM PDD for the project activity (previously termed as "CTR Candeias Landfill Gas Project" (UNFCCC ref. 3958)), for which a Letter of Approval (LoA) was previously issued by the DNA of Brazil on 30/06/2011.

13. APPLICATION OF BASELINE AND MONITORING METHODOLOGY (IES)

13.1 Title and Reference

The Transition Request Form + GS4GG PDD for the proposed GS project activity correctly refers to the applicable version of the CDM baseline and monitoring methodology ACM0001 (version 19.0). As confirmed by the Applus+ Certification's validation team, version 19.0 represents the version of ACM0001 which the CDM PDD for the 2nd 7-year crediting period applies¹¹. Thus, the selection of ACM0001 (version 19.0) for completing Transition Request Form + GS4GG PDD is confirmed as being correct.

The Applus+ Certification's validation team has 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 GS project activity hosted in Brazil.

The following CDM methodological tools are also applied:

- "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0)
- "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 03.0)
- "Emissions from solid waste disposal sites" (version 08.0)

¹¹ As also confirmed by the Applus+ Certification's assessment team, the project activity (formerly titled "CTR Candeias Landfill Gas Project" (UNFCCC ref. 3958)) was previously registered under the CDM by applying ACM0001 (version 11).

- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)
- "Project emissions from flaring" (version 03.0)
- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)
- "Determining the baseline efficiency of thermal or electric energy generation systems" (version 02.0)
- "Project and leakage emissions from transportation of freight" (version 01.1.0)
- "Tool to calculate the emission factor for an electricity system" (version 07.0)
- "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1)
- "Positive lists of technologies" (version 01.0)

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 in Transition Request Form + GS4GG PDD with respect to the following:

- Meeting of applicability conditions/criteria (assessment details included in Section 14.2)
- Delineation of project boundary and selection of emission sources and Greenhouse gases (GHGs) (assessment details included below in Section 5)
- Baseline identification (assessment details included in Section 15)
- Algorithms and/or formulae used to determine emission reductions (assessment details included in Section 16)
- Selection and definition of values for ex-ante determined (fixed) parameters (assessment details included in Section 17.1)
- Monitoring plan (including selection and definition of parameters monitored ex-post and monitoring approaches for such parameters (assessment details included in Section 17.2)

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

The Transition Request Form + GS4GG PDD was completed under full conformance with the selected CDM baseline and monitoring methodology + applicable CDM methodological tools. 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 14.2 of the Transition Request Form + GS4GG PDD.

As confirmed by the Applus+ Certification's validation team, the applied CDM baseline and monitoring methodology and applicable CDM methodological tools represent the applicable version of such methodological sources at the time of the previous registration under the CDM.

13.2 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 the CDM PDD previously registered under the CDM, related assessment details are summarized in the table below:

Applicability criteria of ACM0001 (version 19.0)	Assessment by the validation team
<i>"The methodology is applicable under the following conditions:</i> <i>(a) Install a new LFG capture system in a new or existing SWDS where no LFG capture system was installed prior to the implementation of the proposed GS project activity; or</i> <i>(b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that:</i> <i>(i) The captured LFG was vented or flared and not used prior to the implementation of the proposed GS project activity; and</i> <i>(ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the proposed GS 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.</i> <i>(c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways:</i> <i>(i) Generating electricity;</i> <i>(ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or</i> <i>(iii) Supplying the LFG to consumers through a natural gas distribution network.</i> <i>(iv) Supplying compressed/liquefied LFG to consumers using trucks;</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 Transition Request Form + GS4GG PDD of a proposed project-based initiative promoting LFG collection and destruction/utilization. Applicability criteria (b-i) is correctly regarded as fulfilled, as the project design encompasses the investment expenditures into an existing passive LFG capture system to increase the recovery rate and include utilization of the captured LFG. While the proposed GS project activity encompasses flaring and utilization (as gaseous fuel for electricity generation) of collected LFG, condition (c.i) is thus also met. As also appropriately outlined and justified in the Transition Request Form + GS4GG PDD, no change in the current practice of landfilling of MSW at the Ecoparque Candeias landfill has occurred (and no changes are expected to occur) after the occurred implementation and starting of operations of the proposed GS project activity either. With or without the proposed GS project activity, no recycling of the organic fraction of the solid waste, neither aerobic treatment of solid waste, neither incineration of solid waste has occurred or are expected to occur at the Ecoparque Candeias landfill. Recycling of organic matter, aerobic treatment and incineration of solid waste is sufficiently demonstrated in the Transition Request Form + GS4GG PDD not to be common practice in

(v) <i>Supplying the LFG to consumers through a dedicated pipeline;</i> (d) <i>Do not reduce the amount of organic waste that would be recycled in the absence of the proposed GS project activity."</i>	Brazil and in the region of influence of the Ecoparque Candeias landfill. 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, interview was conducted with representative of the project proponent Orizon Valorização de Resíduos S.A. and it was confirmed that the design and/or operation of the Ecoparque Candeias 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 available in the Transition Request Form + GS4GG PDD 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 Transition Request Form + GS4GG PDD 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 GS 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 Ecoparque Candeias 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 GS project activity (baseline scenario). The prevailing waste management practices pertinent to organic solid waste recycling in the region attended by the Ecoparque Candeias landfill were also assessed by the Applus+ Certification's validation team. As verified, detailed information (including aspects, facts and statistics related to recycling of organic fraction of MSW in the region of influence of the Ecoparque Candeias landfill and in other regions of Brazil) are included in the related documented
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	evidence assessed by the Applus+ Certification's validation team which are appropriately referred in the Transition Request Form + GS4GG PDD. 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 GS 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 Transition Request Form + GS4GG PDD as well as other credible sources selected by the validation team). Assessed data and information sufficiently confirm the suitability and plausibility of all related argumentation and explanations which are made available in the Transition Request Form + GS4GG PDD. 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 GS project activity has not represented (and they are not expected to represent) any potential incentive or 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
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	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 Ecoparque Candeias landfill under the baseline scenario (absence of the proposed GS project activity). In summary, it is sufficiently demonstrated in the Transition Request Form + GS4GG PDD 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 LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and</i> (b) <i>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> (i) <i>For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and</i> (ii) <i>For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary</i> (c) <i>In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas."</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>	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 (free emission) of generated LFG into the atmosphere (with a minor share of LFG being combusted in the pre-project passive venting drains in the absence of the proposed GS project activity). The proposed GS project activity encompasses generation of electricity using collected LFG as gaseous fuel. Furthermore, no on-site heat requirements at the Ecoparque Candeias landfill are identified in the description of the project design, the project design does not encompass generation of heat using LFG as fuel either. Supply LFG for heat generation off-site is not considered either. Therefore, applicability conditions (b - i) is applicable and (b – ii) is not an applicable alternative. Applicability condition (c) and (d) are not applicable either, since the project design does not encompass supply of LFG to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline and the Ecoparque Candeias landfill does not represent a Greenfield SWDS.

<i>Non applicability condition:</i> <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 during the crediting in order to increase methane generation compared to the situation prior to the implementation of the proposed GS project activity.</i>	Condition (a) is not applicable as LFG captured by the proposed GS project activity is not expected to displace fossil fuels in a kiln, air heater 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 Ecoparque Candeias 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 GS project activity. As appropriately outlined in the Transition Request Form + GS4GG PDD, with or without the implementation of the proposed GS 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, interview was conducted with representative of the project proponent Orizon Valorização de Resíduos S.A. and it was confirmed that this project developer does not intend or plan to change the operation or design of the Ecoparque Candeias landfill site in any aspect. Moreover, as claimed by the project developer and described in the Transition Request Form + GS4GG PDD, the operational conditions and the previously conceived design of the Ecoparque Candeias 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: - Original construction and operational design of the Ecoparque Candeias landfill; - Technical specifications and requirements for the management of the Ecoparque Candeias landfill;
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	- 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 GS project activity.
<i>"The applicability conditions included in the tools referred to above also apply."</i>	As confirmed by the Applus+ Certification's validation team, demonstration of meeting of applicability conditions for the following methodological tools is sufficiently demonstrated in Section 3.1 of the Transition Request Form + GS4GG PDD: - "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) - "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 03.0) - "Emissions from solid waste disposal sites" (version 08.0) - "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) - "Project emissions from flaring" (version 03.0) - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) - "Determining the baseline efficiency of thermal or electric energy generation systems" (version 02.0) - "Project and leakage emissions from transportation of freight" (version 01.1.0) - "Tool to calculate the emission factor for an electricity system" (version 07.0) - "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1)

	- "Positive lists of technologies" (version 01.0) As confirmed by the Applus+ Certification's validation team, the applied 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.
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13.3 Methodology deviations

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

14. **ASSESSMENT OF GHG EMISSION REDUCTIONS CALCULATION AND ESTIMATION OF EMISSIONS REDUCTIONS**

As a result of the approach from the Project Developer Orizon Valorização de Resíduos S.A. on applying the CDM baseline and monitoring methodology ACM0001 (version 19.0) applied methodological tools for completing the Transition Request Form + GS4GG PDD, the appointed The Applus+ Certification's validation team confirmed the overall appropriateness and correctness of the application of related algorithms/formulae for determining emission reduction to be achieved by the proposed GS project activity vis-à-vis applicable requirements of such CDM methodology and methodological tools.

While as per ACM0001 (version 19.0), no leakage emissions are required to be accounted, emissions reductions are thus correctly defined (in tCO₂e) as the difference between baseline emissions (BE_y) and project emissions (PE_y), where assessment details for the approaches for the determination of BE_y and PE_y are presented below.

14.1 Baseline emissions

The Applus+ Certification's validation team assessed whether the methods and formulae applied to determine baseline emissions are correct and appropriate. The performed assessment encompassed checking whether applied methods and formulae (as defined in the monitoring plan as per both the previously registered PDD and reported in the Transition Request Form + GS4GG PDD) are under conformance with the applied CDM baseline and monitoring methodology ACM0001 (version 19.0) + methodological tools and are correctly reported. The correct selection and application of emission factor and default values (ex-ante determined/fixed parameters were also verified in the as per the Transition Request Form + GS4GG PDD).

The Applus+ Certification's verification team was able to verify that, as correctly established by ACM0001 (version 19.0) and applied methodological tools, baseline emissions (BE_y) are correctly reported in the Transition Request Form + GS4GG PDD as being calculated as follows:

As established by selected CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable CDM methodological tools and correctly outlined in Section B.6.1 of the Transition Request Form + GS4GG PDD, in the particular case of the proposed GS project activity baseline

emissions are directly and correctly determined as follows by taking into account the proposed GS 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):

$$BE_y = BE_{CH_4,y} + BE_{EC,y}$$

Where:

BE_y Baseline emissions in year y (in tCO₂e/yr)

$BE_{CH_4,y}$ Baseline emissions of methane from the SWDS in year y (in tCO₂e/yr)

$BE_{EC,y}$ Baseline emissions associated with electricity generation in year y (in tCO₂e/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 ($BE_{CH_4,y}$):

Baseline emissions of methane from the Ecoparque Candeias landfill ($BE_{CH_4,y}$) are correctly assumed as 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 GS 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).

$BE_{CH_4,y}$ is thus calculated (in tCO₂e/yr) as follows:

$$BE_{CH_4,y} = ((1 - OX_{top_layer}) * F_{CH_4,PJ,y} - F_{CH_4,BL,y}) * GWP_{CH_4}$$

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 B.6.2 the Transition Request Form + GS4GG PDD, 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 15.1.

$F_{CH_4,PJ,y}$ Amount of methane in the LFG which is flared and/or used in the project activity in year y (in tCH₄/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 15.1.

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

As assessed by the Applus+ Certification's validation team, during the current renewable crediting period of the proposed GS 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 enclosed flare and engine-generator set(s)) as follows:

$$F_{CH_4,PJ,y} = F_{CH_4,flared,y} + F_{CH_4,EL,y}$$

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:

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

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 Transition Request Form + GS4GG PDD, for each individual flare, $F_{CH_4, sent_flare, y}$ 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 enclosed flare. $F_{CH_4, sent_flare, y}$ is thus calculated as the mass flow of methane to the flare.
- CH_4 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 Transition Request Form + GS4GG PDD, $F_{CH_4, EL, y}$ 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.
- CH_4 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 ($Op_{j, h}$ = equipment not working), the accumulated hourly values are then summed to a yearly unit basis.

Assessment of the use of applicable guidance of the CDM methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" for determining $F_{CH_4, sent_flare, y}$ and $F_{CH_4, EL, y}$:

As confirmed by the Applus+ Certification's validation team, options A and B of the CDM methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) are correctly considered for the ex-post determination of $F_{CH_4, sent_flare, y}$ and $F_{CH_4, EL, y}$ as follows:

Option A (Volume flow in dry basis and volumetric fraction in dry basis) when the temperature of the gaseous stream is less than 60°C (333.15 K) at the flow measurement point)

$$F_{i, t} = V_{t, db} * v_{i, t, db} * \rho_{i, n}$$

Where:

$F_{i, t}$ Mass flow of greenhouse gas i in the gaseous stream in time interval t (in kg gas/h)

$V_{t, db}$ Volumetric flow of the gaseous stream (LFG) in time interval t on a dry basis at normal conditions (in m³ dry gas/h). Further related assessment details are included in Section 15.2.

$v_{i, t, db}$ Volumetric fraction of greenhouse gas i in the gaseous stream (LFG) in time interval t on a dry basis (in m³ gas /m³ dry gas). $v_{i, t, db}$ is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further related assessment details for monitoring of $v_{i, t, db}$ ex-post are included in Section 15.2.

$\rho_{i, t}$ Density of methane in the gaseous stream at normal conditions (in kg gas i /m³ gas i). Parameter $\rho_{i, t}$ will be determined as follows:

$$\rho_{i, t} = P_t * MM_i / R_u * T_t$$

Where:

- P_t Absolute pressure of the gaseous stream in time interval t (in Pa). P_t is correctly indicated in the Transition Request FORM + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further assessment details for the ex-post determination/monitoring of P_t ex-post are included in Section 15.2.
- T_t Temperature of the gaseous stream in time interval t (in K). T_t is correctly indicated in the Transition Request FORM + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further assessment details for the ex-post determination/monitoring of T_t ex-post are included in Section 15.2.
- MM_i Molecular mass of greenhouse gas i (in kg/kmol). MM_i is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-ante determined as 16.04 kg/kmol. Further related assessment details are included in Section 15.1.
- R_u Universal ideal gases constant (in Pa.m³/kmol.K). R_u is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-ante determined as 8,314 Pa.m³/kmol.K. Further related assessment details are included in Section 15.1.

In case it is not possible to demonstrated that the gaseous stream is dry, then the flow measurement should be assumed to be on a wet basis and the option B should be applied instead as follows:

Option B (Volume flow in wet basis and volumetric fraction in dry basis) when the temperature of the gaseous stream is higher than 60°C (333.15 K) at the flow measurement point)

$$V_{t,db} = V_{t,wb} / (1 + v_{H2O,t,db})$$

Where:

$V_{t,db}$ Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h). $V_{t,db}$ is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further assessment details for the ex-post determination/monitoring of $V_{t,db}$ ex-post are included in Section 15.2.

$V_{t,wb}$ Volumetric flow of the gaseous stream in time interval t on a wet basis (m^3 wet gas/h). $V_{t,wb}$ is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further assessment details for the ex-post determination/monitoring of $V_{t,wb}$ ex-post are included in Section 15.2.

$V_{H_2O,t,db}$ Volumetric fraction of H_2O in the gaseous stream in time interval t on a dry basis ($m^3 H_2O/m^3$ dry gas). Calculated as follows:

$$V_{H_2O,t,db} = m_{H_2O,t,db} * MM_{t,db} / MM_{H_2O}$$

Where:

$MM_{t,db}$ Molecular mass of the gaseous stream in time interval t on a dry basis (kg dry gas/kmol dry gas).

MM_{H_2O} Molecular mass of H_2O (kg H_2O /kmol H_2O). MM_{H_2O} is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-ante determined as 18.0152 kg/kmol. Further related assessment details are included in Section 15.1.

$m_{H_2O,t,db}$ Absolute humidity in the gaseous stream in time interval t on a dry basis (kg H_2O /kg dry gas). The absolute humidity of the gaseous stream ($m_{H_2O,t,db}$) will be determined using Option 2 (simplified calculation without measurement of the moisture content):

$$m_{H_2O,t,db,Sat} = p_{H_2O,t,Sat} * MM_{H_2O} / (P_t - p_{H_2O,t,Sat}) * MM_{t,db}$$

Where:

$p_{H_2O,t,Sat}$ Saturation pressure of H_2O at temperature T_t in time interval t (Pa). $p_{H_2O,t,Sat}$ is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-ante determined as 101,325 Pa. Further related assessment details are included in Section 15.1.

T_t Temperature of the gaseous stream in time interval t (K). T_t is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further assessment details for the ex-post determination/monitoring of T_t ex-post are included in Section 15.2.

P_t Absolute pressure of the gaseous stream in time interval t (Pa). P_t is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further assessment details for the ex-post determination/monitoring of P_t ex-post are included in Section 15.2.

MM_{H_2O} Molecular mass of H_2O (kg H_2O /kmol H_2O). MM_{H_2O} is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-ante determined as 18.0152 kg/kmol.

Further related assessment details are included in Section 15.1.

$MM_{t,db}$ Molecular mass of the gaseous stream in a time interval t on a dry basis (kg dry gas/kmol dry gas). Calculated as follows:

$$MM_{t,db} = \sum (v_{k,t,db} * MM_k)$$

Where:

$v_{k,t,db}$ Volumetric fraction of gas k in the gaseous stream in time interval t on a dry basis (m^3 gas k/m^3 dry gas)

MM_k Molecular mass of gas k (kg/kmol). MM_k is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-ante determined as 28.01 kg/kmol. Further related assessment details are included in Section 15.1.

k All gases, except H_2O , are contained in the gaseous stream (e.g. N_2 and CH_4). The determination of the molecular mass of the gaseous stream ($MM_{t,db}$) requires measuring the volumetric fraction of all gases (k) in the gaseous stream. However, as a simplification, in the case of the project activity, the volumetric fraction of the methane

that is a greenhouse gas and considered in the emission reduction calculation in the underlying methodology must be monitored and the difference to 100% may be considered as pure nitrogen. Simplification is not acceptable if it is differently specified in the underlying methodology.

Assessment of the determination of $PE_{\text{flare},y}$ (in the context of the determination of $F_{\text{CH}_4,\text{flared},y}$):

As correctly outlined in the Transition Request Form + GS4GG PDD, $PE_{\text{flare},y}$ is to be determined using the methodological approaches of the latest version of the CDM methodological tool "Project emissions from flaring" (version 03.0). Project emissions from flaring the residual gas ($PE_{\text{flare},y}$) are determined based the flare efficiency ($\eta_{\text{flare},m}$) and the mass flow of methane to the flare ($F_{\text{CH}_4,\text{RG},m}$). As correctly described in the Transition Request Form + GS4GG PDD, the 3-step approach of the tool for determining project emissions from flaring will be used as follows:

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 ($F_{\text{CH}_4,m}$). Furthermore, $F_{\text{CH}_4,m}$ shall be used to determine the mass of methane in kilograms directed to the flare in minute m ($F_{\text{CH}_4,\text{RG},m}$).

As appropriately outlined in the Transition Request Form + GS4GG PDD, 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:

As outlined in the Transition Request Form + GS4GG PDD, the flare efficiency will be determined primarily by using Option B.2. of the CDM methodological tool "Project emissions from flaring". Nonetheless, in accordance with the tool, provisions from Option A (default value) are also included in the Transition Request Form + GS4GG PDD as a backup approach in case there are missing data for relevant monitoring parameters in each monitoring period.

Option A: Application of default value:

The flare efficiency for each minute m ($\eta_{\text{flare},m}$) is 90% when the following two operational conditions/requirements are simultaneously met (in order to demonstrate that the flare is operating as per the recommendations and requirements set by the equipment manufacturer for the minute m in question):

(1) The temperature of the exhaust gases of the flare (monitoring parameter $T_{\text{EG},m}$) and the flow rate of LFG to the flare (monitoring parameter $F_{\text{RG},m}$) is within the manufacturer's specification/requirements for the flare (monitoring parameter $\text{SPEC}_{\text{flare}}$) in minute m ;

(2) Flame is detected in the flare in minute m (monitoring parameter Flame_m).

If for the minute m , conditions (1) and/or (2) are not met, $\eta_{\text{flare},m}$ is set as 0% for the minute in question.

Option B: Measured flare efficiency:

The flare efficiency in the minute m is determined as a value which is calculated based on performed related measurements ($\eta_{\text{flare},m} = \eta_{\text{flare,calc},m}$) when the following conditions are simultaneously met (in order to demonstrate that the flare is operating):

- (1) The temperature of the exhaust gas of the flare (monitoring parameter $T_{EG,m}$) and the flow rate of LFG to the flare (monitoring parameter $F_{RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m ;
- (2) Flame is detected in the flare in minute m (monitoring parameter $Flame_m$).
- (3) Otherwise $\eta_{flare,m}$ is set as 0% for the minute in question.

Option B.2: Measured flare efficiency in each minute:

The efficiency of combustion in the flare in minute m is determined as follows:

$$\eta_{flare,calc,y} = 1 - (F_{CH4,EG,m} / F_{CH4,RG,m})$$

Where:

$\eta_{flare,calc,y}$	Flare efficiency in the minute m
$F_{CH4,RG,m}$	Mass flow of methane in the residual gas on a dry basis at reference conditions in minute m (in kg)
$F_{CH4,EG,m}$	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in minute m (in kg). $F_{CH4,EG,m}$ is to be measured according to an appropriate national or international standard. $F_{CH4,RG,m}$ is calculated according to Step 1 and consists of the sum of methane flow in the minutes m that make up the time period t .

Step 2.1: Determine the methane mass flow in the exhaust gas on a dry basis

$$F_{CH4,EG,m} = V_{EG,m} * f_{CH4,EG,m} * 10^{-6}$$

Where:

$V_{EG,m}$	Volumetric flow of the exhaust gas of the flare on a dry basis at reference conditions in the minute m (kg)
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$f_{CH_4,EG,m}$ Concentration of methane in the exhaust gas of the flare on a dry basis at reference conditions in minute m (mg/m^3)

Step 2.2: Determine the volumetric flow of the exhaust gas ($V_{EG,m}$)

$$V_{EG,m} = Q_{EG,m} * M_{RG,m}$$

Where:

$Q_{EG,m}$ Volume of the exhaust gas on a dry basis at reference conditions per kilogram of residual gas on a dry basis at reference conditions in minute m (m^3 exhaust gas/kg residual gas)

$M_{RG,m}$ Mass flow of the residual gas on a dry basis at reference conditions in the minute m (kg). $M_{RG,m}$ is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-post determined/monitored along the current crediting period of the proposed GS project activity. Further assessment details for the ex-post determination/monitoring of $M_{RG,m}$ ex-post are included in Section 15.2.

Step 2.3: Determine the mass flow of the residual gas ($M_{RG,m}$)

$$M_{RG,m} = \rho_{RG,ref,m} * V_{RG,m}$$

Where:

$\rho_{RG,ref,m}$ Density of the residual gas at reference conditions in the minute m (kg/m^3).

$V_{RG,m}$ Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m (m^3). Further assessment details for the ex-post determination/monitoring of $V_{RG,m}$ ex-post are included in Section 15.2.

Step 2.4: Determine the volume of the exhaust gas on a dry basis at reference conditions per kilogram of residual gas ($Q_{EG,m}$)

$$Q_{EG,m} = Q_{CO_2,EG,m} + Q_{O_2,EG,m} + Q_{N_2,EG,m}$$

Where:

$Q_{CO_2,EG,m}$ Quantity of CO_2 volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m^3/kg residual gas) calculated as follows:

$$Q_{CO_2,EG,m} = \frac{MF_{C,RG,m}}{AM_C} \times VM_{ref}$$

Where:

$MF_{C,RG,m}$ Mass fraction of carbon in the residual gas in the minute m

AM_C Atomic mass of carbon ($kg/kmol$)

VM_{ref} Volume of one mole of any ideal gas at reference temperature and pressure ($m^3/kmol$)

$Q_{O_2,EG,m}$ Quantity of O_2 volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m^3/kg residual gas), calculated as follows:

$$Q_{O_2,EG,m} = n_{O_2,EG,m} \times VM_{ref}$$

Where:

$n_{O_2,EG,m}$ Quantity of O_2 (moles) in the exhaust gas per kg of residual gas flared on a dry basis at reference conditions in minute m ($kmol/kg$ residual gas)

VM_{ref} Volume of one mole of any ideal gas at reference temperature and pressure ($m^3/kmol$)

$Q_{N_2,EG,m}$ Quantity of N_2 volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m^3/kg residual gas) calculated as follows:

$$Q_{N_2,EG,m} = VM_{ref} \times \left\{ \frac{MF_{N,RG,m}}{2 \times AM_N} + \left(\frac{1 - v_{O_2,air}}{v_{O_2,air}} \right) \times [F_{O_2,RG,m} + n_{O_2,EG,m}] \right\}$$

Where:

VM_{ref} Volume of one mole of any ideal gas at reference temperature and pressure ($m^3/kmol$)

$MF_{N,RG,m}$ Mass fraction of nitrogen in the residual gas in the minute m

AM_N Atomic mass of nitrogen (kg/kmol)

$v_{O_2,air}$ Volumetric fraction of O_2 in air

$F_{O_2,RG,m}$ Stoichiometric quantity of moles of O_2 required for a complete oxidation of one kg residual gas in minute m (kmol/kg residual gas)

$n_{O_2,EG,m}$ Quantity of O_2 (moles) in the exhaust gas per kg of residual gas flared on a dry basis at reference conditions in minute m (kmol/kg residual gas)

Where:

$$n_{O_2,EG,m} = \frac{v_{O_2,EG,m}}{\left(1 - (v_{O_2,EG,m}/v_{O_2,air})\right)} \times \left[\frac{MF_{C,RG,m}}{AM_C} + \frac{MF_{N,RG,m}}{2 \times AM_N} + \left(\frac{1 - v_{O_2,air}}{v_{O_2,air}} \right) \times F_{O_2,RG,m} \right]$$

Where:

$n_{O_2,EG,m}$ O_2 (moles) in the exhaust gas per kg of residual gas flared on a dry basis at reference conditions in minute m (kmol/kg residual gas)

$v_{O_2,EG,m}$ Volumetric fraction of O_2 in the exhaust gas on a dry basis at reference conditions in the minute m . Further assessment details for the ex-post determination/monitoring of $v_{O_2,EG,m}$ ex-post are included in Section 15.2.

$v_{O_2,air}$ Volumetric fraction of O_2 in the air

$MF_{C,RG,m}$ Mass fraction of carbon in the residual gas in the minute m

AM_C Atomic mass of carbon (kg/kmol)

$MF_{N,RG,m}$ Mass fraction of nitrogen in the residual gas in the minute m

AM_N Atomic mass of nitrogen (kg/kmol)

$F_{O_2,G,m}$ Stoichiometric quantity of moles of O_2 required for a complete oxidation of one kg residual gas in minute m (kmol/kg residual gas) calculated as follows:

$$F_{O_2,RG,m} = \frac{MF_{C,RG,m}}{AM_C} + \frac{MF_{H,RG,m}}{4AM_H} - \frac{MF_{O,RG,m}}{2AM_O}$$

Where:

$MF_{C,RG,m}$ Mass fraction of carbon in the residual gas in the minute m

AM_C Atomic mass of carbon (kg/kmol)

$MF_{O,RG,m}$ Mass fraction of oxygen in the residual gas in the minute m

AM_O Atomic mass of oxygen (kg/kmol)

$MF_{H,RG,m}$ Mass fraction of hydrogen in the residual gas in the minute m

AM_H Atomic mass of hydrogen (kg/kmol)

With $MF_{j,RG,m}$ calculated as follows:

$$MF_{j,RG,m} = \frac{\sum_i V_{i,RG,m} \times AM_j \times NA_{j,i}}{MM_{RG,m}}$$

Where:

$MF_{j,RG,m}$ Mass fraction of element j in the residual gas in the minute m

$V_{i,RG,m}$ Volumetric fraction of component i in the residual gas on a dry basis in the minute m . Further assessment details for the ex-post determination/monitoring of $V_{i,RG,m}$ ex-post are included in Section 15.2.

AM_j Atomic mass of element j (kg/kmol)

$NA_{j,i}$ Number of atoms of element j in component i

$MM_{RG,m}$ Molecular mass of the residual gas in minute m (kg/kmol)

j elements C, O, H and N

i Component of residual gas. If Option (a) is selected to measure the volumetric fraction, then $i = \text{CH}_4, \text{CO}, \text{CO}_2, \text{O}_2, \text{H}_2, \text{H}_2\text{S}, \text{NH}_3, \text{N}_2$ or if Option (b) is selected then $i = \text{CH}_4$ and N_2

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 ($PE_{\text{flare},y}$) are calculated as the sum of emissions for each minute m in year y as follows:

$$PE_{\text{flare},y} = GWP_{\text{CH}_4} * \sum^{525,600} F_{\text{CH}_4,\text{RG},m} * (1 - \eta_{\text{flare},m}) * 10^{-3}$$

Where:

$PE_{\text{flare},y}$	Project emissions from flaring of the residual gas in year y (in tCO ₂ e)
GWP_{CH_4}	Global warming potential of methane valid for the commitment period (in tCO ₂ e/tCH ₄). GWP_{CH_4} is correctly ex-ante determined as 28 tCO ₂ e/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 15.1.
$F_{\text{CH}_4,\text{RG},m}$	Mass flow of methane in the residual gas in the minute m (in kg)
$\eta_{\text{flare},m}$	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 Transition Request Form + GS4GG PDD.

Assessment of the ex-ante determination of $F_{\text{CH}_4,\text{PJ},y}$

As established by ACM0001 (version 19.0), the *ex-ante* estimation of emission reductions for the whole current crediting period of the proposed GS project activity are correctly calculated and reported in both the Transition Request Form + GS4GG PDD 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 08.0). 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 GS project activity within its current crediting period, the amount of methane in the LFG which is flared and/or used in the project activity in year y ($F_{\text{CH}_4,\text{PJ},y}$) is determined (in tCO₂e) as follows:

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

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 08.0) 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 0.85 (85%), which corresponds to suitable value obtained from credible technical literature and by also taking into consideration the design and operational characteristics/aspects of the Ecoparque Candeias landfill plus the currently considered general construction as well as design aspects for the project's LFG collection network during its current crediting period. Further related assessment details are included in Section 15.1.

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 GS 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:

Cases for the determination of $F_{CH_4, BL, Y}$ as per ACM0001 (version 19.0):

Situation at the start of the proposed GS 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 and correctly indicated in Section B.6.2 of the Transition Request Form + GS4GG PDD, from the time the Ecoparque Candeias 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 Ecoparque Candeias 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 Orizon Valorização de Resíduos S.A., 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).

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 GS project activity, as appropriately outlined in the Transition Request Form + GS4GG PDD, 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 Transition Request Form + GS4GG PDD:

"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 non-existence of "LFG capture and destruction system" at the Ecoparque Candeias 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 Transition Request Form + GS4GG PDD applying ACM0001 (version 19.0), it is correctly assumed that, under the baseline scenario (absence of the proposed GS project activity), destruction of small share of generated methane at the Ecoparque Candeias landfill would occur through combustion (passive system). By taking into consideration construction and design aspects of the Ecoparque Candeias landfill, the Applus+ Certification's validation team has confirmed that combustion of LFG has occurred (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 GS project activity. Thus, it is reasonably assumed that, under the baseline scenario, the pre-project existent set of LFG venting drains (passive system) 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 small share

of LFG being combusted through an existing passive LFG capture system vented.

By correctly taking into account the definition of "*LFG capture system*" and "*existing LFG capture system*" as per ACM0001 (version 19.0), it is thus also correctly assumed that there has been an "*existing LFG capture system*" at the Ecoparque Candeias landfill prior to the occurred implementation and starting of operations of the proposed GS project activity.

Therefore, like occurred for Case 2 and Case 4, Case 3 (*Existing LFG capture and destruction system?* = Yes) is thus correctly demonstrated to be an applicable case for the project activity either¹².

The following disclaimer is thus confirmed to be appropriately added in the Transition Request Form + GS4GG PDD:

"Existing LFG capture and destruction system: YES".

Thus, the only remaining case applicable for the proposed GS 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 Ecoparque Candeias landfill prior to the occurred implementation and starting of operations of the proposed GS project activity (which corresponds to the identified baseline scenario for the proposed GS project activity):

As confirmed by the Applus+ Certification's validation team, it is assumed that under the absence of the proposed GS project activity (baseline scenario) and during the whole period encompassed by the period from year 2007 (when the Ecoparque Candeias landfill started its operations) to nowadays, LFG would remain being partially combusted through existing pre-project-registration/implementation conventional passive LFG venting/combusting system.

Based on its sectoral expertise, the Applus+ Certification's validation team also confirms that the conventional passive LFG venting/combusting system 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).

¹² 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 proposed GS 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 Transition Request Form + GS4GG PDD, Case 3 is correctly selected as the only applicable case for the determination of $F_{CH_4,BL,y}$.

Assessment of application of methodological guidance valid for Case 3: As correctly outlined in the Transition Request Form + GS4GG PDD, by directly applying the applicable guidance of ACM0001 (version 19.0) for Case 3 in the particular context of the Ecoparque Candeias landfill under the baseline scenario (absence of the proposed GS project activity), $F_{CH_4,BL,y}$ is correctly and directly determined (in tCH_4) as follows:

$$F_{CH_4,BL,y} = F_{CH_4,BL,sys,y}$$

As confirmed by Applus+ validation team through assessing the CDM Validation Report for renewal of the 7-year crediting period of the CDM project activity "CTR Candeias Landfill Gas Project" (version 02.0) ^{/17/}: there is no monitored or historical data on the amount of methane that was captured in the year prior to the implementation of the project situation, then:

$$F_{CH_4,BL,sys,y} = 20\% * F_{CH_4,PJ,y}; \text{ or}$$

$$F_{CH_4,BL,y} = 20\% * F_{CH_4,PJ,y}$$

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

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 GS project activity ($BE_{EC,y}$), are correctly presented in the Transition Request Form + GS4GG PDD as being determined as follows:

$$BE_{EC,grid,y} = EC_{BL,k,y} * EF_{EL,grid,y} * (1 + TD_{Lgrid,y})$$

Where:

$EC_{BL,k,y}$ Amount of electricity generated using LFG by the project activity in year y (in MWh). $EC_{BL,k,y}$ is correctly indicated in the Transition Request Form + GS4GG PDD 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 current crediting period of the proposed GS project activity. Further related assessment details for monitoring of $EC_{BL,k,y}$ ex-post is included in Section 15.2.

In the particular context of the ex-ante estimation of emission reductions to be achieved by the proposed GS project activity within the current crediting period, annual values for $EC_{BL,k,y}$ are estimated as 189,875 MWh, 213,609 MWh and 176,219 MWh during the years of 2021, 2022 and 2023 (from 01/01/2023 to 28/09/2023), respectively.

$EF_{EL,grid,y}$ CO₂ emission factor of the Brazilian grid electricity during the year y (in tCO₂/MWh). $EF_{EL,grid,y}$ is to be determined as the combined margin (CM) emission factor ($EF_{grid,CM,y}$) for which assessment details are included below. In the particular context of the ex-ante estimation of emission reductions to be achieved by the proposed GS project activity within the current crediting period $EF_{EL,grid,y}$ is estimated as 0.1220 tCO₂/MWh along the whole current crediting period of the proposed GS project activity.

TDL_y Average technical transmission and distribution losses for providing electricity to the grid and/or for grid-sourced electricity consumed by the project activity.. TDL_y is correctly indicated in the Transition Request Form + GS4GG PDD as being ex-post determined/monitored as per the provisions of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) along the 1st GS crediting period of the GS project activity. In the particular context of the ex-ante estimation of emission reductions to be achieved by the GS project activity within the 1st GS crediting period, the value for TDL_y is assumed as being 20%. This value represents the applicable default value as per Option C.III of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0).

As reported in the Transition Request Form + GS4GG PDD, the ex-ante estimated value for BE_y is correctly determined as follows:

Year	$BE_{CH_4,y}$ (tCO ₂ e)	$BE_{EC,y}$ (tCO ₂ e)	BE_y (tCO ₂ e)
2021	660,217	27.789	687,982
2022	680,073	31.262	711,312
01/01/2023 to 28/09/2023	499,479	25.790	525,252
Total	1,839,768	84.841	1.924.547

14.2 Project emissions

As correctly outlined in the Transition Request Form + GS4GG PDD for the proposed GS project activity, project emissions are determined as follows:

$$PE_y = PE_{EC1,y} + PE_{EC2,y}$$

Where:

$PE_{EC1,y}$ Emissions from consumption of electricity due to the project activity in year y

$PE_{EC2,y}$ Emissions from consumption of fossil fuels due to the project activity in year y

Emissions from consumption of electricity due to the project activity in year y :

Project emissions due to the consumption of grid-sourced electricity by the project activity ($PE_{EC1,y}$) are correctly determined by following applicable guidance of the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” as follows:

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

Where:

$EC_{PJ1,y}$ Quantity of electricity consumed from the grid by the project activity in year y . Further related assessment details are included in Section 15.2. The following monthly values for consumption of grid-sourced electricity ($EC_{PJ1,y}$) within the considered crediting period are correctly estimated as follows:

Month	Electricity consumption
2021	152
2022	152
01/01/2023 to 28/09/2023	113
Total	417

TDL_y Average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site. As indicated in Transition Request Form + GS4GG PDD, TDL_y is determined as 20%. Further related assessment details are included in Section 15.1.

$EF_{grid,CM,y}$ Brazilian grid emission factor. As indicated in the GS4GG, $EF_{grid,CM,y}$ is determined by following the applicable guidance of the methodological “Tool to calculate the emission factor for an electricity system” as follows:

$$EF_{EL,j,y} = EF_{grid,CM,y}$$

Where:

$EF_{grid,CM,y}$ CO₂ emission factor of the Brazilian grid electricity during the year y . Further related assessment details are included in Section 15.2. As per the applied monitoring procedure and as also assessed in GS4GG, $EF_{grid,CM,y}$ is calculated as follows:

$$EF_{grid,CM,y} = W_{OM} * EF_{grid,OM,y} + W_{BM} * EF_{grid,BM,y}$$

Where:

W_{OM}	Weighting of operating margin emissions factor. W_{OM} is ex-ante determined as 0.25%.
W_{BM}	Weighting of operating margin emissions factor. W_{BM} is ex-ante determined as 0.75%.
$EF_{grid,OM,y}$	Operating margin CO ₂ emission factor for the project activity system in year y . Further related assessment details are included in Section 15.2. The selected value for $EF_{grid,OM}$ for year 2022 (0.4068 tCO ₂ /MWh) correctly represents the official average value for the year (vintage) of 2022 as calculated and made public available by the DNA of Brazil.
$EF_{grid,BM,y}$	Build margin CO ₂ emission factor for the project activity system in year y . As per the GS4GG, the selected value for $EF_{grid,BM}$ for year 2022 (0.0270 tCO ₂ /MWh) correctly represents the official average value for the year (vintage) of 2022 as calculated and made public available by the DNA of Brazil. Further related assessment details are included in Section 15.1.

As presented in the emission reduction calculation spreadsheet which is also enclosed to the GS4GG, $EF_{grid,CM,y}$ is thus calculated as 0.1220 tCO₂/MWh.

The ex-ante calculated value for $PE_{EC1,y}$ is correctly determined as 63 tCO₂ (rounded value).

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

Project emissions from electricity consumption from an off-grid captive power plant ($PE_{EC2,y}$) are correctly determined as follows:

$$PE_{EC2,y} = EC_{PJ2,y} * EF_{diesel_generator,y} * (1 + TDL_y)$$

Where:

$EC_{PJ2,y}$ Quantity of electricity consumed from diesel generator by the project activity during the year y . In the particular case, the only fossil fuel consumed by the project activity was diesel (for fueling the backup diesel generator). Further related assessment details are included in Section 15.2. The following estimation of diesel consumed by the project activity are correctly reported in the GS4GG and emission reduction calculation spreadsheet:

Month	$EC_{PJ2,y}$ (m ³)
2021	0
2022	0
01/01/2023 to 28/09/2023	0
Total	0

$EF_{\text{diesel_generator},y}$ Emission factor for the diesel generator in year y . $EF_{\text{diesel_generator},y}$ is determined by following the applicable guidance of the methodological "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion". As per the GS PDD: a conservative approach was adopted and option B2 of scenario B was chosen as: "The electricity consumption source is a project or leakage electricity consumption source". Therefore, the value used is 1.3 tCO₂/MWh.

The calculated value for $PE_{EC2,y}$ for the crediting period is correctly determined as 0 tCO₂.

Total project emissions are correctly calculated and reported as 63 tCO₂ (rounded value) and are correctly considered in the context of the emission reduction calculations.

14.3 Summary of ex-ante estimation of emission reductions

The Applus+ Certification's validation was able to confirm that annual ex-ante estimates of emission reductions to be achieved along its GS crediting period are correctly calculated and reported as the difference between estimated annual values for baseline emissions and estimated annual values for project emissions for each year encompassed by such crediting period.

Ex-ante estimates of emission reductions to be achieved by the proposed GS project activity within its crediting period are determined under full conformance with all applicable measurement, reporting and calculation requirements as per the monitoring plan of the Transition Request Form + GS4GG PDD for the proposed GS project activity, applied CDM monitoring and baseline methodology ACM0001 (version 19.0) + applicable CDM methodological tools. The Applus+ Certification's validation team confirms that annual average emission reductions to be achieved by the proposed GS project activity are correctly calculated and reported as 702,389 tCO₂e.

15. **MONITORING PLAN**

15.1 Ex ante determined parameters

As outlined in Section B.6.2 of the Transition Request Form + GS4GG PDD for the proposed GS project activity, 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 GS project activity within its crediting period and/or for the ex-post determination of baseline and/or project emissions for the proposed GS 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 to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 03.0)
- "Emissions from solid waste disposal sites" (version 08.0)
- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)
- "Project emissions from flaring" (version 03.0)
- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)
- "Determining the baseline efficiency of thermal or electric energy generation systems" (version 02.0)
- "Project and leakage emissions from transportation of freight" (version 01.1.0)
- "Tool to calculate the emission factor for an electricity system" (version 07.0)

Assessment details for parameters determined *ex-ante*:

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	As confirmed by the Applus+ Certification's validation team, the default value for OX_{top_layer} as per ACM0001 (version 19.0) is correctly selected and indicated in the Transition Request Form + GS4GG PDD. The selected value represents the same value previously selected and applied in the registered CDM PDD for the project activity, with such values being previously validated by CDM DOE. In summary, the parameter and its selected value is correctly reported and selected value is determined under consistency with the 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 ¹³	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). The selected value is in conformance with applicable rules/guidance from GS4GG applicable to the selection of Global Warming Potential for Greenhouse Gases considered in GS project activities. In summary, the parameter description and its selected value are correctly reported and selected value is determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s) + applicable GS4GG's guidance for selection of GWP values for GHGs.
Efficiency of the LFG capture system installed in the project activity (η_{PJ})	-	0.85	As confirmed by the Applus+ Certification's validation team, selected value reasonably corresponds to suitable value which is obtained from credible technical literature and by also taking into consideration the design and operational characteristics/aspects of the Ecoparque Candeias landfill plus the general construction, design the project's LFG collection network¹⁴.
Universal ideal gas 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 correctly applied in the GS 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).
Molecular mass of gas k (MM _k)	kg/kmol	28.01 (N ₂)	
Molecular mass of greenhouse gas i (MM _i)	kg/kmol	16.04 (CH ₄)	
Atmospheric pressure at reference conditions (P_{ref})	Pa	101,325	

¹³ Default value used, according to IPCC Fifth Assessment Report (AR5). Available online: <https://www.ipcc.ch/assessment-report/ar5/>

¹⁴ Collection efficiency 0.85 & Load Factor 0.95 - USEPA 1996 Handbook EPA-LFG.pdf - Item 2.2.2. page 2-8.

Temperature at reference conditions (T_{ref})	K	273.15	
Molecular mass of water (MM_{H_2O})	kg/kmol	18.0152	
Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (OX)	-	0.1	As confirmed by the Applus+ Certification's validation team, value is correctly selected according to the application A of the CDM methodological tool "Emissions from solid waste disposal sites" (based on the climate conditions valid for the location of the proposed GS project activity and/or technical design aspects of the Ecoparque Candeias landfill). The selected value represents the same value previously selected and applied in the registered CDM PDD for the project activity (formally termed as CTR Candeias Landfill Gas Project), with such value being previously validated by CDM DOE. In summary, the parameter and its selected value are correctly reported and selected under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Default value for the model correction factor to account for model uncertainties ($\Phi_{default}$)	-	0.75	
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	
Methane correction factor ($MCF_{default}$)	-	1.0	
Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j)	-	-	
Decay rate for the waste type j (k_j)	-	-	Assessment details are presented below under "Additional assessment details for the ex-ante determined parameter $MCF_{default}$, DOC_j, k_j and Waste composition".
Waste composition (Waste composition)	-	-	

Manufacturer's flare specifications for temperature, flow rate and maintenance schedule (SPEC _{flare})	Required temperature of the exhaust gas of the flare (to ensure LFG destruction (combustion) under high CH ₄ destruction efficiency)	°C	850 (min) 1,200 (max)	Values are correctly indicated as per specifications of the flare currently installed as part of the project's LFG destruction infrastructure. In summary, the parameters and their selected values are reasonably reported and are determined in consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
	Operational LFG flow (for continuous operation)	Nm ³ /h	500 (min) 2,500 (max)	
	Required minimum frequency for inspection and maintenance service (incl. inspection in the conditions of the flare isolation ceramics revetment material)	Days	365	
Build margin emission factor of the Brazilian grid (EF _{grid,BM,y})	tCO ₂ /MWh	0.0270	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". 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).	

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 Ecoparque Candeias 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 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 08.0).

The selected value represents the same value previously selected and applied in the registered CDM PDD for the project activity (formally termed as CTR Candeias Landfill Gas Project), with such value being previously validated by CDM DOE.

In summary, the parameter description and its selected value are correctly reported and selected value is 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 DOC_j , k_j and Waste composition

As established by the CDM methodological tool "Emissions from solid waste disposal sites" (version 08.0), default IPCC 2006 values were correctly selected for the parameters Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j) and 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 Ecoparque Candeias landfill is located. For the parameter Waste composition, default values from the 2019 Refinement to the 2006 IPCC Guidelines were confirmed as being appropriately applied (values applicable for Brazil).

The selected values for DOC_j , k_j and Waste composition for the different fractions of solid waste types are summarized in the table below. Furthermore, the values were confirmed by the Applus+ Certification's validation team to be deemed appropriate and correct. Values of mean temperatures and precipitation data for the region where the Ecoparque Candeias landfill is located were also correctly taken into account for the determination of values of k_j as required by the CDM methodological tool "Emissions from solid waste disposal sites" (version 08.0).

The selected values represent the same values previously selected and applied in the registered CDM PDD for the project activity (formally termed as C), with such value being previously validated by CDM DOE.

In summary, the parameter descriptions and their selected values are correctly reported and selected values are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Composition of disposed Waste composition (Waste composition) and *ex-ante* selected values for the parameter DOC_j and k_j

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)	Waste composition (Waste composition)
Wood and wood products	43%	0.035	0%
Pulp, paper and cardboard (other than sludge)	40%	0.07	17.60%
Food, food waste, beverages and tobacco (other than sludge)	15%	0.40	53.50%
Textiles	24%	0.07	0%
Garden, yard and park waste	20%	0.17	0%
Glass, plastic, metal, other inert waste	0%	0	28.90%

Conclusion about the assessment of the selection/reporting of ex-ante determined (fixed) parameters as per the Transition Request Form + GS4GG PDD:

In summary, the selection and report of all *ex-ante* determined (fixed) parameters in the Transition Request Form + GS4GG PDD are deemed reasonable, complete and transparent. The rationale/justification for selected values for all *ex-ante* determined (fixed) parameters is sufficiently provided in the Transition Request Form + GS4GG PDD. Supporting evidence for the selected values was made available to the Applus+ Certification's validation team. Referred data sources were also verified by the Applus+ Certification's 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).

15.2 Parameters monitored ex-post

As outlined in Section B.7.1 of the Transition Request Form + GS4GG PDD for the proposed GS project activity, the parameters monitored ex-post listed in the table below as SDG 13 related parameters are correctly defined and used for ex-post determination of baseline and/or project emissions for the proposed GS project activity along its GS crediting period. Whenever applicable, ex-ante annual estimates of values for the parameters monitored ex-post are also

reasonably defined and correctly considered in the context of ex-ante estimates of emission reductions to be achieved by the proposed GS project activity along its GS crediting period.

The selection of parameters monitored ex-post is 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 to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 03.0)
- "Emissions from solid waste disposal sites" (version 08.0)
- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)
- "Project emissions from flaring" (version 03.0)
- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)
- "Tool to calculate the emission factor for an electricity system" (version 07.0)

Assessment details for parameters monitored ex-post and related to SDG 13:

Parameter monitored ex-post	Assessment details
Management of SWDS	As appropriately outlined in the Transition Request Form + GS4GG PDD, the design and operational conditions of the Ecoparque Candeias 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 Ecoparque Candeias 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 Ecoparque Candeias 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 GS project activity. As established by ACM0001 (version 19.0), any change in the management of the landfill after the implementation of the proposed GS project activity will be justified by referring to technical or regulatory specifications. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Volumetric flow of the gaseous stream in time interval t on a dry basis ($V_{t,db}$)	The parameter $V_{t,db}$ will be measured continuously by using an appropriate flow meter(s) with gathered every-minute monitoring data being aggregated monthly and yearly. Utilized flow meter(s) shall be subject to regular maintenance, testing and/or calibration events by following manufacturer's recommended schedule and procedures. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the applied CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Volumetric flow of the gaseous stream in time interval t on a wet basis ($V_{t,wb}$)	The parameter $V_{t,wb}$ will be measured continuously by using an appropriate flow meter(s) with gathered every-minute monitoring data being aggregated monthly and yearly. Utilized flow meter(s) shall be subject to regular maintenance, testing and/or calibration events by following manufacturer's recommended schedule and procedures. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the applied CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m ($V_{RG,m}$)	The parameter $V_{RG,m}$ will be measured continuously by using an appropriate flow meter(s) with gathered every-minute monitoring data being aggregated monthly and yearly. Utilized flow meter(s) shall be subject to regular maintenance, testing and/or calibration events by following manufacturer's recommended schedule and procedures. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the applied CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Volumetric fraction of greenhouse gas i in a time interval t on a dry basis ($V_{i,t,db}$)	This parameter will be taken from the project implementer. It will be monitored continuously as per the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Analyzers will be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Volumetric fraction of greenhouse gas i in a time interval t on a wet basis ($v_{i,t,wb}$)	This parameter will be taken from the project implementer. It will be monitored continuously as per the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Analyzers will be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Volumetric fraction of O_2 in the exhaust gas on a dry basis at reference conditions in the minute m ($v_{O_2,EG,m}$)	This parameter will be taken from the project implementer. It will be monitored continuously as per the "Project emissions from flaring". A gas analyzer will be adopted. The gas analyzer will: 1) sample and analyze the methane, carbon dioxide and oxygen content of LFG, 2) provide continuous monitoring of the parameter and 3) transfer data to monitoring system for storage of the information. Analyzers will be calibrated according to the manufacturer's recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Volumetric fraction of component i in the residual gas on a dry basis in the minute m ($v_{i,RG,m}$)	This parameter will be taken from the project implementer. It will be monitored continuously as per the "Project emissions from flaring". Analyzers will be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Mass flow of the residual gas on a dry basis at reference conditions in the minute m ($M_{RG,m}$)	This parameter will be taken from the project implementer. It will be monitored continuously as per the "Project emissions from flaring". Flow meters are to be periodically calibrated according to the manufacturer's recommendations. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Concentration of methane in the exhaust gas of the flare on a dry	This parameter will be taken from the project implementer. It will be monitored as per the "Project emissions from flaring".

basis at reference conditions in the minute m ($f_{CH_4,EG,m}$)	It will be continuously measured and aggregated in a minute basis. Analyzers will be periodically calibrated according to manufacturer's recommendation. Zero check and typical value check will be performed by comparison with a standard gas. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Temperature of the gaseous stream in time interval t (T_t)	The parameter T_t will be measured continuously by using appropriate temperature sensor(s). Under conformance with applicable monitoring requirements, no separate monitoring is necessary when using flow meters that automatically measure the temperature and pressure, expressing LFG volumes in normalized cubic meters. The temperature sensor(s) shall be subject to regular maintenance, testing and calibration events as per manufacturer's recommendations. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Pressure of the gaseous stream in time interval t (P_t)	The parameter P_t will be measured continuously by using appropriate pressure sensor(s). Under conformance with applicable monitoring requirements, no separate monitoring is necessary when using flow meters that automatically measure the temperature and pressure, expressing LFG volumes in normalized cubic meters. The temperature sensor(s) shall be subject to regular maintenance, testing and calibration events as per manufacturer's recommendations. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Quantity of electricity consumed from the grid by the project activity during the year y ($EC_{PJ1,y} = EG_{EC1,y}$)	This parameter will be taken from the project implementer. It will be measured continuously using an electricity meter. Data will be aggregated at least annually as stated in the "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation". Electricity meter will be subject to regular maintenance and testing in accordance with meter supplier recommendations. Measurement records will be cross-checked against available electricity consumption receipts/invoices issued by the local electricity distribution company. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Quantity of electricity consumed from diesel generator by the project activity during the year y ($EC_{PJ2,y} = EG_{EC2,y}$)	This parameter will be taken from the project implementer. It will be measured continuously using an electricity meter. Data will be aggregated at least annually as stated in the "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation". Electricity meter will be subject to regular maintenance and testing in accordance with meter supplier recommendations. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Saturation pressure of H_2O at temperature T_t in time interval t ($P_{H_2O,t,Sat}$)	As appropriately outlined in the Transition Request Form + GS4GG PDD, this parameter is solely a function of the LFG stream temperature T_t and can be found ex-post at literature. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$)	The parameter $T_{EG,m}$ will be monitored based on measurements to be continuously performed by appropriate thermocouples (one instrument for each flare). Measuring instruments will be subject to regular maintenance, testing and calibration events as per manufacturer's recommendations. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD 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 Transition Request Form + GS4GG PDD, detection of flame in the flare(s) 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, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Maintenance events completed in year y (Maintenance_{y})	As appropriately outlined in the Transition Request Form + GS4GG PDD, the date(s) that related maintenance events are completed in year y will be recorded. Records of maintenance logs for the flare(s) must include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or needing to be replaced, source of replacement parts, serial numbers and calibration certificates. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Operational status of biogas destruction devices (Status of biogas destruction device)	As appropriately outlined in the Transition Request Form + GS4GG PDD, 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 the flare(s). Monitoring and documenting may 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 enclosed flare(s) or engine-generator sets) is/are not operational. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

Operation of the equipment that consumed the LFG ($O_{pj,h}$)	As appropriately outlined in the Transition Request Form + GS4GG PDD, 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 Transition Request Form + GS4GG PDD. (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. $O_{pj,h} = 0$ when: (a) One or 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, $O_{pj,h} = 1$ In the particular case of the proposed GS project activity the only equipment that consumes LFG are the engine-generator set(s) of the electricity generation infrastructure. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD 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 and/or for grid-sourced electricity consumed by the project activity ($TDL_{grid,y}$)	As appropriately outlined in the Transition Request Form + GS4GG PDD, value is correctly selected as per the CDM methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation". In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

CO ₂ emission factor of the Brazilian grid electricity during the year y ($EF_{grid,CM,y}$)	The parameter $EF_{grid,CM,y}$ will be calculated for each year of the GS crediting period of the project activity as per provisions and guidance from the CDM methodological tool "Tool to calculate the emission factor for an electricity system", based on published official electricity dispatch data for parameters $EF_{grid,BM,y}$ and $EF_{grid,OM,y}$ and applying 0.25 and 0.75 for the constants w_{OM} and w_{BM}, respectively. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
Operating margin emission factor of the Brazilian grid ($EF_{grid,OM,y}$)	The parameter $EF_{grid,OM,y}$ will be calculated for each year of the GS crediting period of the project activity as per provisions and guidance from the CDM methodological tool "Tool to calculate the emission factor for an electricity system", based on published official electricity dispatch data. In summary, the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).

As confirmed by the Applus+ Certification's validation team, the following additional parameters monitored ex-post, which are related to SDGs 7 and 13 and SDG 8 are also included in the monitoring plan for the proposed GS project activity as outlined in the Transition Request Form + GS4GG PDD:

Assessment details for parameters monitored ex-post and related to SDGs 7 and SDG 13:

Amount of electricity generated using LFG by the project activity in year y ($EG_{PJ,y} = EG_{BL,k,y}$) (asper the SDG impact tool (under SDG 7), this parameter is termed "Total electricity produced: Renewable").	The parameter $EG_{PJ,y} = EG_{BL,k,y}$ will be measured continuously using an appropriate electricity meter. Electricity meter will be subject to regular maintenance and testing in accordance with supplier recommendations to ensure accuracy. Measurement records will be cross-checked against available electricity receipts/invoices issued by the local electricity distribution company. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with the selected CDM baseline and monitoring methodology and/or applicable CDM methodological tool(s).
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Assessment details for parameters monitored ex-post and related to SDGs 8:

Number of employees related to the operation of the project activity (Total number of jobs)	The number of employees related to the operation of the project activity will be determined every year. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the Transition Request Form + GS4GG PDD under consistency with applicable GS Rules and procedures.
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It is the opinion of the Applus+ Certification's validation team that the monitoring plan, as described in the Transition Request Form + GS4GG PDD, is feasible for the project developer and will give opportunity for real measurements of achieved emission reductions and SDGs indicators.

All data pertaining to monitoring parameters will be archived for at least two years after the end of the crediting period. General details of data to be collected and frequency of data recording are also clearly defined in the monitoring plan of the Transition Request Form + GS4GG PDD.

Maintenance service and routines for project's equipment and instruments include all required preventive and corrective actions in order to ensure appropriate functioning of all project-related equipment. Related maintenance activities include visual control of the equipment status and real-time check of displayed parameters; cleaning up the equipment and the sensors; lubrication and greasing; replacement or overhauling of defective parts (including regular welding service in the HDPE pipelines and manifolds). Furthermore, spare units for some of the monitoring instruments/equipment may be kept on-site.

As also appropriately outlined in the Transition Request Form + GS4GG PDD, an appropriate project's operational and management structure is considered for the proposed GS project activity. Such operational and management structure will rely on staff with responsibilities to be clearly defined; where all collaborators and employees involved with the operation of the project and/or monitoring will receive appropriate training. Training of operational and management staff will encompass general competence development about LFG generation and collection; review of equipment operational principles; maintenance and calibration requirements for project's related equipment; procedures for monitoring data gathering and handling as well as emergency and safety procedures.

It is the opinion of the Applus+ Certification's validation team that the descriptions of the monitoring plan (and descriptions in related sections of the Transition Request Form + GS4GG PDD describing the approaches for determining baseline and project emissions) do not negatively affect the accuracy and correctness of the determination of emission reductions.

In summary, the Applus+ Certification's validation team confirmed that the description and design of the monitoring plan, as described in the Transition Request Form + GS4GG PD, fully complies with all the monitoring requirements of the ACM0001 (version 19.0) and applicable methodological tools. Such description is also in conformance with currently applicable guidelines for completing the Transition Request Form + GS4GG PD form.

16. CHANGES TO THE COMPLETED TRANSITION REQUEST FORM + GS4GG PDD FOR THE PROPOSED GS PROJECT ACTIVITY IN COMPARISON WITH THE REGISTERED CDM PDD

The Applus+ Certification's validation team has assessed the content of the completed Transition Request Form + GS4GG PDD for the proposed GS project activity and has confirmed that, in accordance with applicable instructions for completing the Transition Request Form + GS4GG PDD, its key project information section was completed in each section by basically copying and pasting information/content presented in the corresponding section of the previously registered CDM PDD for the proposed GS project activity. Moreover, Applus+ Certification has also confirmed that all performed revisions/amendments in texts previously made available in the CDM PDD or inclusion of new text elements or content are presented in the Transition Request Form + GS4GG PDD with "changes tracked" in order to highlight any information that has not previously validated/assessed as part of the previously performed validation of the project activity under the CDM.

Related assessment of performed revisions/amendments in texts (previously made available in the CDM PDD) or inclusion of new text elements or content in the Transition Request Form + GS4GG PDD is summarized below:

Description of the performed revision/amendment in text (previously made available in the CDM PDD) or inclusion of new text element or content	Applus+ Certification assessment
Correction of the CDM reference ID and the version of CDM methodology used of the project activity "CTR Candeias Landfill Gas Project".	The Applus+ Certification' validation team confirmed that correction of the CDM reference ID and the version of CDM methodology used of a previously registered CDM project activity when transitioning to the GS4GG is required and deemed reasonable in the particular case of the proposed GS project activity. This change is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD.
Correction on the estimation of emission reductions along with other estimations/calculations of the project activity "CTR Candeias Landfill Gas Project".	The Applus+ Certification' validation team confirmed that correction on the estimation of emission reductions along with other estimations/calculations when transitioning to the GS4GG is required and deemed reasonable in the particular case of the proposed GS project activity. This change is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD.
Correction on the duration of the proposed GS crediting period of the project activity "CTR Candeias Landfill Gas Project".	The Applus+ Certification' validation team confirmed that correction on the duration of the proposed GS crediting period when transitioning to the GS4GG is required and deemed reasonable in the particular case of the proposed GS project activity. This change is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD.

Update of the name of the project developer from "Haztec Tecnología e Planejamento Ambiental S.A." to "Orizon Valorização de Resíduos S.A.".	The Applus+ Certification' validation team confirmed that changing the name of the project developer when transitioning to the GS4GG is required and deemed reasonable in the particular case of the proposed GS project activity. This updating is confirmed as being under conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. The Applus+ Certification's validation team has confirmed that the following disclaimer is correctly and appropriately included in the Transition Request Form + GS4GG PDD: <i>"While the project activity was previously implemented and registered under the CDM by Haztec Tecnología e Planejamento Ambiental S.A., such company was recently merged with Orizon Valorização de Resíduos S.A., which is now the owner and operator of the project activity."</i>
Inclusion of demonstration of the eligibility of the proposed GS project activity under conformance with applicable requirements of the GS4GG (Section A.1.1 of the Transition Request Form + GS4GG PDD).	The Applus+ Certification' validation team confirmed that including demonstration of the eligibility of the proposed GS project activity under conformance with applicable requirements of the GS4GG is required and deemed reasonable in the particular case of the proposed GS project activity. This inclusion is confirmed as being under conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. Related assessment of the eligibility of the proposed GS project activity under the GS4GG is presented in Section 3.5.
Revisions/amendment in the description of the proposed GS project activity (to reflect the current implementation status of project's related infrastructure/components) (Section A.3 of the Transition Request Form + GS4GG PDD).	The Applus+ Certification' validation team confirmed that revising/amending the description of the proposed GS project activity (in order to reflect the currently implementation status of project's related infrastructure/components) is deemed reasonable in the particular case of the proposed GS project activity. These revisions/amendments are confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. Related assessment of design aspects of the proposed GS project activity is presented in Section 3.2.
Inclusion of information regarding monitoring of SDG targets/indicators and SDG impacts.	The Applus+ Certification' validation team confirmed that including information regarding monitoring of SDG targets/indicators and SDG impacts is indeed required and deemed reasonable in the particular case of the proposed GS project activity. This inclusion is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. Related assessment of SDG targets/indicators and SDG impacts is presented in Section 10 and Section 15.2.
Update of the applied value for the ex-ante determined parameter "Global Warming Potential of CH₄" (GWP_{CH₄}) from 25 tCO₂e/tCH₄ to 28 tCO₂e/tCH₄.	The Applus+ Certification' validation team confirmed that updating the applied value for the ex-ante determined parameter "Global Warming Potential of CH₄" (GWP_{CH₄}) is required in the particular case of the project activity since its current crediting period is from 01/01/2021 to 28/09/2023.

	This update is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. The Applus+ Certification's validation team verified that, since the proposed GS project activity issues GS VERs for the period from 01/01/2021 to 28/09/2023, the revised applied value of 28 tCO₂e/tCH₄ for the parameter GWP_{CH4} (as per the IPCC 5th assessment report (AR5)), is under conformance with applicable rules/guidance from GS4GG applicable to the selection of Global Warming Potential for Greenhouse Gases considered in GS project activities. It is also relevant to note that such increase in the parameter GWP_{CH4} has also resulted in a significant increase in the estimated annual values of emission reductions to be achieved by the project activity when compared to the values presented in the registered PDD for the project activity under the CDM¹⁵.
Revision of the applied values for the ex-ante determined parameter "Waste composition" (η_{PJ}).	The Applus+ Certification' validation team confirmed that revising the applied values for the ex-ante determined parameter "Waste composition" by selecting values as per 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas, Volume 5, Chapter 2, table 2.4 (values applicable for Brazil) is deemed reasonable in the particular case of the project activity since the values previously adopted (from a gravimetric study performed in 2015) had inconsistencies and did not reflect the average waste composition in Brazil. This update is confirmed as being performed in order to address a comment raised during the 2nd round of comments of the Design Review. The Applus+ Certification' validation team has confirmed that the revised values more appropriately reflect the actual average waste composition in Brazil. Moreover, based on its technical expertise and experience with similar/comparable project-based initiatives promoting collection and destruction/utilization of LFG, the Applus+ Certification's validation team also confirmed that the adopted values from the IPCC Guidelines are commonly adopted for the ex-ante estimates of emission reductions in many other LFG collection/utilization projects in Brazil since gravimetric studies are not commonly performed at Brazilian landfills.
Update of the value for the monitored parameter "Average technical transmission and distribution losses for providing electricity to the grid and/or for grid-sourced electricity consumed by the project activity" (TDL _y) applied for ex-ante estimation of emission reductions to be achieved by the	The Applus+ Certification's validation team has confirmed that the updated estimated value for the monitoring parameter TDL_y to 20% (this value represents the applicable default value as per Option C.III of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)) is more appropriate in the context of ex-ante estimation of emission reductions to be achieved by the proposed GS project activity within its GS crediting period than value

¹⁵ It is also important to note that, in accordance with applicable rules for demonstration of additionality, total emission reductions achieved by the project activity and, consequently, carbon revenues (revenues from commercialization of CERs issued by project activity) are not to be considered in the investment analysis as part of the demonstration of additionality for the project activity. Thus, this increase in the value of the parameter GWP (which does not represent a design change), and the consequent increase in estimated emission reductions to be achieved by the GS project activity, do not affect the additionality of the project activity.

proposed GS project activity within its GS crediting period.	previously applied (16%), since it was based on available data as per the World Bank Database – 2014 ¹⁶ (older than 5 years and thus, not in accordance with methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0)).
Update of the values for the monitored parameters “CO ₂ emission factor of the Brazilian grid electricity during year y ” ($EF_{grid,CM,y}$) and “Operating margin CO ₂ emission factor for the project electricity system in year y ” ($EF_{grid,OM,y}$) and also the ex-ante determined parameter “Build margin CO ₂ emission factor for the project electricity system in year y ” ($EF_{grid,BM,y}$) applied for ex-ante estimation of emission reductions to be achieved by the proposed GS project activity within its GS crediting period.	The Applus+ Certification’s validation team has confirmed that the updated estimated values for the monitoring parameters $EF_{grid,OM,y}$, $EF_{grid,CM,y}$ and the ex-ante determined parameter $EF_{grid,BM,y}$ (values calculated by the DNA of Brazil applicable for the year of 2022) are more appropriate in the context of ex-ante estimation of emission reductions to be achieved by the proposed GS project activity within its GS crediting period than values previously calculated by the DNA of Brazil, applicable for the years of 2018 (for the $EF_{grid,OM}$) and 2017 (for the $EF_{grid,BM}$) and made available in the PDD valid/applicable for the proposed GS project activity under the CDM.
Correction on information presented in Section B.7 regarding the monitored parameters: - Volumetric fraction of greenhouse gas i in a time interval t on a wet basis ($v_{i,t,wb}$) - Quantity of electricity consumed from the grid by the project activity during the year y ($EC_{PJ1,y} = EG_{EC1,y}$) - Quantity of electricity consumed from diesel generator by the project activity during the year y ($EC_{PJ2,y} = EG_{EC2,y}$) - Saturation pressure of H₂O at temperature T_t in time interval t ($P_{H2O,t,Sat}$) - Amount of electricity generated using LFG by the project activity in year y ($EG_{PJ,y} = EC_{BL,k,y}$).	The Applus+ Certification’ validation team confirmed that corrections performed on the listed monitored parameters in Section B.7 the proposed GS crediting period when transitioning to the GS4GG is required and deemed reasonable in the particular case of the proposed GS project activity. This change is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD.
Correction on information presented in Figure 5 of Section B.7.3 Other elements of monitoring plan.	The Applus+ Certification’ validation team confirmed that correction performed on Figure 5 of Section B.7.3 is required and deemed reasonable in order to reflect the actual monitoring plan to be applied by the proposed GS project activity. This change is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD.

¹⁶ World Bank Database (15.775% for 2014 is the most recent data. It was adopted 16%). Source: <https://data.worldbank.org/indicator/EG.ELC.LOSS.ZS?end=2014&locations=BR&start=1971&view=chart>

Inclusion of information regarding relevance of each safeguarding principle and definition of mitigation measures for relevant safeguarding principles.	The Applus+ Certification' validation team confirmed that including information regarding relevance of each safeguarding principle and definition of mitigation measures for relevant safeguarding principles is required and deemed reasonable in the particular case of the project activity. This inclusion is confirmed as being under conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. Assessment of the information included in the Transition Request Form + GS4GG PDD regarding safeguarding principles is presented in Section 8.
Inclusion of information regarding compliance of the proposed GS project activity with GS4GG Gender Sensitive Requirements.	The Applus+ Certification' validation team confirmed that including information regarding compliance of the proposed GS project activity with GS4GG Gender Sensitive Requirements is required and deemed reasonable in the particular case of the project activity. This inclusion is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. Assessment of the information included in the Transition Request Form + GS4GG PDD regarding the project's compliance with GS4GG Gender Sensitive Requirements is presented in Section 9.
General text improvements and minor text revisions/corrections in different Sections of the Transition Request Form + GS4GG PDD.	The Applus+ Certification' validation team confirmed that promoting general text improvements and minor text revisions/corrections in different Sections of the Transition Request Form + GS4GG PDD is deemed reasonable in the particular case of the project activity. This promotion of text improvements/revision/corrections is confirmed as being in conformance with applicable instructions for completing the Transition Request Form + GS4GG PDD. The Applus+ Certification's validation team confirmed that several text revisions/corrections were performed in different Sections of the Transition Request Form + GS4GG PDD to improve the overall description of the proposed GS project activity, its monitoring plan and other project aspects.

17. VALIDATION OPINION AND REPORT

LGAI Technological Center, S.A. (Applus+ Certification) has performed the validation for transition from the UNFCCC's Clean Development Mechanism (CDM) into Gold Standard for Global Goals (GS4GG) (from a CDM project activity to a Gold Standard (GS) project activity) for the "Ecoparque Candeias Landfill Gas Project" (formerly titled "CTR Candeias Landfill Gas Project" (UNFCCC ref. 3958). The proposed GS project activity is located in the municipality of Jaboatão dos Guararapes - PE, Brazil.

The GS validation assessment for transitioning from CDM to GS4GG was performed to independently assess whether the project activity meets all criteria and requirements of to be transitioned/registered under GS4GG in order to issue GS Voluntary Emission Reductions (GS VERs). The assessment was performed in accordance with applicable requirements of GS4GG's "Principles and Requirements" (version 1.2) with requirements of the GS4GG Validation and Verification Manual (version 1.0), UNFCCC's CDM Validation and Verification standard for project activities (version 03.0) being also considered. The performed GS validation assessment encompasses the following issues:

- Assessment of the correctness for the completion of Transition Request Form + GS4GG PDD for the proposed GS project activity.
- Evaluation of the correctness and appropriateness of the application of the selected CDM baseline and monitoring methodology ACM0001 (version 19.0) and applicable CDM methodological tools for the completion of the Transition Request Form + GS4GG PDD.
- Assessment of calculations and reporting of estimates of emission reductions to be achieved by the proposed GS project activity during its GS crediting period as outlined in the Transition Request Form + GS4GG PDD.

A risk-based approach has been followed to perform the validation assessment. The review of the project description and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews with representatives of the project developer Orizon Valorização de Resíduos S.A. have provided the appointed validation team of Applus+ Certification with sufficient evidence for positive validation opinion as per applicable requirements of GS4GG.

The performed desk-review of the Transition Request Form + GS4GG PDD, performance of on-site inspection to the project activity and the subsequently performed follow-up interviews with representatives of the Project Developer Orizon Valorização de Resíduos S.A. have provided the Applus+ Certification's validation team sufficient information and evidence to determine/confirm the eligibility and meeting of qualification criteria and requirements of GS4GG by the proposed GS project activity.

The Applus+ Certification's validation team also confirmed that the Transition Request Form + GS4GG PDD was correctly completed by correctly applies the CDM baseline and monitoring methodology previously selected for the 2nd 7-year crediting period for the previously registered CDM project activity "CTR Candeias Landfill Gas Project" under the CDM (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 GS project activity during its GS crediting period. Such spreadsheet is enclosed to the Transition Request Form + GS4GG PDD and was confirmed to be correctly elaborated.

The Applus+ Certification's validation team is of the opinion that the proposed GS project activity has the potential to achieve GHG emission reductions (and issue GS VERs) during its crediting

period based on monitoring requirements and ex-ante estimates of emission reductions included in the completed Transition Request Form + GS4GG PDD.

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

Year	Estimated GHG emission reductions or removals (tCO₂e)
2021	687,982
2022	711,312
01/01/2023 to 28/09/2023	525,252
Total estimated ERs	1,924,547
Average annual ERs	702,389

As also verified by the Applus+ Certification's validation team, all explanations and justifications provided by the Project Developer regarding information and assumptions included in the Transition Request Form + GS4GG PDD are deemed reasonable and acceptable.

It is thus the opinion of Applus+ Certification that the proposed GS project activity sufficiently meets all the relevant requirements for its registration/transition under GS4GG. Hence, Applus+ Certification recommends the registration/transition of the proposed GS project activity.

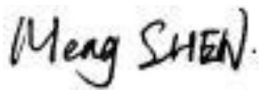
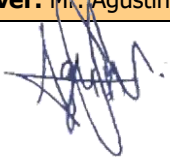
Date: 08/07/2024

Lead Auditor: Mr. Marco A. Ratton

Tech. Expert: Mr. Marco A. Ratton

Tech. Reviewer: Mr. Simon Shen

Approver (Applus+ Certification- VVB Technical Manager): Mr. Agustín Calle de Miguel

ASSESSMENT TEAM	
Lead Auditor: Mr. Marco A. Ratton	Technical Reviewer: Mr. Simon Shen
Signature: 	Signature: 
Approver: Mr. Agustín Calle de Miguel	
Signature: 	

ABBREVIATIONS	
ACM	Approved Consolidated Methodology
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CL/CR	Clarification Request
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
DOE	Designated Operational Entity
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
GS4GG (or GS)	Gold Standard for Global Goals
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
LSC	Local Stakeholder Consultation
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-Governmental Organization
OM	Operational Margin
OHSAS	Occupational Health and Safety Assessment Series

PDD	Project Design Document
PD	Project Developer
SDG	Sustainable Development Goal
UNFCCC	United Nations Framework Convention for Climate Change
VVB	Validation and Validation Body
VVS	Validation and Validation Standard

18. REFERENCE

LIST OF DOCUMENTS	
S. No.	Document/ Evidence/ Reference/ Web link, version, date
/01/	GS4GG Principles and Requirements (version 1.2) Available online: https://globalgoals.goldstandard.org/101-par-principles-requirements/
/02/	GS4GG Validation and Verification Standard (version 1.0) Available online: https://globalgoals.goldstandard.org/113-par-validation-and-verification-standard/
/03/	CDM Validation and Verification standard for project activities (version 03.0) Available online: https://cdm.unfccc.int/Reference/Standards/index.html
/04/	Transition Request Form + GS4GG PDD for the GS project activity "Ecoparque Candeias Landfill Gas Project", all versions.
/05/	Emission reduction calculation spreadsheet for the project activity: "Ecoparque Candeias Landfill Gas Project", all versions.
/06/	ACM0001 – "Flaring or use of landfill gas" (version 19.0) Available online: https://cdm.unfccc.int/methodologies/DB/JPYB4DYQUXQPZLBDVPHA87479EMY9M
/07/	Kyoto Protocol to the United Nations Framework Convention on Climate Change Available online: https://unfccc.int/resource/docs/convkp/kpeng.pdf
/08/	Decision 3/CMP. 1 (Marrakesh – Accords) Available online: https://unfccc.int/cop7/documents/accords_draft.pdf
/09/	1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book. Available online: https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html
/10/	2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book. Available online: https://www.ipcc-nggip.iges.or.jp/public/2006gl/

/11/	"Project emissions from flaring" (version 03.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf/history_view
/12/	"Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf/history_view
/13/	"Tool to calculate the emission factor for an electricity system" (version 07.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf/history_view
/14/	"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (version 03.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf/history_view
/15/	"Emissions from solid waste disposal sites" (version 08.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v6.0.1.pdf/history_view
/16/	"Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf/history_view
/17/	"Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v1.pdf/history_view
/18/	CDM Validation Report for the CDM Project Activity "CTR Candeias Landfill Gas Project" (version 02.1) Available online: https://cdm.unfccc.int/Projects/DB/ERM-CVS1283351787.62/view?cp=1
/19/	CO₂ emission factor for electricity generation in Brazil National Interconnected System. Available online: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao
/20/	"Guideline – Application of materiality in validations", (version 02.0) Available online: https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150225171039008/iss_guid08.pdf
/21/	Transition Request Form + GS4GG PDD for the GS project activity "Ecoparque Candeias Landfill Gas Project" (version 2.0)

	Available online: https://platform.sustain-cert.com/public-project/3294
/22/	Orizon Valorização de Resíduos S.A.: “Relatório anual de Sustentabilidade” (Annual Sustainability Report) years 2020 and 2021 Available online: https://ri.orizonvr.com.br/sustentabilidade/relatorio-anual-de-sustentabilidade/
/23/	GS4GG Stakeholder Consultation Report for the Project activity: “Ecoparque Candeias Landfill Gas Project” (version 2.0, dated 21/11/2023, version 2.1, dated 01/03/2024).
/24/	Pictures and movies from GS4GG Stakeholder Consultation for the Project activity: “Ecoparque Candeias Landfill Gas Project” occurred at the Ecoparque Candeias landfill on 16/05/2023.
/25/	GS4GG Stakeholder Consultation Presentation for the Project activity: “Ecoparque Candeias Landfill Gas Project” occurred at the Ecoparque Candeias landfill on 30/09/2022.
/26/	Ecoparque Candeias Landfill Gas Project - Gold Standard Stakeholder Consultation Process
/27/	Minutes and attendance list for performed Local Stakeholder Consultation (LSC) audience/meeting for the proposed GS project activity “Ecoparque Candeias Landfill Gas Project” occurred at the Ecoparque Candeias landfill on 30/09/2022.
/28/	Environmental license/permit (Ref./No. 05.20.02.000616-0) issued by Agência Estadual de Meio Ambiente (CPRH) authorizing the project implementer Orizon Valorização de Resíduos S.A. to implement and operate infrastructure promoting utilization of LFG as gaseous fuel for electricity generation in grid-connected electricity generation infrastructure located within the geographical limits of the Ecoparque Candeias landfill site.
/29/	Latest environmental license/permit (Ref./No. 03.20.03.000712-2) issued by Agência Estadual de Meio Ambiente (CPRH) authorizing the project implementer Orizon Valorização de Resíduos S.A. to keep on operating the Ecoparque Candeias landfill site.
/30/	GS4GG Rule Update - Requirements for Projects to Transition from other schemes to Gold Standard for Global Goals Available online: https://globalgoals.goldstandard.org/ru-2020-requirements-for-projects-to-transition-from-other-schemes-to-gold-standard-for-global-goals/
/31/	GS4GG Audit techniques template Available online: https://globalgoals.goldstandard.org/t-vvb_audit-techniques/
/32/	GS4GG GHG Emission Reduction & Sequestration Product Requirements Available online: https://globalgoals.goldstandard.org/standards/501_V2.1_PR_GHG-Emissions-Reductions-Sequestration.pdf
/33/	EIA Report for the construction of the Ecoparque Candeias landfill.

/34/	Complementary/revised financial analysis spreadsheet in order to demonstrate that the Project activity faces a serious risk of discontinuation without carbon revenues. File name: "Complementary Financial Analysis DEV277.xls" (dated 10/05/2024).
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Appendix 1: Corrective Action Requests / Clarification Request / Forward Action Request resolution table

Table 1. Remaining FAR from a previous Deviation Request (regarding the eligibility of the project activity for transitioning from the CDM to the GS4GG)

FAR ID	FAR Dev. Req.	Date: 11/04/2021
Description of FAR		
The validating VVB, through appropriate means at its disposal, validate the Project's compliance with the above-mentioned conditions and provides its opinion in the Validation Report.		
Project developer response		Date: DD/MM/YYYY
-		
Documentation provided by project developer		
-		
DOE assessment		Date: 07/12/2023
Section 3.5 includes Applus+ Certification's detailed assessment of this FAR which was raised as part of a Deviation Request submitted to the GS4GG (prior to the submission of the documents for preliminary review) in order to determine the eligibility of the project activity for transitioning from the CDM to the GS4GG.		

Table 2. FAR from this validation

FAR ID	01	Date: 19/05/2023
Description of FAR		
The project developer should include a declaration in the Monitoring Reports submitted to the GS4GG that the project will not issue both CERs/other compliance units under the Paris Agreement and a GSVER for the same vintage. Moreover, the project developer should agree to comply with all future UNFCCC COP/CMP decisions including adjustment of GWP values.		
Project Developer response		Date: DD/MM/YYYY
-		
Documentation provided by Project Developer		
-		

DOE assessment	Date: DD/MM/YYYY
-	

Table 3. FAR from this validation

FAR ID	02	Date: 19/05/2023
Description of FAR		
Projects transitioning to the GS4GG are required to demonstrate Ongoing Financial Need (OFN) as per the relevant GS4GG rules and requirements available at the time of renewal of crediting period. Project developer shall demonstrate OFN during the crediting period renewal submission.		
Project Developer response		Date: DD/MM/YYYY
-		
Documentation provided by Project Developer		
-		
DOE assessment		Date: DD/MM/YYYY
-		

Table 4. FAR from this validation

FAR ID	03	Date: 19/05/2023
Description of FAR		
In-line with "Guidance for Site Visit rule Deviations", following the first site visit within the first two years after the start date of crediting period, verifiers shall conduct a site visit once every three years after that first two-year period. In case of deviation from this requirement, the project developer can only request Issuance for the latest three years prior to verification site visit date for which monitoring data can be verified. The remaining years/months of the crediting period will be foregone without any extension.		
Project Developer response		Date: DD/MM/YYYY
-		
Documentation provided by Project Developer		
-		
DOE assessment		Date: DD/MM/YYYY

-

Table 5. FAR from this validation

FAR ID	04	Date: 19/05/2023
Description of FAR		
In-line with GS4GG Principles and Requirements, VVB and PP shall consider the following rules after the Transition is finalized: 5.1.39: Transparent, annual update reports need to be provided for Projects that have achieved the Project Design Certification stage or have successfully transitioned to Gold Standard for the Global Goals. An annual report shall be submitted for each monitoring year by the end of next calendar year for which verification is not completed. If a verification is in progress but not completed, then an Annual Report is still required by the end of calendar year. 5.1.50: Transitioning projects, maintaining their existing crediting cycle shall undergo Performance Certification no later than the first two years after project implementation or design certification, whichever is later, and once every three years after that, unless the Verifier provides a convincing case for less frequent visits as part of the Verification Report.		
Project Developer response		Date: DD/MM/YYYY
-		
Documentation provided by Project Developer		
-		
DOE assessment		Date: DD/MM/YYYY
-		

Table 6. CL from this validation

CL ID	Xx	Date: DD/MM/YYYY
Description of CL		
There are no CLs from this validation to be considered.		
Project Developer response		Date: DD/MM/YYYY
Documentation provided by Project Developer		
DOE assessment		Date: DD/MM/YYYY

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Table 7. CAR from this validation

CAR ID	1	Date: 19/05/2023
Description of CAR		
Monitored parameters are not correctly presented in Section B.7.1 of the Transition Request Form + GS4GG PDD.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, monitored parameters were corrected in Section B.7.1 of the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in the Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.		

Table 8. CAR from this validation

CAR ID	2	Date: 19/05/2023
Description of CAR		
Annual GHG emission reduction values reported in Section B.6.2 (Table 11) do not completely match with annual GHG emission reduction values reported in Section B.6.4 of the Transition Request Form + GS4GG PDD.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, information about the annual GHG emission reduction values was corrected in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 24/05/2023

The Applus+ Certification's validation team confirmed that related amendments made in both the ER calculation spreadsheet and the Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.

Table 9. CAR from this validation

CAR ID	3	Date: 19/05/2023
Description of CAR		
Monitored parameter (indicator) related to SDG 8 is missing in Section B.7.1 of the Transition Request Form + GS4GG PDD. Moreover the estimated number of employees to be directly involved with the operation of the GS project activity as indicated in the Transition Request Form + GS4GG PDD, are not in accordance with the provided evidence.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, information about related to SDG 8 was included in Section B.7.1 of the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.		

Table 10. CAR from this validation

CAR ID	4	Date: 19/05/2023
Description of CAR		
The table in Section D.1 of the Transition Request Form + GS4GG PDD does not present correct/complete information regarding the safeguarding principles which may be relevant to the project activity.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, table in Section D.1 was corrected included in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		

DOE assessment	Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.	

Table 11. CAR from this validation

CAR ID	5	Date: 19/05/2023
Description of CAR		
Responses presented in the table in Section D.2 of the Transition Request Form + GS4GG PDD are not completely in accordance with applicable GS4GG requirements.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, the table in Section D.2 was corrected in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.		

Table 12. CAR from this validation

CAR ID	6	Date: 19/05/2023
Description of CAR		
Evidence of Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project is missing In Section A.1.2.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, the required evidence was provided and the related information was included in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
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DOE assessment	Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.	

Table 13. CAR from this validation

CAR ID	7	Date: 19/05/2023
Description of CAR		
Information presented in the table in Appendix 1 is not in conformance with applicable GS4GG requirements regarding Safeguarding Principles.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, information presented in the Appendix 1 was corrected in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.		

Table 14. CAR from this validation

CAR ID	8	Date: 19/05/2023
Description of CAR		
Information presented in Section A.1.1 is not under full conformance with applicable GS4GG Renewable Energy Activity Requirements		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, information presented in Section A.1.1 was corrected in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
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DOE assessment	Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.	

Table 15. CAR from this validation

CAR ID	9	Date: 19/05/2023
Description of CAR		
Technical specifications of the installed high enclosed flare are missing in Section A.3 of the Transition Request Form + GS4GG PDD.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, information about technical specifications of the installed high enclosed flare was included in Section A.3 of the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.		

Table 16. CAR from this validation

CAR ID	10	Date: 19/05/2023
Description of CAR		
Implementation schedule of the engine generator sets do not completely match with information presented in the ER spreadsheet.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, the correct implementation schedule of the engine generator sets was included in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		

DOE assessment	Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.	

Table 17. CAR from this validation

CAR ID	11	Date: 19/05/2023
Description of CAR		
Ex-ante parameter $EF_{grid,BM}$ in Section B.6.2 and the ex-post monitored parameters $EF_{grid,CM}$ and $EF_{grid,OM}$ in Section B.6.3 of the Transition Request Form + GS4GG PDD are not completely in accordance with the "Tool to calculate the emission factor for an electricity system" (Version 07.0).		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, information about the ex-ante parameter $EF_{grid,BM}$ and the ex-post monitored parameters $EF_{grid,CM}$ and $EF_{grid,OM}$ were corrected in Sections B.6.2 and B.6.3 in the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.		

Table 18. CAR from this validation

CAR ID	12	Date: 19/05/2023
Description of CAR		
Diagram of elements of the monitoring plan presented in Section B.7.3 the Transition Request Form + GS4GG PDD is not in accordance with information presented in Section A.3.		
Project Developer response		Date: 22/05/2023
As a response to the raised CAR, the diagram of elements of the monitoring plan was corrected in Section B.7.3 of the revised Transition Request Form + GS4GG PDD.		
Documentation provided by Project Developer		

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DOE assessment	Date: 24/05/2023
The Applus+ Certification's validation team confirmed that related amendments made in Transition Request Form + GS4GG PDD sufficiently address the raised CAR. This CAR is thus closed.	

Table 19. CAR from this validation

CAR ID	13	Date: 14/06/2023
Description of CAR		
The start and end dates of the project's crediting period under the GS4GG as indicated in the Transition Request Form + GS4GG PDD are not under conformance with the crediting period indicated in the project's webpage under the GS4GG.		
Project Developer response		Date: 16/06/2023
As a response to the raised CAR, the start and end dates of the project's crediting period under the GS4GG were revised accordingly in both the Transition Request Form + GS4GG PDD and the ER calculation spreadsheet.		
Documentation provided by Project Developer		
-		
DOE assessment		Date: 21/06/2023
The Applus+ Certification's validation team confirmed that related amendments made in both Transition Request Form + GS4GG PDD and the ER calculation spreadsheet sufficiently address the raised CAR. This CAR is thus closed.		

Appendix 2: Assessment of the demonstration of risk of discontinuation of the project activity without carbon revenues

As appropriately outlined in Appendix 5 of the Transition Request Form + GS4GG PDD, a project registered under other GHG program/standard which has crediting period start date with such other GHG program/standard before 01/01/2016 (such as the case of the project activity) is required to demonstrate the following as an eligibility requirement:

- *"(...) that the project faces a serious risk of discontinuation without carbon revenue, and*
- *how the project has been operational in the absence of carbon revenue, if carbon credits have not been issued to the project in recent years"*

A full assessment of the complementary financial analysis provided by the project developer (file named "*Complementary Financial Analysis DEV277.xls*", which will be submitted along with the revised version of the Transition Request Form + GS4GG PDD) was performed by the Applus+ Certification's validation team in order to appropriately address a received comment from the SustainCERT under the 1st and 2nd rounds of the Design Review phase and also to demonstrate the following:

- demonstration that the project activity indeed remains financially unattractive even when carbon revenues associated to previously occurred commercialization of issued CDM CERs are considered.
- demonstration/justification that the project activity has only been kept under operation by its project developer by taking into consideration their positive view and good expectations about future generation of future carbon revenue stream (due to the commercialization of GS VERs).

The project developer Orizon Valorização de Resíduos S.A. claims that the project activity seeking transition into GS4GG has indeed faced serious expectable/probable technical risk of discontinuation (without continuation of carbon revenues (under GS4GG) (in addition to so far promoted carbon revenues)) by outlining the overall unfavorable (negative) economic/financial performance of the operation of the project activity (under its gradual/phased implementation schedule) even when the revenues associated to so far occurred CDM carbon revenues are considered. In this context, it is reasonably assumed that carbon revenues due to the commercialization of GS VERs for the remaining share of the total combined 15-year crediting periods of the project activity under GS4GG (2,097-day periods¹⁷ from 01/01/2021 to 28/09/2023 and from 29/09/2023 to 28/09/2026) indeed plays an important role for having the project activity reaching its overall financial/economic sustainability. Such assumption is based on assuming complementary carbon revenues to be promoted by the project activity under GS4GG (which can be reasonably estimated based on projected scenarios for future GS VER prices and amount of GHG emission reductions (GS VERs) to be potentially achieved by the project activity along its GS crediting periods)¹⁸.

¹⁷ Upon successful registration (transitioning) of the project activity into GS4GG, its crediting periods under GS4GG includes a period of 5 years, 8 months and 28 days for which it will be able to claim achieved GHG emission reductions as GS VERs.

¹⁸ As confirmed by the Applus+ Certification's validation team, the complementary financial analysis spreadsheet does not include projected scenarios for future GS VER prices and/or amount of GHG emission reductions (GS VERs) to be potentially achieved by the project activity along its GS crediting periods. As alleged by the project developer Orizon Valorização de Resíduos S.A., making any attempt to precisely estimate future carbon revenues of the project activity would be a very uncertain task in light of all operational uncertainties and price volatility for carbon offsets under the global carbon voluntary market.

The demonstration of the overall unfavorable (negative) economic/financial performance of the project activity (under its gradual/phased implementation schedule) (even when the revenues associated to previously occurred CDM carbon revenues are considered) is appropriately made by the project developer through the submission of a complementary/revised financial analysis spreadsheet (titled "*Complementary Financial Analysis DEV277.xls*") now including the following financial/economic elements/aspects for the project activity (under its gradual/phased implementation schedule):

- all so far occurred historical annualized earning due to CDM carbon revenues since the start of operation of the project activity (organized based on the vintage year of issued CERs and corresponding negotiated prices¹⁹).
- incurred historical annual capital expenditures (CAPEX)
- incurred historical annual operation and maintenance costs (OPEX)
- incurred annual revenues due to commercialization of electricity²⁰
- projections/forecasts for annual future OPEX
- projections/forecasts of annual future revenue stream associated with commercialization of electricity to be generated by the project activity²¹.

While validating the complementary and revised financial analysis made available by the project developer (that is made enclosed to the revised version of the GS4GG TRF + PDD), the Applus+ Certification's validation team confirmed the overall correctness and appropriateness of all made

¹⁹ The approach applied by the project developer in the performed complementary financial analysis by considering CDM carbon revenues based on the quantities valid for each vintage year for which CERs were issued (instead of considering the years when the earnings of such revenues occurred as a result of later occurred commercialization events of the issued CERs) is deemed reasonable and acceptable in the opinion of the Applus+ Certification's validation team by inter alia considering the purpose of the complementary financial analysis and the typical timeframe for issuance/certification of commercialization of CDM CERs in place during the period encompassing year 2012 to year 2020. It is relevant to note that the applied approach promotes a relative anticipation in presented carbon revenues which technically increases the attractiveness of the calculated financial performance of project activity.

²⁰ All values in the performed complementary complementary financial analysis spreadsheet were cross-checked by the Applus+ Certification's validation team against their primary data sources (company's historical annual accounting records/registries/reports for company's financial results). Such records/registries/reports were confirmed by the Applus+ Certification's validation team as previously audited by independent 3rd party (accounting/financial auditing company) under a yearly basis. As per the rules guiding accounting bookkeeping and audit services in Brazil applicable for Orizon Valorização de Resíduos S.A., annual financial result reports and bookkeeping/accounting records are reviewed and signed by a chartered 3rd party accredited/registered accounting/controllers professionals. The rules guiding the accounting bookkeeping and audit services in Brazil are known by the acronyms "NBC Ts" (numbers 3, 4, 6, 8, 10, 11 and 12) and NBC Ps (numbers 1, 2 and 3) and were established by the Brazilian regulatory accountability agencies, the CFC (Federal Council of Accounting) along with its state bodies, and the IBRACON (Independent Auditors Institute). The Central Bank of Brazil and the CVM (Securities Commission) also participate in the regulation of the accounting audit services in the country, as well as the IFAC (International Federation of Accountants), which determines the rules of this activity at an international level. Such rules are available online: <http://www.portaldecontabilidade.com.br/nbc/index.htm>

²¹ No projections/forecasts of future annualized carbon revenues (due to commercialization of GS VERs to be issued by the project activity upon its successful transition/registration under/into GS4GG) are included in the complementary financial analysis. As argued by the representatives of the project developer Orizon Valorização de Resíduos S.A., only upon successful transition/registration of the project activity under/into GS4GG and at the time of the GS project activity is requesting its design renewal, Ongoing Financial Need (OFN) for the project activity will be demonstrated as part of its Design Certification Renewal phase (under conformance with applicable GS4GG rules and procedures). As also argued by the representatives of the project developer, as part of such OFN demonstration, the whole historical project finances of the project up to such period will be presented (including revenues of yet to be issued commercialized annual stream of GS VERs) in order to demonstrate how the finance derived Gold Standard Certification is indeed material to the ongoing sustainability of the project. This is deemed reasonable and acceptable in the opinion of Applus+ Certification.

assumptions and selection of values for all related incurred capital expenditures (CAPEX), incurred and projected operation and maintenance costs (OPEX)²², earned historical revenues and projected/forecasted revenues due to commercialization of generated electricity as well as so far earned historical CDM carbon revenues (due to commercialization of CDM CERs previously generated by the project activity).

The 20-year length time-horizon for the complementary financial analysis (from year 2012 to year 2031) is also regarded by the Applus+ Certification's validation team as deemed reasonable and acceptable (by taking into account both the purpose of the complementary financial analysis and the project design).

Furthermore, it was also confirmed that all figures are appropriately presented in local currency (Brazilian Real currency (BRL)) and were adjusted to real values in order to harmonize the analysis vis-à-vis the quite significant price inflation for the country during the period²³. This is deemed appropriate.

As part of its performed assessment, the Applus+ Certification's validation team also made the following relevant observations:

- Costs associated to GS4GG consultancy and advisory services (e.g. completion of GS4GG TRF + PDD, design/review of the monitoring plan, etc.) and GS4GG certification (e.g. Design review (validation), performance review (verification) and design certification renewal (validation)) were confirmed as not considered in the complementary financial analysis. This is deemed conservative, reasonable and acceptable (by taking into consideration the purpose and nature of the performed complementary financial analysis).
- As argued by the representatives of the project developer and confirmed through assessment of related values applicable for the particular case of the project activity for the period in question, so far occurred CDM carbon revenues for the project activity were confirmed as being dramatically negatively affected not only due to the very unfavorable market conditions for the commercialization of CDM CERs in place at the time of commercialization of CDM CERs for vintages from year 2012 to year 2020 (very low prices and liquidity for issued CDM CERs), but also due to the overall very low activity level of the project activity during its initial implementation phase in year 2012 up to year 2019 (project encompassing only LFG collection and destruction of LFG by flaring) with special operational situation being also confirmed as occurred during year 2018²⁴.

²² Incurred OPEX were confirmed by the Applus+ Certification's validation team as appropriately considering annual capital provision for covering associated costs for the performance of major overhauling work in the engine-generator sets of the project's electricity generation infrastructure after 60,000 hours of operation.

²³ As per data from the Brazilian Central Bank, the accumulated price index inflation in the country for the period from March/2013 to May/2020 reached 52%. For the period from March/2020 to December/2023, like most of the countries in the world, accumulated country price index inflation was also high in Brazil as an indirect reflect/consequence of the COVID-19 pandemic.

²⁴ As confirmed by the Applus+ Certification's team, elements of the project's LFG collection infrastructure (i.e. LFG collection wells, LFG pipeline, centrifugal blowers, etc.) had to be completely redesigned and/or overhauled in year 2018 in order to have collected LFG meeting the minimum required specification (i.e. LFG with higher CH₄ fraction, lower O₂ fraction and lower moisture content) in order to meet operational requirements for LFG from the later installed engine-generator sets of the project's electricity generation infrastructure. Moreover, even the location of the LFG destruction facility was changed in year 2018. Such occurred change in the positioning of the flares and other ancillary equipment in year 2018 occurred due to technical and operational requirements of the project activity under its gradual/phased implementation status. Such redesign, overhauling and relocation of the project's infrastructure required inter alia significant temporary interruption in the operation of the whole project infrastructure (which was directly reflected in the dramatic decrease in issuance of CDM CER for the particular case of year 2018). The occurred redesign, overhauling and relocation of the project's infrastructure also required

- The results of the complementary financial analysis are confirmed by the Applus+ Certification team as being dramatically affected/influenced by the following external related factors/issues:
 - Significant variation in the Brazilian Real / US Dollar currency exchange rate during the period²⁵;
 - Trend of relative decrease in the commercialization price for electricity generated by independent power producers (IPPs) due to the verified trend of significant increase in the offer/supply of electricity from low-cost energy sources (e.g. large hydropower plants) vis-à-vis low increase in the country total electricity demand (due to bad macroeconomic conditions of the country and reduction of general country's economic activity during its COVID-19 and post-COVID-19 periods)²⁶.

Assessment of the narrative/justification provided by the project developer for the rationale/reason of having the project under operational conditions despite of the absence of carbon revenues since year 2020/2021²⁷

significant relative increase in operational and maintenance costs (OPEX) for this particular year.

²⁵ As confirmed by the Applus+ Certification's validation team, the average currency exchange rate (Brazilian Real (BRL) vs US Dollar (USD)) has significantly changed during the period 2013 to 2022 (strong depreciation of the BRL value along the period (from about BRL 1.96 per 1 USD in March/2013 to up to BRL 5.93 per 1 USD in May/2020 (accumulated depreciation of the local currency against USD of more than 200%) and reaching about BRL 5.00 per 1 USD in May/2022 (when the Request for Deviation DEV_277 was submitted) (accumulated depreciation of local currency against USD of more than 155%). While major equipment/systems for the project's electricity generation infrastructure were acquired during the years of 2018/2019/2020, such equipment are mostly imported equipment which were (and are still being) priced in USD currency at that time. Therefore, related CAPEX for the implementation of the project's electricity generation infrastructure was relatively increased in local currency BRL. It is also relevant to note that accumulated values for price inflation rates for the same periods are by far lower than occurred depreciation of the local currency BRL against USD. Therefore, regardless of the adjustment of such CAPEX figures to real values, required related CAPEX is still increased, therefore negatively affecting the overall financial attractiveness of the project activity as claimed by the project developer.

²⁶ While, as confirmed by the Applus+ Certification's validation team, the expected/forecasted commercialization price for electricity to be generated by the project activity was previously assessed in the Validation Report for the project activity (dated year 2011) as being BRL 148.39/MWh (about USD 95.50 USD/MWh as per the BRL/USD exchange rate valid at that time (year 2011)), electricity generated by the project activity was commercialized during the period from year 2019 to year 2022 with the average price of about BRL 280.00/MWh (about USD 52.80/MWh as per the average BRL/USD exchange rate valid at that period (encompassing year 2019 – year 2022). Furthermore, as also confirmed by the Applus+ Certification's validation team through review of credible study for electricity and energy markets in Brazil issued by PSR energy market analysis company, prices for commercialization of generated electricity by IPPs in Brazil under the so-called Free Contracting Environment (FCE) for the Brazilian electricity trading market along the 6-year period from year 2023 to year 2028 has had a negative trend (in comparison with the average market price valid in May/2022 (when the Request for Deviation DEV_277 was submitted)).

In 2004 the Federal Government set a new model for the Brazilian Electricity Sector and defined the creation of two energy trading markets: a Regulated Contracting Environment (RCE) (where a pool of power distributors buys electricity from independent power producers (IPPs) in public auctions under set prices) and a Free Contracting Environment (FCE) (where free consumers, traders and IPPs can freely negotiate their own bilateral contracts for electricity commercialization). In FCE Agents are free to make bilateral contracts, defining prices, quantities, durations and hedge clauses. As per the current rules of the Brazilian power market, IPPs are allowed to sell electric power within the two environments (RCE and FCE), maintaining their competitive nature of the generation. Further details about the Brazilian power market are available at the peer-reviewed paper titled "The Brazilian Electricity Model: An Overview of the Current Structure and Market Design" (available online: <http://www.elbiamelo.com.br/site/wp-content/uploads/2011/06/Paper-Brazilian-Model-Finalx.pdf>)

²⁷ While the latest stream of CERs issued by the project activity under the CDM is from year 2020 vintage, the Applus+ Certification's validation team confirmed that, as claimed by the project developer, revenues for such CERs of vintage 2020 ended up occurring (being accounted as receivables by Orizon Valorização de Resíduos S.A.) for the fiscal year of 2021 in the performed complementary financial analysis. Anyway, as a simplification, such revenue stream is positioned as revenues for year 2020. The same situation applies to previously issued CDM CERs

As explained by the representatives of the project developer and confirmed by the the Applus+ Certification's validation team through review of the latest issue version of Orizon Valorização de Resíduos S.A.'s company's annual sustainability report (issued in year 2023 and valid for year 2022), the company is an important player in the solid waste management business in Brazil, with accumulated *earnings before interest, taxes, depreciation, and amortization (EBITIDA)* of *BRL* 312.5 million (about USD 62.5 million) for year 2022. While the core business of the company has been permanent disposal of municipal solid waste (MSW) through the application of high standard waste landfilling technics (currently in 16 landfill sites across Brazil owned and operated by the company), the implementation of project-based LFG collection, LFG destruction utilization of LFG for energy sources as initiatives promoted by carbon mechanisms/programs has played an important role for its operations since year 2005 (when their first LFG collection and destruction/utilization initiative was designed and implemented under the CDM).

As a matter of fact, all the company's initiatives promoting collection and destruction/utilization of LFG are project-based initiatives registered (or under registration) under the CDM, Verified Carbon Standard (VCS) and/or GS4GG. This aspect undoubtedly denotes the importance of carbon mechanisms/programs promoting carbon revenues for the implementation and operation of such projects in the opinion of the Applus+ Certification's validation team.

As also confirmed by the Applus+ Certification's validation team through review of the latest issue version of the company's annual sustainability report (issued in year 2023 and valid for year 2022), the company claims to have implemented and systematically follow a clearly defined Corporate Social Responsibility (CSR) strategy for with its business model which integrates social and environmental concerns in all business operations and interactions with the company's stakeholders (instead of only considering economic profits). As also claimed by Orizon Valorização de Resíduos S.A., innovation in its operation with a focus on better management of residues through the application of environmentally and climate friendly approaches and techniques (always identifying related risks and opportunities) became incorporated as part of the corporate governance of assets and operations. In this context, the interviewed representatives of the project proponent claim that, while successfully implementing and operating LFG collection and destruction/utilization project-based initiatives in landfill sites since year 2005 (with all of such initiatives historically successfully promoting generation of carbon revenues (as instrumental and important complementary revenue sources for this project activities), Orizon Valorização de Resíduos S.A. has developed very relevant expertise and experience with such project-based initiatives registered under different market-based GHG programs/standards²⁸. As also confirmed

from other annual vintages (.e.g. CERs with vintage 2012 for example). This is deemed reasonable and acceptable by considering the purpose of the financial analysis.

²⁸ As confirmed by the Applus+ Certification's validation team, the following large-scale project-based initiatives promoting LFG collection and destruction/utilization with relevant generation of carbon revenues were previously implemented as a result of investments by Orizon Valorização de Resíduos S.A. (or by companies/ventures which were incorporated or acquired by Orizon Valorização de Resíduos S.A.) (despite of the very unfavorable condition for the global market for carbon offsets during the whole period for commercialization of CDM CERs issued by the project activity and with vintages from year 2012 to year 2020 (very low prices and liquidity for issued CDM CERs) as argued and emphasized by this project developer/proponent/participant):

Project Name	GHG program /standard	Web Link
Project 0008: Brazil NovaGerar Landfill Gas to Energy Project	CDM	https://cdm.unfccc.int/Projects/DB/DNV-CUK1095236970.6/view?cp=1

by the Applus+ Certification's validation team, the company declares in its annual sustainability report that has generated 296,685 MWh of electricity through the utilization of LFG in all the LFG collection and destruction/utilization project activities it operates.

As also declared by interviewed representatives of the project developer, in the position of a well-managed and well-structured public listed company (code "ORVR3" in the Brazilian BOVESPA stock ex-change) and having a professional business council and with more than 2,000 direct collaborators, the venture Orizon Valorização de Resíduos S.A. has operated the project activity in question (which is implemented in a landfill site also owned and operated by the company) by making use of its own capital and capital from 3rd parties (short-term debt, medium term debt and long-term debt) as part of its day to day operation and long-term strategical planning. This is also declared as being the common business approach for other landfill sites and project activities operated by the company.

In this context, and by also taking into consideration all the above-listed aspects, it is the opinion of the Applus+ Certification's validation team, that it is deemed reasonable and acceptable the claim from the project developer that long-term-perspective view and positive expectations about future carbon revenues (with GS VERs generated by the project activity under GS4GG being commercialized by more attractive prices) and also considering a positive performance of the project activity (in terms of quantitative issuance of GS VERs) have represented important drivers

Project 3958: CTR Candeias Landfill Gas Project (being currently transitioned into GS4GG)	CDM / GS4GG	https://cdm.unfccc.int/Projects/DB/ERM-CVS1283351787.62/view?cp=1
Project 1165: PROBIOGAS-JP – João Pessoa Landfill Gas Project (successfully transitioned into GS4GG (in March/2024)): GS 12045: Ecoparque João Pessoa Landfill Gas Project	CDM / GS4GG	CDM: https://cdm.unfccc.int/Projects/DB/SGS-UKL1181685608.94/view?cp=1 GS: https://registry.goldstandard.org/projects/details/4047
CPA-2: CTR São Gonçalo (included in the PoA 6573: Caixa Econômica Federal Solid Waste Management and Carbon Finance Project) (being currently transitioned into GS4GG (GS 11736))	CDM / GS4GG	CDM: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/Q9LW74OKAXMUZPCE3IJBVS16025HDT/view GS: https://registry.goldstandard.org/projects/details/3914
GS 12199: Ecoparque Maceió Landfill Gas Project (undergoing Validation / Design Review)	GS4GG	https://registry.goldstandard.org/projects/details/4405
GS 12205: Ecoparque Sergipe Landfill Gas Project (undergoing Validation / Design Review)	GS4GG	https://registry.goldstandard.org/projects/details/4404

to maintain the project activity under operational status until nowadays (regardless of the absence of carbon revenues since year 2020/2021 and regardless of non-attractive prices for electricity).

In summary, it is the opinion of the Applus+ Certification's team that the rationale for the provided narrative about the continuation of operation of the project activity provided by the project developer is deemed credible and rational from a corporate and operational perspective. This narrative is also in line with principles listed in the company's annual sustainability report and its adopted CSR principles.